Table 4.2 Soil Results Dublin Centre 2008

| Parameter        | Sample ID Sample Depth Units | BH-7<br>0.5-1m | BH-9<br>0.4-0.8m | BH-10<br>1.7-2.5m | EPA Range<br>for Non-<br>polluted Soils | Dutch D<br>Values | Dutch I<br>values | EU limits<br>for Inert<br>landfill |
|------------------|------------------------------|----------------|------------------|-------------------|---|-------------------|-------------------|------------------------------------|
| Antimony         | mg/kg                        | 1.6            | 1.6              | 1.7               | 0.2-3                                   | 3                 | 15                | 0.06                               |
| Arsenic          | mg/kg                        | 16             | 12               | 13                | 1.0-50                                  | 29                | 55                | 0.5                                |
| Barium           | mg/kg                        | 150            | 72               | 79                | NE                                      | 160               | 625               | 20                                 |
| Cadmium          | mg/kg                        | 0.65           | 1.2              | 1.6               | 0.1-1                                   | 0.8               | 12                | 0.04                               |
| Chromium         | mg/kg                        | 11             | 14               | 14                | 5-250                                   | 100               | 380               | 0.5                                |
| Copper           | mg/kg                        | 19             | 28               | 30                | 2-100                                   | 36                | 190               | 2                                  |
| Iron             | mg/kg                        | 8900           | 20000            | 25000             | 10000-50000                             | -                 | -                 | -                                  |
| Lead             | mg/kg                        | 42             | 79               | 59                | 2.0-80                                  | 85                | 530               | 0.5                                |
| Manganese        | mg/kg                        | 830            | 1100             | 1500              | 20-3000                                 | NE                | NE                | -                                  |
| Mercury          | mg/kg                        | < 0.25         | 0.34             | < 0.25            | 0.3-0.8                                 | 0.3               | 10                | 0.01                               |
| Nickel           | mg/kg                        | 24             | 31               | 37                | 0.5-100                                 | 35                | 210               | 0.4                                |
| Tin              | mg/kg                        | <2.0           | 3.5              | 3.7               | 1.0-40                                  | NE                | 900               | -                                  |
| Zinc             | mg/kg                        | 68             | 86               | 94                | 10-200                                  | 140               | 720               | 4                                  |
| TPH C6-C40       | mg/kg                        | 180            | 150              | <50               | NE                                      | 50*               | 5000*             | 500                                |
| BTEX             | mg/kg                        | < 0.2          | < 0.2            | < 0.2             | NE                                      | NE                | 100               | 6                                  |
| PAHs (sum of 10) | mg/kg                        | 17.3           | 2.9              | 0.3               | NE                                      | 1                 | 40                | -                                  |
| PAHs (sum of 16) | mg/kg                        | 23.0           | 3.7              | <1.0              | NE                                      | NE                |                   | 100                                |

<sup>\*</sup>Denotes limit for mineral oil

In BH-7 and BH-9 PAHs (sum of 10) the PAH, 17.3 mg/kg and 2.9 mg/kg respectively, exceeded the D value of 1 mg/kg, but are well below the 100 mg/kg limit applied at Irish inert waste disposal landfills.

### Waste Acceptance Criteria (WAC) Testing

The results of the WAC testing of the fill material and the natural susbsoils are shown in Table 4.3 and 4.4 respectively. The Tables include the WAC for inert and non-inert landfills. The EU Council Decision does not include a WAC for PAH, but allows individual member states to apply their own limits. The limit used in this assessment is derived from the Waste Licence issued by the EPA for an inert landfill in County Dublin.

TPH was detected above the inert WAC (500 mg/kg) in four of the fill material samples- RC-8 (510 mg/kg and 1800 mg/kg); BH-12 (640 mg/kg), and W-2 (5000 mg/kg).

Antimony exceeded the inert WAC of 0.06 mg/kg in the upper fill sample of OW2 (0.36 mg/kg), but was less than the non-hazardous WAC (0.7 mg/kg). The chromium level in BH-14 (0.53 mg/kg) was slightly above the inert WAC of 0.5 mg/kg, but well below the non-hazardous WAC of 10 mg/kg.

Mercury was detected in samples of the fill taken in BH-12 (0.5-1m) and BH-14 (2-3m) and the natural ground (BH 7 (4-5m) marginally above the inert WAC of 0.01 mg/kg, but below the non-hazardous WAC of 0.2 mg/kg.

PAH levels greater that the inert WAC (100 mg/kg) were detected in both samples from OW-2, 230 mg/kg and 570 mg/kg respectively and the lower sample from RC-8 (280 mg/kg). There is no non-hazardous WAC for PAH.

PCBs were only detected in one sample at RC-8 (0.5-1m) at 0.028 mg/kg. This is considerably below the EU limit of 1 mg/kg.

Sulphate levels exceeded the inert WAC (1000 mg/kg) in two samples from RC-8, however the levels -15000 mg/kg (0.5-1m) and 14000 mg/kg (1-2m) respectively- were less than the non-hazardous WAC of 20,000 mg/kg. The TDS of both samples from RC-8 exceeded the inert WAC, but were less than the non-hazardous WAC.

Table 4.3 Fill Material WAC Dublin Centre 2008

|                          | Sample I.D.       | BH-12   | BH-12   | BH-14   | BH-14   | EU Limits for Inert | EU Limits for             |
|--------------------------|-------------------|---------|---------|---------|---------|---------------------|---------------------------|
| Parameter                | Depth (m)<br>Unit | 0.5-1m  | 3-4 m   | 0.5-1m  | 1-2m    | Landfill            | Non-Hazardous<br>Landfill |
| Arsenic                  | mg/kg             | < 0.50  | < 0.50  | < 0.50  | < 0.50  | 0.5                 | 2                         |
| Barium                   | mg/kg             | 0.19    | 0.033   | 0.12    | 0.097   | 20                  | 100                       |
| Cadmium                  | mg/kg             | < 0.001 | < 0.001 | < 0.001 | < 0.001 | 0.04                | 1                         |
| Chromium                 | mg/kg             | 0.33    | < 0.10  | 0.53    | 0.48    | 0.5                 | 10                        |
| Copper                   | mg/kg             | < 0.10  | < 0.10  | 0.24    | 0.44    | 2                   | 50                        |
| Mercury                  | mg/kg             | 0.016   | < 0.003 | 0.0051  | 0.0068  | 0.01                | 0.2                       |
| Molybdenum               | mg/kg             | 0.084   | 0.31    | 0.27    | 0.43    | 0.5                 | 10                        |
| Nickel                   | mg/kg             | < 0.10  | < 0.10  | < 0.10  | < 0.10  | 0.4                 | 10                        |
| Lead                     | mg/kg             | < 0.10  | < 0.10  | < 0.10  | < 0.10  | 0.5                 | 10                        |
| Antimony                 | mg/kg             | < 0.30  | < 0.30  | < 0.30  | < 0.30  | 0.06                | 0.7                       |
| Selenium                 | mg/kg             | < 0.060 | < 0.060 | < 0.060 | < 0.060 | 0.1                 | 0.5                       |
| Zinc                     | mg/kg             | < 0.10  | < 0.10  | < 0.10  | < 0.10  | 4                   | 50                        |
| Chloride                 | mg/kg             | <25     | <25     | <25     | 29      | 800                 | 15000                     |
| Fluoride                 | mg/kg             | 3       | 2.3     | <2      | 2       | 10                  | 150                       |
| Sulphate                 | mg/kg             | 910     | 300     | 190     | 820     | 1,000               | 20000                     |
| Phenols                  | mg/kg             | < 0.50  | < 0.50  | < 0.50  | < 0.50  | 1                   |                           |
| Dissolved Organic Carbon | mg/kg             | 26      | 22      | 58      | 69      | 500                 | 800                       |
| Total Dissolved Solids   | mg/kg             | 3200    | <2000   | 2900    | <2000   | 4000                | 60000                     |
| Total Organic Carbon     | %                 | 5.3     | 3       | 4.4     | 3.8     | 3*                  |                           |
| BTEX                     | mg/kg             | < 0.5   | < 0.5   | < 0.5   | < 0.5   | 6                   |                           |
| PCBs                     | mg/kg             | < 0.01  | < 0.01  | < 0.01  | < 0.01  | 1                   |                           |
| TPH                      | mg/kg             | 640     | 170     | 99      | 180     | 500**               |                           |
| PAH (16)                 | mg/kg             | 6.6     | <1.0    | 8.1     | 8.3     | -                   |                           |
| PAH (17).                | mg/kg             | 6.6     | <1.0    | 8.1     | 8.3     | Murphy's 100mg/kg   |                           |

\*If DOC is less than 500 then a higher limit can be accepted \*\* Limit is for Mineral Oil

Table 4.3 continued Fill Material WAC Dublin Centre 2008

|                          | Sample I.D.       | BH-14   | BH-15   | BH-15   | BH-8    | EU Limits for Inert | EU Limits for             |
|--------------------------|-------------------|---------|---------|---------|---------|---------------------|---------------------------|
| Parameter                | Depth (m)<br>Unit | 2-3m    | 0.5-1   | 1.0-2.0 | 0.5-1   | Landfill            | Non-Hazardous<br>Landfill |
| Arsenic                  | mg/kg             | < 0.50  | < 0.5   | < 0.5   | < 0.5   | 0.5                 | 2                         |
| Barium                   | mg/kg             | 0.13    | 0.06    | 0.055   | 0.21    | 20                  | 100                       |
| Cadmium                  | mg/kg             | < 0.001 | < 0.001 | < 0.001 | < 0.001 | 0.04                | 1                         |
| Chromium                 | mg/kg             | 0.17    | 0.18    | < 0.1   | <1      | 0.5                 | 10                        |
| Copper                   | mg/kg             | 0.47    | 0.36    | 0.28    | <1      | 2                   | 50                        |
| Mercury                  | mg/kg             | 0.012   | 0.0035  | 0.0049  | < 0.003 | 0.01                | 0.2                       |
| Molybdenum               | mg/kg             | 0.34    | 0.16    | 0.13    | 0.1     | 0.5                 | 10                        |
| Nickel                   | mg/kg             | 0.12    | 0.15    | 0.14    | <1      | 0.4                 | 10                        |
| Lead                     | mg/kg             | < 0.10  | 0.42    | 0.43    | <1      | 0.5                 | 10                        |
| Antimony                 | mg/kg             | < 0.30  | < 0.3   | < 0.3   | < 0.3   | 0.06                | 0.7                       |
| Selenium                 | mg/kg             | < 0.060 | < 0.06  | < 0.06  | < 0.06  | 0.1                 | 0.5                       |
| Zinc                     | mg/kg             | < 0.10  | < 0.1   | 0.13    | <1      | 4                   | 50                        |
| Chloride                 | mg/kg             | 54      | <25     | <25     | 43      | 800                 | 15000                     |
| Fluoride                 | mg/kg             | <2      | 2.3     | <2      | <2      | 10                  | 150                       |
| Sulphate                 | mg/kg             | 140     | 500     | 190     | 15000   | 1,000               | 20000                     |
| Phenols                  | mg/kg             | < 0.50  | < 0.5   | < 0.5   | < 0.5   | 1                   |                           |
| Dissolved Organic Carbon | mg/kg             | 82      | 62      | 36      | 52      | 500                 | 800                       |
| Total Dissolved Solids   | mg/kg             | <2000   | 4200    | <2000   | 24000   | 4000                | 60000                     |
| Total Organic Carbon     | %                 | 3.6     | 3.6     | 5.2     | 3.1     | 3.33%               |                           |
| BTEX                     | mg/kg             | < 0.5   | < 0.5   | < 0.5   | < 0.5   | 6                   |                           |
| PCBs                     | mg/kg             | < 0.01  | < 0.01  | < 0.01  | 0.028   | 1                   |                           |
| Mineral Oil              | mg/kg             | <50     | 120     | 86      | 510     | 500                 |                           |
| PAH (16)                 | mg/kg             | <1.0    | 4.2     | 1.4     | 44      | -                   | MILE LE DESIGNATION       |
| PAH (17).                | mg/kg             | <1.0    | 4.2     | 1.4     | 44      | Murphy's 100mg/kg   |                           |

\*If DOC is less than 500 then a higher limit can be accepted \*\* Limit is for Mineral Oil

Table 4.3 continued Fill Material WAC Dublin Centre 2008

|                          | Sample I.D. | BH-8    | W-2     | W-2     | EU Limits for Inert  | EU Limits for   |
|--------------------------|-------------|---------|---------|---------|--|---|
| Parameter                | Depth (m)   | 1020    | 0.5-1   | 1.0-2.0 | Control of the Contro | Non-Hazardous   |
|                          | Unit        | 1.0-2.0 |         |         | Landfill   | Landfill  |
| Arsenic                  | mg/kg       | < 0.5   | < 0.5   | < 0.5   | 0.5  | 2   |
| Barium                   | mg/kg       | 0.25    | 0.24    | 0.18    | 20   | 100   |
| Cadmium                  | mg/kg       | < 0.001 | < 0.001 | < 0.001 | 0.04   | 1   |
| Chromium                 | mg/kg       | <1      | 0.21    | <1      | 0.5  | 10  |
| Copper                   | mg/kg       | <1      | 0.34    | <1      | 2  | 50  |
| Mercury                  | mg/kg       | < 0.003 | < 0.003 | < 0.003 | 0.01   | 0.2   |
| Molybdenum               | mg/kg       | 0.095   | 0.066   | 0.081   | 0.5  | 10  |
| Nickel                   | mg/kg       | <1      | 0.13    | <1      | 0.4  | 10  |
| Lead                     | mg/kg       | <1      | 0.43    | <1      | 0.5  | 10  |
| Antimony                 | mg/kg       | < 0.3   | 0.36    | < 0.3   | 0.06   | 0.7   |
| Selenium                 | mg/kg       | < 0.06  | < 0.06  | < 0.06  | 0.1  | 0.5   |
| Zinc                     | mg/kg       | <1      | 0.11    | <1      | 4  | 50  |
| Chloride                 | mg/kg       | 58      | 27      | 140     | 800  | 15000   |
| Fluoride                 | mg/kg       | <2      | 4.1     | <2      | 10   | 150   |
| Sulphate                 | mg/kg       | 14000   | 440     | 1600    | 1,000  | 20000   |
| Phenols                  | mg/kg       | < 0.5   | < 0.5   | < 0.5   | 1  | LICE STATE  |
| Dissolved Organic Carbon | mg/kg       | 73      | 45      | 60      | 500  | 800   |
| Total Dissolved Solids   | mg/kg       | 24000   | 2100    | 4200    | 4000   | 60000   |
| Total Organic Carbon     | %           | 3       | 5.6     | 5.4     | 3.33%  |   |
| BTEX                     | mg/kg       | < 0.5   | < 0.5   | < 0.5   | 6  | CONTRACTOR OF THE PARTY OF THE |
| PCBs                     | mg/kg       | < 0.01  | < 0.01  | < 0.01  | 1  |   |
| Mineral Oil              | mg/kg       | 1800    | 150     | 5000    | 500  |   |
| PAH (16)                 | mg/kg       | 272     | 228.5   | 566     | -  |   |
| PAH (17).                | mg/kg       | 280     | 230     | 570     | Murphy's 100mg/kg  |   |

\*If DOC is less than 500 then a higher limit can be accepted \*\* Limit is for Mineral Oil

Table 4.4 Natural Ground WAC Dublin Centre 2008

|                          | Sample I.D.       | BH-7    | BH-7    | BH-9    | BH-12   | EU Limits for Inert | EU Limits for             |
|--------------------------|-------------------|---------|---------|---------|---------|---------------------|---------------------------|
| Parameter                | Depth (m)<br>Unit | 4-5 m   | 13-14 m | 4-5 m   | 4-5 m   | Landfill            | Non-Hazardous<br>Landfill |
| Arsenic                  | mg/kg             | < 0.50  | < 0.5   | < 0.50  | < 0.50  | 0.5                 | 2                         |
| Barium                   | mg/kg             | 0.084   | 0.14    | 0.076   | 0.068   | 20                  | 100                       |
| Cadmium                  | mg/kg             | < 0.001 | < 0.001 | < 0.001 | < 0.001 | 0.04                | 1                         |
| Chromium                 | mg/kg             | < 0.10  | < 0.1   | < 0.10  | < 0.10  | 0.5                 | 10                        |
| Copper                   | mg/kg             | < 0.10  | < 0.1   | < 0.10  | < 0.10  | 2                   | 50                        |
| Mercury                  | mg/kg             | 0.012   | 0.0038  | 0.0078  | < 0.003 | 0.01                | 0.2                       |
| Molybdenum               | mg/kg             | < 0.03  | 0.085   | 0.056   | 0.2     | 0.5                 | 10                        |
| Nickel                   | mg/kg             | < 0.10  | < 0.1   | < 0.10  | < 0.10  | 0.4                 | 10                        |
| Lead                     | mg/kg             | < 0.10  | < 0.1   | < 0.10  | < 0.10  | 0.5                 | 10                        |
| Antimony                 | mg/kg             | < 0.30  | < 0.3   | < 0.30  | < 0.30  | 0.06                | 0.7                       |
| Selenium                 | mg/kg             | < 0.060 | < 0.06  | < 0.060 | < 0.060 | 0.1                 | 0.5                       |
| Zinc                     | mg/kg             | < 0.10  | < 0.1   | < 0.10  | < 0.10  | 4                   | 50                        |
| Chloride                 | mg/kg             | <25     | 71      | <25     | <25     | 800                 | 15000                     |
| Fluoride                 | mg/kg             | 3       | 4.2     | 2.7     | 2.9     | 10                  | 150                       |
| Sulphate                 | mg/kg             | <110    | <110    | <110    | <110    | 1,000               | 20000                     |
| Phenols                  | mg/kg             | < 0.50  | < 0.5   | < 0.50  | < 0.50  | 1                   | MILITARY IN               |
| Dissolved Organic Carbon | mg/kg             | 13      | 39      | 14      | 19      | 500                 | 800                       |
| Total Dissolved Solids   | mg/kg             | <2000   | <2000   | <2000   | <2000   | 4000                | 60000                     |
| Total Organic Carbon     | %                 | 3.1     | 0.52    | 2.8     | 2.4     | 3%*                 |                           |
| BTEX                     | mg/kg             | < 0.5   | < 0.5   | < 0.5   | < 0.5   | 6                   | PAUL IN COLUMN TO         |
| PCBs                     | mg/kg             | < 0.01  | < 0.01  | < 0.01  | < 0.01  | 1                   |                           |
| TPH                      | mg/kg             | <50     | <50     | <50     | 57      | 500**               |                           |
| PAH (16)                 | mg/kg             | <1.0    | <1.0    | <1.0    | <1.0    | -                   |                           |
| PAH (17).                | mg/kg             | <1.0    | <1.0    | <1.0    | <1.0    | Murphy's 100mg/kg   |                           |

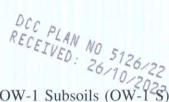
\*If DOC is less than 500 then a higher limit can be accepted \*\* Limit is for Mineral Oil

Table 4.4 continued Natural Ground WAC Dublin Centre 2008

|                          | Sample I.D.       | BH-12   | BH-14   | BH-14   | BH-15     | EU Limits for Inert | EU Limits for             |
|--------------------------|-------------------|---------|---------|---------|-----------|---------------------|---------------------------|
| Parameter                | Depth (m)<br>Unit | 8-10m   | 3-4m    | 8-10m   | 12.0-13.0 | Landfill            | Non-Hazardous<br>Landfill |
| Arsenic                  | mg/kg             | < 0.50  | < 0.50  | < 0.50  | < 0.5     | 0.5                 | 2                         |
| Barium                   | mg/kg             | 0.17    | 0.046   | 0.27    | 0.17      | 20                  | 100                       |
| Cadmium                  | mg/kg             | < 0.001 | < 0.001 | < 0.001 | < 0.001   | 0.04                |                           |
| Chromium                 | mg/kg             | < 0.10  | < 0.10  | < 0.10  | < 0.1     | 0.5                 | 10                        |
| Copper                   | mg/kg             | < 0.10  | < 0.10  | < 0.10  | 0.15      | 2                   | 50                        |
| Mercury                  | mg/kg             | 0.0047  | 0.0039  | 0.0036  | < 0.003   | 0.01                | 0.2                       |
| Molybdenum               | mg/kg             | 0.1     | 0.18    | 0.15    | 0.046     | 0.5                 | 10                        |
| Nickel                   | mg/kg             | < 0.10  | < 0.10  | < 0.10  | 0.14      | 0.4                 | 10                        |
| Lead                     | mg/kg             | < 0.10  | < 0.10  | < 0.10  | 0.41      | 0.5                 | 10                        |
| Antimony                 | mg/kg             | < 0.30  | < 0.30  | < 0.30  | < 0.3     | 0.06                | 0.7                       |
| Selenium                 | mg/kg             | 0.079   | < 0.060 | < 0.060 | < 0.06    | 0.1                 | 0.5                       |
| Zinc                     | mg/kg             | 0.19    | < 0.10  | < 0.10  | < 0.1     | 4                   | 50                        |
| Chloride                 | mg/kg             | 41      | <25     | 35      | 100       | 800                 | 15000                     |
| Fluoride                 | mg/kg             | 2.7     | 2.3     | 2.4     | 4.7       | 10                  | 150                       |
| Sulphate                 | mg/kg             | 250     | <110    | 420     | 130       | 1,000               | 20000                     |
| Phenols                  | mg/kg             | < 0.50  | < 0.50  | < 0.50  | < 0.5     | 1                   | The same                  |
| Dissolved Organic Carbon | mg/kg             | 19      | 27      | 23      | 37        | 500                 | 800                       |
| Total Dissolved Solids   | mg/kg             | <2000   | <2000   | <2000   | <2000     | 4000                | 60000                     |
| Total Organic Carbon     | %                 | 1.4     | 3.5     | 1.4     | 0.34      | 3%*                 |                           |
| BTEX                     | mg/kg             | < 0.5   | < 0.5   | < 0.5   | < 0.5     | 6                   |                           |
| PCBs                     | mg/kg             | < 0.01  | < 0.01  | < 0.01  | < 0.01    | 1                   |                           |
| TPH                      | mg/kg             | <50     | <50     | <50     | <50       | 500**               |                           |
| PAH (16)                 | mg/kg             | <1.0    | <1.0    | <1.0    | <1.0      | -                   | The Edward                |
| PAH (17).                | mg/kg             | <1.0    | <1.0    | <1.0    | <1.0      | Murphy's 100mg/kg   |                           |

\*If DOC is less than 500 then a higher limit can be accepted \*\* Limit is for Mineral Oil

### 4.4 Groundwater



Samples were collected from four groundwater monitoring wells, OW-1 Subsoils (OW-1'S) and OW-1 Bedrock (OW-1 B) and RC-16 Subsoils (RC-16 S) and RC-16 Bedrock (RC-16 B). The samples were collected in accordance with OCM's Groundwater Sampling Protocol, a copy of which is included in Appendix 5.

All the samples were sent to the STL laboratory in Santry for analysis. The range of parameters tested was based on the nature of the historical site activities and included dissolved metals (arsenic, antimony, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, tin and zinc.), sodium, chloride, potassium, magnesium, sulphate, sulphide, total hardness, bicarbonate, TPH, BTEX and PAH.

