

APPENDIX 5

GEOLOGICAL & HYDROGEOLOGICAL DOCUMENTATION

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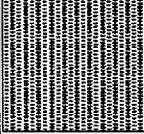

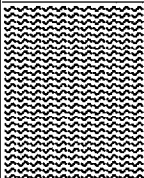
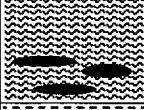



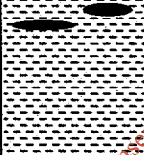
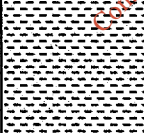
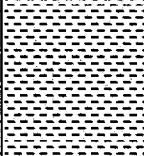
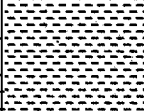
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TRIAL PIT LOGS FOR KILSHANE CROSS

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| Soil (S)/ Water (W) Sampling and/or Monitoring | | | | | | TRIAL PIT LOG | | TP1 | |
|---|----------------|--|------------------------|----------------------------|--|---|--|------------------------|---------------------------------|
| Sample No. | Depth/interval | Pit Completion | Groundwater occurrence | Depth (mbGL) | Geology - graphical log | <i>Client:</i> | Fingal County Council | <i>Date excavated:</i> | 29 th November, 2001 |
| | | | | | | <i>Project:</i> | Recycling Park at Kilshane Cross | <i>Logged by:</i> | Padraic Mulroy |
| | | | | <i>TES File Reference:</i> | F: TES Current Projects \\1234\Reports\Geology | <i>Equipment used:</i> | | JCB Back Hoe | |
| | | | | | | Description | Interpretation | | |
| SO-TP1-01 | | ↑ Backfilled with natural material ↓ | | |  | Barley Stubble | | | |
|  | | | | | 0.5 |  | Soft/firm, moist, black sandy SILT with clay. | | Friable/Good Humus Content |
| | | | | | 1.0 |   | Very stiff, grey/white, sandy SILT with clay Firm, green/brown, sandy CLAY with silt, with small subangular limestone boulders | | Thin Layer |
| | | | | | 1.5 |   | Small, subangular limestone boulders | | |
| | | | | 2.0 |   | Soft red/brown, sandy CLAY with silt Angular/subangular limestone boulders Red sandstone boulders | | | |
| | | | | 2.5 |  | Clay becoming light orange with depth | | | |
| | | | | 3.0 |  | Terminated at 3.7m | | | |
| | | | | 3.7 | | | | | |

Comments

Located at North-Western end of site
Approx. ground level = 76m AOD

Legend

DISTURBED SAMPLE 

CLAY 

GRAVEL 

SAND 

UNDISTURBED SAMPLE 

SILT 

SURFACE CROP 

COBBLES AND BOULDERS 



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Block 10-3 Blanchardstown Corporate Park
Blanchardstown




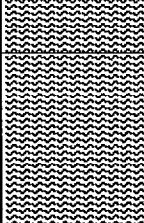

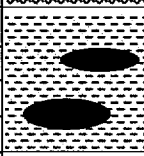
Dublin 15

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





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| Soil (S)/ Water (W) Sampling and/or Monitoring | | TRIAL PIT LOG | | | | TP2 | |
|---|----------------|--|------------------------|--------------|--|---|---------------------------------|
| Sample No. | Depth/interval | Pit Completion | Groundwater occurrence | Depth (mbGL) | Geology - graphical log | Client: | Date excavated: |
| | | | | | | Fingal County Council | 29 th November, 2001 |
| | | | | | | Project: | Logged by: |
| | | | | | | Recycling Park at Kilshane Cross | Padraic Mulroy |
| | | | | | | TES File Reference: | Equipment used: |
| | | | | | | F: TES Current Projects \\234\Reports\Geology | JCB Back Hoe |
| | | | | | | Description | Interpretation |
| SO- TP2- 01   | | ↑ Backfilled with natural material ↓ | | |  | Barley Stubble | |
| | | | | 0.5 |  | Soft/firm, moist, black sandy SILT with clay. | Friable/High Humus Content |
| | | | | 1.0 |  | Firm, brown/black sandy SILT with clay Large subangular limestone boulders | |
| | | | | 1.5 |  | Large, subangular limestone boulders | |
| | | | 2.0 | | Terminated at 1.9m | | |
| | | | 2.5 | | | | |
| | | | 3.0 | | | | |

Comments

Located at North-Western end of site
Approx. ground level = 76.75m AOD

Legend


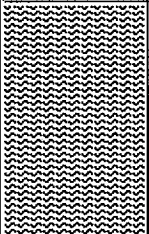
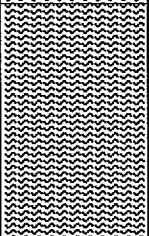
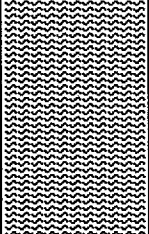

| | |
|---|---|
| DISTURBED SAMPLE  | UNDISTURBED SAMPLE  |
| CLAY  | SILT  |
| GRAVEL  | SURFACE CROP  |
| SAND  | COBBLES AND BOULDERS  |











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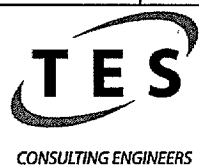
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| Soil (S)/ Water (W) Sampling and/or Monitoring | | Pit Completion | Groundwater occurrence | Depth (mbGL) | Geology - graphical log | TRIAL PIT LOG | | TP3 | |
|---|----------------|--|------------------------|--------------|---|--|---|-----------------|---------------------------------|
| Sample No. | Depth/interval | | | | | Client: | Fingal County Council | Date excavated: | 29 th November, 2001 |
| | | | | | | Project: | Recycling Park at Kilshane Cross | Logged by: | Padraic Mulroy |
| | | | | | | TES File Reference: | F: TES Current Projects \\1234\Reports\Geology | Equipment used: | JCB Back Hoe |
| Description | | | | | | Interpretation | | | |
| SO-TP3-01 | | ↑ Backfilled with natural material ↓ | | 0.5 |  | Barley Stubble | | | |
| | | | | |  | Soft/firm, moist, dark brown sandy SILT with clay | | | |
| | | | | |  | Firm, grey/yellow, sandy SILT with clay | | | |
| | | | | |  | Firm/soft, grey/brown, sandy SILT with clay Angular/subangular limestone boulders Red sandstone boulders | | | |
| | | | | |  | Stiff, black, sandy silty, gravelly CLAY Weathered, rounded pebbles | | | |
| | | | | 3.0 | | Terminated at 3.5m | | | |
| | | | | 3.5 | | | | | |

Comments
 Located at Eastern end of site
 Approx. ground level = 77.5m AOD

| Legend | |
|--|--|
| DISTURBED SAMPLE  | UNDISTURBED SAMPLE  |
| CLAY  | SILT  |
| GRAVEL  | SURFACE CROP  |
| SAND  | COBBLES AND BOULDERS  |



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| Soil (S)/ Water (W) Sampling and/or Monitoring | | TRIAL PIT LOG | | | | TP4 | | |
|---|----------------|--|------------------------|--------------|-------------------------|--|---------------------------------|----------------|
| Sample No. | Depth/interval | Pit Completion | Groundwater occurrence | Depth (mbGL) | Geology - graphical log | Client: | Date excavated: | |
| | | | | | | Fingal County Council | 29 th November, 2001 | |
| | | | | | | Project: | Logged by: | |
| | | | | | | Recycling Park at Kilshane Cross | Padraic Mulroy | |
| | | | | | | TES File Reference: | Equipment used: | |
| | | | | | | F: TES Current Projects \1234\Reports\Geology | JCB Back Hoe | |
| | | | | | | Description | | Interpretation |
| | | ↑ Backfilled with natural material ↓ | | | | Barley Stubble | | |
| SO-TP4-01 | | | | 0.5 | | Soft/firm, moist, dark brown, gravelly, sandy SILT with clay | | |
| | | | | 1.0 | | Large subangular and angular boulders in places | | |
| | | | | 1.5 | | | | |
| | | | | 2.0 | | | | |
| | | | | 2.5 | | | | |
| | | | | 3.0 | | | | |
| | | | | 3.5 | | Terminated at 3.5m | | |

Comments

Located in Middle of the site
Approx. ground level = 77.5m AOD



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Legend

DISTURBED SAMPLE

UNDISTURBED SAMPLE

CLAY

SILT

GRAVEL

SURFACE CROP

SAND

COBBLES AND BOULDERS

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| Soil (S)/ Water (W) Sampling and/or Monitoring | | Pit Completion | Groundwater occurrence | Depth (mbGL) | Geology - graphical log | TRIAL PIT LOG | | TP5 |
|---|----------------|----------------|------------------------|--------------|-------------------------|--|--|----------|
| Sample No. | Depth/interval | | | | | Client: | Date excavated: | Project: |
| | | | | | | Fingal County Council | 29 th November, 2001 | |
| | | | | | | Recycling Park at Kilshane Cross | Padraic Mulroy | |
| | | | | | | F: TES Current Projects \\1234\Reports\Geology | JCB Back Hoe | |
| | | | | | | Description | Interpretation | |
| | | | | | | Barley Stubble | | |
| | | | | 0.5 | | Soft/firm, moist, dark black/brown sandy silty CLAY, Small rounded boulders in places | Friable/Good Humus Content | |
| | | | | | | Coarse/loose grey, sandy GRAVEL | | |
| | | | | 1.0 | | Firm, dark black/brown, gravelly sandy SILT with clay | | |
| | | | | 1.5 | | Stiff, black, sandy, silty, gravelly CLAY with small black limestone boulders | Boulders becoming more frequent with depth | |
| | | | | 2.0 | | Possible fractured limestone bedrock | | |
| | | | | 2.5 | | Terminated at 2.3m | | |
| | | | | 3.0 | | | | |
| | | | | 3.5 | | | | |

Comments

Located at South Western corner of site
Approx. ground level = 76m AOD

Legend

- | | |
|-------------------------|-----------------------------|
| DISTURBED SAMPLE | UNDISTURBED SAMPLE |
| CLAY | SILT |
| GRAVEL | SURFACE CROP |
| SAND | COBBLES AND BOULDERS |