The laboratory test report is included in Appendix 5 and the results are shown in Table 4.5. The results are compared for discussion purposes with the EPA Interim Guideline Values (IGVs). The IGVs are not statutory guidelines but have been prepared by the EPA to assist in the assessment of impacts on groundwater quality.

TPH was only detected in one well-RC-16- at a level of 8 mg/l, which is above the IGV of 0.01 mg/l. Iron, manganese and potassium exceeded their respective IGVs in both the subsoil and bedrock samples from RC -16. Barium, sodium and copper exceeded the IGV in the bedrock sample from RC-16 and PAH exceeded the IGV in the bedrock sample from RC-16.

PAHs exceeded the IGV in the subsoil and bedrock samples from RC-16 Subsoil and the bedrock sample in OW-1.

Chloride exceeded the IGV of 30 mg/l in both subsoil and bedrock samples from RC-16 and OW-1. The sulphate level in the bedrock sample marginally exceeded the IGV and hardness also exceeded the IGV in the subsoil sample from OW-1 and both subsoil and bedrock samples from RC-16.

Table 4.5 Groundwater Results Dublin Centre December 2008

| E1- I D               | Tielte | Subsoi        | l Wells      | Bedroc        | k Wells      | IGV   |
|-----------------------|--------|---------------|--------------|---------------|--------------|-------|
| Sample I.D.           | Units  | RC-16 Subsoil | OW-1 Subsoil | RC-16 Bedrock | OW-1 Bedrock | IGV   |
| Antimony              | mg/l   | 0.00048       | 0.00017      | 0.0023        | 0.00015      | 100   |
| Arsenic               | mg/l   | 0.0069        | < 0.0001     | 0.0059        | < 0.0001     | 0.01  |
| Barium                | mg/l   | 0.056         | 0.015        | 0.12          | 0.018        | 0.1   |
| Cadmium               | mg/l   | < 0.0001      | 0.00014      | 0.00024       | < 0.0001     | 0.005 |
| Chromium              | mg/l   | < 0.03        | < 0.03       | < 0.03        | < 0.03       | 0.03  |
| Copper                | mg/l   | 0.025         | < 0.007      | 0.096         | < 0.007      | 0.03  |
| Iron                  | mg/l   | 0.41          | 0.045        | 0.55          | 0.041        | 0.2   |
| Lead                  | mg/l   | 0.0033        | < 0.0005     | 0.00081       | < 0.0005     | 0.01  |
| Manganese             | mg/l   | 0.17          | 0.022        | 0.07          | < 0.01       | 0.05  |
| Mercury               | mg/l   | < 0.0003      | < 0.00030    | 0.00074       | < 0.00030    | 0.00  |
| Nickel                | mg/l   | 0.006         | < 0.0005     | 0.0039        | 0.0005       | 0.02  |
| Tin                   | mg/l   | < 0.01        | < 0.01       | < 0.01        | < 0.01       | -     |
| Zinc                  | mg/l   | 0.053         | < 0.005      | 0.016         | 0.005        | 0.1   |
| Magnesium             | mg/l   | 6.6           | 8.8          | 28            | 8.4          | 50    |
| Potassium             | mg/l   | 60            | 11           | 7.6           | 10           | 5     |
| Sodium                | mg/l   | 100           | 35           | 680           | 35           | 150   |
| Hardness (as CaCO3)   | mg/l   | 100           | 360          | 210           | 360          | 200   |
| Bicarbonate as CaCO3  | mg/l   | 710           | 200          | 350           | 200          | -     |
| Chloride as Cl        | mg/l   | 150           | 39           | 860           | 41           | 30    |
| Sulphate as SO4       | mg/l   | <11           | 150          | 230           | 160          | 200   |
| Sulphide as S         | mg/l   | 0.14          | < 0.010      | 0.011         | < 0.010      | -     |
| TPH                   | mg/l   | 8             | < 0.1        | < 0.1         | < 0.1        | 0.01  |
| PAH Total (Sum of 16) | μg/l   | 16            | < 0.10       | 0.25          | 1.7          | 0.1   |
| Benzene               | μg/l   | <10           | <10          | <10           | <10          | 1     |
| Toluene               | μg/l   | <10           | <10          | <10           | <10          | 10    |
| Ethylbenzene          | μg/l   | <10           | <10          | <10           | <10          | 10    |
| p & m xylene          | μg/l   | <20           | <20          | <20           | <20          | 10    |
| o-Xylene              | μg/l   | <10           | <10          | <10           | <10          | 10    |

### 5. DISCUSSION

### 5.1 Discussion

The purpose of environmental site investigation was to establish if there was contamination in the subsoils or groundwater associated with the historical use of the site. It was also undertaken to establish the nature of the fill material and underlying subsoils in terms of off-site management options for such materials that will have to be removed during site development.

The majority of the Dublin Centre area has been in use as shops, offices, stores and houses since the late 1700's. The 2006 assessment concluded that, given the nature of these historic landuses, the potential for subsurface soil or groundwater contamination is considered to be low. However, the assessment identified areas where there was potential for subsurface contamination. These included the Royal Dublin Hotel; car parking area for Dr. Quirke's Emporium; 5-11 Moore Lane, and 4-8 Henry Place.

The environmental investigation, in so far as the ground conditions allowed, targeted those risk areas identified in the 2006 assessment. Boreholes RC-8 and W-2 were installed in 48A-50 O' Connell Street, which had been designated at moderate risk. It is presently used as an unpaved car park and storage area for Dr. Quirke's Emporium.

#### 5.2 Soils

In RC-8 and W-2, the levels of sulphate, total dissolved solids, TPH and PAHs exceeded the inert waste WAC. However all of the levels were less than the non-hazardous WAC.

In BH-12, which was located on the southeast perimeter of the site TPH and mercury were detected above the inert waste WAC in the upper fill sample; however the levels of these parameters in the underlying fill and natural ground were less than the inert WAC.

There was no evidence of significant contamination in any of the other samples and the tested parameters, where detected, are at levels generally below the inert WAC.

#### 5.3 Groundwater

TPH and PAHs above the IGV limits were detected in the well installed in the subsoil in RC-16. A strong hydrocarbon odour was noted during sampling. No TPH or PAH was detected in the bedrock well. RC-16 is located immediately to the south and not within the portion of the site where deep excavation will occur. It is possible therefore that the hydrocarbons detected in this well originate from an off-site location and not from within the development site.

Low levels of PAH were detected in the subsoil and bedrock wells at OW-1 in the centre of the site. While the levels detected are above the IGV limits, they are not indicative of significant pollution.

The elevated iron and manganese levels detected in the subsoil and bedrock wells and are most likely naturally occurring. The copper level detected in OW-1, while slightly above the IGV is less than the drinking water standard for this parameter (2mg/L) and this detection is not therefore considered to be significant.

Elevated potassium and chloride levels were detected in both wells with higher chloride leves detected in RC-16, which is closest to the River Liffey. The levels detected are not indicative of significant contamination from historical site activities and it is possible that there is link via the gravels beneath the site and the brackish waters in the River Liffey.

OCM understand that pumping tests have been carried out to estimate the dewatering rate that will be necessary during the deep excavation and construction of the basement. While the volumes of groundwater in the fill, subsoil and bedrock, higher volumes may be expected from the gravels where present in significant thickness.

The groundwater quality monitoring data indicates that while low levels of PAH are present, the water should be suitable for discharge to sewer. Dublin City Council are likely to require on-site settlement to treat suspended solids and possibly pH control during any concrete forming or piling works.

### 6. CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Conclusions

The subsurface comprises made ground ranging in thickness from 2-5.2 m, which contains mainly grey brown gravelly clay fill with red brick. This is underlain by natural ground of between 11.1 m and 23.3 m in thickness, that comprises gravels underlain by clay. The minimum depth to bedrock is 12.6 m while the maximum is 27.3 m.

The bedrock ranges from interbedded argillaceous limestone, siliceous limestone and black fossiliferous shale which are part of the Calp Limestone formation. The bedrock is considered to be a Locally Important Aquifer (Ll), which is moderately productive only in local zones. Aquifer vulnerability is considered to be moderate to low.

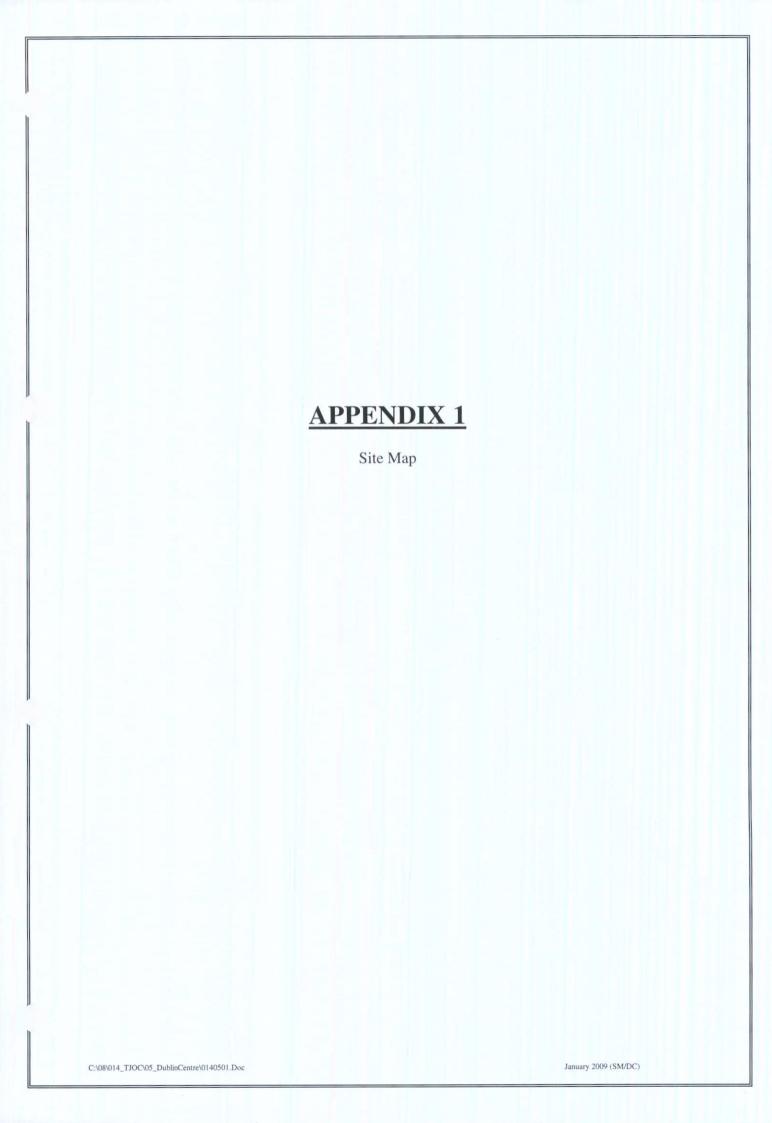
The investigation has established that the fill material and the underlying subsoils can generally be categorised as inert and suitable either for disposal at inert landfill or for use in land reclamation projects. There are localised zones in the fill such as at BH-12, RC-8 and W-2, where the contaminant levels exceed the inert category limits. However in these cases the materials fall into the non-hazardous waste category.

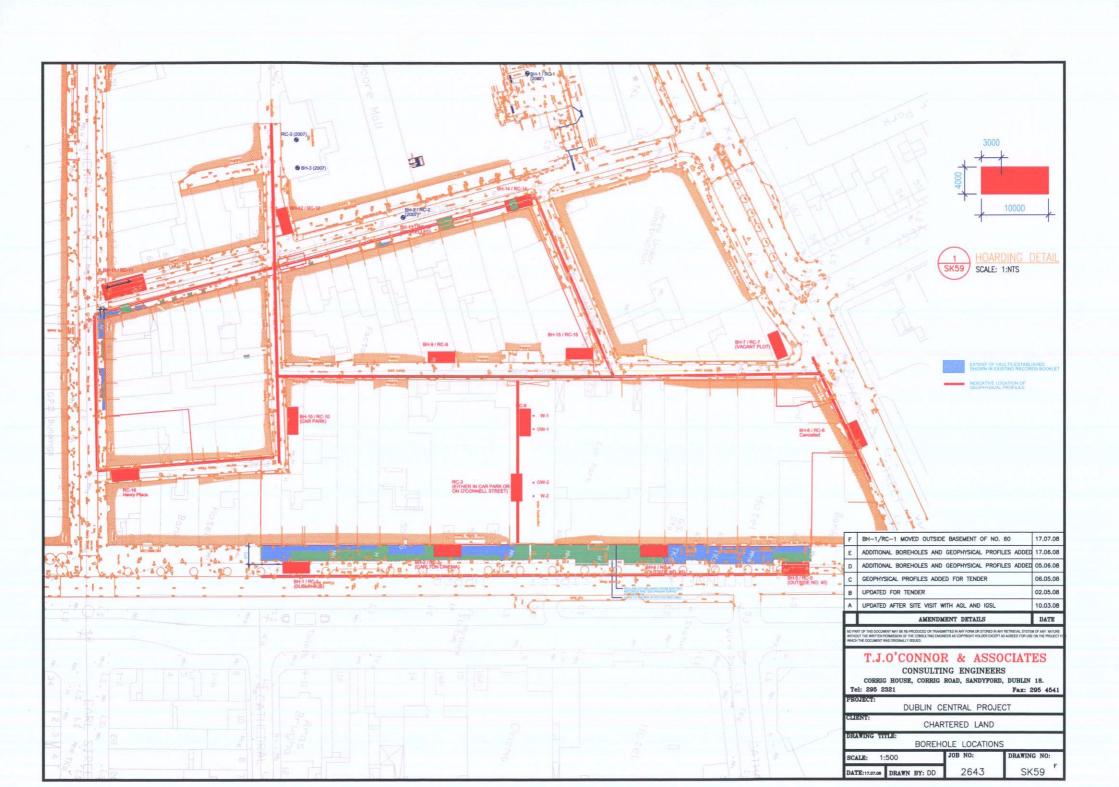
Elevated PAH levels were detected in the groundwater wells immediately to the south but not within the portion of the site where deep excavation will occur. It is possible therefore that these from an off-site location and not from within the development site. Low levels of PAH were detected in the subsoil and bedrock wells in the centre of the site. While the levels are above the IGV limits they are not indicative of significant pollution and the water should be suitable for discharge to sewer during the dewatering programme.

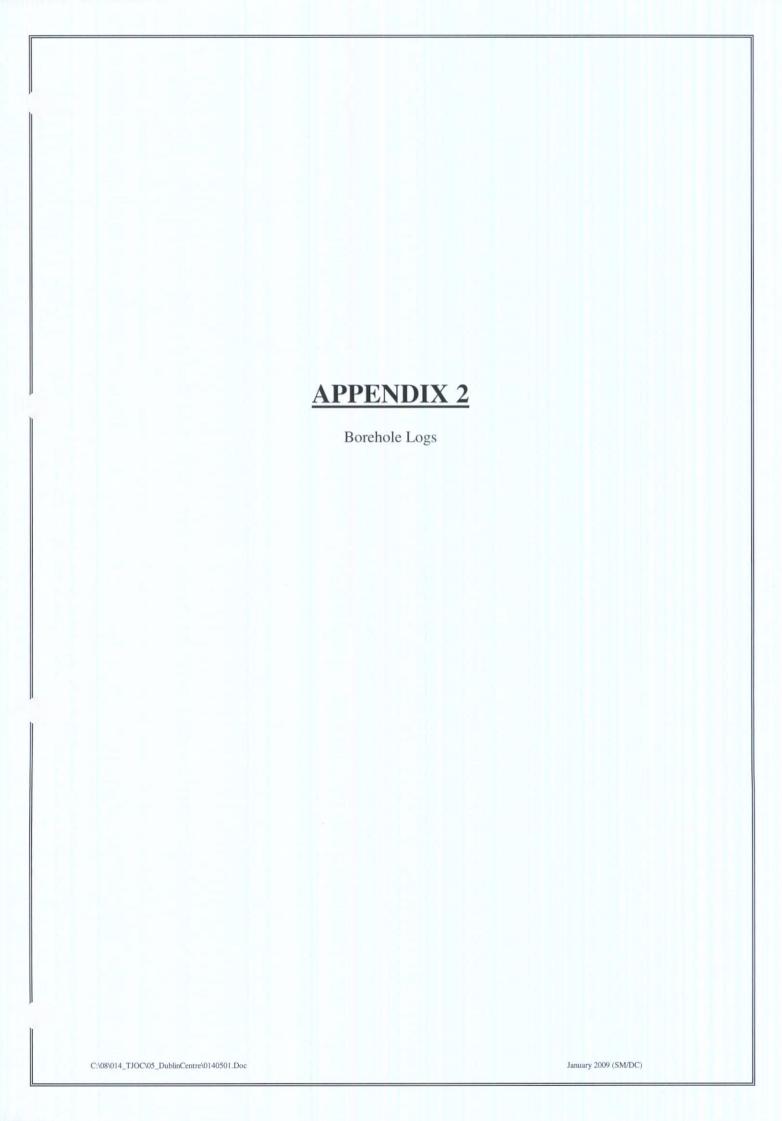
### 6.2 Recommendations

OCM recommend that following site clearance and as part of the bulk excavation samples of the fill and subsoil excavated in the vicinity of BH-12, W-2 and RC-8 be tested to confirm the waste characterisation i.e. inert or non-hazardous.

OCM recommend that all material excavated and removed from the site be disposed of in accordance with Dublin City Council Waste Management Regulations to suitably permitted or licensed waste management facilities.









REPORT NUMBER

|           | DNTRACT Dublin Central Development  |                 |   |           |                      | 25 000         |                | BOREHO<br>SHEET | OLE I    | NO.      | BH7<br>Sheet 1 of 2                  | 2         |
|-----------|---|-----------------|---|-----------|----------------------|----------------|----------------|-----------------|----------|----------|--------------------------------------|-----------|
|           | O-ORDINATES   | RIG TY          |   |           |                      | Dando 15       |                | DATE ST         |          |          | 05/08/2008                           |           |
| GR        | ROUND LEVEL (m AOD)   |                 | HOLE DIAMET                             | 100       | 2/                   | 200            | 1              | DATE C          | OMP      | LETED    | 12/08/2008                           |           |
|           | JENT Dublin Central Developments  | Liu             | OLE DEPTH                               | (m)       |                      | 16.00          |                | BORED           |          |          | J. O'Hara                            |           |
| NC        | GINEER AGL Consulting Ltd   | CASIN           | G DEPTH (m)                             | 1         |                      | 16.00          |                | PROCES          | SED      | BY       | S. Letch                             |           |
| E         |   |                 |   | _         | Ê                    |                | Sam            | ipies           | 1 ;      | >        |                                      | e e       |
| Depth (m) | Description   |                 | end                                     | Elevation | Depth (m)            | nbe            | nple           | the state of    |          | l over   | Field Test<br>Results                | idbr      |
| Det       |   |                 | Legend                                  | Elev      | Dep                  | Ref.<br>Number | Sample<br>Type | Depth<br>(m)    | 0        | Recovery |                                      | Standpipe |
| 0         | MADE GROUND consisting of concrete  |                 | XXXX                                    |           |                      |                |                |                 |          |          |                                      | W         |
| 1         | MADE GROUND consisting of brown gr<br>slightly gravelly clay with some cobbles  |                 |   |           | 0.30                 | AF4959         | В              | 1.50-1.50       |          |          | N = 7<br>(1, 1, 1, 2, 2, 2)          |           |
| 2         |   |                 |   |           |                      | AF4960         | В              | 2.70-2.70       |          | (5       | N = 57<br>, 7, 15, 13, 11, 18)       |           |
| 3         |   |                 |   |           |                      | AF4961         | В              | 3.60-3.60       | 8        | (6       | N = 63<br>5, 5, 9, 13, 17, 24)       |           |
| 4         | Dense grey slightly clayey/silty sandy G<br>many cobbles. Gravel is fine to coarse a<br>subrounded to subangular of limestone.  | RAVEL with      |   |           | 4.20                 | AF4962         | В              | 4.50-4.50       |          |          | N = 100/225 mm<br>9, 20, 33, 38, 29) |           |
| 5         | Subjourned to Subangular of infestore.  |                 | 000000000000000000000000000000000000000 |           |                      | AF4963         | В              | 5.50-5.50       |          |          | N = 26<br>(7, 7, 6, 7, 6, 7)         |           |
| 3         |   |                 |   |           |                      | AF4964         | В              | 6.30-6.30       |          |          | N = 31<br>(2, 4, 6, 8, 8, 9)         |           |
| 7         |   |                 |   |           |                      | AF4965         | В              | 7.30-7.30       |          |          | N = 13<br>(5, 3, 3, 3, 3, 4)         |           |
| 9         |   |                 |   |           |                      | AF4966         | В              | 8.30-8.30       |          |          | N = 21<br>(1, 1, 3, 5, 5, 8)         |           |
|           | ARD STRATA BORING/CHISELLING  |                 | WATER                                   | STRIF     | CE DE                | TAILS          |                |                 |          |          |                                      |           |
| -         | Time  |                 | Water                                   | Cas       |                      | Sealed         | Rise           | e Ti            | me       | 0-       | mants.                               |           |
|           | m (m) 10 (m) (h) Comments   |                 | Strike                                  | Dep       | oth                  | At             | То             | (m              | nin)     | Comr     | Call of the Carl Man                 |           |
| 5         | 4 4.2 0.5 Boulder<br>5.6 9 8 Hard Strata Boring<br>9 12.6 8 Hard Strata Boring  |                 | 5.00                                    | 5.0       | 0                    | No             | 5.00           | 2               | 20       | Mod      | lerate                               |           |
| 12        | 12.5   13.5   4   Hard Strata Boring<br>13.5   16   7   Hard Strata Boring  |                 | GROUND                                  | WAT       | ER DE                | TAILS          |                |                 |          |          |                                      |           |
|           | 16 16 7 Hard Strata Boring Boulder  |                 | Date                                    | 1         | lole                 | Casing         | Dep            | oth to dater    | Comr     | nents    |                                      |           |
|           |   |                 | 01-08-08                                |           | epth<br>2.00         | Depth<br>2.00  | VV             |                 | nd of    |          |                                      |           |
|           | STALLATION DETAILS  |                 | 05-08-08<br>05-08-08                    |           | 2.00<br>2.00<br>5.60 | 2.00           |                | - 8             | Start of | shift    |                                      |           |
|           | Date Tip Depth RZ Top RZ Base   | Type<br>50mm SP | 06-08-08<br>06-08-08                    | 1 3       | 5.00<br>3.60         | 6.00           | 4              | 1.80            | Start of | shift    |                                      |           |
|           | 2-08-08   15.00   13.00   15.00    EMARKS Hand dug inspection pit excavated to 1.20m   5.6m bgl to base of hole. Falling and rising the second control of |                 | 07-08-08                                |           | 8.60                 | 9.00           |                |                 | Start of |          |                                      |           |