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| Soil (S)/ Water (W) Sampling and/or Monitoring | | Pit Completion | Groundwater occurrence | Depth (mbGL) | Geology - geographical log | TRIAL PIT LOG | | TP6 |
|---|----------------|----------------|------------------------|--------------|----------------------------|--|----------------------------|-----------------|
| | | | | | | Client: | Fingal County Council | Date excavated: |
| Sample No. | Depth/interval | ↑ | | | | Description | Interpretation | |
| | | | | | | SO-TP6-01 | | |
| | | | | 0.5 | | Soft/firm, moist, dark brown sandy SILT with clay, Small rounded boulders in places | Friable/Good Humus Content | |
| | | | | | | Coarse, orange/grey, gravelly SAND with pockets of marl Some small boulders | | |
| | | | | 1.0 | | Firm, dark black/brown, gravelly sandy SILT with clay | | |
| | | | | 1.5 | | | | |
| | | | | 2.0 | | | | |
| | | | | 2.5 | | Firm, orange/grey, gravelly CLAY with pockets of marl Stratified layer of pink CLAY | | |
| | | | | 3.0 | | | | |
| | | | | 3.5 | | Terminated at 3.2m | | |

Comments

Located at South Eastern corner of site
Approx. ground level = 77.75m AOD

Legend

DISTURBED SAMPLE

CLAY

GRAVEL

SAND

UNDISTURBED SAMPLE

SILT

SURFACE CROP

COBBLES AND BOULDERS



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| Soil (S)/ Water (W) Sampling and/or Monitoring | | TRIAL PIT LOG | | | | TP7 | | | |
|---|----------------|---|------------------------|---------------------|---|--|---|-----------------|---------------------------------|
| Sample No. | Depth/interval | Pit Completion | Groundwater occurrence | Depth (mbGL) | Geology - graphical log | Client: | Fingal County Council | Date excavated: | 29 th November, 2001 |
| | | | | | | Project: | Recycling Park at Kilshane Cross | Logged by: | Padraic Mulroy |
| | | | | TES File Reference: | F: TES Current Projects \\1234\Reports\Geology | Equipment used: | | JCB Back Hoe | |
| | | | | | | Description | Interpretation | | |
| SO- TP7- 01 | | ↑ Backfilled with natural material ↓ | | 0.5 | | Barley Stubble | | | |
| | | | | | | Soft, wet, dark brown, sandy gravelly silty CLAY | | | |
| | | | | | | Firm, grey/black, sandy SILT with clay | Encountered clay land drain at 0.6m depth | | |
| | | | | | | Some large rounded limestone boulders | | | |
| | | | | 2.0 | | Stiff, black/brown, sandy gravelly silty CLAY with angular, subangular and rounded pebbles | More boulders encountered with depth | | |
| | | | | 2.5 | | | | | |
| | | | | 3.0 | | | | | |
| | | | | 3.5 | | Terminated at 3.4m | | | |
| Comments | | Located at eastern boundary of site Hit shallow clay pipe land drain - Not repaired as site is to be developed and no longer used as agricultural land Approx. ground level = 77.m AOD | | | | TES CONSULTING ENGINEERS TES Consulting Engineers Block 10-3 Blanchardstown Corporate Park Blanchardstown Dublin 15 Tel.: 01-8030401 Fax.:01-8030410 Email: tes@iol.ie www.tesltd.ie | | | |
| Legend | | DISTURBED SAMPLE UNDISTURBED SAMPLE CLAY SILT GRAVEL SURFACE CROP SAND COBBLES AND BOULDERS | | | | | | | |

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BOREHOLE LOGS FOR KILSHANE CROSS

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| | | | | | | | | | |
|--------------------------|--------|----------------|-----------------------|-------------|-----------|---------|--------------------------------------|-----------------------------------|-------------|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 101 | | PAGE 1 OF 3 |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE. INVESTIGATIONS | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| | | CHECKED BY: SF | SCREEN SLOT SIZE: 2mm | | | | | | |

| | | | | | DEPTH (m) | GEOLOGY | DESCRIPTION | COMMENTS |
|--|--|--|--|--|-----------|-------------|--|---|
| | | | | | 0 | | Barley Stubble | |
| | | | | | 1 | | Soft/firm, wet, black sandy silty CLAY | friable - high humus no gravel No evidence of contamination olfactory or visual |
| | | | | | 2 | | | |
| | | | | | 3 | | | |
| | | | | | 4 | | | |
| | | | | | 5 | | | |
| | | | | | 6 | | | |
| | | | | | 7 | | | |
| | | | | | 8 | Resting SWL | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |

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| | | | |
|--|--|---|--|
| LOCATION / NOTES: Borehole located at western boundary of site. Estimated ground level @76.5m AOD | LEGEND Groundwater Table | BOREHOLE LOG | |
| | | JOB TITLE RECYCLING PARK AT KILSHANE CROSS | LOCATION KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN |
| | | CLIENT FINGAL COUNTY COUNCIL | Block 10-3 Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. |
| | | e-mail: administration@testld.ie Tel: 01-6606471 Fax: 01-6601702 | |

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|--------------------------|--------|------|----------------------|-------------|-----------|---------|--------------------------------------|--|-----------------------------------|--|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 101 | | PAGE 2 OF 3 | |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE. INVESTIGATIONS | | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| | | | | | | | CHECKED BY: SF | | SCREEN SLOT SIZE: 2mm | |

| | | | | | | DESCRIPTION | COMMENTS |
|--|--|--|--|--|----|--|--|
| | | | | | 10 | Soft to firm black sandy silty CLAY friable - high humus/OM content no gravel - homogenous | Saturated No evidence of contamination olfactory or visual |
| | | | | | 11 | | |
| | | | | | 12 | | |
| | | | | | 13 | | |
| | | | | | 14 | | |
| | | | | | 15 | | |
| | | | | | 16 | | |
| | | | | | 17 | | |
| | | | | | 18 | | |
| | | | | | 19 | | |
| | | | | | 20 | | |

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| | | | |
|--|--|--|--|
| LOCATION / NOTES: Water at 15m | LEGEND Groundwater Table | BOREHOLE LOG | |
| | | JOB TITLE RECYCLING PARK AT KILSHANE CROSS | |
| | | LOCATION KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN | |
| | | CLIENT FINGAL COUNTY COUNCIL | |
| | | Unit 10-3, Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. | |
| | | e-mail: administration@tesltd.ie Tel: 01-6606471 Fax: 01-6601702 | |

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| | | | | | | | | | | |
|-----------------------|--------|------|-------------------|-------------|-----------|---------|--------------------------------------|--|-----------------------------------|--|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 101 | | PAGE 3 OF 3 | |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE. INVESTIGATIONS | | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| | | | | | | | CHECKED BY: SF | | SCREEN SLOT SIZE: 2mm | |

| | | | | | | DEPTH (m) | GEOLOGY | DESCRIPTION | COMMENTS |
|--|--|--|--|--|--|-----------|---------|--|----------|
| | | | | | | 20 | | Soft to firm black sandy silty CLAY friable - high humus/OM content no gravel - homogenous | |
| | | | | | | 21 | | | |
| | | | | | | 22 | | | |
| | | | | | | 23 | | dark grey limestone BEDROCK | |
| | | | | | | 24 | | | |
| | | | | | | 25 | | Terminated @ 25m | |
| | | | | | | 26 | | | |
| | | | | | | 27 | | | |
| | | | | | | 28 | | | |
| | | | | | | 29 | | | |
| | | | | | | 30 | | | |
| | | | | | | 30 | | | |

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| | | | | |
|----------------------------------|---------------------|--|--|--|
| <u>LOCATION / NOTES:</u> | <u>LEGEND</u> | BOREHOLE LOG | | |
| | ▼ Groundwater Table | JOB TITLE | RECYCLING PARK AT KILSHANE CROSS | |
| | | LOCATION | KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN | |
| | | CLIENT | FINGAL COUNTY COUNCIL | |
| | | <p>Block 10-3, Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. e-mail: administration@tesltd.ie Tel: 01-6606471 Fax: 01-6601702</p> | | |

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| | | | | | | | | | | |
|-----------------------|--------|------|-------------------|-------------|-----------|---------|-------------------------------------|--|-----------------------------------|--|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 102 | | PAGE 1 OF 3 | |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE INVESTIGATIONS | | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| | | | | | | | CHECKED BY: SF | | SCREEN SLOT SIZE: 2mm | |

| | | | | | | DEPTH (m) | DESCRIPTION | COMMENTS |
|--|--|--|--|--|--|-----------|---|--|
| | | | | | | 0 | BARLEY STUBBLE | No evidence of contamination olfactory or visual |
| | | | | | | 1 | firm orange/yellow sandy gravelly CLAY (MARL) red brown iron mottles on clay | |
| | | | | | | 2 | | |
| | | | | | | 3 | | |
| | | | | | | 4 | | |
| | | | | | | 5 | | |
| | | | | | | 6 | | |
| | | | | | | 7 | | |
| | | | | | | 8 | | |
| | | | | | | 9 | | |
| | | | | | | 10 | Water strike | |

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| | | | |
|--|--|--|--|
| LOCATION / NOTES: Borehole located at southwestern boundary of site. | LEGEND Groundwater Table | BOREHOLE LOG | |
| | | JOB TITLE | RECYCLING PARK AT KILSHANE CROSS |
| | | LOCATION | KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN |
| | | CLIENT | FINGAL COUNTY COUNCIL |
| | | Block10-3, Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. | |
| | | e-mail: administration@tesltd.ie Tel: 01-6606471 Fax: 01-6601702 | |

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| | | | | | | | | | | |
|-----------------------|--------|------|-------------------|-------------|-----------|---------|--------------------------------------|--|-----------------------------------|--|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 102 | | PAGE 2 OF 3 | |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE. INVESTIGATIONS | | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| | | | | | | | CHECKED BY: SF | | SCREEN SLOT SIZE: 2mm | |

| | | | | | DEPTH (m) | GEOLOGY | DESCRIPTION | COMMENTS | |
|----|--|--|--|--|-----------|---------|---|--|--|
| | | | | | 10 | | | | |
| | | | | | 11 | | | | |
| | | | | | 12 | ▼ | Resting water level | | |
| | | | | | 13 | | firm orange/yellow sandy gravelly CLAY (MARL) red brown iron mottles on clay | Saturated | |
| | | | | | 14 | | | | |
| | | | | | 15 | | | | |
| | | | | | 16 | | weathered orange/yellow semi-formed BEDROCK | No evidence of contamination olfactory or visual | |
| | | | | | 17 | | | | |
| | | | | | 18 | | | | |
| | | | | | 19 | | | | |
| 20 | | | | | | | | | |