REPORT NUMBER

|            | ORDINAT                | Dublin Central Development - Dra   | RIG TYF         | oe .   |             | -  | ando 15                                   |                | SHEET                                    |   | Sheet 2 of 2                           | 2         |
|------------|------------------------|--|-----------------|--|-------------|--|---|----------------|--|---|--|-----------|
|            |                        | /EL (m AOD)  |                 | OLE DIAME  | TER (r      |  | 00  |                | DATE ST                                  |   | 05/08/2008<br>TED 12/08/2008           |           |
| CLIE       | ENT<br>SINEER          | Dublin Central Developments Ltd<br>AGL Consulting Ltd  | BOREH           | OLE DEPTH  | l (m)       | 1  | 6.00<br>6.00                              |                | BORED                                    |   | J. O'Hara<br>Y S. Letch                |           |
|            |                        | , in a contact of the |                 |  |             |  |   |                | nples                                    |   |  |           |
| Depth (m)  |                        | Description  |                 | Legend   | Elevation   | Depth (m)                                    | Ref.<br>Number                            | Sample<br>Type | Depth<br>(m)                             | Recovery  | Field Test<br>Results                  | Standpipe |
| 10         | many cob<br>gravelly c | ey slightly clayey/silty sandy GRAVE<br>bles and lenses of brown slightly sa<br>lay. Gravel is fine to coarse and sub  | andy            | 0.000  |             | 10.00  | AF4967                                    | В              | 10.20-10.20                              |   | N = 25<br>(8, 7, 7, 6, 6, 6)           |           |
| 11         | Very dens<br>cobbles.  | Jular of limestone.<br>se grey slightly sandy GRAVEL with<br>Gravel is fine to coarse and subrour<br>ar of limestone.  | some<br>nded to | 00000  |             |  | AF4968                                    | В              | 11.00-11.00                              |   | N = 100<br>(12, 15, 16, 21, 25, 38     | 3)        |
| 12         |                        |  |                 | 80.00  |             |  | AF4969                                    | В              | 12.00-12.00                              |   | N = 100/225 mm<br>(11, 20, 26, 33, 41) |           |
| 13         |                        |  |                 | 0000   |             |  | AF4970                                    | В              | 13.00-13.00                              |   | N = 100/90 mm<br>(25, 44, 56)          |           |
| 14         |                        |  |                 |  |             |  | AF4971                                    | В              | 14.00-14.00                              |   | N = 100/185 mm<br>(8, 11, 33, 48, 19)  |           |
| 15         |                        |  |                 | 00000  |             |  | AF4972                                    | В              | 15.00-15.00                              |   | N = 100/150 mm<br>(17, 27, 39, 61)     |           |
| 16         | Cobbles. Obstuctio     | vn slightly sandy gravelly CLAY with<br>n - possible boulder<br>rehole at 16.00 m  | n some          | 9  |             | 15.80<br>16.00                               | AF4973<br>AF4974                          | B<br>B         | 15.90-15.90<br>16.00-16.00               |   | N = 100/90 mm<br>(25, 40, 60)          |           |
| 17         |                        |  |                 |  |             |  |   |                |  |   |  |           |
| 18         |                        |  |                 |  |             |  |   |                |  |   |  |           |
| 19         |                        |  |                 |  |             |  |   |                |  | 2   |  |           |
| HAI        | RD STRA                | TA BORING/CHISELLING   |                 | WATER  | STRIE       | (E DET                                       | AILS                                      |                |  |   |  |           |
| 5.0        | 6 9                    | 2 0.5 Boulder<br>8 Hard Strata Boring  |                 | Water<br>Strike  | Cas<br>Dep  |  | ealed<br>At                               | Rise<br>To     |  |   | omments                                |           |
| 12.<br>13. | .5 13.1<br>.5 16       | 5 4 Hard Strata Boring<br>7 Hard Strata Boring   |                 | GROUNI   |             | ER DET                                       | AILS<br>Casing                            | Der            | oth to                                   |   |  |           |
|            |                        |  |                 | 07-08-08   | D 1         | epth<br>2.50                                 | Depth<br>12.50                            | W              | ater 2.70 E                              | ommer   |  |           |
| D          | 08-08 1                |  | /pe<br>m SP     | 08-08-08<br>08-08-08<br>11-08-08<br>11-08-08<br>12-08-08<br>12-08-08 | 1<br>1<br>1 | 2.50<br>3.50<br>3.50<br>6.00<br>6.00<br>6.00 | 12.50<br>13.50<br>13.50<br>16.00<br>16.00 | 6<br>4<br>5    | 2.70 Ei<br>5.20 St<br>5.80 Ei<br>5.20 St | art of shift<br>nd of shift<br>art of shift<br>nd of shift<br>art of shift<br>nd of shift | 1                                      |           |



REPORT NUMBER

|           | NTRAC         |                  | lin Centi   | al Developme                                      | ent - Draft  |                 |   |           |              |                    |                  | BOREH<br>SHEET  |                    | NO.      | BH9<br>Sheet 1 o            | f 2       |
|-----------|---------------|------------------|-------------|---|--------------|-----------------|---|-----------|--------------|--------------------|------------------|-----------------|--------------------|----------|-----------------------------|-----------|
|           | ORDIN         | ATES<br>.EVEL (n | n AOD)      |   |              | RIG TY<br>BOREH | PE<br>IOLE DIAMET                       | TER (ı    |              | Dando 15<br>200    |                  | DATE S          |                    |          | 15/07/200                   |           |
| CLIE      | ENT           | Dub              |             | ral Developme                                     | ents Ltd     | BOREH           | OLE DEPTH                               | (m)       |              | 17.50<br>17.50     |                  | BORE            |                    | ) BY     | J. McDon<br>S. Letch        | nell      |
|           |               | 7,02             | 00110011    | 9 2.13  |              |                 |   |           |              | 17.00              |                  | nples           |                    |          | O. Loton                    |           |
| Depth (m) |               |                  | De          | escription  |              |                 | Legend                                  | Elevation | Depth (m)    | Ref.<br>Number     | Sample<br>Type   | Depth<br>(m)    |                    | Kecovery | ield Test<br>Results        | Standpipe |
|           | MADE          | <b>GROUN</b>     | D consis    | sting of reinfo<br>sting of brown<br>h some cobbl | grey san     | dy              |   |           | 0.20         | AF1908             | В                | 1.00-1.0        |                    |          | N = 7<br>(2, 2, 2, 1, 1, 3) |           |
| 2         | GRAV          | EL with n        | nany col    | slightly claye<br>obles. Gravel<br>angular of lim | is fine to d | dy<br>coarse    |   |           | 2.00         | AF1909<br>AF1910   | В                | 2.10-2.         |                    | (4       | N = 36<br>I, 6, 7, 2, 10, 1 | 7)        |
| 3         |               |                  |             |   |              |                 | 0000                                    |           |              | AF1911             | В                | 3.00-3.0        |                    | (7       | N = 39<br>, 9, 8, 10, 10, 1 | 1)        |
| 4         |               |                  |             |   |              |                 |   |           |              | AF1912             | В                | 4.00-4.0        | 00                 | 9        | N = 28<br>(2, 3, 6, 7, 8, 7 |           |
| 5         |               |                  |             |   |              |                 |   |           |              | AF1913             | В                | 5.00-5.0        | 00                 | (        | N = 34<br>3, 4, 7, 7, 9, 11 | )         |
| 6         |               |                  |             |   |              |                 |   |           |              | AF1914             | В                | 6.00-6.0        | 00                 | 1        | N = 27<br>(3, 3, 4, 8, 8, 7 |           |
| 7         |               |                  |             |   |              |                 | 000                                     |           |              | AF1915             | В                | 7.00-7.0        | 00                 | (7,      | N = 77<br>18, 20, 25, 20,   | 12)       |
| 3         |               |                  |             |   |              |                 |   |           |              | AF1916             | В                | 8.00-8.0        | 00                 | (6,      | N = 69<br>12, 16, 20, 20,   | 13)       |
| 9         |               |                  |             |   |              |                 | 000000000000000000000000000000000000000 |           |              | AF1917             | В                | 9.00-9.1        | 00                 |          | N = 18<br>(6, 6, 5, 5, 5, 3 |           |
| HA        | RD ST         | RATA BO          | ORING/      | CHISELLING  |              |                 | WATER                                   | STRI      | KE DE        | TAILS              |                  |                 |                    |          |                             | N.V.      |
| 16        | 5.2           | o (m)            | Time<br>(h) | Comments  Boulder Boulder                         |              |                 | Water<br>Strike<br>5.50                 |           | pth<br>50    | Sealed<br>At<br>No | Ris<br>To<br>3.1 | ) (             | Time<br>min)<br>5  | Comn     | nents                       |           |
| 107.      |               | WARCASS T        | 50          |   |              |                 | GROUNI                                  |           | ER DE        | TAILS<br>Casing    | De               | pth to          | 0                  |          |                             |           |
| NST       | TALLA         | TION DE          | TAILS       |   |              |                 | 15-07-08<br>16-07-08                    |           | 2.00<br>2.00 | 2.00<br>2.00       | V                | pth to<br>later | End of<br>Start of | fshift   |                             |           |
|           | Date<br>07-08 |                  |             | op RZ Base<br>0 13.50                             | Typ<br>50mm  |                 | 16-07-08<br>17-07-08                    |           | 7.00<br>7.00 | 7.00<br>7.00       |                  | 4.50<br>4.50    | End of<br>Start of |          |                             |           |



REPORT NUMBER

13696

CONTRACT BOREHOLE NO. **BH9 Dublin Central Development - Draft** SHEET Sheet 2 of 2 **CO-ORDINATES** RIG TYPE Dando 150 DATE STARTED 15/07/2008 BOREHOLE DIAMETER (mm) DATE COMPLETED 23/07/2008 200 GROUND LEVEL (m AOD) BOREHOLE DEPTH (m) 17.50 BORED BY CLIENT J. McDonnell Dublin Central Developments Ltd PROCESSED BY CASING DEPTH (m) **ENGINEER** 17.50 S. Letch AGL Consulting Ltd Samples E Standpipe E Recovery Elevation Ref. Number Sample Type Field Test Legend Depth ( Description Details Depth Depth (m) Results 10.00-10.00 AF1918 Very dense grey brown slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone. (continued) No CPT as gravel blowing up casing AF1919 В 11.00-11.00 (11, 13, 11, 10, 10, 10) 80 80 N = 43 (7, 5, 8, 8, 13, 14) AF1920 В 12.00-12.00 12 000000 000 AF1921 13.00-13.00 N = 78 (6, 6, 10, 18, 25, 25) 13 13.50 Hard dark brown slightly sandy gravelly CLAY with occasional cobbles. 0 N = 68 (6, 11, 15, 17, 19, 17) AF1922 В 14.00-14.00 Very dense grey brown slightly sandy GRAVEL with 14.20 8 14.40-14.40 AF1923 some cobbles. Gravel is medium to coarse and 14.50 (9 14.50-14.50 0% rec subrounded to subangular of limestone Hard dark brown slightly sandy gravelly CLAY with 0 N = 45/150 mm (20, 35, 20, 25) AF1924 В 15.00-15.00 occasional cobbles. 8 Very dense grey brown slightly sandy GRAVEL with 8 15.90 AF1925 В some cobbles. Gravel is medium to coarse and 80 0 subrounded to subangular of limestone. 8 Hard black slightly sandy gravelly CLAY with 16.50 occasional cobbles AF1828 В 16 80-16 80 N = 100 (8, 12, 20, 30, 30, 20) Obstuction - possible boulder 17.00 AF1829 B 17.10-17.10 17.50 End of Borehole at 17.50 m 19 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Rise Time Time From (m) To (m) Comments Comments Strike Depth To (h) (min) Boulder Boulder 1/10/08 **GROUNDWATER DETAILS** GDT Depth to Water Hole Casing Comments Date IGSL Depth Depth 13.00 13.00 16.50 17-07-08 13.00 13.00 5.00 End of shift 18-07-08 18-07-08 Start of shift GPJ INSTALLATION DETAILS

Date | Tip Depth | RZ Top | RZ Base 16.50 5.80 End of shift Type 21-07-08 16.50 16.50 4.65 Start of shift 22-07-08 13.50 12.00 13.50 50mm SP REMARKS Hand dug inspection pit excavated to 1.20m. Falling and rising head tests completed. Standing from 24th to 28th July - No access BH



REPORT NUMBER

13696

BOREHOLE NO. CONTRACT Dublin Central Development - Draft **BH10** SHEET Sheet 1 of 2 CO-ORDINATES **RIG TYPE** Dando 150 DATE STARTED 30/07/2008 **BOREHOLE DIAMETER (mm)** 200 DATE COMPLETED 13/08/2008 GROUND LEVEL (m AOD) **BOREHOLE DEPTH (m)** 15.45 **BORED BY** J. McDonnell CLIENT Dublin Central Developments Ltd CASING DEPTH (m) 15.45 PROCESSED BY S. Letch **ENGINEER** AGL Consulting Ltd Samples Standpipe Details E  $\Xi$ Elevation Ref. Number Recovery Sample Type Field Test egend Description Depth Depth Depth (m) Results - 0 MADE GROUND consisting of concrete 0.10 MADE GROUND consisting of brown grey sandy slightly gravelly clay with some cobbles and red brick. AF1830 В 1.00-1.00 N = 6AF1831 2.00-2.00 - 2 (1, 1, 2, 1, 1, 2) N = 51 (8, 18, 16, 11, 17, 7) AF1832 В 3.00-3.00 3.00 Very dense grey slightly clayey/silty sandy GRAVEL 8 with many cobbles. Gravel is fine to coarse and 20 subrounded to subangular of limestone. N = 30 (3, 5, 7, 7, 8, 8) AF1833 4.00-4.00 4 E. N = 50AF1834 B 5 00-5 00 5 (8, 8, 14, 14, 12, 10) 00 Dense grey slightly clayey/silty sandy GRAVEL with many cobbles. GRAVEL is fine to coarse and 2000 5.50 20 subrounded to subangular of limestone. AF1835 6.00-6.00 2000 F6 (4, 6, 6, 7, 7, 8) 00 00 101 Very stiff black slightly sandy gravelly CLAY with 6.80 AF1836 7.00-7.00 В occasional cobbles (3, 15, 18, 12, 11, 15) 0. Very dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and 00 7.50 80 20 N = 100/225 mm (15, 24, 25, 30, 45) subrounded to subangular of limestone. 2000 AF1837 8.00-8.00 8 00 00 000 90 AF1838 9.00-9.00 В 9 (7, 9, 14, 15, 13, 10) 80 8080 WATER STRIKE DETAILS HARD STRATA BORING/CHISELLING Casing Time Water Sealed Rise Time Comments From (m) Comments To (m) (h) Strike Depth At To (min) Hard Strata Boring Hard Strata Boring Moderate 8.00 6.50 20 8.00 No 11 15.4 15.45 Boulder **GROUNDWATER DETAILS** IGSL GDT Hole Casing Depth to Water Date Comments Depth Depth 6.00 6.00 30-07-08 4.80 End of shift Start of shift End of shift GPJ **INSTALLATION DETAILS** 6.10 08-08-08 8.00 8.00 Tip Depth RZ Top RZ Base Date Type 11-08-08 8 00 8.00 4.55 Start of shift OG DCD REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.0m to aid drilling. Blowing gravels from 9.5m to 10.5m and 11.5m to 12.0m bgl. Falling and rising head test completed. Standing 5.5 days - stopped by Client due to Landowner request.



REPORT NUMBER

|           | NTRACT<br>-ORDINAT   |                                    | tral Development - Dra   | RIG TYF          | PE   |           | г                                | Dando 15                         |             | SHEET                                     |  | Sheet 2 of 2  |           |
|-----------|----------------------|------------------------------------|--|------------------|--|-----------|----------------------------------|----------------------------------|-------------|---|--|---|-----------|
|           |                      | VEL (m AOD)                        |  |                  | OLE DIAME                                    | TER (     |                                  | 200                              |             | DATE STA                                  |  | 30/07/2008<br>TED 13/08/2008  |           |
| CLII      | ENT<br>GINEER        |                                    | tral Developments Ltd  | BOREH            | OLE DEPTH                                    | l (m)     | 1                                | 5.45<br>5.45                     | - 1         | BORED B                                   |  | J. McDonnel   | I         |
| Depth (m) |                      | D                                  | escription   |                  | Legend                                       | Elevation | Depth (m)                        | Ref.<br>Number                   | Sample Type | Depth (m)                                 | Recovery   | Field Test<br>Results   | Standpipe |
| 110       | with man<br>subround | y cobbles. Gra<br>led to subangu   | y clayey/silty sandy GF<br>avel is fine to coarse ar<br>ular of limestone. (cont | nd               |  | ш         | 13.80                            | AF1840  AF1841  AF1842           | B<br>B      | 11.00-11.00<br>12.00-12.00<br>13.00-13.00 | α  | N = 76<br>(9, 13, 16, 24, 19, 17)<br>N = 100/160 mm<br>(13, 39, 50, 40, 10)<br>N = 100/170 mm<br>(12, 30, 40, 45, 15)<br>N = 100/125 mm<br>(12, 23, 62, 38)<br>N = 100/230 mm | V///      |
| 14        |                      | al cobbles.                        | ay gravelly OLAT with  |                  |  |           | , 0.00                           | AF1843                           | В           | 15.00-15.00                               |  | N = 100/230 mm<br>(4, 10, 20, 35, 40, 5)<br>N = 100/75 mm<br>(12, 43, 100)  |           |
| 16        | End of Bo            | on - possible b<br>prehole at 15.4 | 45 m   |                  |  |           | 15.45                            |                                  |             |   |  |   |           |
| 18        |                      |                                    |  |                  |  |           |                                  |                                  |             |   |  |   |           |
| HA        | RD STRA              | TA BORING/                         | CHISELLING   |                  | WATER  | STRI      | KE DET                           | AILS                             |             |   |  |   |           |
|           | n (m) To (           | (m) Time<br>(h)<br>1 8<br>.5 8     | Comments  Hard Strata Boring Hard Strata Boring Boulder                          |                  | Water<br>Strike                              | Cas<br>De | ing S                            | Sealed<br>At                     | Rise<br>To  |   | 1 ( .(   | omments   |           |
|           |                      |                                    |  |                  | Date   |           | ER DET<br>Hole<br>Depth          | Casing<br>Depth                  | W           | ater                                      | omment   | ts  |           |
|           | Date Ti              | DN DETAILS D Depth RZ T            | op RZ Base Ty pit excavated to 1.20m. Water lowing gravels from 9.5m to 10       | pe<br>added from | 12-08-08<br>12-08-08<br>12-08-08<br>13-08-08 |           | 11.00<br>14.50<br>14.50<br>15.45 | 11.00<br>14.50<br>14.50<br>15.45 | 5           | 4.60 Sta<br>5.60 End<br>4.50 Sta          | ort of shift<br>d of shift<br>ort of shift<br>d of shift |   |           |

|           |                    |                             |                        |                   |                           |                  |                                  |             |           |                      |                |                 |                              |          | 13696                                 |           |
|-----------|--------------------|-----------------------------|------------------------|-------------------|---------------------------|------------------|----------------------------------|-------------|-----------|----------------------|----------------|-----------------|------------------------------|----------|---------------------------------------|-----------|
|           | NTRACT             |                             | n Centra               | l Develop         | oment - Dr                | raft             |                                  |             |           |                      |                | BOREH<br>SHEET  | OLE N                        | IO.      | BH12<br>Sheet 1 of                    | 2         |
|           | ORDINA             |                             | AOD)                   |                   |                           | RIG TY           | PE<br>IOLE DIAMETE               | R (mn       |           | Dando 20<br>200      |                | DATE S          |                              |          | 12/10/2008                            |           |
| _         | OUND LE            |                             |                        | I Develo          | ments Ltd                 | PODE             | IOLE DEPTH (r                    |             | ,         | 13.60                |                | BORED           |                              |          | J. McDonn                             |           |
|           | SINEER             |                             | Consultin              |                   | ments Lic                 |                  | G DEPTH (m)                      | ,           |           | 13.60                |                | PROCE           |                              | BY       | S. Letch                              | CII       |
|           |                    |                             |                        |                   |                           |                  |                                  |             | _         |                      | Sam            | ples            |                              |          |                                       | 0         |
| Deptn (m) |                    |                             | De                     | scription         |                           |                  | Legend                           | Elevation   | Depth (m) | Ref.<br>Number       | Sample<br>Type | Depth<br>(m)    |                              | Recovery | Field Test<br>Results                 | Standpipe |
| 0         | MADE (<br>gravelly | GROUNE<br>clay with         | consist<br>some re     | ing of bro        | wn slightly<br>nd concret | / sandy<br>te.   |                                  |             |           | AF4857               | В              | 1.00-1.0        |                              |          | N = 14<br>(2, 2, 3, 3, 4, 4)          |           |
| 2         |                    |                             |                        |                   |                           |                  |                                  |             |           | AF4858               | В              | 2.00-2.0        | 00                           |          | N = 11<br>(2, 2, 2, 3, 3, 3)          |           |
| 3         | Firm be            | coming s                    | tiff brown             | n slightly        | sandy gra                 | velly CLAY       | <u>0</u>                         |             | 3.40      | AF4859               | В              | 3.00-3.0        | 00                           |          | N = 30<br>(4, 8, 10, 8, 6, 6)         |           |
| 1         |                    | and the C                   |                        |                   |                           |                  |                                  |             |           | AF4860               | В              | 4.00-4.0        | 00                           |          | N = 17<br>(4, 3, 4, 4, 4, 5)          |           |
| 5         |                    |                             |                        |                   |                           |                  | 0 0                              |             |           | AF4861               | В              | 5.00-5.0        | 00                           |          | N = 34<br>(4, 6, 8, 8, 9, 9)          |           |
| 3         |                    | ff becomi<br>vith occas     |                        |                   | htly sandy                | gravelly         |                                  |             | 6.00      | AF4862               | В              | 6.00-6.0        | 00                           |          | N = 49<br>(6, 6, 9, 10, 12, 18        | 3)        |
| 7         |                    |                             |                        |                   |                           |                  |                                  |             |           | AF4863               | В              | 7.00-7.0        | 00                           |          | N = 100/200 mm<br>(14, 20, 35, 35, 36 | 3         |
| 8         |                    |                             |                        |                   |                           |                  |                                  |             |           | AF4864               | В              | 8.00-8.0        | 00                           | (        | N = 54<br>6, 8, 12, 12, 14, 1         | 6)        |
| 9         |                    |                             |                        |                   |                           |                  |                                  |             |           | AF4865               | В              | 9.00-9.0        | 00                           | (        | N = 55<br>7, 8, 11, 14, 14, 1         | 6)        |
| HA        | RD STR             |                             |                        | ISELLIN           | G                         |                  | WATER                            |             | _         | -                    | 1              |                 |                              |          |                                       | V. X1     |
|           | 2. 2               | 7.5                         | (n)                    | Commer<br>Boulder | nts                       |                  | Water<br>Strike                  | Casi<br>Dep |           | Sealed<br>At         | Rise<br>To     | 100             | Time<br>(min)                | Con      | nments                                |           |
|           |                    |                             |                        |                   |                           |                  |                                  |             |           |                      |                |                 |                              |          |                                       |           |
|           |                    |                             |                        |                   |                           |                  | GROUND                           |             | R DET     |                      | Dr             | nth to          |                              |          |                                       |           |
|           |                    |                             |                        |                   |                           |                  | Date                             | D           | epth      | Casing<br>Depth      | De<br>W        | pth to<br>later | 2000000                      | nents    |                                       |           |
| NS        | TALLAT             | ON DET                      | AILS                   |                   |                           |                  | 12-10-08<br>13-10-08<br>14-10-08 | 1           | .20       | 1.20<br>1.20<br>7.00 |                | -               | End of<br>Start of<br>End of | shift    |                                       |           |
|           |                    | Tip Depti<br>13.60          |                        |                   |                           | Type<br>Omm SP   | 14-10-08                         |             | .00       | 7.00                 | 6              | 3.70            | Start o                      |          |                                       |           |
| REN       | MARKS              | Hand dug in<br>started at 1 | nspection p<br>800hrs. | it excavate       | d to 1.20m. N             | Night work - shi | R.                               |             |           |                      |                |                 |                              |          |                                       |           |