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| | | | |
|--|--|---|--|
| LOCATION / NOTES: Water at approx. 10m | LEGEND ▼ Groundwater Table | BOREHOLE LOG | |
| | | JOB TITLE RECYCLING PARK AT KILSHANE CROSS | |
| | | LOCATION KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN | |
| | | CLIENT FINGAL COUNTY COUNCIL | |
| | | | |
| | | Block 10-3, Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. | |
| | | e-mail: administration@tesltd.ie Tel: 01-6606471 Fax: 01-6601702 | |

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| | | | | | | | | | |
|-----------------------|--------|------|-------------------|-------------|-----------|---------|-------------------------------------|-----------------------------------|-------------|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 102 | | PAGE 3 OF 3 |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE INVESTIGATIONS | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| | | | | | | | CHECKED BY: SF | SCREEN SLOT SIZE: 2mm | |

| | | | | | | DEPTH (m) | DESCRIPTION | COMMENTS |
|--|--|--|--|--|--|-----------|---|-----------|
| | | | | | | 20 | weathered orange/yellow semi-formed BEDROCK no evidence of solid bedrock | Saturated |
| | | | | | | 21 | | |
| | | | | | | 22 | Terminated @ 27m | |
| | | | | | | 23 | | |
| | | | | | | 24 | | |
| | | | | | | 25 | | |
| | | | | | | 26 | | |
| | | | | | | 27 | | |
| | | | | | | 28 | | |
| | | | | | | 29 | | |
| | | | | | | 30 | | |
| | | | | | | | | |

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| | | | |
|--|------------------------------------|---|--|
| <u>LOCATION / NOTES:</u> no evidence of solid bedrock | <u>LEGEND</u> Groundwater Table | BOREHOLE LOG | |
| | | JOB TITLE | RECYCLING PARK AT KILSHANE CROSS |
| | | LOCATION | KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN |
| | | CLIENT | FINGAL COUNTY COUNCIL |
| | | Block 10-3, Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. | |
| | | e-mail: administration@tesltd.ie Tel: 01-6606471 Fax: 01-6601702 | |

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| | | | | | | | | | | |
|--------------------------|--------|------|----------------------|-------------|-----------|---------|-------------------------------------|--|-----------------------------------|--|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 103 | | PAGE 1 OF 3 | |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE INVESTIGATIONS | | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| | | | | | | | CHECKED BY: SF | | SCREEN SLOT SIZE: 2mm | |

| | | | | | | DESCRIPTION | COMMENTS |
|--|--|--|--|--|--|---|--|
| | | | | | | BARLEY STUBBLE | No evidence of contamination olfactory or visual |
| | | | | | | firm green brown sandy gravelly CLAY | |
| | | | | | | For inspection purposes only. Consent of copyright owner required for any other use. | |

LOCATION / NOTES:

Borehole located at southeastern boundary of site.

LEGEND

▼ Groundwater Table

BOREHOLE LOG

| | |
|---|---|
| JOB TITLE | RECYCLING PARK AT KILSHANE CROSS |
| LOCATION | KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN |
| CLIENT | FINGAL COUNTY COUNCIL |
| | |
| Block 10-3, Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. | |
| e-mail: administration@tesltd.ie Tel: 01-6606471 Fax: 01-6601702 | |

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| | | | | | | | | | | |
|-----------------------|--------|-----------------------|-------------------|-------------|-----------|---------|-------------------------------------|--|-----------------------------------|--|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 103 | | PAGE 2 OF 3 | |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE INVESTIGATIONS | | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| CHECKED BY: SF | | SCREEN SLOT SIZE: 2mm | | | | | | | | |

| | | | | | DEPTH (m) | GEOLOGY | DESCRIPTION | COMMENTS |
|--|--|--|--|--|-----------|-----------------------------|---|----------|
| | | | | | 10 | | Resting water level | |
| | | | | | 11 | | | |
| | | | | | 12 | | | |
| | | | | | 13 | | | wet |
| | | | | | 14 | dark grey limestone BEDROCK | firm, did not encounter a weathered upper layer | dry |
| | | | | | 15 | | | |
| | | | | | 16 | | | |
| | | | | | 17 | | | |
| | | | | | 18 | | Water strike | |
| | | | | | 19 | | | |
| | | | | | 20 | | | |

| | | | |
|--|--|---|--|
| LOCATION / NOTES: Water at approx. 10m | LEGEND Groundwater Table | BOREHOLE LOG | |
| | | JOB TITLE | RECYCLING PARK AT KILSHANE CROSS |
| | | LOCATION | KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN |
| | | CLIENT | FINGAL COUNTY COUNCIL |
| | | Block 10-3, Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. | |
| | | e-mail: administration@testd.ie Tel: 01-6606471 Fax: 01-6601702 | |

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| | | | | | | | | | | |
|--------------------------|--------|-----------------------|----------------------|-------------|-----------|---------|--------------------------------------|--|-----------------------------------|--|
| BOREHOLE CONSTRUCTION | SAMPLE | | SOIL VAPOUR (ppm) | GROUNDWATER | DEPTH (m) | GEOLOGY | BOREHOLE NUMBER: 103 | | PAGE 3 OF 3 | |
| | NUMBER | TYPE | | | | | DRILLING DATES: 30/11/01 | | DRILLING METHOD: AIR ROTARY/ODEX | |
| | | | | | | | DRILLER: GLOVER SITE. INVESTIGATIONS | | BOREHOLE DIAMETER: 200mm | |
| | | | | | | | LOGGED BY: PM | | SCREEN TYPE & DIAMETER: 50mm HDPE | |
| CHECKED BY: SF | | SCREEN SLOT SIZE: 2mm | | | | | | | | |

| | | | | | | DEPTH (m) | DESCRIPTION | COMMENTS |
|--|--|--|--|--|--|-----------|---|-----------------------|
| | | | | | | 20 | dark grey limestone BEDROCK poor production of groundwater | Wet but not saturated |
| | | | | | | 21 | | |
| | | | | | | 22 | Terminated @ 24m | |
| | | | | | | 23 | | |
| | | | | | | 24 | <i>For inspection purposes only. Consent of copyright owner required for any other use.</i> | |
| | | | | | | 25 | | |
| | | | | | | 26 | | |
| | | | | | | 27 | | |
| | | | | | | 28 | | |
| | | | | | | 29 | | |
| | | | | | | 30 | | |

| | | | |
|---|---------------------------------|---|--|
| LOCATION / NOTES: Poor groundwater yield | LEGEND Groundwater Table | BOREHOLE LOG | |
| | | JOB TITLE | RECYCLING PARK AT KILSHANE CROSS |
| | | LOCATION | KILSHANE CROSS, ASHBOURNE ROAD, DUBLIN |
| | | CLIENT | FINGAL COUNTY COUNCIL |
| | | Block 10-3, Blanchardstown Corporate Centre, Blanchardstown, Dublin 15. | |
| | | e-mail: administration@tesltd.ie Tel: 01-6606471 Fax: 01-6601702 | |

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GEOTECHNICAL REPORT FOR KILSHANE CROSS

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**KILSHANE N2
GROUND INVESTIGATION
GEOTECHNICAL LABORATORY
TESTS RESULTS**

REPORT No. 4389

JANUARY 2002

Engineer: TES Consulting Engineers

**Glover Site Investigations Ltd.,
8 Drumahiskey Road,
Balmore,
Ballymoney,
Co. Antrim BT53 7QL.**

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KILSHANE N2
GROUND INVESTIGATION
GEOTECHNICAL LABORATORY TESTS RESULTS

CONTENTS:

Testing on Small Disturbed Samples:

Moisture Content Determination
Atterberg Limits Determination

Particle Size Distribution by Wet Sieving/Sedimentation Analysis

Sulphate Content of Soil
pH Value of Soil

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Testing on Undisturbed U100 samples:

Oedometer Consolidation Tests

Unconsolidated Undrained Triaxial Compression Tests

TABULATED RESULTS (on 1 Sheet) OF:

DETERMINATION OF MOISTURE CONTENT (Clause 3.2 of BS 1377 : Part 2 : 1990)

DETERMINATION OF ATTERBERG LIMITS (Clauses 4.3 & 5.3 of BS 1377 : Part 2 : 1990)

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GRAPHICAL RESULTS (on 7 Sheets) OF:

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

(Clauses 9.2 & 9.5 of BS 1377 : Part 2 : 1990)

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KILSHANE N2

GROUND INVESTIGATION CONTRACT

PARTICLE SIZE DISTRIBUTION RESULTS

| Trial Hole No. | Sample Type | Sample No. | GRAVEL Content (%) | SAND Content (%) | 'FINES' | | D ₁₀ (mm) | D ₆₀ (mm) | C _u |
|----------------|-------------|------------|--------------------|------------------|----------|----------|----------------------|----------------------|----------------|
| | | | | | SILT (%) | CLAY (%) | | | |
| TP 1 | J | A & B | 10 | 21 | 57 | 12 | 0.0015 | 0.041 | 27 |
| TP 2 | J | A & B | 0 | 11 | 83 | 6 | 0.0028 | 0.021 | 7.7 |
| TP 3 | J | A & B | 13 | 18 | 45 | 24 | < 0.001 | 0.031 | > 31 |
| TP 4 | J | A & B | 10 | 18 | 60 | 12 | 0.0016 | 0.036 | 22 |
| TP 5 | J | A | 23 | 25 | 35 | 17 | < 0.001 | 0.185 | > 185 |
| TP 6 | J | A & B | 0 | 1 | 60 | 39 | < 0.001 | 0.0069 | > 6.9 |
| TP 7 | J | A & B | 2 | 12 | 61 | 25 | < 0.001 | 0.0155 | > 15.5 |

J indicates small disturbed sample.