| COI     | NTRACT               | Dublin Centra                           | al Developmen  | t - Draft                  |                             |           |                |                 |                | BOREHOL      | E NO.                     | BH12                               |           |
|---------|----------------------|---|--|----------------------------|-----------------------------|-----------|----------------|-----------------|----------------|--------------|---------------------------|------------------------------------|-----------|
| co-     | ORDINATI             | ES                                      |  | RIG TY                     | PF.                         |           | r              | Dando 20        |                | SHEET        | DTC                       | Sheet 2 of 2                       | -         |
|         |                      | /EL (m AOD)                             |  |                            | HOLE DIAME                  | TER (m    |                | 200             |                | DATE STA     |                           |                                    |           |
| _       | ENT                  |   | al Development   | DODE                       | HOLE DEPTH                  |           |                | 13.60           |                | BORED BY     |                           | J. McDonne                         |           |
|         | SINEER               | AGL Consultin                           | The state of the s | to Eta                     | G DEPTH (m)                 |           |                | 13.60           |                | PROCESS      |                           |                                    | 11        |
| T       |                      |   |  | 27.10111                   |                             |           |                |                 |                | nples        |                           |                                    | an an     |
| H (III) |                      | De                                      | escription   |                            | ъ                           | tion      | m) h           | per             | ole            | ے            | /ery                      | Field Test                         | pipe      |
| Depth ( |                      | 50                                      |  |                            | Legend                      | Elevation | Depth (m)      | Ref.<br>Number  | Sample<br>Type | Depth<br>(m) | Recovery                  | Results                            | Standpipe |
| 10      | Very stiff I         | becoming hard I                         | black slightly e   | andy gravelly              | 79                          | Ш         | П              | AF4866          | B<br>O F       | 10.00-10.00  | 02                        | N = 100/50 mm                      | S         |
|         | CLAY with            | h occasional col                        | obles (continue  | ed)                        | 0.0                         |           |                |                 |                |              |                           | (8, 42, 100)                       |           |
|         |                      |   |  |                            | 8 .0.                       |           |                |                 |                |              |                           |                                    | S         |
| 11      |                      |   |  |                            | 0-0-                        |           |                | AF4867          | В              | 11.00-11.00  |                           | N = 100/90 mm<br>(10, 38, 80, 20)  |           |
|         |                      |   |  |                            | <u>o</u> . <del>o</del> . o |           |                |                 |                |              |                           | 112, 2-12/                         |           |
|         | Very dens            | se grey slightly o<br>al cobbles. Grave | clayey/silty sand<br>el is fine to coa   | dy GRAVEL with<br>arse and | 3000                        |           | 11.50          |                 |                |              |                           |                                    |           |
| 12      |                      | ed to subangula                         |  |                            | 2000                        |           |                | AF4868          | В              | 12.00-12.00  |                           | N = 68<br>(9, 11, 15, 16, 18, 19)  | EF        |
|         |                      |   |  | 44                         | 0000                        |           | 40.50          |                 |                |              |                           |                                    |           |
|         | Hard blac cobbles    | k slightly sandy                        | gravelly CLAY  | with occasional            | <u> </u>                    |           | 12.50          |                 |                |              |                           |                                    |           |
| 13      |                      |   |  |                            | 8.0.8                       |           |                | AF4869          | В              | 13.00-13.00  |                           | N = 100/150 mm<br>(22, 35, 40, 60) |           |
| -       | Obstrut              | n noosible beer                         | ldor   |                            |                             |           | 13.50          |                 |                |              |                           |                                    |           |
|         | End of Bo            | n - possible bou<br>orehole at 13.60    | m  |                            |                             |           | 13.60          | 1               |                |              |                           |                                    |           |
| 14      |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
| 15      |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
| 16      |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
| 17      |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
| 18      |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
| 19      |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
|         |                      |   |  |                            |                             |           |                |                 |                |              |                           |                                    |           |
| _       |                      | Time                                    |  |                            | WATER                       | -         |                | AILS<br>Sealed  | Rise           | e Time       | e                         |                                    |           |
|         | (m) To (             | m) (h)                                  | Comments   |                            | Strike                      | De        | pth            | At              | То             | (min         | 1)                        | omments                            |           |
| 13      | .5 13.               | 6 2                                     | Boulder  |                            | 11.50                       | 11.       | .50            | No              | 10.5           | 0 20         |                           | Moderate                           |           |
|         |                      |   |  |                            | GROUN                       | DWAT      | ER DET         | AILS            |                |              |                           |                                    |           |
|         |                      |   |  |                            | Date                        |           | Hole<br>Depth  | Casing<br>Depth | Der            | oth to Co    | mmen                      | ts                                 |           |
|         |                      |   |  |                            | 15-10-08<br>15-10-08        |           | 12.50<br>12.50 | 12.50<br>12.50  | 1 1            | 1.50 End     | f of shift                | (                                  |           |
|         | TALLATIO<br>Date Tip | N DETAILS<br>o Depth RZ Top             | p RZ Base  | Туре                       | 16-10-08                    |           | 13.60          | 13.60           | 13             | 3.00 Star    | rt of shift<br>d of shift | i)                                 |           |
|         | 177,5393 - 177       | 3.60 11.50                              |  | 50mm SP                    |                             |           |                |                 |                |              |                           |                                    |           |
| )EI/    | IARKS Hai            | nd dug inspection pi                    | it excavated to 1.2  | 0m. Night work - shif      | t                           |           |                |                 |                |              |                           |                                    |           |
| /FIA    |                      | rted at 1800hrs.                        |  |                            |                             |           |                |                 |                |              |                           |                                    |           |

26-09-08

27-09-08 27-09-08

28-09-08

28-09-08

29-09-08

Type

6.00

6.00

8.00

9.00

6.00

6.00 8.00

8.00

9.00

5.40 5.00 4.20

4.80

4.50

Start of shift End of shift Start of shift

End of shift

Start of shift

GPJ LOG DCD BHI

Date

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.0m to aid drilling. Blowing gravels from 4.9m to 6m bgl. Casing size reduced from 300mm to 250mm diameter at 14.0m bgl. Casing left in borehole to allow rotary follow on. Re set up rig on 00/10/08 to advance hole after rotary rig advanced to rockhead and gravel falling in behind hammer.

Tip Depth RZ Top RZ Base

| COI       | NTRACT  | Dublin Cent  | ral Development  | - Draft                                  |   |             |   |   |                | BOREHO<br>SHEET            | JLE N  | 10.                     | W2<br>Sheet 2 of 3       | 3                    |
|-----------|---|--|--|--|---|-------------|---|---|----------------|----------------------------|--|-------------------------|--------------------------|----------------------|
|           | ORDINAT   | TES<br>VEL (m AOD)                                   |  | RIG TYP<br>BOREH                         | PE<br>OLE DIAME                                     | TER (n      |   | Dando 30                                  |                | DATE ST                    |  |                         | 25/09/2008<br>10/10/2008 |                      |
|           | ENT   | Dublin Cent  | ral Developments   | Liu                                      | DEPTH (m  |             | 2   | 1.40                                      |                | BORED                      |  | BY                      | J. Edwards<br>S. Letch   | / J. McDo            |
|           | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,         | 7102 0011041   | 9 2.03   | OAGING                                   |   | /           |   |   |                | nples                      |  |                         | 01.201011                |                      |
| Deptn (m) |   |  | Description  |  | Legend  | Elevation   | Depth (m)                                 | Ref.<br>Number                            | Sample<br>Type | Depth<br>(m)               | Docovoro   | Kecovery                | Field Test<br>Results    | Standpipe<br>Details |
| 10        | cobbles.<br>subangu                             | Gravel is medi<br>lar of limestone                   |  | subrounded to                            |   |             | 11.20                                     | AG3611                                    | В              | 11.00-11.0                 |  |                         |                          |                      |
| 12        | cobbles a<br>to coarse<br>Grey slig<br>cobbles. | and bands of da<br>and subround<br>htly clayey/silty | sandy GRAVEL<br>ark grey clay. Gra<br>ed to subangular<br>sandy GRAVEL<br>um to coarse and<br>e. | vel is medium of limestone.              | 00000000000000000000000000000000000000              |             | 11.40                                     | AG3613                                    | В              | 12.00-12.0                 | 00   |                         |                          |                      |
| 13        |   |  |  |  | 2000  |             |   | AG3614                                    | В              | 13.00-13.0                 | 00   |                         |                          |                      |
| 14        |   |  |  |  |   |             |   | AG3615                                    | В              | 14.00-14.0                 | 00   |                         |                          |                      |
| 15        | Brown sli                                       | ightly sandy gra                                     | avelly CLAY with o   | occasional                               | \$ 4 5 A  |             | 15.50                                     | AG3616                                    | В              | 15.00-15.0                 | 00   |                         |                          |                      |
| 16        | Black slig                                      |  | velly CLAY with o  |  |   |             | 16.40                                     | AG3617                                    | В              | 16.00-16.0                 | 00   |                         |                          |                      |
| 17        |   |  | y rig advanced to<br>mmer so must be   |  | 0.0.0.0   |             |   |   |                |                            |  |                         |                          |                      |
| 18        |   |  |  |  |   |             |   |   |                |                            |  |                         |                          |                      |
|           |   |  |  |  | 20-   |             |   |   |                |                            |  |                         |                          |                      |
| U A       | DD CTDA   | TA BORING/C  | HISELLING  |  | IN TE   | o empi      | KE DETA                                   | All S                                     |                |                            |  |                         |                          |                      |
|           |   | Time   | T_   |  | Water   | _           |   | Sealed                                    | Rise           | e Ti                       | me   | Comn                    | nente                    |                      |
| 12        | 1 12  | (m) (h)<br>2.2 10<br>4 10<br>6 10                    | 7hrs Chiselling 3hrs<br>7hrs Chiselling 3hrs<br>6hrs Chiselling 4hrs                             | Hard Strata Boring                       | Strike  | De          | pth                                       | At  | То             | (m                         | nin)   | COM                     | noma                     |                      |
| 1         | 6 16  | 3.2<br>3.4<br>3                                      | Hard Strata Boring<br>Boulder  |  | GROUN   | DWAT        | ER DET                                    | AILS                                      |                |                            |  |                         |                          |                      |
| 16        | 3.4 19  | 0.5<br>1.4<br>8                                      | 1hr Chiselling 7hrs I<br>2hrs Chiselling 6hrs  | Hard Strata Boring<br>Hard Strata Boring | Date 29-09-0  |             | Hole<br>Depth                             | Casing<br>Depth                           | W              | ater                       | Comm   |                         |                          |                      |
| NS'       | TALLATIC  | ON DETAILS   |  |  | 30-09-0<br>30-09-0                                  | 8           | 11.00<br>11.00<br>12.20                   | 11.00<br>11.00<br>12.20                   | 4              | .50 8                      | Start of s   | shift                   |                          |                      |
|           | Date T  | ip Depth RZ T  | op RZ Base   | Туре                                     | 01-10-0<br>01-10-0<br>02-10-0                       | 8<br>8<br>8 | 12.20<br>14.00<br>14.00                   | 12.20<br>14.00<br>14.00                   | 5              | .80 S<br>.00 E             | Start of s<br>End of s<br>Start of                         | shift<br>shift<br>shift |                          |                      |
| REN       | 3.<br>C:  | Om to aid drilling. I                                | pit excavated to 1.20<br>Blowing gravels from 4<br>from 300mm to 250m                            | 1.9m to 6m bgl.<br>nm diameter at        | 02-10-0<br>03-10-0<br>03-10-0<br>09-10-0<br>09-10-0 | 8<br>8<br>8 | 16.00<br>16.00<br>16.40<br>16.40<br>19.50 | 16.00<br>16.00<br>16.40<br>16.40<br>19.50 | 4              | 1.50 S<br>1.90 E<br>1.80 S | End of s<br>Start of s<br>End of s<br>Start of<br>End of s | shift<br>shift<br>shift |                          |                      |

|                  | GEOTEC   | HNICA                             | L BORI                | NG I      | RECO                   | RD              |        |                  |                     | 13696                      | `                    |
|------------------|--|-----------------------------------|-----------------------|-----------|------------------------|-----------------|--------|------------------|---------------------|----------------------------|----------------------|
| ONTRACT          | Dublin Central Development - Draft   |                                   |                       |           |                        |                 |        | BOREH            | OLE NO.             |                            |                      |
| O-ORDINA         | TES  | RIG TYP                           | PΕ                    |           | [                      | Dando 30        | 000    | SHEET<br>DATE S  | TARTE               | Sheet 3 of 3<br>25/09/2008 | 5                    |
| ROUND LE         | EVEL (m AOD)   | BOREH                             | OLE DIAME             | TER (r    | nm)                    |                 |        | DATE C           |                     |                            |                      |
| LIENT<br>NGINEER | Dublin Central Developments Ltd<br>AGL Consulting Ltd  |                                   | OLE DEPTH<br>DEPTH (m |           | 2                      | 21.40           |        | BORED PROCES     |                     | J. Edwards  Y S. Letch     | / J. McDoi           |
|                  |  |                                   |                       | _         | (F                     |                 | 1      | mples            |                     |                            | e                    |
|                  | Description  |                                   | Legend                | Elevation | Depth (m)              | Ref.<br>Number  | Sample | Depth<br>(m)     | Recovery            | Field Test<br>Results      | Standpipe<br>Details |
| cobbles          | ghtly clayey/silty sandy GRAVEL with m. Gravel is medium to coarse and subroular of limestone.   | nany<br>ounded to                 |                       |           | 20.00                  |                 |        |                  |                     |                            |                      |
|                  | ion - rockhead<br>Borehole at 21.40 m  |                                   |                       |           | 21.30<br>21.40         |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
|                  |  |                                   |                       |           |                        |                 |        |                  |                     |                            |                      |
| ARD STR          | ATA BORING/CHISELLING  |                                   |                       | _         | IKE DET                |                 |        |                  | r:                  |                            |                      |
| m (m) To         | o (m) Time Comments  |                                   | Water<br>Strike       |           | epth                   | Sealed<br>At    | Ris    |                  | rime<br>min)        | Comments                   |                      |
|                  |  |                                   | GROUI                 | NDWA.     | TER DET                |                 |        |                  |                     |                            |                      |
|                  |  |                                   | Date                  | 9         | Hole<br>Depth<br>21.40 | Casing<br>Depth | V      | epth to<br>Water | Comme<br>End of shi |                            |                      |
| STALLAT<br>Date  | ION DETAILS Tip Depth RZ Top RZ Base T   | уре                               | 10-10-1               |           | 21.40                  | 21.40           |        | 5.00             | End of Sfil         |                            |                      |
|                  | Hand dug inspection pit excavated to 1.20m. Wai<br>3.0m to aid drilling. Blowing gravels from 4.9m to<br>Casing size reduced from 300mm to 250mm dian<br>14.0m bgl. Casing left in borehole to allow rotary<br>Re-set-up-rig-on-09/10/08 | 6m bgl.<br>meter at<br>follow on. | n                     |           |                        |                 |        |                  |                     |                            |                      |

BH LOG DCD 13696.GPJ IGSL.GDT 5/11/08



REPORT NUMBER

| ~         | ODDINATEO                   | ( )                                   |   |   | _  |           |                              |                              |                | SHEET                  |  | Sheet 1 of 2                               |           |
|-----------|-----------------------------|---------------------------------------|---|---|--|-----------|------------------------------|------------------------------|----------------|------------------------|--|--|-----------|
|           | -ORDINATES<br>OUND LEVEL    |                                       |   | RIG TYPI                                      | E<br>DLE DIAMETI                             | ER (m     |                              | Dando 20<br>200              |                | DATE ST                |  |  |           |
|           |                             |                                       | al Developments Ltd   | BOREHO  | LE DEPTH (                                   | m)        |                              | 12.00                        |                | BORED E                | BY   | J. McDonnell                               |           |
| N         | GINEER A                    | AGL Consultin                         | ng Ltd  | CASING  | DEPTH (m)                                    |           |                              | 12.00                        |                | PROCES                 | SED B  | Y S. Letch                                 |           |
| =         |                             |                                       |   |   |  | _         | <u>-</u>                     |                              | Sam            | ples                   |  |  | Ф         |
| Depth (m) |                             | De                                    | escription  |   | Legend                                       | Elevation | Depth (m)                    | Ref.<br>Number               | Sample<br>Type | Depth<br>(m)           | Recovery   | Field Test<br>Results                      | Standpipe |
| 0         | MADE GRO                    | UND consist                           | ting of granite cobbleto  | ock.  | ******                                       |           | 0.10                         |                              |                |                        |  |  | W         |
| 1         | MADE GRO                    | UND consist                           | ting of concrete.<br>ting of brown slightly s<br>ed brick and concrete.             | andy  |  |           | 0.20                         | AF4832                       | ENV<br>B       | 1.00-1.00<br>1.00-1.00 |  | N = 18<br>(3, 3, 5, 5, 4, 4)               |           |
| 2         |                             |                                       |   |   |  |           |                              | AF4833                       | ENV<br>B       | 2.00-2.00<br>2.00-2.00 |  | N = 12<br>(2, 2, 3, 3, 3, 3)               |           |
| 3         | Stiff brown s               | lightly sandy                         | gravelly CLAY.  |   |  |           | 3.20                         | - AF4834                     | ENV<br>B       | 3.00-3.00<br>3.00-3.00 |  | N = 11<br>(2, 2, 2, 3, 3, 3)               |           |
| 4         |                             |                                       |   |   | <u> </u>                                     |           |                              | AF4835                       | ENV<br>B       | 4.00-4.00<br>4.00-4.00 |  | N = 22<br>(3, 3, 5, 5, 6, 6)               |           |
| 5         | Very stiff bro              | wn slightly s                         | andy very gravelly CL   | AY.   |  |           | 5.00                         | AF4836                       | В              | 5.00-5.00              |  | N = 57<br>(8, 14, 16, 16, 15, 10)          |           |
| 3         |                             | -                                     |   |   |  |           |                              | AF4837                       | В              | 6.00-6.00              |  | N = 84<br>(14, 20, 20, 24, 20, 20)         |           |
| 7         | occasional c                | obbles. Grav                          | clayey/silty sandy GRA<br>vel is fine to coarse and<br>ar of limestone.             | d   |  |           | 6.50                         | AF4838                       | В              | 7.00-7.00              |  | N = 84<br>(9, 14, 15, 19, 20, 30)          |           |
| 3         |                             |                                       |   |   | 2000   |           |                              | AF4839                       | В              | 8.00-8.00              |  | N = 100/225 mm<br>(14, 21, 30, 30, 40)     |           |
| 9         |                             |                                       |   | 31  |  |           |                              | AF4840                       | В              | 9.00-9.00              |  | N = 100/275 mm<br>(12, 16, 20, 20, 32, 28) |           |
| НА        | RD STRATA                   | BORINGICH                             | HISFLLING   |   | WATER  | STRIE     | (E DET                       | AILS                         |                | -                      | 1  |  | X/Z       |
|           | n (m) To (m)                | Time                                  | Comments  |   | Water  | Cas       | sing S                       | Sealed                       | Rise           | 7,300                  |  | Comments                                   |           |
|           | .1 8.3                      | (h)<br>1                              | Boulder   |   | Strike<br>6.60                               | De<br>6.6 |                              | At<br>No                     | 5.00           | 1                      | in)  | Moderate                                   |           |
|           |                             |                                       |   |   |  |           |                              |                              |                |                        |  |  |           |
|           |                             |                                       |   |   | GROUND                                       |           | ER DET<br>Hole               | AILS<br>Casing               | Der            | oth to                 |  |  |           |
|           |                             |                                       |   |   | Date   |           | Depth                        | Depth                        | W              | ater                   | omme   | 1011                                       |           |
|           | TALLATION I<br>Date Tip D   | DETAILS<br>Depth RZ To                | pp RZ Base T  | ype   | 10-11-08<br>11-11-08<br>12-11-08<br>13-11-08 |           | 6.50<br>6.50<br>9.70<br>9.70 | 6.50<br>6.50<br>9.70<br>9.70 | 5              | .00 S                  | nd of shit<br>tart of shi<br>nd of shit<br>tart of shi | ift<br>ft                                  |           |
| EN        | started<br>finishe<br>hours | d at 1800hrs to a<br>ed at 2300hrs du | pit excavated to 1.20m. Niglaccommodate Moore Street us to T2 licence restrictions. | traders. Shift<br>Standing 5<br>Falling and 1 |  |           |                              |                              |                |                        |  |  |           |



REPORT NUMBER

|           | ORDINAT       |                            | ral Development - Draf  | RIG TYP          | E                                     |           |                | Dando 20       |                | SHEET        |             | BH14<br>Sheet 2 of 2  |                      |
|-----------|---------------|----------------------------|---|------------------|---------------------------------------|-----------|----------------|----------------|----------------|--------------|-------------|---|----------------------|
|           |               | /EL (m AOD)                |   | 25,772,910,452   | C<br>OLE DIAMETE                      | ER (m     |                | 200            |                | DATE STA     |             |   |                      |
| CLIE      | ENT<br>SINEER |                            | tral Developments Ltd   | BOREH            | OLE DEPTH (r<br>DEPTH (m)             |           | 1              | 2.00           |                | BORED B'     | Y           | J. McDonnell  |                      |
|           |               |                            |   |                  |                                       |           | <u>e</u>       |                | San            | nples        |             |   | Φ                    |
| Depth (m) |               | 1                          | Description   |                  | Legend                                | Elevation | Depth (m)      | Ref.<br>Number | Sample<br>Type | Depth<br>(m) | Recovery    | Field Test<br>Results   | Standpipe<br>Details |
| 10        | occasion      | al cobbles. Gr             | v clayey/silty sandy GR/<br>avel is fine to coarse an<br>alar of limestone. (contil | d                | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |           |                | AF4841         | В              | 11.00-11.00  |             | N = 82<br>(9, 13, 16, 19, 22, 25)<br>N = 100/225 mm<br>(15, 19, 35, 31, 34) |                      |
| 13        | End of B      | orehole at 12.0            | 00 m  |                  | 0 000                                 |           | 12.00          |                |                |              |             |   |                      |
| 15        |               |                            |   |                  |                                       |           |                |                |                |              |             |   |                      |
| 17        |               |                            |   |                  |                                       |           |                |                |                |              |             |   |                      |
| 18        |               |                            |   |                  |                                       |           |                |                |                |              |             |   |                      |
| НА        | RD STRA       | TA BORING/                 | CHISELLING  |                  | WATER                                 | _         |                |                |                |              |             |   |                      |
|           |               | (m) Time<br>(h)<br>12 1.25 | Comments  Boulder   |                  | Water<br>Strike                       |           | sing<br>epth   | Sealed<br>At   | Ris            |              |             | Comments  |                      |
|           |               |                            |   |                  | GROUND                                | NA/AT     | ED DET         | AII S          |                |              |             |   |                      |
|           |               |                            |   |                  | Date                                  |           | Hole           | Casing         |                | epth to C    | ommer       | nts   |                      |
| INS       | TALLATI       | ON DETAILS                 | Top RZ Base   | Гуре             | 13-11-08                              |           | Depth<br>12.00 | Depth<br>12.00 |                |              | nd of shift | 1   |                      |
|           | MARKS +       | land dug inspection        | n pit excavated to 1.20m. Nig   | ght work - shift |                                       |           |                |                |                |              |             |   |                      |



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### GEOTECHNICAL BORING RECORD

REPORT NUMBER

13696

CONTRACT BOREHOLE NO. **BH15 Dublin Central Development - Draft** SHEET Sheet 1 of 3 **CO-ORDINATES RIG TYPE** Dando 150 DATE STARTED 15/09/2008 BOREHOLE DIAMETER (mm) GROUND LEVEL (m AOD) 200 DATE COMPLETED 24/09/2008 BOREHOLE DEPTH (m) 21.20 CLIENT **Dublin Central Developments Ltd BORED BY** J. McDonnell **ENGINEER** CASING DEPTH (m) S. Letch AGL Consulting Ltd 21.20 PROCESSED BY Samples E E Standpipe Elevation Ref. Number Sample Type Recovery Field Test Description -egend Depth ( Depth Details Depth (m) Results 0 MADE GROUND consisting of tarmacadam. MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick, ash and concrete. 0.20 N = 4 (1, 1, 1, 1, 1, 1) AF4821 В 1.20-1.20 AF4822 N = 7(1, 2, 2, 2, 1, 2) В 2.00-2.00 2 N = 17 (4, 4, 4, 3, 2, 8) 3 AF4823 B 3 00-3 00 Very dense grey slightly clayey/silty sandy GRAVEL 3.50 00 80 with occasional cobbles. Gravel is fine to coarse and 200 subrounded to subangular of limestone. AF4824 В 4.00-4.00 N = 111(12, 16, 25, 30, 27, 29) 300000 N = 100/150 mm AF4825 В 5.00-5.00 (35, 48, 52) 0000 2000 AF4826 В 6.00-6.00 6 (15, 22, 30, 29, 27, 33) 400 N = 17 (4, 6, 4, 5, 4, 4) AF4827 В 7.00-7.00 N = 56AF4828 В 8.00-8.00 8 (6, 9, 11, 16, 15, 14) 9 AF4829 В 9.00-9.00 (9, 11, 16, 25, 20, 26) 8 200-HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Time Water Casing Sealed Rise Time From (m) To (m) Comments Comments (h) Strike Depth At To (min) 0.5 3.8 Boulder 6.00 6.00 No 4.70 5 Moderate 3.9 Boulder Boulder 0.5 5.8 Boulder 14.4 16.7 18.5 Hard Strata Boring Hard Strata Boring Hard Strata Boring **GROUNDWATER DETAILS** 14.4 16.7 Hole Casing Depth to Water Date Comments Depth Depth 18.5 21.2 Hard Strata Boring 15-09-08 End of shift Boulder 16-09-08 16-09-08 17-09-08 3.50 6.00 6.00 3.50 6.00 Start of shift End of shift **INSTALLATION DETAILS** Tip Depth RZ Top RZ Base Type 6.00 Start of shift REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.5m to aid drilling.



REPORT NUMBER

|           | ORDINAT               | Dublin Central Development - D  | RIG TY          | PE   |           | [  | Dando 15   |                | SHEET DATE ST                                |  | Sheet 2 of 3                                    |           |
|-----------|-----------------------|---|-----------------|--|-----------|--|--|----------------|--|--|---|-----------|
| GRC       | UND LE                | VEL (m AOD)   | BORE            | HOLE DIAME   | TER (r    | mm) 2  | 200  |                | DATE CO                                      | OMP  | <b>LETED</b> 24/09/2008                         |           |
|           | INEER                 | Dublin Central Developments Lt  | iu              | HOLE DEPTH<br>G DEPTH (m)  |           |  | 21.20<br>21.20                                     |                | BORED PROCES                                 |  | J. McDonnel  DBY S. Letch                       | I         |
|           |                       |   |                 |  |           | _  |  | San            | nples  |  |   | d)        |
| Deptn (m) |                       | Description   |                 | Legend   | Elevation | Depth (m)  | Ref.<br>Number                                     | Sample<br>Type | Depth<br>(m)                                 |  | Field Test Results                              | Standpipe |
|           | with occa             | se grey slightly clayey/silty sandy isional cobbles. Gravel is fine to colled to subangular of limestone. (co | parse and       |  |           |  | AF4830   | В              | 10.00-10.0                                   | O)   | N = 54<br>(7, 10, 11, 11, 17, 15)               |           |
| 11        |                       |   |                 | 2000   |           |  | AF4831   | В              | 11.00-11.0                                   | 0  | N = 47<br>(3, 5, 9, 9, 14, 15)                  |           |
| 12        |                       |   |                 |  |           |  | AF4832   | В              | 12.00-12.0                                   | 0  | N = 69<br>(5, 7, 20, 15, 16, 18)                |           |
| 13        |                       |   |                 | \$ 000<br>\$ 000 |           |  | AF4833   | В              | 13.00-13.0                                   | 0  | N = 100/150 mm<br>(3, 11, 26, 74)               |           |
| 14        |                       |   |                 |  |           |  | AF4834   | В              | 14.00-14.0                                   | 0  |   |           |
| 5         | Hard blad<br>occasion | ck slightly sandy gravelly CLAY wi<br>al cobbles  | th              |  |           | 14.40  | AF4835   | U              | 14.50-14.5                                   |  | rec<br>blows                                    |           |
| 16        |                       |   |                 |  |           |  | AF4836   | В              | 15.50-15.5                                   | 0  | N = 100/240 mm<br>(11, 15, 20, 25, 45, 10)      |           |
| 17        |                       |   |                 |  |           |  | AF4837   | В              | 16.50-16.5                                   | 0  | N = 100<br>(10, 15, 19, 24, 30, 27)             |           |
| 18        |                       |   |                 |  |           |  | AF4838   | В              | 17.50-17.5                                   | 0  | N = 100/150 mm<br>(20, 29, 40, 60)              |           |
| 19        |                       |   |                 |  |           |  | AF4839   | В              | 18.50-18.5                                   | 0  | N = 100/210 mm<br>(12, 26, 34, 37, 29)          |           |
|           |                       |   |                 | 0.0  |           |  | AF4840   | В              | 19.50-19.5                                   | 0  | N = 100/180 mm<br>(12, 30, 36, 44, 20)          |           |
|           |                       | TA BORING/CHISELLING  |                 | WATER  | _         |  | TAILS<br>Sealed                                    | Ris            | e Ti   | me   |   |           |
| 3.        | 9 4                   | (m) (h) Comments  8   |                 | Strike   |           | pth  | At   | To             |  | nin)   | Comments  |           |
| 5.        | 8 6                   | 0.5 Boulder   |                 | GROUNI   | DWAT      | ER DE  | TAILS  |                |  |  |   |           |
| 14<br>16  | .4 16<br>.7 18        | 1.7 8 Hard Strata Boring<br>1.5 8 Hard Strata Boring  |                 | Date   | 1         | Hole<br>Depth                                      | Casing<br>Depth                                    | De             | epth to (                                    | Comr   | ments   |           |
|           | TALLATIO              |   | Туре            | 17-09-08<br>18-09-08<br>18-09-08<br>19-09-08<br>19-09-08<br>22-09-08   |           | 11.00<br>11.00<br>14.40<br>14.40<br>16.70<br>16.70 | 11.00<br>11.00<br>14.40<br>14.40<br>16.70<br>16.70 |                | 5.50<br>5.50<br>5.80<br>5.80<br>6.40<br>6.10 | End of<br>Start of<br>End of<br>Start of<br>End of<br>Start of | f shift<br>shift<br>f shift<br>shift<br>f shift |           |
| REN       | MARKS H               | and dug inspection pit excavated to 1.20m. W<br>5m to aid drilling.   | ater added from | 22-09-08<br>23-09-08   |           | 18.50<br>18.50                                     | 18.50<br>18.50                                     |                |  | End of<br>Start of   |   |           |



BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

### **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

| CO               | NTRACT                | Dublin                          | Centra            | l Develop                                | ment - Draf    | ft               |          |      |           |               |      |                | - 1            | BOREHO       | LE NO      |  |                      |
|------------------|-----------------------|---------------------------------|-------------------|--|----------------|------------------|----------|------|-----------|---------------|------|----------------|----------------|--------------|------------|--|----------------------|
| co.              | -ORDINA               | TES                             |                   |  |                | RIG TYP          | )E       |      |           |               | Dan  | do 15          |                | SHEET        |            | Sheet 3 of 3                           |                      |
|                  | OUND LE               |                                 | (OD)              |  |                | CONTRACT NO CONT | OLE DIAM | /IET | ER (      | mm)           | 200  |                |                | DATE ST      |            | 15/09/2008<br>TED 24/09/2008           |                      |
| CLI              | ENT                   | Dublin                          | Centra            | l Developi                               | ments Ltd      | BOREH            | OLE DEP  | TH ( | (m)       |               | 21.2 | 20             |                | BORED E      | 3Y         | J. McDonne                             | II                   |
| ENC              | SINEER                | AGL Co                          | onsultin          | g Ltd                                    |                | CASING           | DEPTH (  | m)   |           |               | 21.2 | 20             |                | PROCES       | SED B      | Y S. Letch                             |                      |
| <u>-</u>         |                       |                                 |                   |  |                |                  |          |      | _         | <u>-</u>      |      |                |                | nples        |            |  | Φ                    |
| Depth (m)        |                       |                                 |                   | cription                                 |                |                  | Legend   |      | Elevation | Depth (m)     |      | Ref.<br>Number | Sample<br>Type | Depth<br>(m) | Recovery   | Field Test<br>Results                  | Standpipe<br>Details |
| - 20             | Hard blad<br>occasion | ck slightly<br>al cobbles       | sandy<br>s (conti | gravelly (<br>inued)                     | CLAY with      | 6                |          |      |           |               | A    | F4841          | В              | 20.50-20.50  |            | N = 100/175 mm<br>(13, 29, 35, 42, 23) |                      |
| - 22             | End of B              | orehole a                       | 21.20             | m  |                |                  |          |      |           | 21.20         | 0    |                |                |              |            |  |                      |
|                  |                       |                                 |                   |  |                |                  |          |      |           |               |      |                |                |              |            |  |                      |
| 23               |                       |                                 |                   |  |                |                  |          |      |           |               |      |                |                |              |            |  |                      |
| 24               |                       |                                 |                   |  |                |                  |          |      |           |               |      |                |                |              |            |  |                      |
| 25               |                       |                                 |                   |  |                |                  |          |      |           |               |      |                |                |              |            |  |                      |
| - 26             |                       |                                 |                   |  |                |                  |          |      |           |               |      |                |                |              |            |  |                      |
| 27               |                       |                                 |                   |  |                |                  |          |      |           |               |      |                |                |              |            |  |                      |
| - 28             |                       |                                 |                   |  |                |                  |          |      |           |               |      |                |                |              |            |  |                      |
| 29               |                       |                                 |                   |  |                |                  |          |      |           |               |      |                |                | . =          |            |  |                      |
| ША               | RD STRA               | TA BOB!                         | NGICH             | ISEL LINE                                | 2              |                  | NA/A T   | ED C | STD!      | KE DE         | TAU  | 9              |                |              |            |  |                      |
|                  |                       | Tie                             | ne                |  | ,              |                  | WATE     |      | Cas       | KE DE         | Seal |                | Rise           | e Tim        | ne c       | - mana a r-1 -                         |                      |
| From<br>3.<br>3. | 5 3.<br>9 4           | m) (h<br>3 0.<br>0.             | 5 Bo              | omments<br>oulder<br>oulder              |                |                  | Strike   |      | De        |               | At   |                | То             |              |            | omments                                |                      |
| 4.<br>5.         | 8 5<br>8 6            | 1 0.                            | 5 B               | oulder                                   | da a           |                  | GROU     | ND   | NAT       | ED DE         | TAU  | S              |                |              |            |  |                      |
| 14<br>16         | .4 16                 | 7 8                             | H                 | ard Strata Bo                            | ring           |                  | Date     |      | ŀ         | Hole          | Ca   | sing           | Dep            | oth to Co    | ommen      | ts                                     |                      |
| 18               | .5 21<br>1 21         | 2 2                             | H:<br>Bo          | ard Strata Bo<br>ard Strata Bo<br>oulder | ing            |                  | 23-09-   |      |           | epth<br>21.20 |      | epth<br>1.20   |                |              | d of shift |  |                      |
|                  | TALLATIO<br>Date Ti   | Depth F                         | RZ Top            | RZ Base                                  | Тур            | oe               |          |      |           |               |      |                |                |              |            |  |                      |
| REM              | MARKS Ha              | nd dug inspe<br>m to aid drilli | ction pit e       | excavated to                             | 1.20m. Water a | added from       |          |      |           |               |      |                |                |              |            |  |                      |



REPORT NUMBER

| COI                | NTRA               | ACT     | D       | ublin        | Central Developme                        | ent - Dra                               | ft                        |                                |   |               |                  | DRILLI<br>SHEET   | HOLE NO             | OW Shee   | <b>1</b><br>t 1 of 4 |
|--------------------|--------------------|---------|---------|--------------|--|---|---------------------------|--------------------------------|---|---------------|------------------|-------------------|---------------------|---|----------------------|
| co.                | ORE                | INA     | ΓES(    | _)           |  |   |                           | GROUND L                       | EVEL (m)<br>ETER (mm)   |               |                  |                   | STARTED<br>COMPLETE |   | 9/2008<br>9/2008     |
|                    | ENT                | ER      |         |              | Central Developme<br>onsulting Engineers | ents Ltd.                               |                           | NCLINATIO<br>LUSH              | N   |               | 90<br>Polymer Ge | DRILLI<br>LOGG    |                     | Miller<br>A. Ma                                       | nnium<br>ahony       |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.%      | Fracture Spacing (mm)  0 250 500         | Legend                                  | Non-intact zones (shaded) | Strata                         | description   | Depth (m)     | Disc             | ontinuities       | Flevation           | Standpipe Details                                     | SPT (N Value)        |
| 0                  |                    |         |         |              |  |   |                           | made gro                       | n Pit -<br>by driller as<br>ound consistin<br>and cobbles.                  | g             |                  |                   |                     | A11231112<br>A11231112<br>A11231112                   |                      |
| 2                  |                    |         |         |              |  |   |                           | HOLE DI<br>Observed<br>madegro | FRIX OPEN<br>RILLING:<br>d by driller as<br>und consisting<br>wood and clay | 1.20          |                  |                   |                     | XVII XVII XVII XVII XVII XVII XVII XVII               |                      |
| 3                  |                    |         |         |              |  |   |                           |                                |   |               |                  |                   |                     | X1112X1112X1112<br>X1112X1112X1112<br>X1112X1112X1112 |                      |
| 5                  |                    |         |         |              |  |   |                           | HOLE D                         | d by driller as   | 4.20          |                  |                   |                     | ]]]   |                      |
| 6                  |                    |         |         |              |  | 00000000                                |                           |                                |   |               |                  |                   |                     |   |                      |
| 7                  |                    |         |         |              |  | 000                                     |                           |                                |   |               |                  |                   |                     | XVIIXVIIXVIIXVIIXVIIXVIIX<br>XVIIXVIIXVIIXV           |                      |
| 9                  |                    |         |         |              |  | 000000000000000000000000000000000000000 |                           |                                |   |               |                  |                   |                     | XVII XVII XVII XVII XVII XVII XVII XVII               |                      |
| RFI                | MAR                | KS      |         |              |  | 00                                      |                           |                                | INSTALLAT   | ION REM       | ARKS             |                   |                     | NAK   |                      |
|                    |                    |         | pecti   | on pi        | t to 1.2m.                               |   |                           |                                | Headworks.  |               |                  |                   |                     |   |                      |
|                    |                    |         |         |              |  |   |                           |                                | GROUNDWA  |               |                  |                   |                     |   |                      |
|                    |                    |         |         |              |  |   |                           |                                | Date  | Hole<br>Depth | Casing<br>Depth  | Depth to<br>Water | Comments            | 3   |                      |
|                    | TAL<br>Date        | -       |         | DETA<br>epth |  |   | Type<br>mm \$             |                                |   |               |                  |                   |                     |   |                      |



REPORT NUMBER

| CONTR                                    | ACT     |                | ublin   | Central [            | Developm         | ent - Dra | aft                       |  |  |           |                  |   | LHOLE N          | Ю         | OW                |                               |  |
|--|---------|----------------|---------|----------------------|------------------|-----------|---------------------------|--|--|-----------|------------------|---|------------------|-----------|-------------------|-------------------------------|--|
| CO-ORI                                   | DINA    | TES(           | _)      |                      |                  |           |                           |  | LEVEL (m)<br>METER (mm                                   | )         |                  | 200000000000000000000000000000000000000 | START            |           | 15/0              | et 2 of 4<br>9/2008<br>9/2008 |  |
| CLIENT                                   |         |                |         | Central Donsulting I |                  | ents Ltd  |                           | NCLINATI<br>LUSH   | ON   |           | -90<br>Polymer G |   | LED BY<br>GED BY |           |                   | nnium<br>ahony                |  |
| Downhole Depth (m)<br>Core Run Depth (m) | T.C.R.% | S.C.R.%        | R.Q.D.% | Frac<br>Spac<br>(mi  | m) 500           | Legend    | Non-intact zones (shaded) | Strata   | a description  | Depth (m) | Dis              | continuities                            | 3                | Elevation | Standpipe Details | SPT (N Value)                 |  |
| 111                                      |         |                |         |                      |                  |           |                           | SYMME<br>HOLE I<br>Observer<br>returns<br>(continual<br>SYMME<br>HOLE I<br>SYMME<br>HOLE I | TRIX OPEN<br>DRILLING:<br>ed by driller a<br>of clay and | s 13.20   |                  |   |                  |           |                   |                               |  |
| EMARI                                    |         | pection        | on pit  | to 1.2m.             |                  |           |                           |  | INSTALLA<br>Headworks                                    |           | ARKS             |   |                  |           | N.Z.ZI IVI        |                               |  |
|  |         |                |         |                      |                  |           |                           |  |  |           |                  |   |                  |           |                   |                               |  |
|  |         |                |         |                      |                  |           |                           |  | GROUNDV  | Hole      | Casing           | Depth to                                | Comm             | onto      |                   |                               |  |
|  |         |                |         |                      |                  |           |                           |  | Date   | Depth     | Depth            | Depth to<br>Water                       | Comm             | ents      |                   |                               |  |
| STALI                                    |         |                |         |                      |                  |           |                           |  |  |           |                  |   |                  |           |                   |                               |  |
| Date<br>16-09-0                          | 8       | Tip De<br>13.5 | 0       | 10.50                | RZ Base<br>13.50 | 50r       | Type<br>nm S              | Р  |  |           |                  |   |                  |           |                   |                               |  |
| 6-09-0                                   |         | 33.0           | 0       | 27.00                | 33.00            | 50r       | nm S                      | Р  |  |           |                  |   |                  |           |                   |                               |  |



REPORT NUMBER

| CONTRA   | СТ      | Duk     | olin (  | Central D            | evelopme              | ent - Draf | ft  |   |                               |                   | DRILLI<br>SHEET   | HOLE NO | 0         | OW1               | 3 of 4        |
|--|---------|---------|---------|----------------------|-----------------------|------------|---|---|-------------------------------|-------------------|-------------------|---------|-----------|-------------------|---------------|
| CO-ORD   | INA     | TES(_   | )       |                      |                       |            |   | D LEVEL (m)<br>NAMETER (mm  | )                             |                   | DATE              | STARTE  |           | 15/09/            | 2008          |
| CLIENT   | ER      |         |         |                      | evelopme<br>Engineers | nts Ltd.   | FLUSH   | TION  |                               | -90<br>Polymer Ge | DRILL<br>LOGG     |         |           | Millenr<br>A. Mah | 3.7.4.1.1.1.1 |
| Downhole Depth (m)<br>Core Run Depth (m)             | T.C.R.% | C.R.    | R.Q.D.% | Fract<br>Spac<br>(mr | n)<br>500             | Legend     | Non-intact zones (shaded)   | rata description  | Depth (m)                     | Disc              | continuities      |         | Elevation | Standpipe Details | SPT (N Value) |
| - 22<br>- 22<br>- 23<br>- 24<br>- 25<br>- 26<br>- 27 |         |         |         |                      |                       |            | HOL Obse return grave SYM HOL Obse return cobb SYM HOL Obse return rock OPE DRIL obse | METRIX OPEN<br>E DRILLING:<br>erved by driller a<br>ns of weathered | s 20.70<br>s 21.50<br>s 22.00 | c&10&D            | Nº 25176          | 5/2022  |           |                   |               |
| REMARI   | KS      |         |         |                      |                       |            |   | INSTALLA  | TION REM                      | ARKS              |                   |         |           | 1                 |               |
| Hand du  | g ins   | pection | n pit   | to 1.2m.             |                       |            |   | Headworks   | 3.                            |                   |                   |         |           |                   |               |
|  |         |         |         |                      |                       |            |   | GROUNDY   | WATER DE                      | TAILS             |                   |         |           |                   |               |
|  |         |         |         |                      |                       |            |   | Date  | Hole<br>Depth                 | Casing<br>Depth   | Depth to<br>Water | Comm    | ents      |                   |               |
| IN IST   |         | 01: -   | -       |                      |                       |            |   |   |                               |                   |                   |         |           |                   |               |
| INSTALI  |         |         |         |                      | D7 Bass               |            | Tyne  |   |                               |                   |                   |         |           |                   |               |
| 16-09-0  | 8       | 13.50   |         | 10.50                | 13.50                 | 50r        | Type<br>nm SP   |   |                               |                   |                   |         |           |                   |               |
| 16-09-0  | 8       | 33.00   |         | 27.00                | 33.00                 | 50r        | nm SP   |   |                               |                   |                   |         |           |                   |               |