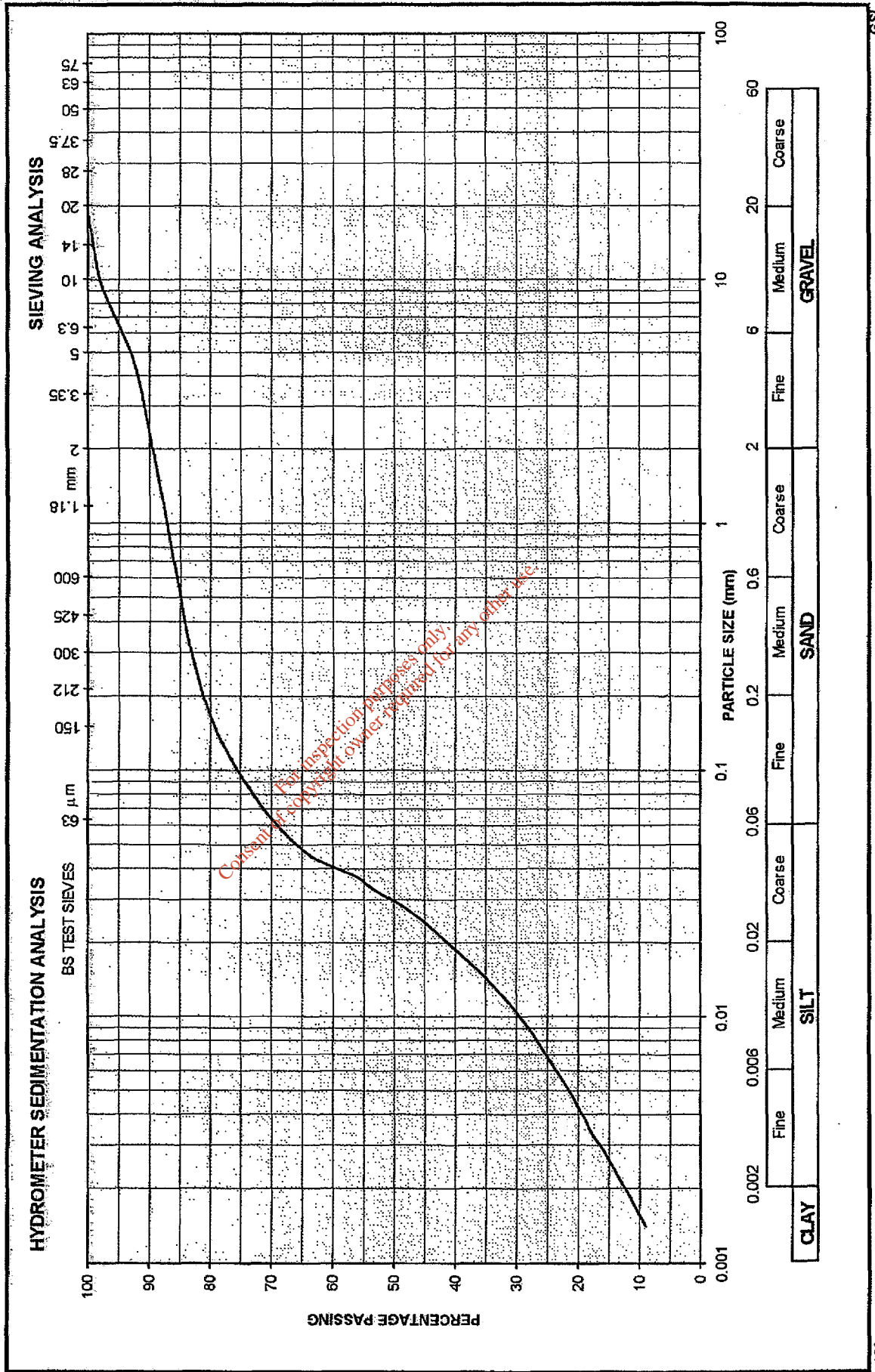
See accompanying Particle Size Distribution curves.

PARTICLE SIZE DISTRIBUTION

CONTRACT: Kilshane.
TRIAL HOLE No.: SO-TP1-01

SAMPLE TYPE: J
SAMPLES: A+B

Tests 9.2 & 9.5 of BS1377 : Part 2 : 1990

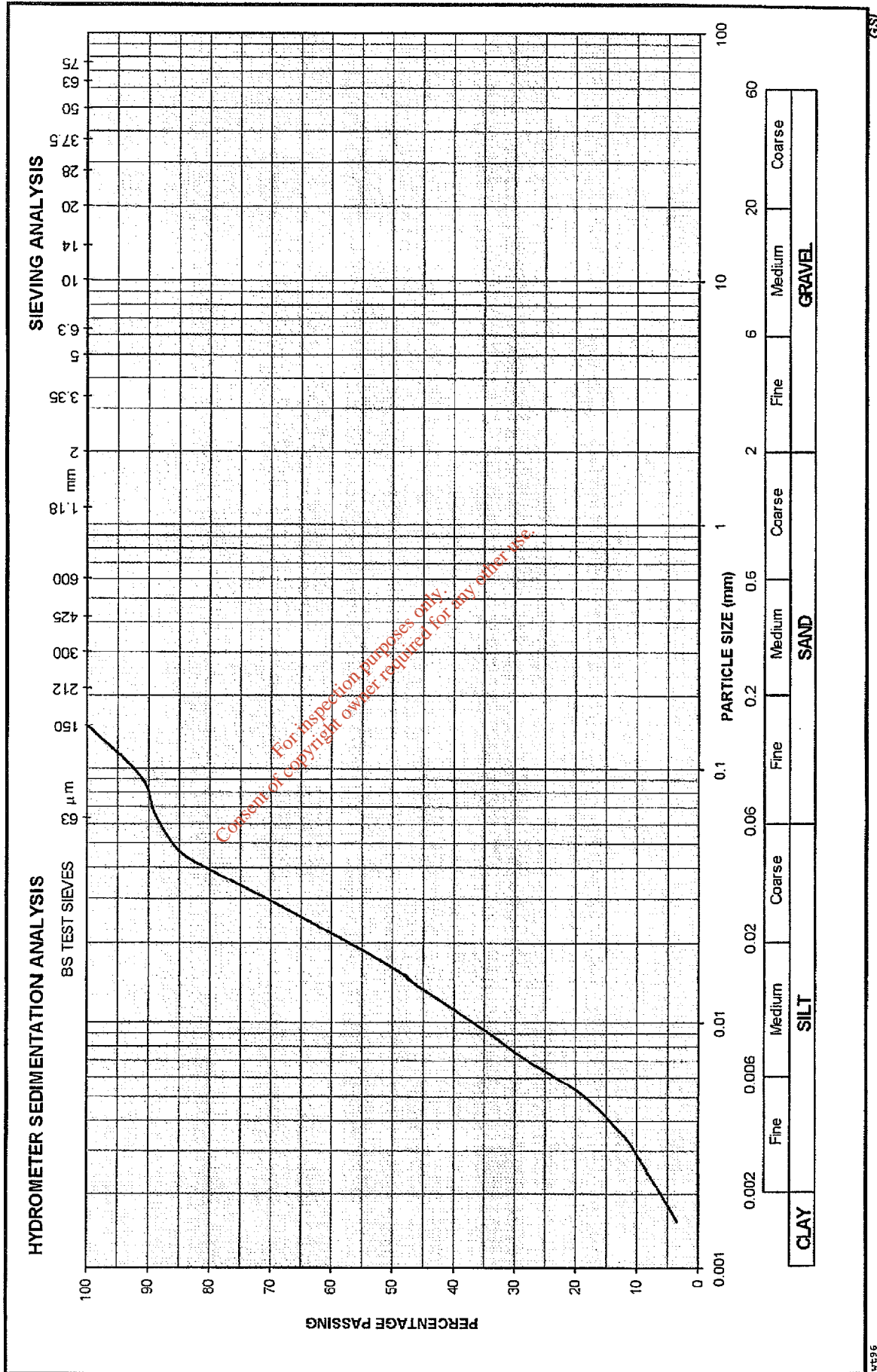


PARTICLE SIZE DISTRIBUTION

CONTRACT: Kilshane.
TRIAL HOLE No.: SO-TP2-01

SAMPLE TYPE: J
SAMPLES: A+B

Tests 9.2 & 9.5 of BS1377 : Part 2 : 1990

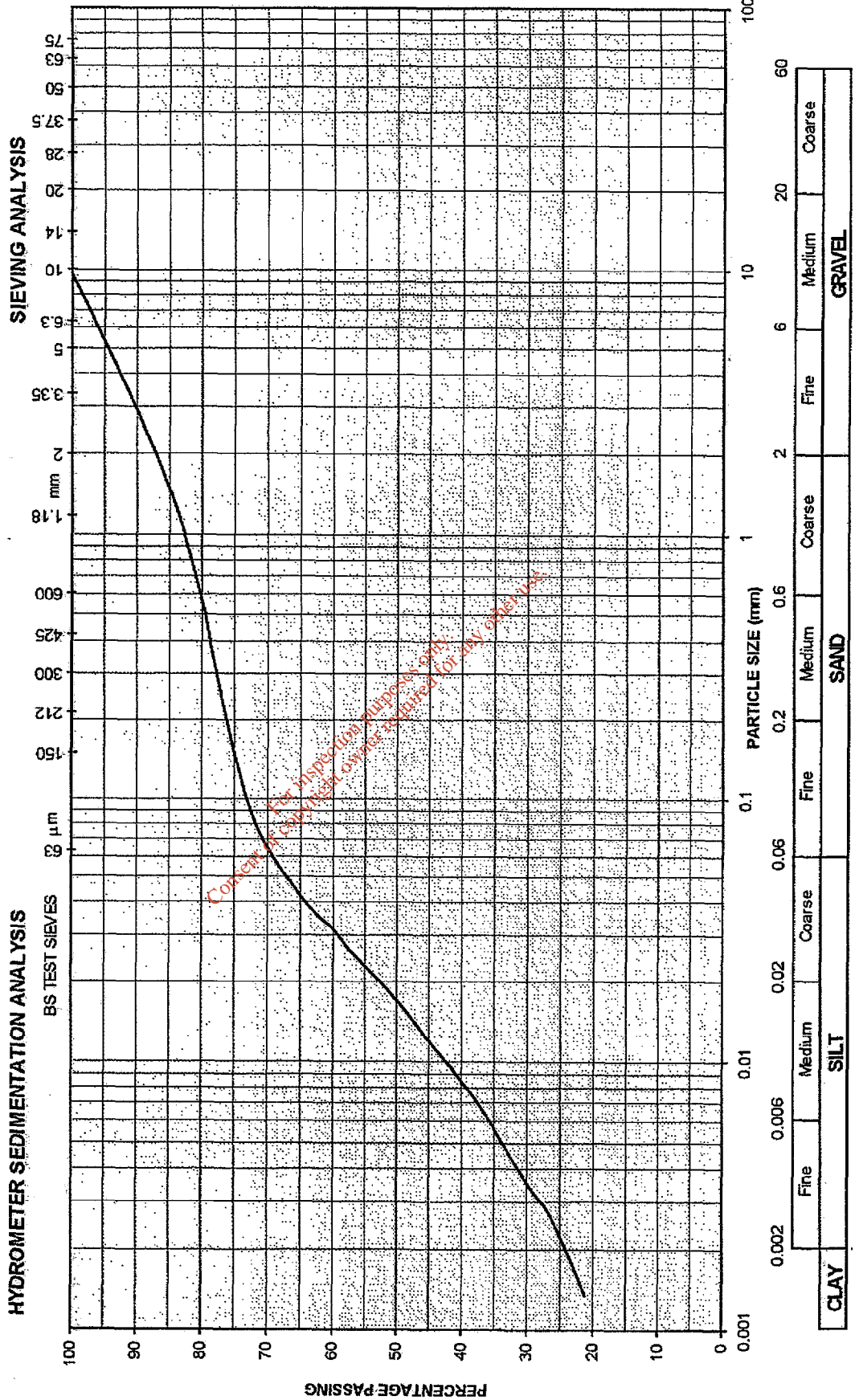


PARTICLE SIZE DISTRIBUTION

CONTRACT: Kilshane.
TRIAL HOLE No.: SO-TP3-01

SAMPLE TYPE: J
SAMPLES: A+B

Tests 9.2 & 9.5 of BS1377 : Part 2 : 1990

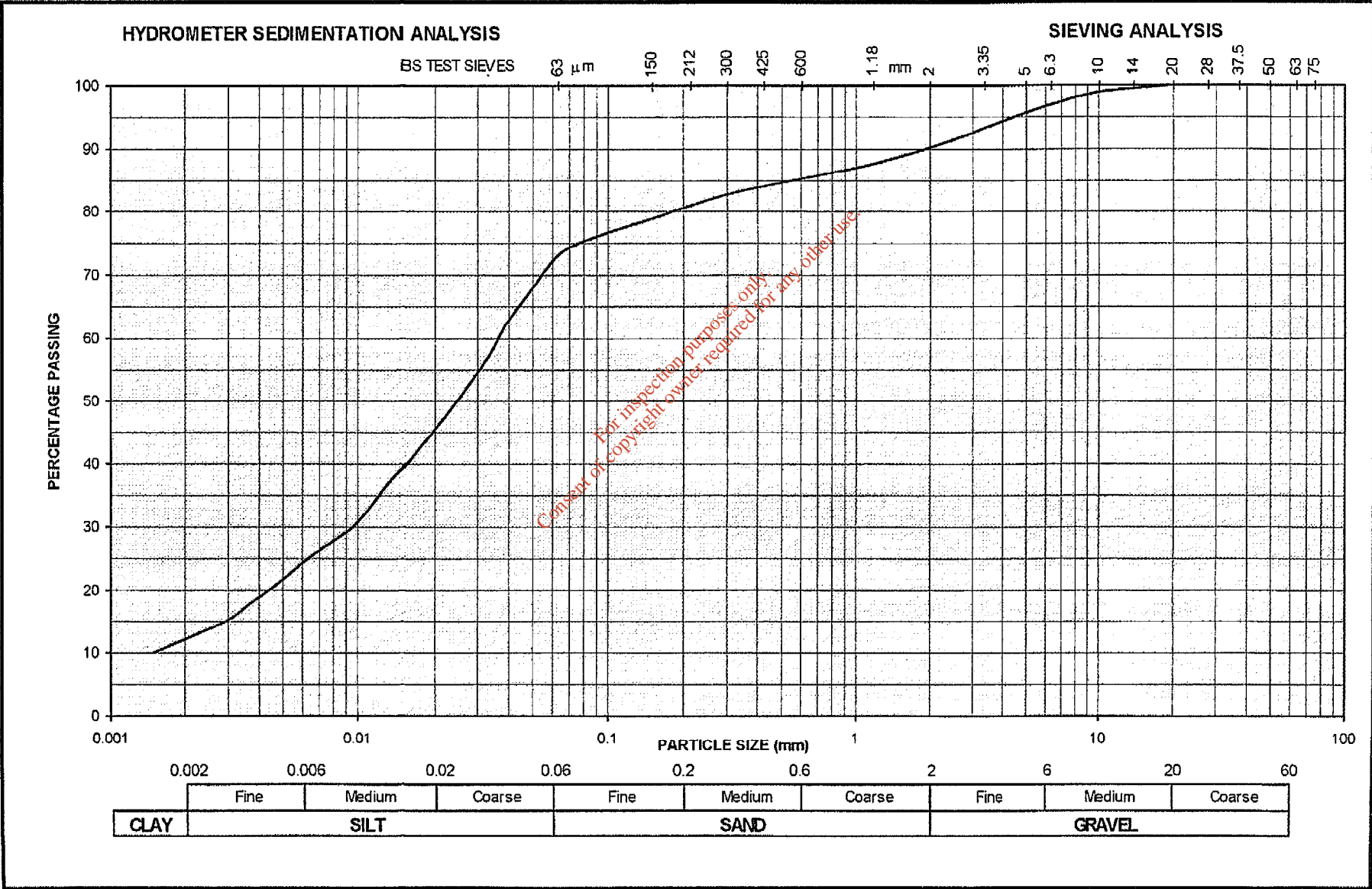


PARTICLE SIZE DISTRIBUTION

CONTRACT: Kilshane.
 TRIAL HOLE No.: SO-TP4-01

SAMPLE TYPE: J
 SAMPLES : A+B

Tests 9.2 & 9.5 of BS1377 : Part 2 : 1990

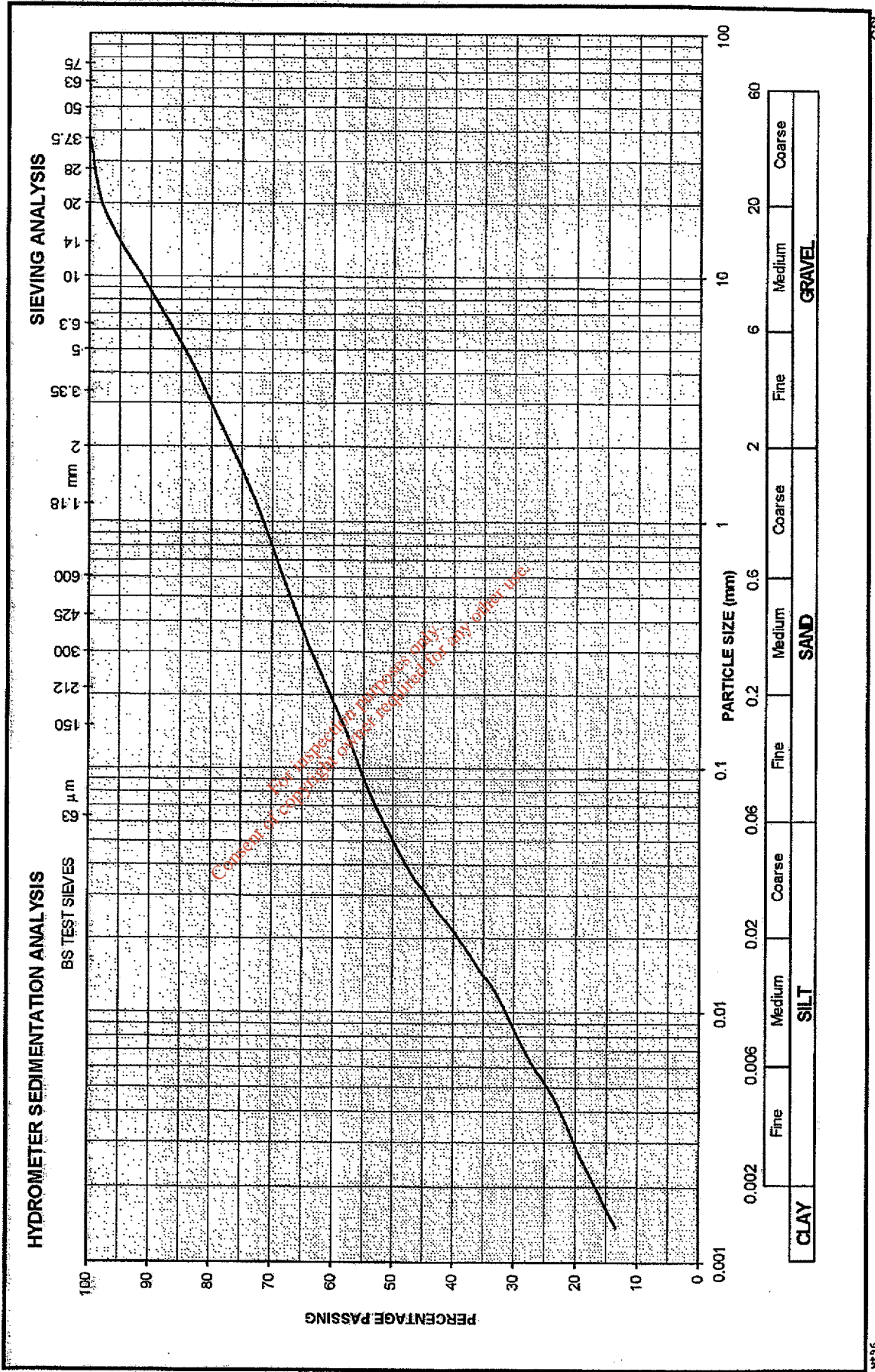


PARTICLE SIZE DISTRIBUTION

CONTRACT: Kilshane.
TRIAL HOLE No.: SO-TP5-01

SAMPLE TYPE: J
SAMPLE: A

Tests 9.2 & 9.5 of BS1377 : Part 2 : 1990



wt36

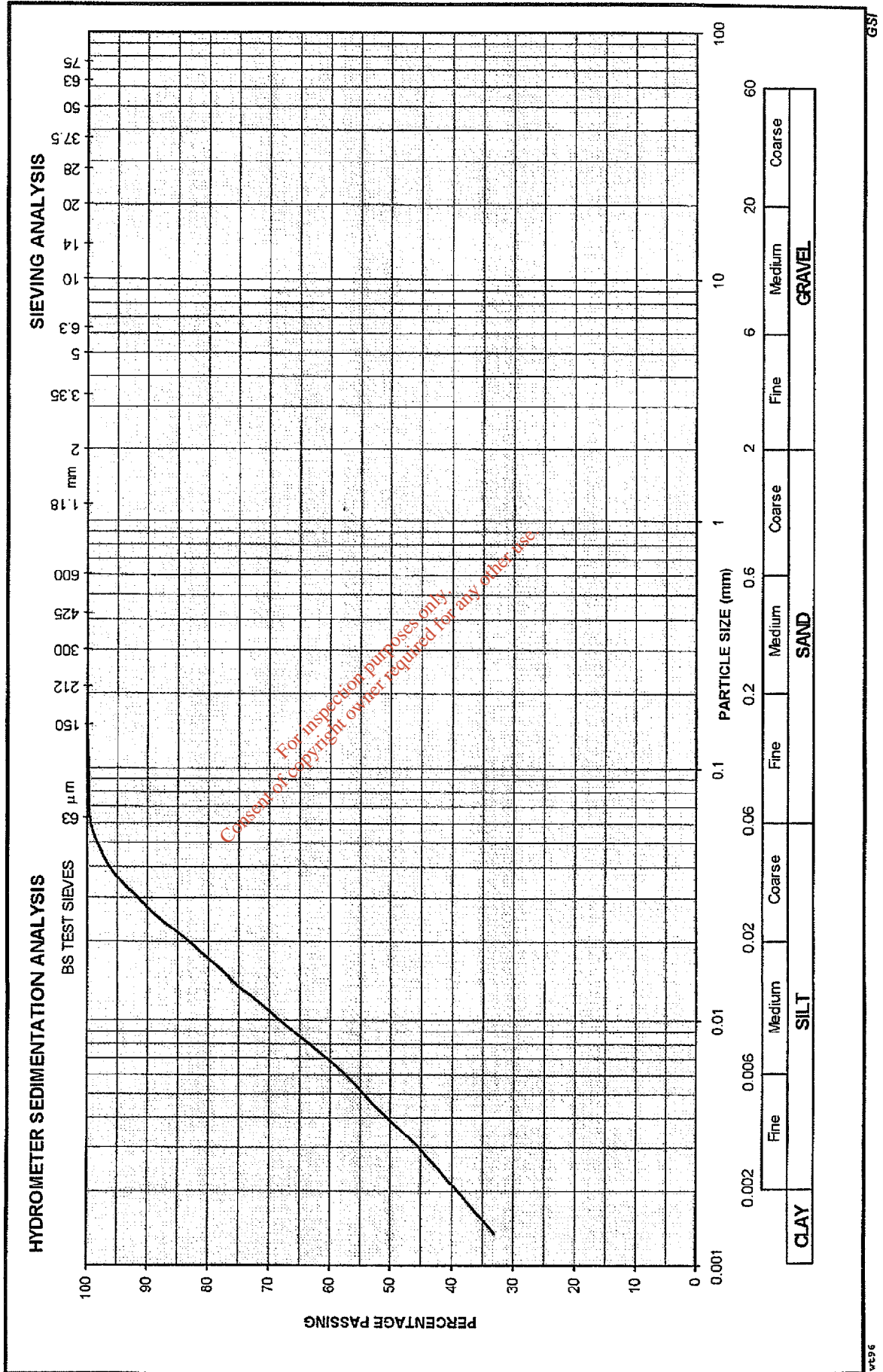
GS1

PARTICLE SIZE DISTRIBUTION

CONTRACT: Kilshane.
TRIAL HOLE No.: SO-TP6-01

SAMPLE TYPE: J
SAMPLES: A+B

Tests 9.2 & 9.5 of BS1377 : Part 2 : 1990

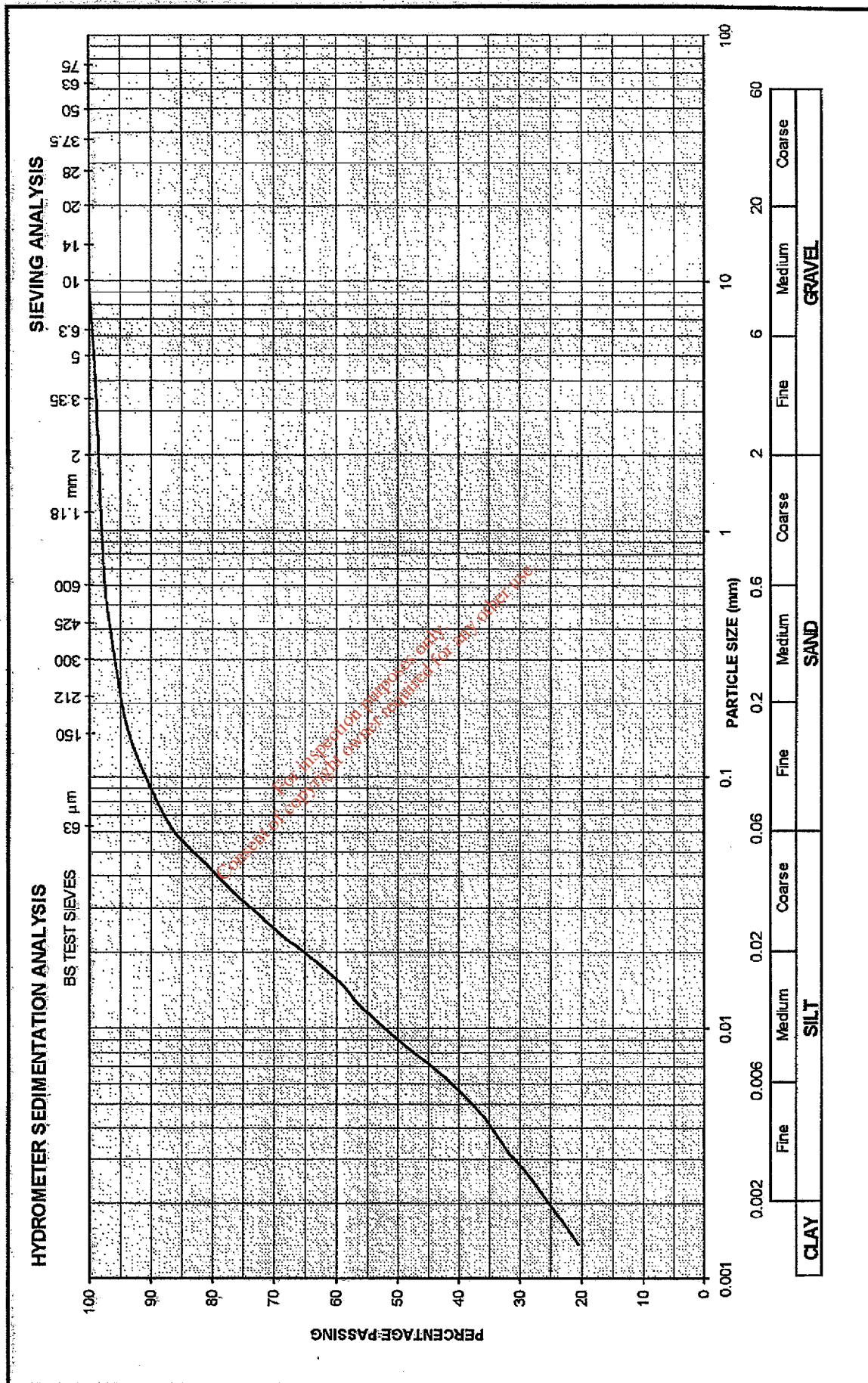


PARTICLE SIZE DISTRIBUTION

CONTRACT: Kilshane.
TRIAL HOLE No.: SO-TP7-01

SAMPLE TYPE: J
SAMPLES: A+B