REPORT NUMBER

| CON  | NTR/               | ACT     | D       | ublin   | Central Dev                | /elopme         | ent - Dra | ift                       |                                |   |           |                   |                   | HOLE N | 0         | OW                |                              |
|--|--------------------|---------|---------|---------|----------------------------|-----------------|-----------|---------------------------|--------------------------------|---|-----------|-------------------|-------------------|--------|-----------|-------------------|------------------------------|
| CO-  | ORE                | OINA'   | TES(    | _)      |                            |                 |           |                           |                                | LEVEL (m)<br>METER (mm)                       |           |                   |                   | STARTE |           | 15/09             | t 4 of 4<br>0/2008<br>0/2008 |
| CLIE   | INE                |         |         |         | Central Dev                |                 | ents Ltd. |                           | NCLINATION LUSH                | ON  |           | -90<br>Polymer Ge |                   | ED BY  |           | Miller<br>A. Ma   |                              |
| Downhole Depth (m)                           | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Fractur<br>Spacing<br>(mm) | g<br>500        | Legend    | Non-intact zones (shaded) | Strata                         | a description                                 | Depth (m) | Disc              | continuities      |        | Elevation | Standpipe Details | SPT (N Value)                |
| 30<br>31<br>32<br>33<br>34<br>35<br>36<br>37 |                    |         |         |         |                            |                 |           |                           | observe<br>returns<br>(continu | NG: No recover<br>d by driller as<br>of rock. | 33.00     |                   |                   |        |           |                   |                              |
| REM<br>Hand                                  |                    |         |         |         |                            |                 |           |                           |                                |   |           |                   |                   |        |           |                   |                              |
| REM  | IARI               |         | necti   | on ni   | to 1.2m.                   |                 |           |                           |                                | INSTALLATI                                    | ON REM    | IARKS             |                   |        |           |                   |                              |
| iaf10  | u uu               | y IIIS  | pecili  | on pil  | to 1.ZIII.                 |                 |           |                           |                                | Headworks.                                    |           | TAH 0             |                   |        |           |                   |                              |
|  |                    |         |         |         |                            |                 |           |                           |                                | GROUNDWA<br>Date                              | Hole      | Casing            | Depth to<br>Water | Comme  | ents      |                   |                              |
|  |                    |         |         |         |                            |                 |           |                           |                                | Date  | Depth     | Depth             | Water             | Commi  | -110      |                   | 100                          |
| NST  |                    |         |         | ETA     |                            |                 |           | -                         |                                |   |           |                   |                   |        |           |                   |                              |
| 16-0   | 09-0               |         | 13.5    |         |                            | Z Base<br>13.50 |           | Гуре<br>nm S              | SP.                            |   |           |                   |                   |        |           |                   |                              |
| 16-0   | 09-0               |         | 33.0    | 00      | 27.00                      | 33.00           | 50r       | nm S                      | SP                             |   |           |                   |                   |        |           |                   |                              |



REPORT NUMBER

| COI                | NTRA                  | АСТ     | D       | ublin      | Central Develo                       | pmen | t - Dra | ft                        |   |           |                   | DRILLI<br>SHEET   | HOLE NO            |   | RC08<br>Sheet     | 3<br>1 of 33  |
|--------------------|-----------------------|---------|---------|------------|--------------------------------------|------|---------|---------------------------|---|-----------|-------------------|-------------------|--------------------|---|-------------------|---------------|
| 00-                | ORD                   | INAT    | TES(    | _)         |                                      |      |         | С                         | ROUND LEVEL (m) ORE DIAMETER (mm)   |           | 102               |                   | STARTED<br>COMPLET |   | 13/09/<br>14/09/  |               |
|                    | ENT                   | ER      |         |            | Central Develo                       |      | ts Ltd. |                           | LUSH  |           | 90<br>Polymer Gel | DRILLE            |                    |   | Millenr<br>A. Mał |               |
| Downhole Depth (m) | Core Run Depth (m)    | T.C.R.% | S.C.R.% | R.Q.D.%    | Fracture<br>Spacing<br>(mm)          | 00   | Legend  | Non-intact zones (shaded) | Description   | Depth (m) | Disco             | ontinuities       |                    | Elevation                               | Standpipe Details | SPT (N Value) |
| 0                  |                       |         |         |            |                                      |      |         |                           | Inspection Pit - observed by driller as made ground consisting of gravel, sand, brick and timber. |           |                   |                   |                    | 8/1/8/1/8/1/8/1/8/1/8/1/8/1/8/1/8/1/8/1 | 71787118811188    |               |
|                    | VIAR                  |         | pectio  | on nit     | to 1.2m.                             |      |         |                           | INSTALLATI  | ON REM    | ARKS              |                   |                    | K                                       | MN                |               |
| - sett             | _ 44                  | 310     | , 5500  | pil        |                                      |      |         |                           | Headworks.  | TER DE    | TAIL C            |                   |                    |   |                   |               |
|                    |                       |         |         |            |                                      |      |         |                           | GROUNDWA<br>Date  | Hole      | Casing            | Depth to<br>Water | Commer             | nts                                     |                   |               |
| 14                 | TALI<br>Date<br>-09-0 | 8       |         | epth<br>00 | RZ Top RZ E<br>6.00 13.<br>26.50 32. | 00   | 50r     | Type<br>nm S              | SP SP   | Depth     | Depth             | vvaler            |                    |   |                   |               |



REPORT NUMBER

|   |                    |         |         |         |                                      |        |                           | LEVEL (m)                 |  |              |                         | SHEE   | STARTE                  | ED    | 13/09     | t 2 of 33<br>9/2008                      |               |  |
|---|--------------------|---------|---------|---------|--------------------------------------|--------|---------------------------|---------------------------|--|--------------|-------------------------|--------|-------------------------|-------|-----------|--|---------------|--|
| CLIENT Dublin Central Developments Ltd. ENGINEER AGL Consulting Engineers   |                    |         |         | II      | CORE DIAMETER (mm) INCLINATION FLUSH |        |                           | 102<br>-90<br>Polymer Gel |  | DRILL        | DRILLED BY<br>LOGGED BY |        | Millennium<br>A. Mahony |       |           |  |               |  |
| → Downhole Depth (m)  | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm)          | Legend | Non-intact zones (shaded) |                           | escription   | :            | Deptn (m)               | Disc   | continuities            |       | Elevation | Standpipe Details                        | SPT (N Value) |  |
|   |                    |         |         |         |                                      |        |                           | made g of grave and timi  | id by driller a round consistent consistent continuation of the co | titing ( ed) | 220                     |        |                         |       |           | XIII KAIII KAIII KAII KAII KAII KAII KAI |               |  |
|   | /IARI              |         | pecti   | on pit  | to 1.2m.                             |        |                           |                           | INSTALLA   |              | EMA                     | RKS    |                         |       |           |  |               |  |
| , with  | _ uu               | 913     | , ,     | or but  |                                      |        |                           |                           | Headworks  |              |                         |        |                         |       |           |  |               |  |
|   |                    |         |         |         |                                      |        |                           |                           | GROUND   | WATER I      |                         | Casing | Depth to                | Comme | onto      |  |               |  |
| NSTALLATION DETAILS           Date         Tip Depth         RZ Top         RZ Base         Type           14-09-08         13.00         6.00         13.00         50mm SP           14-09-08         32.50         26.50         32.50         50mm SP |                    |         |         |         |                                      |        | Date                      | Depth                     | 1  | Depth        | Depth to<br>Water       | Commo  | ents                    |       |           |  |               |  |



REPORT NUMBER

| _  | ORE                | DINA    |         |         | Central Developme                           |        | G                         | GROUND L             | EVEL (m)   | )                              | 1           | 02           | DATE :            | HOLE NO STARTED COMPLETE | 13/09                                      | t 3 of 33<br>9/2008<br>9/2008 |
|--|--------------------|---------|---------|---------|---|--------|---------------------------|----------------------|--|--------------------------------|-------------|--------------|-------------------|--------------------------|--|-------------------------------|
| CLIENT Dubilit Central Developments Ltd. |                    |         |         |         |   |        |                           |                      |  | -90 DRILLED Polymer Gel LOGGED |             |              |                   | Millennium<br>A. Mahony  |  |                               |
| Downhole Depth (m)                       | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture Spacing (mm)  0 250 500            | Legend | Non-intact zones (shaded) | Des                  | scription  |                                | Depth (m)   | Disc         | continuities      | Elevation                | Standpipe Details                          | SPT (N Value)                 |
| 2  |                    |         |         |         |   |        |                           | SYMME HOLE D Observe | TRIX OPEN RILLING: d by driller as f gravelly cla oles (continu  TRIX OPEN RILLING: d by driller as f gravelly cla | yy ed)                         | 2.70        |              |                   |                          | KOTIKATI KATI KATI KATI KATI KATI KATI KAT |                               |
|  | MAR<br>nd du       |         | pect    | ion pi  | t to 1.2m.                                  |        |                           |                      | Headworks  |                                | REMA        | ARKS         |                   |                          |  |                               |
|  |                    |         |         |         |   |        |                           |                      | GROUNDV  |                                | R DET       | AILS         |                   |                          |  |                               |
|  |                    |         |         |         |   |        |                           |                      | Date   | Н                              | ole<br>epth | Casing Depth | Depth to<br>Water | Comments                 | 3  |                               |
| 14                                       | Date<br>-09-0      | 08      |         | 00      | RZ Top RZ Base<br>6.00 13.00<br>26.50 32.50 | 50     | Type<br>mm s              | SP                   |  |                                |             |              |                   |                          |  |                               |



REPORT NUMBER

| CO                              | NTR                | ACT     | D       | ublin   | Central [         | Developm   | ent - Dra  | aft                       |  |           |           |                   | LHOLE N     | 0         | RC                                       |                      |
|---------------------------------|--------------------|---------|---------|---------|-------------------|------------|------------|---------------------------|--|-----------|-----------|-------------------|-------------|-----------|--|----------------------|
| co                              | -ORI               | DINA    | TES(    | _)      |                   |            |            | 0                         | ROUND LEVEL (m)  |           |           | SHEE              | T<br>STARTI | ED        |  | et 4 of 33<br>9/2008 |
|                                 |                    |         | (       | _ /     |                   |            |            |                           | ORE DIAMETER (mm)  |           | 102       |                   | COMPL       |           |  | 9/2008               |
| CLI                             | ENT                |         | D       | ublin   | Central [         | Developm   | ents Ltd   | 11                        | CLINATION  |           | -90       | DRIL              | LED BY      |           | Mille                                    | nnium                |
|                                 | GINE               |         |         |         |                   | Engineers  |            |                           | USH  |           | Polymer G |                   | GED BY      |           |  | ahony                |
| <sup>∞</sup> Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Frac<br>Spa<br>(m | cing<br>m) | o   Legend | Non-intact zones (shaded) | Description  SYMMETRIX OPEN  | Depth (m) | Dis       | continuities      | 3           | Elevation | Standpipe Details                        | SPT (N Value)        |
|                                 |                    |         |         |         |                   |            |            |                           | HOLE DRILLING: Observed by driller as returns of gravelly clay (continued) |           |           |                   |             |           | KUITKUITKUITKUITKUITKUITKUITKUITKUITKUIT |                      |
| _                               | ARI<br>d du        |         | pectio  | n pit   | to 1.2m.          |            |            |                           | INSTALLATION   | KEM       | AKNO      |                   |             |           |  |                      |
| . 411                           | uu                 | 9 1113  | -5500   | pil     |                   |            |            |                           | Headworks.   |           |           |                   |             |           |  |                      |
|                                 |                    |         |         |         |                   |            |            |                           | GROUNDWATE   | R DE      | TAILS     |                   |             |           |  |                      |
|                                 |                    |         |         |         |                   |            |            |                           | Date H   | lole      | Casing    | Depth to<br>Water | Comme       | ents      |  |                      |
|                                 |                    |         |         |         |                   |            |            |                           | Della  | epth      | Depth     | vvater            | 55.11111    |           |  |                      |
| 44.                             | TALL               | ATIO    | ON D    | ETA     | ILS               |            |            |                           |  |           |           |                   |             |           |  |                      |
| NS.                             |                    |         |         |         |                   | RZ Base    | -          | Гуре                      |  |           |           |                   |             |           |  |                      |
| [                               | Date<br>09-0       |         | ib De   | 2 20 11 | 1 100             | ,          |            | nm S                      |  |           | '         |                   |             |           |  |                      |



REPORT NUMBER

|                    | NTR/                 | 1904.0.10 |         |         | Central Developme                           | ent - Dra                               | 1                         |   |           |                   | DRILLI<br>SHEET   | HOLE NO             | RC0<br>Sheet                            | <b>8</b> t 5 of 33 |
|--------------------|----------------------|-----------|---------|---------|---|---|---------------------------|---|-----------|-------------------|-------------------|---------------------|---|--------------------|
| :0-                | ORE                  | INA       | TES(    | _)      |   |   | c                         | GROUND LEVEL (m)<br>CORE DIAMETER (mm)  |           | 102               |                   | STARTED<br>COMPLETE |   | )/2008<br>)/2008   |
|                    | ENT                  | ER        |         |         | Central Developme<br>onsulting Engineers    | ents Ltd.                               |                           | NCLINATION<br>LUSH  |           | 90<br>Polymer Gel | DRILL             |                     | Miller<br>A. Ma                         |                    |
| Downhole Depth (m) | Core Run Depth (m)   | T.C.R.%   | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm)                 | Legend                                  | Non-intact zones (shaded) | Description   | Depth (m) | Disco             | ntinuities        | Elevation           | Standpipe Details                       | SPT (N Value)      |
| 4                  |                      |           |         |         |   | 0 0                                     |                           | SYMMETRIX OPEN<br>HOLE DRILLING:<br>Observed by driller as<br>returns of gravelly clay<br>(continued) | ,         |                   |                   |                     |   |                    |
|                    |                      |           |         |         |   | 000000000000000000000000000000000000000 |                           | SYMMETRIX OPEN<br>HOLE DRILLING:<br>Observed by driller as<br>returns of gravel.                      | 4.20      |                   |                   |                     |   |                    |
|                    |                      |           |         |         |   |   |                           |   |           |                   |                   |                     | XIII KUII KUII KUII KUII KUII KUII KUII |                    |
|                    | <b>MAR</b><br>nd du  |           | pecti   | on pit  | t to 1.2m.                                  | 000                                     |                           | INSTALLAT<br>Headworks.   |           |                   |                   |                     |   |                    |
|                    |                      |           |         |         |   |   |                           | GROUNDW   | Hole      |                   | Depth to          | Comments            |   |                    |
| 14-                | TAL<br>Date<br>-09-0 | 18        | ON E    | 00      | RZ Top RZ Base<br>6.00 13.00<br>26.50 32.50 | 50                                      | Type                      | SP  | Depth     | Depth             | Depth to<br>Water | Commonto            |   |                    |



REPORT NUMBER

| СО                 | NTR                | ACT     |               | Oublin  | Central [      | Developme        | ent - Dra | aft                       |          |  |       |           |              | 10000000   | LLHOLE   | NO        | RCC  |                      |
|--------------------|--------------------|---------|---------------|---------|----------------|------------------|-----------|---------------------------|----------|--|-------|-----------|--------------|------------|----------|-----------|--|----------------------|
| СО                 | -ORI               | DINA    | TES(          | _)      |                |                  |           |                           |          | LEVEL (m)  |       |           |              | 1000000    | TE START |           | 13/09  | et 6 of 33<br>9/2008 |
|                    |                    |         |               |         |                | 2                |           | C                         | ORE DIA  | METER (mn  | 1)    |           | 102          | DA         | TE COMP  | LETED     | 14/09  | 9/2008               |
| CLI                | ENT                |         |               | Dublin  | Central [      | Developme        | ents Ltd  | 11                        | NCLINATI | ON   |       |           | -90          | DRI        | LLED BY  |           | Miller   | nnium                |
| EN                 | GINE               | ER      | Α             | GL C    | Consulting     | Engineers        |           | F                         | LUSH     |  |       |           | Polymer G    | el LO      | GED BY   |           | A. Ma  | ahony                |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.%       | R.Q.D.% | Spa            |                  | Legend    | Non-intact zones (shaded) | D€       | escription   |       | Depth (m) | Dis          | continuiti | es       | Elevation | Standpipe Details  | SPT (N Value)        |
| 5                  |                    |         |               |         |                |                  |           |                           | HOLE I   | ETRIX OPEN<br>DRILLING:<br>ed by driller a<br>of gravel. |       |           |              |            |          |           | XXII IXXII I |                      |
|                    | MAR                |         |               |         |                |                  |           |                           |          | INSTALL  | ATION | REM       | ARKS         |            |          |           |  |                      |
| lar                | nd du              | ıg ins  | pecti         | on pi   | t to 1.2m.     |                  |           |                           |          | Headworks  | 3.    |           |              |            |          |           |  |                      |
|                    |                    |         |               |         |                |                  |           |                           |          | CROUND   | MATE  | D DE      | TAIL C       |            |          |           |  |                      |
|                    |                    |         |               |         |                |                  |           |                           |          | Date Date  |       | ole       | Casing Depth | Depth t    | O Comr   | nents     |  |                      |
|                    |                    |         |               |         | MD etc.        |                  |           |                           |          |  |       | pt M.I    | Бориг        |            |          |           |  |                      |
|                    |                    | LATI    |               |         |                |                  |           | _                         |          |  |       |           |              |            |          |           |  |                      |
|                    | Date<br>-09-0      |         | Tip D<br>13.0 |         | RZ Top<br>6.00 | RZ Base<br>13.00 |           | Type<br>mm S              |          | -  |       |           |              |            |          |           |  |                      |
|                    | -09-0              |         | 32.5          |         | 26.50          | 32.50            |           | mm S                      |          |  |       |           |              |            |          |           |  |                      |



REPORT NUMBER

|                    | ORE                | OINA    |         |         | Central Developmen                          | t - Draf | G                         | ROUND LEVEL (m) ORE DIAMETER (mm)   |           | 102               | DATE              | HOLE NO STARTED COMPLETED | 13/09             | 08<br>t 7 of 33<br>9/2008<br>9/2008 |
|--------------------|--------------------|---------|---------|---------|---|----------|---------------------------|---|-----------|-------------------|-------------------|---------------------------|-------------------|-------------------------------------|
|                    | ENT                |         |         |         | Central Developmen                          | ts Ltd.  | IN                        | CLINATION   | -         | 90<br>Polymer Gel | DRILL             | ED BY                     |                   | nnium                               |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm)                 | Legend   | Non-intact zones (shaded) | Description   | Depth (m) | Disco             | ontinuities       | Elevation                 | Standpipe Details | SPT (N Value)                       |
| 6                  |                    |         |         |         |   |          |                           | SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. (continued) |           |                   |                   |                           |                   |                                     |
| _                  | WAR                |         | 4       |         |   | -01      |                           | INSTALLATIO   | N REM     | ARKS              |                   |                           | rj rj rj          |                                     |
| nar                | ia du              | y ins   | pecti   | on pr   | t to 1.2m.                                  |          |                           | Headworks.  |           |                   |                   |                           |                   |                                     |
|                    |                    |         |         |         |   |          |                           | GROUNDWA  | Hole      |                   | Donth to          |                           |                   |                                     |
|                    |                    |         |         |         |   |          |                           | Date  | Depth     | Casing<br>Depth   | Depth to<br>Water | Comments                  |                   |                                     |
| 14                 | Date<br>-09-0      | 18      |         | 00      | RZ Top RZ Base<br>6.00 13.00<br>26.50 32.50 | 50n      | ype<br>nm S<br>nm S       | P<br>P  |           |                   |                   |                           |                   |                                     |



REPORT NUMBER

| СО                 | NTR                | ACT     |         | Oublin  | Central I     | Developm              | ent - Dra | aft                       |   |           |                  | DRILL<br>SHEE     | HOLE N | 0         | RC0               | 8<br>t 8 of 33 |
|--------------------|--------------------|---------|---------|---------|---------------|-----------------------|-----------|---------------------------|---|-----------|------------------|-------------------|--------|-----------|-------------------|----------------|
| СО                 | -ORI               | DINA    | TES(    | _)      |               |                       |           |                           | GROUND LEVEL (m)  | )         | 102              | DATE              | STARTI |           | 13/09             | 0/2008         |
|                    | IENT               |         |         |         |               | Developm<br>Engineers |           |                           | NCLINATION  |           | -90<br>Polymer G |                   | ED BY  |           | Miller<br>A. Ma   | nnium<br>ahony |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Spa<br>(m     | cture<br>icing<br>im) | Legend    | Non-intact zones (shaded) | Description   | Depth (m) | Dis              | scontinuities     |        | Elevation | Standpipe Details | SPT (N Value)  |
| 7                  |                    |         |         |         |               |                       |           |                           | SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. (continued) |           |                  |                   |        |           |                   |                |
|                    | MAR<br>nd du       |         | pection | on pit  | to 1.2m.      |                       |           |                           | INSTALLA<br>Headworks   |           | IARKS            |                   |        |           |                   |                |
|                    |                    |         |         |         |               |                       |           |                           |   | 2         |                  |                   |        |           |                   |                |
|                    |                    |         |         |         |               |                       |           |                           | GROUNDW   | Hole      | T                | Donth to          |        |           |                   |                |
|                    |                    |         |         |         |               |                       |           |                           | Date  | Depth     | Casing<br>Depth  | Depth to<br>Water | Comm   | ents      |                   |                |
| VS                 | TAL                | LATI    | ON D    | ETA     | ILS           |                       |           |                           |   |           |                  |                   |        |           |                   |                |
|                    | Date               | -       | Γip D   | epth    | RZ Top        | RZ Base               |           | Туре                      |   |           |                  |                   |        |           |                   |                |
|                    | -09-0              |         | 13.0    |         | 6.00<br>26.50 | 13.00<br>32.50        |           | mm S                      |   |           |                  |                   |        |           |                   |                |



REPORT NUMBER

| СО                 | NTR                | ACT     | D       | ublin   | Central Developme                           | ent - Dra | aft                       |   |           |                    | DRILLI<br>SHEET   | HOLE NO              | RC0<br>Shee       | <b>18</b><br>t 9 of 33 |
|--------------------|--------------------|---------|---------|---------|---|-----------|---------------------------|---|-----------|--------------------|-------------------|----------------------|-------------------|------------------------|
| СО                 | -ORE               | OINA.   | TES(    | _)      |   |           | C                         | GROUND LEVEL (m) CORE DIAMETER (mm)   |           | 102                |                   | STARTED<br>COMPLETED |                   | 9/2008<br>9/2008       |
|                    | ENT                |         |         |         | Central Developme<br>onsulting Engineers    | ents Ltd  |                           | NCLINATION<br>LUSH  |           | -90<br>Polymer Gel | DRILLI            |                      | Miller<br>A. Ma   | nnium<br>ahony         |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm)                 | Legend    | Non-intact zones (shaded) | Description   | Depth (m) | Disco              | ntinuities        | Elevation            | Standpipe Details | SPT (N Value)          |
| 8                  |                    |         |         |         |   |           |                           | SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. (continued) |           |                    |                   |                      |                   |                        |
|                    | MAR<br>nd du       |         | pecti   | on pit  | t to 1.2m.                                  |           |                           | INSTALLATION Headworks.   | ON REM    | ARKS               |                   |                      |                   |                        |
|                    |                    |         |         |         |   |           |                           | GROUNDWA  | TER DF    | TAILS              |                   |                      |                   |                        |
|                    |                    |         |         |         |   |           |                           | Date  | Hole      | Casing             | Depth to<br>Water | Comments             |                   |                        |
| 14                 | Date<br>-09-0      | 08      |         | 00      | RZ Top RZ Base<br>6.00 13.00<br>26.50 32.50 | 50        | Type<br>mm (              | SP  | Depth     | Depth              | Water             | Comments             |                   |                        |