Tests 9.2 & 9.5 of BS1377 : Part 2 : 1990



TABULATED RESULTS (on 1 Sheet) OF:

DETERMINATION OF SULPHATE CONTENT (Clause 5 of BS 1377 : Part 2 : 1990)

DETERMINATION OF pH VALUE (Clause 9 of 1377 : Part 2 : 1990)

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KILSHANE N2

GROUND INVESTIGATION CONTRACT

RESULTS OF CHEMICAL ANALYSIS OF SOIL & GROUNDWATER SAMPLES

| T. H. No. | Sample No. | Material | pH Value | Sulphate Content (g/l) |
|-----------|------------|---------------------|----------|------------------------|
| TP 1 | A & B | Gravelly CLAY | 7.5 | 0.11 |
| TP 2 | A & B | DIATOMITE | 8.5 | 0.16 |
| TP 3 | A & B | Gravelly CLAY | 7.5 | 0.08 |
| TP 4 | A & B | Gravelly CLAY | 7.5 | 0.06 |
| TP 5 | A | Gravelly sandy CLAY | 7.5 | 0.07 |
| TP 6 | A & B | CLAY | 8.0 | 0.10 |
| TP 7 | A & B | Sandy CLAY | 7.5 | 0.08 |

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**DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES IN
OEDOMETER (Clause 3 of BS 1377 : Part 5 : 1990)**

WITH GRAPHS OF VOIDS RATIO v. LOG PRESSURE (on 5 Sheets)

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TABULATED RESULTS (on 1 Sheet) OF:
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL
COMPRESSION (UU) (Clause 8 of BS 1377 : Part 7 : 1990)

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SUMMARY OF TEST RESULTS

CONTRACT: Kilshane N2 Ground Investigation

SHEET No. 1 of 1

| T.H. No. | Sample Type | Sample No. | Sample Depth (m) | Description | TRIAXIAL COMPRESSION TEST Test 8 & 9 of Part 7 and Test 7 of Part 8 of BS 1377: 1990 | | | | | | | | | | | | | | |
|----------|-------------|------------|------------------|--|--|--------------------------------|---------------------------|-------|--------------------------|----------------|-------------|------------------------------|---|---------------------------|---------------------|---------------|-----------------------|------------|------|
| | | | | | Test Type | Undrained Shear Strength (kPa) | Shear Strength Parameters | | Triaxial Test/ Stage No. | Specimen Sizes | | Initial Moisture Content (%) | Initial Bulk Density (Mg/m ³) | Total Cell Pressure (kPa) | Porewater Pressures | | Failure Conditions | | |
| | | | | | | | c (kPa) | φ (°) | | Dia. (mm) | Length (mm) | | | | Initial (kPa) | Failure (kPa) | Deviator Stress (kPa) | Strain (%) | Mode |
| | | | | | | | | | | | | | | | | | | | |
| TP2 | U | | | TOP 0.10m of U100 sample: Intermixed firm dark brownish grey organic silty CLAY with occasional decayed rootlets in thin lenses of dark brown silt; and soft (friable) light grey with white specklings DIATOMITE (FILL/DISTURBED?) | UU | | 34 | 5 | 1 | 38 | 76 | 62 | 1.48 | 50 | | | 84 | 15.0 | |
| | | | | | | | | | | 38 | 76 | | | | | | - | - | |
| | | | | | | | | | | 38 | 76 | | | | | | 114 | 15.0 | |
| TP 3 | U | | | TOP 0.12m of U100 sample: Stiff-very stiff mottled light brownish grey, dark greyish brown & orange brown gravelly sandy CLAY | UU | | 180 | 15 | 1 | 38 | 76 | 12.9 | 2.20 | 50 | | | 509 | 15.0 | |
| | | | | | | | | | | 38 | 76 | | | | | | - | - | |
| | | | | | | | | | | 38 | 76 | | | | | | 615 | 14.0 | |
| TP 4 | U | | | SPECIMEN 0.10m-0.30m from TOP of U100 sample: TOP 0.10m of specimen: Soft to firm brownish grey slightly gravelly sandy CLAY & silty CLAY with pockets of Topsoil BOTTOM 0.10m: Firm/stiff to stiff friable orange brown & dark brownish grey f/m gravelly sandy CLAY | UUM | | 43 | 13.5 | 1 | 106 | 203 | 19.7 | 2.02 | 50 | | | >135 | >10.0 | |
| | | | | | | | | | | 2 | | | | | | | 170 | 13.1 | |
| | | | | | | | | | | 3 | | | | | | | 231 | 18.2 | |
| TP 6 | U | | | SPECIMEN 0.08-0.28m from TOP of U100 specimen: Firm to stiff (friable) mottled light orange brown & light grey slightly fine gravelly sandy CLAY | UUM | | 67 | 7 | 1 | 106 | 203 | 23 | 2.00 | 50 | | | >161 | >10.0 | |
| | | | | | | | | | | 2 | | | | | | | 180 | 13.8 | |
| | | | | | | | | | | 3 | | | | | | | 208 | 17.4 | |
| TP 7 | U | | | SPECIMEN 0.08-0.28m from TOP of U100 specimen TOP 0.10m of specimen: Soft/firm-firm brownish grey & greyish brown slightly organic gravelly silty CLAY (SUBSOIL?) BOTTOM 0.10m: Firm dark grey slightly fine gravelly CLAY (one piece of red brick at interface - FILL?) | UUM | | 51 | 4 | 1 | 106 | 203 | 20 | 2.03 | 50 | | | >109 | >10.0 | |
| | | | | | | | | | | 2 | | | | | | | 127 | 13.8 | |
| | | | | | | | | | | 3 | | | | | | | 143 | 16.2 | |

Undisturbed samples tested.

Maximum effective principal stress ratio failure criterion; otherwise maximum deviator stress.
* Brittle mode of failure; otherwise plastic failure.

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SURFACE WATER LABORATORY RESULTS

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Preliminary

Validated

ALcontrol Geochem Analytical Services

Table Of Results

Job Number: 01/04255/01/01

Client: TES

Date of Receipt: 10/05/01
(of first sample)

Sample Type: WATER

Location: Not Specified

Client Contact: Patrick Mulroy

Client Ref. No.: Kilshane

| UKAS Accredited | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | |
|------------------------|-----------------|-----------|--------------------|---------------------|-------------------|-----------------|-------------------|-----------------|---------------------------|---------------------------|--|--|--|--|--|--|
| Units | | ppb | ppb | ppb | ppb | ppb | ppb | ppm | ppm | | | | | | | |
| Detection Method | | ICP-USN | ICP-USN | ICP-USN | ICP-USN | ICP-USN | ICP-USN | IR | Titrat | | | | | | | |
| Method Detection Limit | | <0.4 | <1 | <5 | <1 | <10 | <5 | <1 | <1 | | | | | | | |
| Sample Number | Sample Identity | Depth (m) | Cadmium by ICP-USN | Chromium by ICP-USN | Copper by ICP-USN | Iron by ICP-USN | Nickel by ICP-USN | Lead by ICP-USN | Tot. Org. Carbon in Water | Alkalinity Total as CaCO3 | | | | | | |
| 2 | WA-UG-01 | UNKNOWN | - | - | - | - | - | - | 7 | - | | | | | | |
| 3 | WA-UG-01 | UNKNOWN | - | - | - | - | - | - | - | 230 | | | | | | |
| 7 | WA-UG-01 | UNKNOWN | <0.4 | 9 | <5 | 44 | <10 | <5 | - | - | | | | | | |
| 11 | WA-DG-01 | UNKNOWN | - | - | - | - | - | - | 7 | - | | | | | | |
| 12 | WA-DG-01 | UNKNOWN | - | - | - | - | - | - | - | 160 | | | | | | |
| 16 | WA-DG-01 | UNKNOWN | <0.4 | 13 | 5 | 29 | <10 | <5 | - | - | | | | | | |

Note: METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

NFP = NO FIBRES PRESENT

Checked By _____ David O'Hare

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Preliminary

Validated

ALcontrol Geochem Analytical Services

Table Of Results

Job Number: 01/10631/01/01

Client: TES

Date of Receipt: 06/11/01
(of first sample)

Sample Type: WATER

Location: Kilshane

Client Contact: Padraig Mulroy

Client Ref. No.:

| UKAS Accredited | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
|------------------------|-----------------|-----------|---------|-------|-----------|-----------|-------|----------|-----------------------|------------------|--------------------|---------|--------------------|-------------------------|-----------------------|------------------------------|-----------------------------|-----------|
| Units | | | ppm | ppm | ppm | ppm | ppm | ppm | mg/l | mg/l | mg/l | ppm | ppm | ppm | mg/l | ppm | ppb | ppm |
| Detection Method | | | ICP | ICP | ICP | ICP | ICP | SPECTRO | Spectro | Spectro | Spectro | SPECTRO | SPECTRO | spectro | ATU | Colour | CVAAS | Flame P |
| Method Detection Limit | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <5 | <15 | <1 | <0.15 | <0.05 | <3 | <0.3 | <1 | <0.2 | <0.05 | <0.2 |
| Sample Number | Sample Identity | Depth (m) | Calcium | Iron | Magnesium | Manganese | Zinc | Chloride | COD Unfiltered Sample | Nitrate in Water | Phosphate in Water | Nitrite | Sulphate (soluble) | Total Oxidised Nitrogen | BOD Unfiltered Sample | Ammoniacal Nitrogen as NH4-N | Mercury Low Dutch Target AA | Potassium |
| 1 | DG | UNKNOWN | - | - | - | - | - | - | - | - | - | - | - | - | - | - | <0.05 | - |
| 2 | DG | UNKNOWN | 191.00 | 0.21 | 16.90 | <0.05 | <0.05 | 27 | - | >1 | <0.15 | <0.05 | 182 | <0.3 | - | - | - | 2.7 |
| 3 | DG | UNKNOWN | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4 | DG | UNKNOWN | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 | - | - |
| 7 | UG | UNKNOWN | - | - | - | - | - | - | - | - | - | - | - | - | - | - | <0.05 | - |
| 8 | UG | UNKNOWN | 189.10 | <0.05 | 17.14 | <0.05 | <0.05 | 27 | - | >1 | <0.15 | <0.05 | 180 | <0.3 | - | - | - | 2.2 |
| 9 | UG | UNKNOWN | - | - | - | - | - | - | - | - | - | - | - | - | 3.1 | - | - | - |
| 10 | UG | UNKNOWN | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 | - | - |

Note: METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE

Checked By _____ David O'Hare

NFP = NO FIBRES PRESENT

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Report Reference: 2K01.4410-4411
Invoice Ref: IR0111007

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| Method Ref | | MCT | MCT* |
|------------|--------------------------------|---|---|
| Lab I.D | Sample Reference | Total Coliforms detected per 100mls (MPN/100mls) | E.coli detected per 100mls (MPN /100mls) |
| 2K01-4410 | Kilshane DG, SPM 6 WA-DG-01 | 19510 | 248.9 |
| 2K01-4411 | Kilshane UG PM 12 WA-UG-01 | 8840 | 61.2 |

Authorised By: 
Maura Quinn.

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Alcontrol Geochem Ltd.

Job Number: 01/04255/01/01
Client: TES Ltd
Date of Receipt: 10/05/01
Sample Type: Water

| Sample No | Sample Id. | E.coli Detected per 100ml | Total coliforms detected per 100mls |
|-----------|------------|------------------------------|---|
| | | MPN/100mls | MPN/100ml |
| - | WA-UG-01 | 4.1 | 435.2 |
| - | WA-DG-01 | 47.1 | 1119.85 |

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Major Ion Balance in Surface Water Samples from Kilshane Cross, County Dublin

Summer

| Sample | Elec. Cond. (μScm^{-1}) | Cations | | | | Anions | | | Balance | | | NO ₃ - N (mg L ⁻¹) | PO ₄ - P (mg L ⁻¹) | pH |
|--------------------|---|--|--|---|--|---|---|---|--------------------------------------|--------------------------------------|---------------------------|--|--|------|
| | | Ca ²⁺ (meq L ⁻¹) | Mg ²⁺ (meq L ⁻¹) | Na ⁺ (meq L ⁻¹) | K ⁺ (meq L ⁻¹) | Cl ⁻ (meq L ⁻¹) | SO ₄ ²⁻ (meq L ⁻¹) | HCO ₃ ⁻ (meq L ⁻¹) | Σ^+ (meq L ⁻¹) | Σ^- (meq L ⁻¹) | % Ion Balance Error | | | |
| SW1 (Upgradient) | 760 | 7.53992 | 0.82401 | 0.97839 | 0.13556 | 0.90250 | 1.85301 | 5.4117647 | 9.4779 | 8.1673 | 7.4276 | 6.4 | <0.03 | 7.85 |
| SW2 (Downgradient) | 790 | 7.57984 | 1.45148 | 1.08710 | 0.10231 | 0.78969 | 3.06059 | 3.7647059 | 10.2207 | 7.6150 | 14.6097 | 0.3 | <0.03 | 7.68 |

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Alcontrol Geochem Ltd.