REPORT NUMBER

| СО                 | NTR                  | ACT     | D            | ublin   | Central I     | Developme              | ent - Dra | aft                       |   |               |                  | DRILL             | HOLE N | 0         | RC                | 18 at 10 of 33 |
|--------------------|----------------------|---------|--------------|---------|---------------|------------------------|-----------|---------------------------|---|---------------|------------------|-------------------|--------|-----------|-------------------|----------------|
| СО                 | -ORI                 | OINA    | TES(         | _)      |               |                        |           |                           | GROUND LEVEL (m) CORE DIAMETER (mm)   | )             | 102              | DATE              | STARTE |           | 13/0              | 9/2008         |
|                    | ENT                  |         |              |         |               | Developme<br>Engineers | ents Ltd. |                           | NCLINATION<br>LUSH  |               | -90<br>Polymer G | 97                | ED BY  |           |                   | nnium<br>ahony |
| Downhole Depth (m) | Core Run Depth (m)   | T.C.R.% | S.C.R.%      | R.Q.D.% | Spa           |                        | Legend    | Non-intact zones (shaded) | Description   | Depth (m)     | Dis              | continuities      |        | Elevation | Standpipe Details | SPT (N Value)  |
| 9                  |                      |         |              |         |               |                        |           |                           | SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. (continued) |               |                  |                   |        |           |                   |                |
|                    | d du                 |         | pectio       | on pit  | t to 1.2m.    | 8                      |           |                           | INSTALLAT<br>Headworks.   | ION REM       | ARKS             |                   |        |           |                   |                |
|                    |                      |         |              |         |               |                        |           |                           | GROUNDWA  | ATER DE       | TAILS            |                   |        |           |                   |                |
|                    |                      |         |              |         |               |                        |           |                           | Date  | Hole<br>Depth | Casing Depth     | Depth to<br>Water | Comme  | ents      |                   |                |
| NS'                | TALI                 |         | ON D         |         |               |                        |           |                           |   | Deput         | Deptil           | . 70.01           |        |           |                   |                |
| 14-                | Oate<br>09-0<br>09-0 | 8       | 13.0<br>32.5 | 0       | 6.00<br>26.50 | 13.00<br>32.50         | 50r       | Type<br>nm S<br>nm S      | SP SP   |               |                  |                   |        |           |                   |                |



REPORT NUMBER

| CO                 | NTRA                 | ACT     | D       | ublin   | Central Developm                            | ent - Dra | aft                       |        |  |               |                |       | DRILLI            | HOLE NO | 0         | RC0<br>Sheet      | 8<br>t 11 of 33  |
|--------------------|----------------------|---------|---------|---------|---|-----------|---------------------------|--------|--|---------------|----------------|-------|-------------------|---------|-----------|-------------------|------------------|
| 00                 | ORE                  | INA     | TES(    | _)      |   |           |                           |        | LEVEL (m)<br>METER (mm   | )             | 102            |       | DATE              | STARTE  |           | 13/09             | 0/2008<br>0/2008 |
|                    | ENT                  | ER      |         |         | Central Developm onsulting Engineers        |           |                           | LUSH   | ON   |               | -90<br>Polymer | Gel   | DRILL             |         |           | Miller<br>A. Ma   |                  |
| Downhole Depth (m) | Core Run Depth (m)   | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm)                 | Legend    | Non-intact zones (shaded) | De     | escription   | Depth (m)     | D              | iscon | tinuities         |         | Elevation | Standpipe Details | SPT (N Value)    |
| 10                 |                      |         |         |         |   |           |                           | HOLE D | ETRIX OPEN<br>DRILLING:<br>ed by driller a<br>of gravel.<br>ued) |               |                |       |                   |         |           |                   |                  |
|                    | MAR<br>nd du         |         | pecti   | on pi   | t to 1.2m.                                  |           |                           |        | INSTALLA<br>Headworks  |               | MARKS          |       |                   |         |           |                   |                  |
|                    |                      |         |         |         |   |           |                           |        | GROUND   |               | ETAILS         |       |                   |         |           |                   |                  |
|                    |                      |         |         |         |   |           |                           |        | Date   | Hole<br>Depth | Casing         | 3 [   | Depth to<br>Water | Comm    | ents      |                   |                  |
| 14                 | TAL<br>Date<br>-09-0 | 8       |         | epth    | RZ Top RZ Base<br>6.00 13.00<br>26.50 32.50 | 50        | Type<br>mm :              | SP     | -  | 2.5641        |                |       |                   |         |           |                   |                  |



REPORT NUMBER

| СО                 | NTR                | ACT     |         | Oublir  | Central I | Developm              | ent - Dra | aft                       |                      |  |      |             |                 |               | RILLHOLE N | 10        | RC                |               |
|--------------------|--------------------|---------|---------|---------|-----------|-----------------------|-----------|---------------------------|----------------------|--|------|-------------|-----------------|---------------|------------|-----------|-------------------|---------------|
| 00                 | 000                | DING    | TEC     |         |           |                       |           | 7                         | SROLIND              | LEVEL (m)  |      |             |                 |               | EET        | The Board |                   | et 12 of 33   |
| CO                 | -ORI               | DINA    | TES(    | _)      |           |                       |           |                           |                      |  | m)   |             | 102             |               | TE START   |           |                   | 9/2008        |
| _                  |                    |         |         |         |           |                       |           |                           |                      | METER (mr  | 11)  |             |                 |               | TE COMPL   | EIED      |                   | 9/2008        |
|                    | ENT                |         |         |         |           | Developm              |           |                           | NCLINATI             | ON   |      |             | -90             |               | ILLED BY   |           |                   | nnium         |
| П                  | SINE               | EK      | I       | GL C    | onsulting | Engineers             |           | -   -                     | LUSH                 |  |      | Т           | Polymer C       | sel LC        | GGED BY    | 1         | A. M              | ahony         |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Spa<br>(m | cture<br>acing<br>im) | Legend    | Non-intact zones (shaded) | D€                   | escription   |      | Depth (m)   | Di              | scontinui     | ties       | Elevation | Standpipe Details | SPT (N Value) |
| 11                 |                    |         |         |         |           |                       |           |                           | SYMME HOLE I Observe | ETRIX OPEN DRILLING: ed by driller a of gravel. sed)  ETRIX OPEN DRILLING: ed by driller a of gravelly class of gravelly | s    | 11.70       |                 |               |            |           |                   |               |
|                    | IAR                |         |         |         |           |                       | 1 - 4     |                           |                      | INSTALLA   | TION | REMA        | ARKS            |               |            |           | l book l b l      |               |
| and                | d du               | g insp  | pectic  | n pit   | to 1.2m.  |                       |           |                           |                      | Headworks  | 3.   |             |                 |               |            |           |                   |               |
|                    |                    |         |         |         |           |                       |           |                           |                      |  |      |             |                 |               |            |           |                   |               |
|                    |                    |         |         |         |           |                       |           |                           |                      | GROUNDV  | VATE | R DET       | AILS            |               |            |           |                   |               |
|                    |                    |         |         |         |           |                       |           |                           |                      | Date   |      | ole<br>epth | Casing<br>Depth | Depth<br>Wate | to Comm    | ents      |                   |               |
| 67                 | TAL!               | ATI     | ON D    | ETA     | 18        |                       |           |                           |                      |  |      |             |                 |               |            |           |                   |               |
| _                  | ate                |         | ip De   |         |           | RZ Base               | 7         | Гуре                      |                      |  |      |             |                 |               |            |           |                   |               |
| 4-(                | 09-0               | 8       | 13.0    | 0       | 6.00      | 13.00                 | 50n       | nm S                      |                      |  |      |             |                 |               |            |           |                   |               |
| -(                 |                    | 8       |         | 0       |           |                       | 50n       | rype<br>nm S<br>nm S      |                      |  |      |             |                 |               |            |           |                   |               |



REPORT NUMBER

| CONTR                                    | ACT     | D       | ublin   | Central Developme            | ent - Dra | ft                        |   |               |                   | DRILLI<br>SHEET   | HOLE NO              | RC0               | 8<br>t 13 of 33 |
|--|---------|---------|---------|------------------------------|-----------|---------------------------|---|---------------|-------------------|-------------------|----------------------|-------------------|-----------------|
| CO-OR                                    | DINA.   | TES(    | _)      |                              |           |                           | ROUND LEVEL (m) ORE DIAMETER (mm)   |               | 102               | DATE              | STARTED<br>COMPLETED |                   | /2008           |
| LIENT                                    |         |         |         | Central Development          |           |                           | ICLINATION<br>LUSH  |               | -90<br>Polymer Ge | DRILLI<br>LOGG    |                      | Miller<br>A. Ma   |                 |
| Downhole Depth (m)<br>Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm)  | Legend    | Non-intact zones (shaded) | Description   | Depth (m)     | Disc              | continuities      | Elevation            | Standpipe Details | SPT (N Value)   |
| 12                                       |         |         |         |                              |           |                           | SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay (continued) |               |                   |                   |                      |                   |                 |
| REMAR                                    |         | nooti   | on ni   | t to 1 2m                    | 1         |                           | INSTALLAT   | ION REM       | ARKS              |                   |                      |                   |                 |
| ⊣and d                                   | ug ins  | pecti   | on pi   | t to 1.2m.                   |           |                           | Headworks.  |               |                   |                   |                      |                   |                 |
|  |         |         |         |                              |           |                           | GROUNDWA  |               |                   | D. "              |                      |                   |                 |
|  |         |         |         |                              |           |                           | Date  | Hole<br>Depth | Casing<br>Depth   | Depth to<br>Water | Comments             |                   |                 |
| NSTAI<br>Date                            | e i     |         | epth    | RZ Top RZ Base<br>6.00 13.00 |           | Type                      |   |               |                   |                   |                      |                   |                 |



REPORT NUMBER

| CON   | TRA                | CT      |         | ublin   | Central       | Developm              | ent - Dra | aft                       |            |                        |                |              |                  |               | RILLH    | HOLE N | 10        | RC0               | 18 at 14 of 33 |
|-------|--------------------|---------|---------|---------|---------------|-----------------------|-----------|---------------------------|------------|------------------------|----------------|--------------|------------------|---------------|----------|--------|-----------|-------------------|----------------|
| 0-0   | ORD                | INA.    | TES(    | _)      |               |                       |           |                           |            | LEVEL (m)<br>METER (mr | n)             |              | 102              | DA            | ATE S    | STARTI |           | 13/09             | 9/2008         |
| CLIE  |                    | :D      |         |         |               | Developm<br>Engineers |           |                           | NCLINATION | ON                     |                |              | -90<br>Polymer G |               |          | D BY   |           |                   | nnium<br>ahony |
|       | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Spa<br>(m     | cture<br>acing<br>am) | Legend    | Non-intact zones (shaded) |            | escription             |                | Depth (m)    | Dis              | scontinui     | ities    |        | Elevation | Standpipe Details | SPT (N Value)  |
| 13    |                    |         |         |         |               |                       |           |                           | HOLE D     |                        | as<br>as<br>as |              |                  |               |          |        |           |                   |                |
| land  | _                  |         | pectio  | on pi   | t to 1.2m.    |                       |           |                           |            | Headwork               |                | REM          | ARKS             |               |          |        |           |                   |                |
|       | -                  |         |         |         |               |                       |           |                           |            |                        |                |              |                  |               |          |        |           |                   |                |
|       |                    |         |         |         |               |                       |           |                           |            | GROUND                 | _              |              |                  | D- "          | , Ac     |        |           |                   |                |
|       |                    |         |         |         |               |                       |           |                           |            | Date                   |                | lole<br>epth | Casing<br>Depth  | Depth<br>Wate | to<br>er | Comm   | ents      |                   |                |
| 10=   |                    | A 771   | DE: -   | landa v |               |                       |           |                           |            |                        |                |              |                  |               |          |        |           |                   |                |
|       | ALL<br>ate         |         |         | ETA     | ILS<br>RZ Top | RZ Base               |           | Туре                      |            |                        |                |              |                  |               |          |        |           |                   |                |
| 14-09 | 9-08               | 3       | 13.0    | 0       | 6.00          | 13.00                 | 50r       | nm S                      |            |                        |                |              |                  |               |          |        |           |                   |                |
| 14-09 |                    |         | 32.5    | 0       | 26.50         | 32.50                 |           | nm S                      |            |                        |                |              |                  |               |          |        |           |                   |                |



REPORT NUMBER

| co                 | NTRA               | ACT     | D       | ublin   | Central Developme                           | ent - Draf |                           |   |                     |               |                  | DRILLI            | HOLE NO   | RC0<br>Shee       | <b>)8</b><br>et 15 of 33 |
|--------------------|--------------------|---------|---------|---------|---|------------|---------------------------|---|---------------------|---------------|------------------|-------------------|-----------|-------------------|--------------------------|
| co                 | -ORE               | OINA    | res(    | _)      |   |            |                           | OUND LEVE   |                     | 1             | 102              |                   | STARTED   |                   | 9/2008<br>9/2008         |
|                    | ENT                |         |         |         | Central Developme<br>onsulting Engineers    | ents Ltd.  |                           | LINATION  |                     |               | 90<br>Polymer Ge | DRILLI<br>LOGGI   |           |                   | nnium<br>ahony           |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm)                 | Legend     | Non-intact zones (shaded) | Descrip   | otion               | Depth (m)     | Dis              | continuities      | Elevation | Standpipe Details | SPT (N Value)            |
| 14                 |                    |         |         |         |   |            |                           | SYMMETRI) HOLE DRILI Observed by returns of gra (continued) | LING:<br>driller as |               |                  |                   |           |                   |                          |
|                    | MAR<br>nd du       |         | pecti   | on pit  | to 1.2m.                                    |            |                           |   | STALLA adworks.     | TION REM      | ARKS             |                   |           |                   |                          |
|                    |                    |         |         |         |   |            |                           | GF  | ROUNDW              | ATER DE       | TAILS            |                   |           |                   |                          |
|                    |                    |         |         |         |   |            |                           |   | Date                | Hole<br>Depth | Casing<br>Depth  | Depth to<br>Water | Comments  |                   |                          |
| INIC               | TAL                | LAT     | ON F    | ETA     | II S  |            |                           |   |                     | - p. M. I     |                  |                   |           |                   |                          |
| 14                 | Date<br>-09-0      | 08      |         | 00      | RZ Top RZ Base<br>6.00 13.00<br>26.50 32.50 | 50m        | ype<br>nm SP<br>nm SP     |   |                     |               |                  |                   |           |                   |                          |



REPORT NUMBER

| СО                 | NTR                | ACT     |         | )ublir  | Central    | Developm              | ent - Dra | aft                       |   |               |                 |   | LHOLE N | Ю         | RC                | 08            |
|--------------------|--------------------|---------|---------|---------|------------|-----------------------|-----------|---------------------------|---|---------------|-----------------|---|---------|-----------|-------------------|---------------|
|                    |                    |         |         |         |            |                       |           |                           |   |               |                 | SHEE                                    | ET      |           | Shee              | et 16 of 33   |
| CO                 | -ORI               | DINA    | TES(    | _)      |            |                       |           |                           | ROUND LEVEL (m)   |               | 100             |   | START   |           |                   | 9/2008        |
| _                  |                    |         |         |         |            |                       |           | _                         | DRE DIAMETER (mm)   |               | 102             | DATE                                    | COMPL   | ETED      | 14/0              | 9/2008        |
|                    | ENT                |         |         |         |            | Developm              |           | .                         | CLINATION   |               | -90             | 100000000000000000000000000000000000000 | LED BY  |           |                   | nnium         |
|                    | SINE               | ER      | I A     | GL C    | Consulting | Engineers             |           | I                         | USH   |               | Polymer C       | Sel LOG                                 | GED BY  | _         | A. M              | ahony         |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Spa<br>(m  | cture<br>acing<br>nm) | Legend    | Non-intact zones (shaded) | Description   | Depth (m)     | Di              | scontinuities                           | S       | Elevation | Standpipe Details | SPT (N Value) |
| 15                 |                    |         |         |         |            |                       |           |                           | SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay (continued) | 16.00         |                 |   |         |           |                   |               |
|                    | IAR                |         |         |         |            |                       |           |                           | INSTALLAT   |               |                 |   |         |           |                   |               |
| lan                | d du               | g insp  | pectio  | n pit   | to 1.2m.   |                       |           |                           | Headworks.  |               |                 |   |         |           |                   |               |
|                    |                    |         |         |         |            |                       |           |                           |   |               |                 |   |         |           |                   |               |
|                    |                    |         |         |         |            |                       |           |                           | GROUNDWA  |               |                 | r                                       |         |           |                   |               |
|                    |                    |         |         |         |            |                       |           |                           | Date  | Hole<br>Depth | Casing<br>Depth | Depth to<br>Water                       | Comme   | ents      |                   |               |
|                    |                    |         |         |         |            |                       |           |                           |   | DODAII        | Depui           | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |         |           |                   |               |
| NS <sup>-</sup>    | TALL               | ATIO    | ON D    | ETA     | ILS        |                       |           |                           |   |               |                 |   |         |           |                   |               |
| -                  |                    | Т       | in De   | epth    | RZ Top     | RZ Base               | -         | Гуре                      |   |               |                 |   |         |           |                   |               |
|                    | 09-0               |         | 13.0    |         | 6.00       | 13.00                 |           | nm S                      |   |               |                 |   |         |           |                   |               |



REPORT NUMBER

| COI                | NTRA                                    | ACT                              | D       | ublin  | Central Developme                        | ent - Dra | _                         |                                     |               |           |                   | DRILLI<br>SHEET                             | HOLE NO |           | RC0<br>Shee       | <b>)8</b><br>et 17 of 33 |
|--------------------|---|----------------------------------|---------|--|--|-----------|---------------------------|-------------------------------------|---------------|-----------|-------------------|---|---------|-----------|-------------------|--------------------------|
| 00-                | ORD                                     | INA                              | res(    | _)   |  |           | C                         | GROUND LEVEL (m<br>CORE DIAMETER (n |               |           | 02                |   | COMPLET |           |                   | 9/2008<br>9/2008         |
|                    | ENT                                     | ER                               |         |  | Central Developme<br>onsulting Engineers | ents Ltd  |                           | NCLINATION<br>LUSH                  |               |           | 90<br>Polymer Gel | DRILLI                                      |         |           |                   | nnium<br>ahony           |
| Downhole Depth (m) | Core Run Depth (m)                      | T.C.R.%                          | S.C.R.% | R.Q.D.%  | Fracture Spacing (mm)                    | Legend    | Non-intact zones (shaded) | Description                         |               | Depth (m) | Disc              | ontinuities                                 |         | Elevation | Standpipe Details | SPT (N Value)            |
| 16                 | 16.00                                   | ARKS dug inspection pit to 1.2m. |         | Stiff brown sandy gravelly CLAY (grapredominantly fine angular to sub-route to sub- | avel is e, inded)                        |           |                           |                                     |               |           |                   | N = 100/80<br>mm<br>(10, 15, 30,<br>60, 10) |         |           |                   |                          |
| 11/4               | 2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - |                                  | pecti   | on pi  | t to 1.2m.                               |           |                           | INSTAL<br>Headwo                    | LATION Forks. | REMA      | ARKS              |   |         |           |                   |                          |
|                    |   |                                  |         |  |  |           |                           | GROUN                               | IDWATER       | DET       | AILS              |   |         |           |                   |                          |
|                    |   |                                  |         |  |  |           |                           | Date                                | Hol<br>Dep    |           | Casing<br>Depth   | Depth to<br>Water                           | Comme   | nts       |                   |                          |
| 14                 | TALI<br>Date<br>-09-0                   | 18                               |         | 00   |  | 50        | Type<br>mm<br>mm          | SP                                  |               |           |                   |   |         |           |                   |                          |



REPORT NUMBER

| CO                   | NTR                | ACT     |              | )ublin  | Central Developn            | nent - Dra | ft                        |                             |  |          |           |           | DRI<br>SHE        | LLHOLE N | NO        | RC                | 08<br>et 18 of 33 |
|----------------------|--------------------|---------|--------------|---------|-----------------------------|------------|---------------------------|-----------------------------|--|----------|-----------|-----------|-------------------|----------|-----------|-------------------|-------------------|
| co                   | -ORI               | DINA.   | TES(         | _)      |                             |            | C                         | GROUND I                    | _EVEL (m)  |          |           |           |                   | E START  | ED        |                   | 9/2008            |
|                      |                    |         |              |         |                             |            | C                         | ORE DIA                     | METER (mm  | 1)       |           | 102       |                   | E COMPI  |           |                   | 9/2008            |
| CLI                  | IENT               |         | Г            | )ublin  | Central Developm            | nents I td | _                         | NCLINATIO                   |  |          | 3         | -90       | DRI               | LLED BY  |           | Mille             | nnium             |
|                      | GINE               |         |              |         | onsulting Engineer          |            | F                         | LUSH                        |  |          |           | Polymer G |                   | GED BY   |           |                   | ahony             |
| □ Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.%      | R.Q.D.% | Fracture<br>Spacing<br>(mm) | Legend     | Non-intact zones (shaded) | De                          | scription  |          | Depth (m) | Dis       | scontinuitie      | 9S       | Elevation | Standpipe Details | SPT (N Value)     |
|                      |                    | 100     | 0            | 0       |                             |            |                           | gravelly<br>predominangular | wn sandy<br>CLAY (grave<br>nantly fine,<br>to sub-round<br>illy rounded) | el is    | 17.05     |           |                   |          |           |                   | mm<br>(25, 45, 55 |
|                      | WAR!               |         | nenti-       | on nit  | to 1.2m                     |            |                           |                             | INSTALLA   |          | REM       | ARKS      |                   |          |           |                   |                   |
| iar                  | ia du              | y insp  | Jecti(       | on pit  | to 1.2m.                    |            |                           |                             | Headworks  |          |           |           |                   |          |           |                   |                   |
|                      |                    |         |              |         |                             |            |                           |                             | GROUNDY  | VATE     | R DFT     | AILS      |                   |          |           |                   |                   |
|                      |                    |         |              |         |                             |            |                           | -                           |  |          |           | Casing    | Donth t           |          |           |                   |                   |
|                      |                    |         |              |         |                             |            |                           |                             | Date   | Ho<br>De |           | Depth     | Depth to<br>Water | Comm     | ents      |                   |                   |
|                      |                    |         |              |         |                             |            |                           |                             |  |          |           |           |                   |          |           |                   |                   |
| NS                   | TALL               |         |              |         |                             |            |                           |                             |  |          |           |           |                   |          |           |                   |                   |
|                      | Date               |         |              |         | RZ Top RZ Base              |            | уре                       | _                           |  |          |           |           |                   |          |           |                   |                   |
| 14-                  | -09-0<br>-09-0     |         | 13.0<br>32.5 | 0       | 6.00 13.00<br>26.50 32.50   | 50m<br>50m | m S                       | P                           |  |          |           |           |                   |          |           |                   |                   |



REPORT NUMBER

| CO-O               |                   |         |         |        | Central Developme                   | ent - Draf | G                         | ROUND LEVEL (m)  |           |                          | DATE              | STARTED   | 13/09             | t 19 of 33<br>0/2008            |
|--------------------|-------------------|---------|---------|--------|-------------------------------------|------------|---------------------------|--|-----------|--------------------------|-------------------|-----------|-------------------|---------------------------------|
| CLIEN              |                   | R       |         |        | Central Developmensulting Engineers |            | IN                        | ORE DIAMETER (mm)<br>ICLINATION<br>LUSH  | -         | 102<br>90<br>Polymer Gel | DRILL             |           |                   | nnium<br>ahony                  |
| Downhole Depth (m) | Core Kun Depm (m) | T.C.R.% | S.C.R.% | Q.D.%  | Fracture<br>Spacing<br>(mm)         |            | Non-intact zones (shaded) | Description  | Depth (m) |                          | ontinuities       | Elevation | Standpipe Details | SPT (N Value)                   |
|                    | \$.50             | 100     | 0       | 0      |                                     |            |                           | Stiff brown sandy gravelly CLAY (gravel is predominantly fine, angular to sub-rounded and locally rounded) (continued) |           |                          |                   |           |                   | N = 50/20<br>mm<br>(25, 50, 50) |
| REM/<br>Hand       |                   |         | pectio  | on pit | to 1.2m.                            |            |                           | Headworks.   | N REM     | ARKS                     |                   |           |                   |                                 |
|                    |                   |         |         |        |                                     |            |                           | GROUNDWAT  | FR DE     | TAILS                    |                   |           |                   |                                 |
|                    |                   |         |         |        |                                     |            |                           | Date   | Hole      | Casing                   | Depth to<br>Water | Comments  |                   |                                 |
| INST               | ate               | 1       |         | epth   | ILS  RZ Top RZ Base 6.00 13.00      |            | Type                      |  | Depth_    | Depth                    | vvalei            |           |                   |                                 |



REPORT NUMBER

| CON  | ITR/               | ACT     |                       | ublin  | Central [  | Developme                 | ent - Dra   | ıft       |  |               |                 | DRILL<br>SHEE     | HOLE N            | 10            | RCO   | 18<br>t 20 of 33 |
|------|--------------------|---------|-----------------------|--------|------------|---------------------------|-------------|-----------|--|---------------|-----------------|-------------------|-------------------|---------------|-------|------------------|
| 0-0  | ORE                | INA.    | TES(                  | _)     |            |                           |             |           | GROUND LEVEL (m)   | )             | 102             | DATE              | STARTI            |               | 13/09 | 9/2008           |
| CLIE |                    | ER      |                       |        |            | Developme<br>Engineers    | ents Ltd.   |           | ICLINATION<br>LUSH   |               | 90<br>Polymer G |                   | ED BY             |               |       | nnium<br>ahony   |
|      | Core Run Depth (m) | T.C.R.% | Fracture Spacing (mm) |        | Plegend    | Non-intact zones (shaded) | Description | Depth (m) | Dis  | continuities  | 0               | Elevation         | Standpipe Details | SPT (N Value) |       |                  |
| 19   | 99.90              | 100     | 0                     | 0      |            |                           |             |           | Stiff brown sandy gravelly CLAY (grave predominantly fine, angular to sub-round and locally rounded) (continued)  Firm (19.4-19.6) to s green brown SILT | ed 19.40      |                 |                   |                   |               |       |                  |
|      |                    | 100     | 0                     | 0      |            |                           |             |           | green brown CLAY   | 20.00         |                 |                   |                   |               |       |                  |
| REM  |                    |         |                       |        |            |                           | , til       |           | INSTALLA   | TION REMA     | ARKS            |                   |                   |               |       |                  |
| land | d du               | g insp  | oectio                | on pit | t to 1.2m. |                           |             |           | Headworks  |               |                 |                   |                   |               |       |                  |
|      |                    |         |                       |        |            |                           |             |           | GROUNDV  | VATER DET     | AILS            |                   |                   |               |       |                  |
|      |                    |         |                       |        |            |                           |             |           | Date   | Hole<br>Depth | Casing<br>Depth | Depth to<br>Water | Comm              | ents          |       |                  |
| UST  |                    | ATI     | ם ואכ                 | ETA    | 11 6       |                           |             |           |  |               | ,               |                   |                   |               |       |                  |
|      | ate                |         |                       |        | RZ Top     | RZ Base                   |             | Гуре      |  |               |                 |                   |                   |               |       |                  |
| 14-0 | 0-9                | 8       | 13.0                  | 00     | 6.00       | 13.00                     | 50r         | nm S      | P  |               |                 |                   |                   |               |       |                  |
|      | 9-0                |         | 32.5                  |        | 26.50      | 32.50                     | 50r         | nm S      | P  |               |                 |                   |                   |               |       |                  |



REPORT NUMBER

| COI                | NTRA                  | АСТ     | D       | ublin   | Central Developme                           | ent - Dra | _                         |  |           |   | DRILLE                  | IOLE NO |           | RC                | 08<br>et 21 of 33               |
|--------------------|-----------------------|---------|---------|---------|---|-----------|---------------------------|--|-----------|---|-------------------------|---------|-----------|-------------------|---------------------------------|
| co-                | ORD                   | INA     | res(    | _)      |   |           | C                         | GROUND LEVEL (m) CORE DIAMETER (mm)  |           | 102                                       |                         | OMPLE   |           |                   | 9/2008<br>9/2008                |
| ENG                | ENT                   | ER      |         |         | Central Developme<br>onsulting Engineers    | ents Ltd. |                           | NCLINATION<br>FLUSH  |           | 90<br>Polymer Gel                         | LOGGE                   |         |           |                   | nnium<br>ahony                  |
| Downhole Depth (m) | Core Run Depth (m)    | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture Spacing (mm)                       | Legend    | Non-intact zones (shaded) | Description  | Depth (m) | Discor                                    | tinuities               |         | Elevation | Standpipe Details | SPT (N Value)                   |
| 20 2               | 20.00                 | 100     | 31      | 26      |   |           |                           | Mottled brown black clayey, very gravelly SAND (medium grained) with local cobbles. Gravel is predominantly coarse and rounded to sub-angular. | 20.80     | Discontinuit and planar smeared. sub-10°. | iies are si<br>and clay |         |           |                   | N = 39/30<br>mm<br>(25, 61, 39) |
|                    | MARI                  |         | necti   | on pi   | t to 1.2m.                                  |           |                           | INSTALLATION   | REM       | ARKS                                      |                         |         |           |                   | 4                               |
| ·                  |                       | JIO     | , 500   | PI      |   |           |                           | GROUNDWATE   | D DE      | TAIL C                                    |                         |         |           |                   |                                 |
|                    |                       |         |         |         |   |           |                           | L L  | lole      |   | Depth to                | Commo   | nte       |                   |                                 |
|                    |                       |         |         |         |   |           |                           |  | epth      | Depth                                     | Depth to<br>Water       | Comme   | ะกเร      |                   |                                 |
| 14-                | TALI<br>Date<br>-09-0 | 18      |         | 00      | RZ Top RZ Base<br>6.00 13.00<br>26.50 32.50 | 50r       | Type                      | SP   |           |   |                         |         |           |                   |                                 |



REPORT NUMBER

| _                  | ORI                | OINA"   |         |         | Central Developme           | ent - Dra | _                         | GROUND             | LEVEL (m)                        |     |             |                 | SHEE                                    | HOLE N<br>T<br>STARTE |           | Sheet             | 22 of 33      |  |
|--------------------|--------------------|---------|---------|---------|-----------------------------|-----------|---------------------------|--------------------|----------------------------------|-----|-------------|-----------------|---|-----------------------|-----------|-------------------|---------------|--|
| 50                 | OKL                | /IIIVA  | I LO(   | _ /     |                             |           |                           |                    | METER (mm                        | 1)  | 1           | 102             | 100000000000000000000000000000000000000 | COMPL                 |           |                   |               |  |
| CLI                | ENT                |         | _       | ublin   | Central Developme           | ents I td | ٠.,                       | NCLINATION         |                                  | ,   | -           | 90              | DRILL                                   | ED BY                 |           | Millen            | nium          |  |
|                    | SINE               | ER      |         |         | onsulting Engineers         | ino Liu.  |                           | LUSH               |                                  |     | F           | Polymer Ge      |   | ED BY                 |           | A. Ma             |               |  |
| <u>_</u>           | (                  |         |         |         |                             |           | o o                       |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm) | Legend    | Non-intact zones (shaded) | De                 | escription                       |     | Depth (m)   | Dise            | continuities                            |                       | Elevation | Standpipe Details | SPT (N Value) |  |
| 21                 |                    |         |         |         |                             | H         |                           | Strong t           | o moderately<br>thin to mediu    | m   |             |                 | nuities are s<br>ar and clay            |                       | 9         |                   |               |  |
|                    |                    |         |         |         |                             |           |                           | bedded,            | dark grey to                     | m   |             | smeared         | . Dips are                              |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           | ARGILL             | ne grained<br>ACEOUS             |     |             | sub-10°.        | (continued                              | )                     |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    | ONE. Fresh<br>and locally        | to  |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             | $\pm$     |                           | moderat            | tely weathere                    | d.  |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           | through            | spersed<br>out. Local            |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             | #         |                           | calcite v          |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         | To the second               |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             | $\perp$   |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         | ×       |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    | 21.50              |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             | 士         |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             | 井         |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             | 井         |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         | THE                         |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    |                                  |     | 21.87       | -               |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           | Moderat<br>moderat | tely strong to<br>tely weak, thi | nly |             | and plan        | nuities are s<br>ar, and clay           |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           | bedded             | to laminated,                    |     |             | smeared         | throughou<br>10° with ha                | . Dips                |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           | SHALE.             | Fresh to                         |     |             | and insip       | ient clay sn                            | neared                |           |                   |               |  |
|                    |                    |         |         |         |                             |           | Fix                       | slightly a         | and locally                      |     |             |                 | throughou                               | I.                    |           |                   |               |  |
|                    | MARI               |         | necti   | on nit  | to 1.2m.                    |           |                           |                    | INSTALLA                         |     | REMA        | ARKS            |   |                       |           |                   |               |  |
| ıdı                | u uu               | 9 1115  | poul    | on pit  | to Liettle                  |           |                           |                    | Headworks                        | 3.  |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    | GROUND                           | _   |             |                 |   |                       |           |                   |               |  |
|                    |                    |         |         |         |                             |           |                           |                    | Date                             |     | ole<br>epth | Casing<br>Depth | Depth to<br>Water                       | Comm                  | ents      |                   |               |  |
| NS                 | TALI               | ATIO    | ON D    | ETAI    | LS                          |           |                           |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    | Date               |         | Γip D   | epth    | RZ Top RZ Base              |           | Гуре                      |                    |                                  |     |             |                 |   |                       |           |                   |               |  |
|                    | -09-0              | 0       | 13.0    | 00      | 6.00 13.00                  | 501       | nm S                      | SP                 |                                  |     |             |                 |   |                       |           |                   |               |  |



REPORT NUMBER

| o                  | NTRA               | АСТ     | D  | ublin (  | Central Developme                   | ent - Dra | ft                        |  |           |  | DRILLI<br>SHEET   | HOLE NO    | )         | RC08<br>Sheet     | 3<br>23 of 33 |
|--------------------|--------------------|---------|--|----------|-------------------------------------|-----------|---------------------------|--|-----------|--|---|------------|-----------|-------------------|---------------|
| co                 | -ORD               | INAT    | TES(   | _)       |                                     |           | co                        | ROUND LEVEL (m)<br>PRE DIAMETER (mm)   |           | 102  |   | STARTE     |           | 13/09/<br>14/09/  |               |
|                    | ENT                | ER      |  |          | Central Developmensulting Engineers | ents Ltd. |                           | CLINATION  |           | -90<br>Polymer Ge                              | DRILLI<br>LOGG  |            |           | Millenr<br>A. Mah |               |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.% | S.C.R.%  | R.Q.D.%  | Fracture<br>Spacing<br>(mm)         | Legend    | Non-intact zones (shaded) | Description  | Depth (m) |  | ontinuities   |            | Elevation | Standpipe Details | SPT (N Value) |
| 222                | 22.80              | 100     | 0  | 0        |                                     |           |                           | moderately weathered. Pyrite dispersed. Incipient fractures common. Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common. (continued) | ,         | and plans<br>smeared<br>are sub-1<br>and insip | uities are s ar, and clay throughout 10° with hai eint clay sm throughout | Dips rline |           |                   |               |
| _                  | MAR<br>ad du       |         | nectio   | on nit t | to 1.2m.                            |           |                           | INSTALLAT  | ION REM   | ARKS   |   |            |           | K/A M             |               |
| ilai               | ia aa              | 9 11101 | poom   | on pic   |                                     |           |                           | Headworks.   |           |  |   |            |           |                   |               |
|                    |                    |         |  |          |                                     |           |                           | GROUNDWA<br>Date   | Hole      | Casing   | Depth to<br>Water   | Comme      | ente      |                   |               |
|                    |                    |         |  |          |                                     |           |                           | Date   | Depth     | Depth  | Water   | COMME      | TILS      |                   |               |
|                    | Date               | 1       | TION DETAILS           Tip Depth         RZ Top         RZ Base         Top           13.00         6.00         13.00         50n |          |                                     |           |                           |  |           |  |   |            |           |                   |               |



REPORT NUMBER

|                    | ORE                | ACT<br>DINA   |         |         | Central Developme           | ent - Dr |                           | GROUND  | LEVEL (m)   |           |   | SHEE   | HOLE N<br>T<br>STARTI        |           |                   | 8<br>t 24 of 33<br>l/2008 |
|--------------------|--------------------|---|---------|---------|-----------------------------|----------|---------------------------|---|---|-----------|---|--|------------------------------|-----------|-------------------|---------------------------|
| CLII               | ENT                |   | D       | ublin   | Central Developme           | ents Ltd |                           | ORE DIA   | METER (mm)<br>ON  |           | 102<br>-90  |  | COMPL<br>ED BY               | ETED      | 14/09<br>Millen   | 900                       |
| ENG                | SINE               | ER  | Α       | GL C    | onsulting Engineers         |          | F                         | LUSH  |   | -         | Polymer G   | el LOGO  | SED BY                       |           | A. Ma             | hony                      |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.%   | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm) | Legend   | Non-intact zones (shaded) |   | escription  | Depth (m) | Dis   | scontinuities  |                              | Elevation | Standpipe Details | SPT (N Value)             |
| 23                 | 23.10              | 100   | 57      | 50      | 54                          |          |                           | modera bedded black, c SHALE slightly a modera Pyrite d Incipien common | tely strong to tely weak, think to laminated, alcareous. Fresh to and locally tely weathered. ispersed. It fractures in . (continued)  to very strong, inedium bedded dark grey, fine SILICEOUS FONE. Fresh to and locally tely weathered. ispersed out. Local reining. | 23.46     | and plar<br>smearer<br>are sub-<br>and insi<br>fracture<br>(continu | nuities are an are subject of the su | y tt. Dips irline meared tt. |           |                   |                           |
|                    | IAR                |   |         |         |                             |          |                           |   | INSTALLAT   | ON REMA   | ARKS  |  |                              |           | K// M             |                           |
| Han                | d du               | g insp  | pection | on pit  | to 1.2m.                    |          |                           |   | Headworks.  |           |   |  |                              |           |                   |                           |
|                    |                    |   |         |         |                             |          |                           |   | GROUNDWA  | TER DET   | AILS  |  |                              |           |                   |                           |
|                    |                    |   |         |         |                             |          |                           |   | Date  | Hole      | Casing  | Depth to<br>Water  | Comm                         | ents      |                   |                           |
|                    |                    |   |         |         |                             |          |                           |   |   | Depth     | Depth   | vvater   |                              |           |                   |                           |
|                    |                    |   |         |         |                             |          |                           |   |   |           |   |  |                              |           |                   |                           |
|                    | Date               |   |         |         |                             |          | Type                      |   |   |           |   |  |                              |           |                   |                           |
|                    |                    | LATION DETAILS  e Tip Depth RZ Top RZ Base Typ  08 13.00 6.00 13.00 50mm  08 32.50 26.50 32.50 50mm |         |         |                             | mm S     | SP                        |   |   |           |   |  |                              |           |                   |                           |



REPORT NUMBER

|                    | ORD                | OINAT                       |         |         | Central Developme                   | ent - Draf |                           | GROUND L   | EVEL (m)   |       |                    |   | SHEE                                    | HOLE N<br>T<br>STARTI     |           | Sheet 13/09/      | 25 of 33      |
|--------------------|--------------------|-----------------------------|---------|---------|-------------------------------------|------------|---------------------------|--|--|-------|--------------------|---|---|---------------------------|-----------|-------------------|---------------|
|                    | ENT                | ER.                         |         |         | Central Developmensulting Engineers | ents Ltd.  | 11                        | ORE DIAN   | IETER (mm)   |       | -6                 | 02<br>90<br>olymer Ge                       | DRIL                                    | COMPL<br>LED BY<br>SED BY | ETED      | Milleni<br>A. Mal | nium          |
| Downhole Depth (m) | Core Run Depth (m) | T.C.R.%                     | S.C.R.% | R.Q.D.% | Fracture<br>Spacing<br>(mm)         | Legend     | Non-intact zones (shaded) | Des  | scription  |       | Depth (m)          | Disc  | continuities                            |                           | Elevation | Standpipe Details | SPT (N Value) |
| 224                |                    |                             |         |         |                                     |            |                           | thin to me<br>grey to di<br>grained S<br>LIMESTO<br>slightly a   | ely weathered.<br>persed<br>ut. Local<br>ining.  |       |                    | and plan                                    |   | re                        |           |                   |               |
|                    |                    |                             |         |         |                                     |            |                           | moderate<br>bedded to<br>black, ca<br>SHALE.<br>slightly a   | Fresh to<br>nd locally<br>ely weathered.   | 24    | 4.49               | and plan<br>smeared<br>sub-10°<br>fractures | nuities are                             | ally clay<br>ne<br>smooth |           |                   |               |
| 4                  | 24.60              | 100                         | 0       | 0       |                                     |            |                           | Incipient common Strong to strong, the bedded, black, fin ARGILLA LIMESTO slightly a moderate Pyrite dis | fractures  moderately in to medium dark grey to e grained ACEOUS DNE. Fresh to locally ely weathered. spersed ut. Local            |       |                    | smeared                                     | ar and cla<br>. Dips are<br>with sub v  |                           |           |                   |               |
|                    | 24.80              |                             |         |         |                                     |            |                           | Moderate<br>moderate<br>bedded t<br>black, ca<br>SHALE.<br>slightly a<br>moderate<br>Pyrite dis          | ely strong to<br>ely weak, thinly<br>o laminated,<br>lcareous<br>Fresh to<br>nd locally<br>ely weathered.<br>spersed.<br>fractures | 1     | 4.80               | and plan                                    | nuities are<br>ar and cla<br>. Dips are | У                         |           |                   |               |
|                    | MAR<br>nd du       |                             | pecti   | on pit  | to 1.2m.                            |            |                           |  | INSTALLAT  | ION R | REMA               | ARKS  |   |                           |           |                   |               |
|                    |                    | dug inspection pit to 1.2m. |         |         |                                     |            | Headworks.                |  |  |       |                    |   |   |                           |           |                   |               |
|                    |                    |                             |         |         |                                     |            |                           | GROUNDWA   | Hole   |       | <b>AILS</b> Casing | Denth to                                    | Comn                                    |                           |           |                   |               |
| 14-                | Date<br>-09-0      |                             |         |         |                                     |            |                           | SP   | Date   | Dept  | th                 | Depth                                       | Depth to<br>Water                       | Comin                     |           |                   |               |



REPORT NUMBER

|                    | ORE                  | DINA    |         |         | Central Developme                           | ent - Dra |                           |   | LEVEL (m)<br>METER (mn  | n)               |              | 102                             | SHE!   | LHOLE N<br>ET<br>E STARTI<br>E COMPL | ED        | 13/09                    | 8<br>t 26 of 33<br>0/2008<br>0/2008 |   |
|--------------------|----------------------|---------|---------|---------|---|-----------|---------------------------|---|---|------------------|--------------|---------------------------------|--|--------------------------------------|-----------|--------------------------|-------------------------------------|---|
|                    | ENT                  |         |         |         | Central Developme onsulting Engineers       | ents Ltd. |                           | NCLINATI<br>LUSH  | ON  |                  |              | -90<br>Polymer Ge               |  | LED BY<br>GED BY                     |           | Miller<br>A. Ma          |                                     |   |
| Downhole Depth (m) | Core Run Depth (m)   | T.C.R.% | S.C.R.% | R.Q.D.% | Fracture Spacing (mm)  0 250 500            | Legend    | Non-intact zones (shaded) | De  | escription  |                  | Depth (m)    | Disc                            | continuitie  | S                                    | Elevation | Standpipe Details        | SPT (N Value)                       |   |
| 25                 |                      |         |         |         |   |           |                           | modera bedded black, c SHALE slightly modera Pyrite d Incipien  | tely strong to<br>tely weak, th<br>to laminated<br>alcareous<br>. Fresh to<br>and locally<br>tely weathers<br>ispersed.<br>t fractures<br>n. (continued | inly<br>,<br>ed. | 25 24        | and plan                        | nuities are<br>ar and cla<br>. Dips are<br>(continue | y                                    |           |                          |                                     |   |
|                    |                      | 100     | 75      | 45      |   |           |                           | strong,<br>bedded<br>black, fi<br>ARGILL<br>LIMEST<br>slightly a<br>moderal<br>Pyrite d<br>through<br>calcite v | to moderately thin to mediu, dark grey to ne grained ACEOUS ONE. Fresh and locally tely weathere ispersed out. Local reining.                           | y im h           | <u>25.72</u> | and plan<br>smeared<br>sub-10°. | uities are<br>ar and cla<br>. Dips are               | Y                                    |           |                          |                                     |   |
|                    |                      |         |         |         |   |           |                           | thin to n<br>grey to d<br>grained<br>LIMEST<br>slightly a<br>moderal<br>Pyrite di                               | nedium beddidark grey, fin SILICEOUS ONE. Freshand locally tely weathere spersed out. Local   | ed,<br>e<br>n to |              | and plan                        | uities are<br>ar and clay<br>Dips are                | /                                    |           | SALIKATI KATIKATI KATIKA |                                     |   |
|                    | d du                 |         | pectio  | on pit  | to 1.2m.                                    |           |                           |   | Headworks   |                  | REM          | ARKS                            |  |                                      |           |                          |                                     | _ |
|                    |                      |         |         |         |   |           |                           |   |   |                  | 2 057        | TAIL C                          |  |                                      |           |                          |                                     |   |
|                    |                      |         |         |         |   |           |                           |   | GROUNDV<br>Date   | Но               | ole          | Casing                          | Depth to<br>Water                                    | Comm                                 | ents      |                          |                                     |   |
| 14-                | TALI<br>Date<br>09-0 | 8 T     |         | 0       | RZ Top RZ Base<br>6.00 13.00<br>26.50 32.50 | 50r       | Гуре<br>nm S              | SP  |   | De               | pui          | Depth                           | vvaler   |                                      |           |                          |                                     |   |