Job Number: 01/04255/01/01
Client: TES Ltd
Date of Receipt: 10/05/01
Sample Type: Water

| Sample No | Sample Id. | E.coli Detected per 100ml | Total coliforms detected per 100mls |
|-----------|------------|---------------------------|-------------------------------------|
| | | MPN/100mls | MPN/100ml |
| - | WA-UG-01 | 4.1 | 435.2 |
| - | WA-DG-01 | 47.1 | 1119.85 |

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Major Ion Balance in Surface Water Samples from Kilshane Cross, County Dublin

Winter

| Sample | Elec. Cond. (μScm^{-1}) | Cations | | | | Anions | | | Balance | | | NO ₃ - N (mg L ⁻¹) | PO ₄ - P (mg L ⁻¹) | pH |
|--------------------|---|--|--|---|--|---|---|---|--------------------------------------|--------------------------------------|---------------------------|--|--|------|
| | | Ca ²⁺ (meq L ⁻¹) | Mg ²⁺ (meq L ⁻¹) | Na ⁺ (meq L ⁻¹) | K ⁺ (meq L ⁻¹) | Cl ⁻ (meq L ⁻¹) | SO ₄ ²⁻ (meq L ⁻¹) | HCO ₃ ⁻ (meq L ⁻¹) | Σ^+ (meq L ⁻¹) | Σ^- (meq L ⁻¹) | % Ion Balance Error | | | |
| SW1 (Upgradient) | 840 | 9.43613 | 1.40954 | 1.13058 | 0.06906 | 0.76149 | 3.74766 | 5.6470588 | 12.0453 | 10.1562 | 8.5089 | <1 | <0.015 | 7.93 |
| SW2 (Downgradient) | 830 | 9.53094 | 1.38980 | 1.04361 | 0.06906 | 0.76149 | 3.78930 | 7.7647059 | 12.0334 | 12.3155 | -1.1585 | <1 | <0.015 | 7.9 |

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GROUNDWATER LABORATORY RESULTS

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Preliminary

Validated

ALcontrol Geochem Analytical Services

Table Of Results

Job Number: 01/12270/01/01

Client: TES

Date of Receipt: 14/12/01
(of first sample)

Sample Type: WATER

Location: KILSHONE CROSS

Client Contact: David McKenna

Client Ref. No.:

| UKAS Accredited | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
|------------------------|-----------------|-----------|---------------------|-------------------|----------------------|-------------------|-----------------|-----------------|---------------------------|----------------|---------------------------|-------------------------|--|--|--|--|
| Units | | ppb | ppb | ppb | ppb | ppb | ppb | ppm | ppm | ppm | mg/l | | | | | |
| Detection Method | | ICP-USN | ICP-USN | ICP-USN | ICP-USN | ICP-USN | ICP-USN | IR | KONE | Titrat | Titrat | | | | | |
| Method Detection Limit | | <1 | <5 | <1 | <10 | <5 | <5 | <1 | <5 | <1 | <1 | | | | | |
| Sample Number | Sample Identity | Depth (m) | Chromium by ICP-USN | Copper by ICP-USN | Manganese by ICP-USN | Nickel by ICP-USN | Lead by ICP-USN | Zinc by ICP-USN | Tot. Org. Carbon in Water | Chloride Water | Alkalinity Total as CaCO3 | Alkalinity Tot as CaCO3 | | | | |
| 3 | WA-101-01 | UNKNOWN | - | - | - | - | - | - | 2 | - | - | - | | | | |
| 4 | WA-101-01 | UNKNOWN | 1 | >5 | 82 | >10 | 6 | 33 | - | 32 | 300 | - | | | | |
| 9 | WA-102-01 | UNKNOWN | - | - | - | - | - | - | 4 | - | - | - | | | | |
| 10 | WA-102-01 | UNKNOWN | <1 | <5 | 1829 | 10 | >5 | 24 | - | 31 | - | 216 | | | | |
| 15 | WA-103-01 | UNKNOWN | - | - | - | - | - | - | 4 | - | - | - | | | | |
| 16 | WA-103-01 | UNKNOWN | >1 | >5 | 89 | <10 | 6 | 25 | - | 35 | 300 | - | | | | |

Note: METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

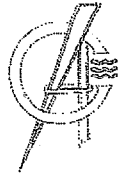
NDP = NO DETERMINATION POSSIBLE

NFP = NO FIBRES PRESENT

Checked By _____ David O'Hare

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12270



Report Reference: 2K01.4837/1-4837/3

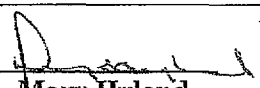
Page 2 of 2

Purchase Order Number: IR0120027

Samples Delivered Late @ Night & Left in cool box overnight outside premises

| Method Ref | | 1201 | 1201 |
|-------------|---|---|--|
| Lab I.D | Sample Reference | Total Coliforms detected per 100mls(MPN/100mls) | E.coli detected per 100mls (MPN /100mls) |
| 2K01-4837/1 | Kilshane Cross BH3, TES WA-103-01, Kilshane 13.12.01 12270-18 | 125.9 | <1 |
| 2K01-4837/2 | Kilshane Cross BH2, TES WA-101, Kilshane 13.12.01 12270-6 | 601.5 | <1 |
| 2K01-4837/3 | Kilshane Cross BH2, TES WA-102-01, Kilshane 13.12.01 12270-12 | 298.7 | <1 |

Authorised By:


Mary Hyland.

Job Number: 01/12270/01/01

ALcontrol Geochem
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Major Ion Balance in Groundwater taken from Kilshane Cross, County Dublin

| Sample | Elec. Cond. (μScm^{-1}) | Cations | | | | Anions | | | Balance | | | NO ₃ - N (mg L ⁻¹) | PO ₄ - P (mg L ⁻¹) | pH |
|--------|---|--|--|---|--|---|---|---|--------------------------------------|--------------------------------------|---------------------------|--|--|------|
| | | Ca ²⁺ (meq L ⁻¹) | Mg ²⁺ (meq L ⁻¹) | Na ⁺ (meq L ⁻¹) | K ⁺ (meq L ⁻¹) | Cl ⁻ (meq L ⁻¹) | SO ₄ ²⁻ (meq L ⁻¹) | HCO ₃ ⁻ (meq L ⁻¹) | Σ^+ (meq L ⁻¹) | Σ^- (meq L ⁻¹) | % Ion Balance Error | | | |
| BH101 | 1170 | 6.29242 | 0.92681 | 1.30452 | 0.06139 | 0.90250 | 0.60379 | 7.0588235 | 8.5851 | 8.5651 | 0.1167 | 26 | <0.15 | 9.3 |
| BH102 | 1200 | 5.32934 | 0.29523 | 0.43484 | 0.03837 | 0.87430 | 1.08266 | 5.0823529 | 6.0978 | 7.0393 | -7.1670 | 0.3 | <0.15 | 8.77 |
| BH103 | 1270 | 6.00798 | 1.74260 | 2.17420 | 0.14835 | 0.98711 | 1.08266 | 7.0588235 | 10.0731 | 9.1286 | 4.9190 | 20.3 | <0.15 | 9.67 |

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PRECIPITATION LEVELS FOR THE PHONEIX PARK

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EUROPEAN CLIMATE ASSESSMENT & DATASET (ECA&D), MARCH 2005
THESE DATA CAN BE USED FREELY PROVIDED THAT THE FOLLOWING
SOURCE IS ACKNOWLEDGED:

Klein Tank, A.M.G. and Coauthors, 2002. Daily dataset of 20th-century surface
air temperature and precipitation series for the European Climate Assessment.
Int. J. of Climatol., 22, 1441-1453.
Data and metadata available at <http://eca.knmi.nl>

FILE FORMAT (MISSING VALUE CODE IS -9999):

01-06 SQUID: Source identifier
08-15 DATE : Date YYYYMMDD
17-21 RR : daily precipitation amount in 0.1 mm
23-27 Q_RR : quality code for RR (0='OK'; 1='suspect'; 9='missing')

This is the blended series of location IRELAND, DUBLIN PHOENIX PARK
(location-ID: 110).

Blended and updated with sources: 100454 903969
See info.txt for more info.

| SQUID | DATE | RR | Q_RR |
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| 100454,20011102, | | 0, | 0 |
| 100454,20011103, | | 0, | 0 |
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| 100454,20011105, | | 10, | 0 |
| 100454,20011106, | | 79, | 0 |
| 100454,20011107, | | 56, | 0 |
| 100454,20011108, | | 8, | 0 |
| 100454,20011109, | | 0, | 0 |
| 100454,20011110, | | 0, | 0 |
| 100454,20011111, | | 3, | 0 |
| 100454,20011112, | | 19, | 0 |
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| 100454,20011116, | | 1, | 0 |
| 100454,20011117, | | 3, | 0 |
| 100454,20011118, | | 0, | 0 |
| 100454,20011119, | | 0, | 0 |
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| 100454,20011122, | | 11, | 0 |
| 100454,20011123, | | 1, | 0 |
| 100454,20011124, | | 19, | 0 |
| 100454,20011125, | | 0, | 0 |
| 100454,20011126, | | 6, | 0 |
| 100454,20011127, | | 15, | 0 |
| 100454,20011128, | | 22, | 0 |

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| | | |
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| 100454,20011203, | 98, | 0 |
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| 100454,20011205, | 1, | 0 |
| 100454,20011206, | 23, | 0 |
| 100454,20011207, | 0, | 0 |
| 100454,20011208, | 0, | 0 |
| 100454,20011209, | 3, | 0 |
| 100454,20011210, | 0, | 0 |
| 100454,20011211, | 0, | 0 |
| 100454,20011212, | 4, | 0 |
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| 100454,20011226, | 7, | 0 |
| 100454,20011227, | 8, | 0 |
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| 903969,20020105, | 20, | 0 |
| 903969,20020106, | 0, | 0 |
| 903969,20020107, | 0, | 0 |
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| 903969,20020110, | 0, | 0 |
| 903969,20020111, | 0, | 0 |
| 903969,20020112, | 0, | 0 |
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| 903969,20020114, | 20, | 0 |
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| 903969,20020116, | 0, | 0 |
| 903969,20020117, | 60, | 0 |

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| | | |
|------------------|------|---|
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| 903969,20020126, | 30, | 0 |
| 903969,20020127, | 30, | 0 |
| 903969,20020128, | 50, | 0 |
| 903969,20020129, | 20, | 0 |
| 903969,20020130, | 0, | 0 |
| 903969,20020131, | 30, | 0 |
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| 903969,20020209, | 40, | 0 |
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| 903969,20020215, | 0, | 0 |
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| 903969,20020219, | 70, | 0 |
| 903969,20020220, | 70, | 0 |
| 903969,20020221, | 30, | 0 |
| 903969,20020222, | 40, | 0 |
| 903969,20020223, | 30, | 0 |
| 903969,20020224, | 100, | 0 |
| 903969,20020225, | 80, | 0 |
| 903969,20020226, | 160, | 0 |
| 903969,20020227, | 20, | 0 |
| 903969,20020228, | 10, | 0 |

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N2 FINGLAS TO ASHBOURNE ROAD SCHEME- FIGURE 7.9

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