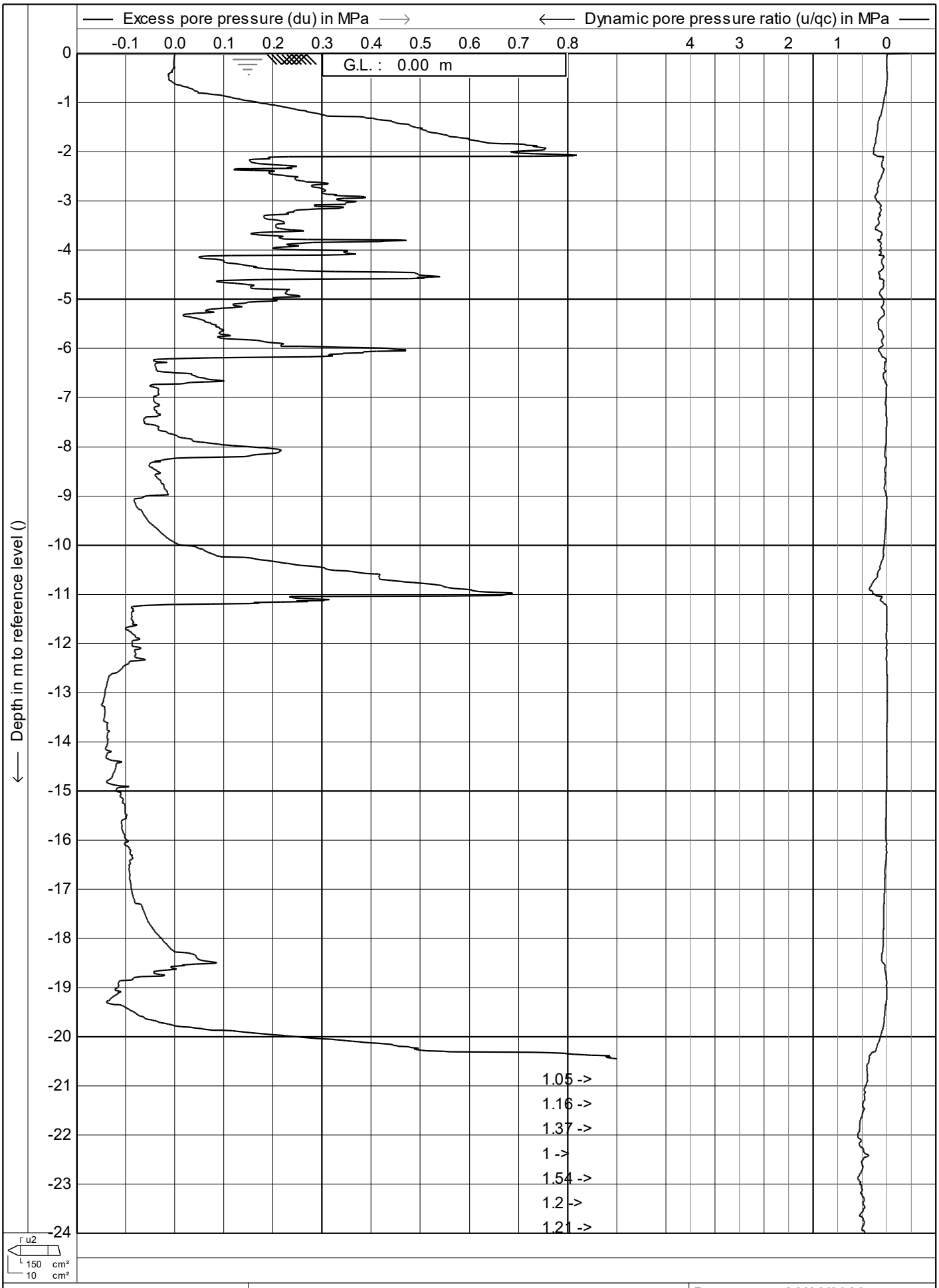



Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

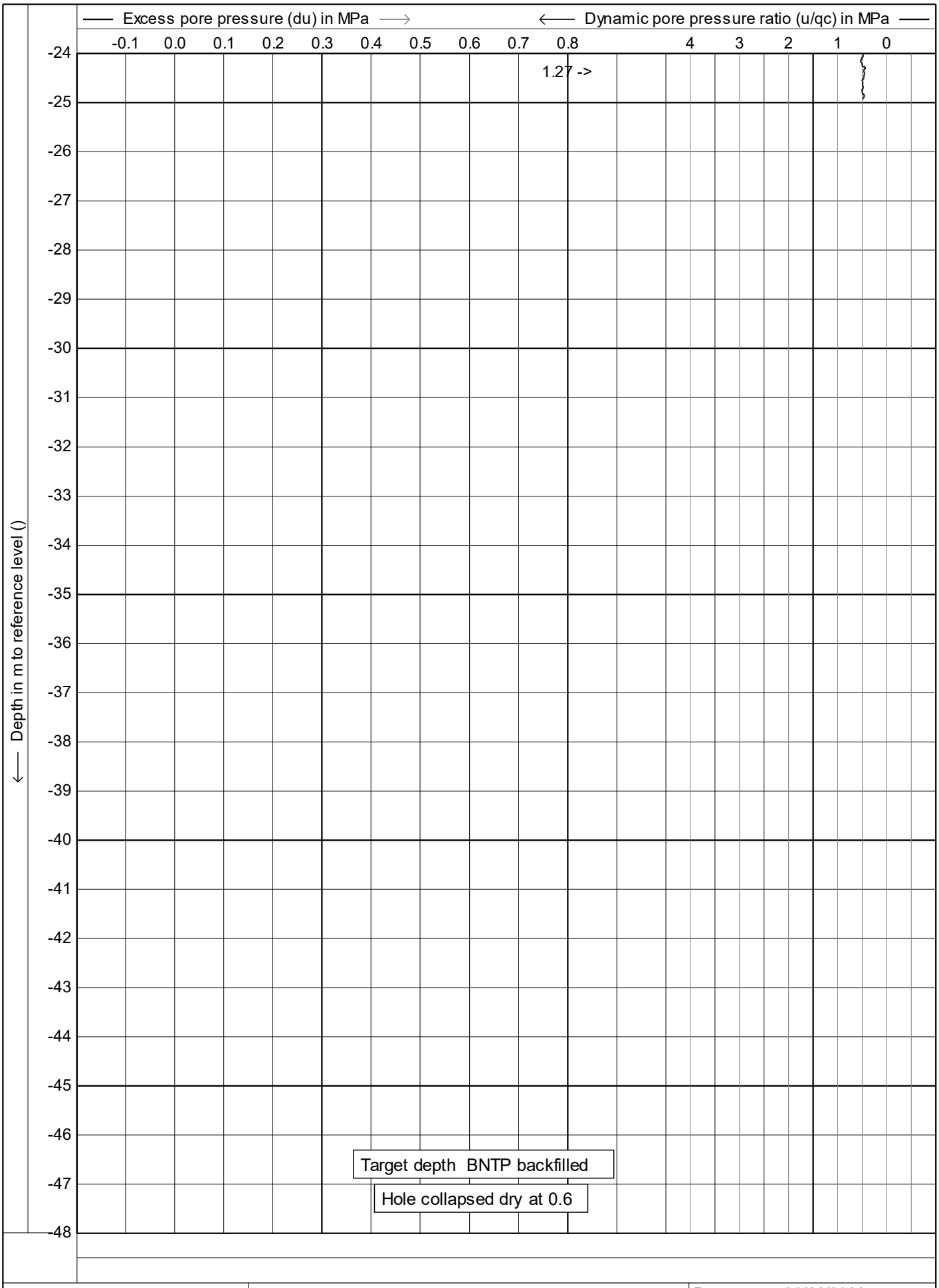
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**7/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

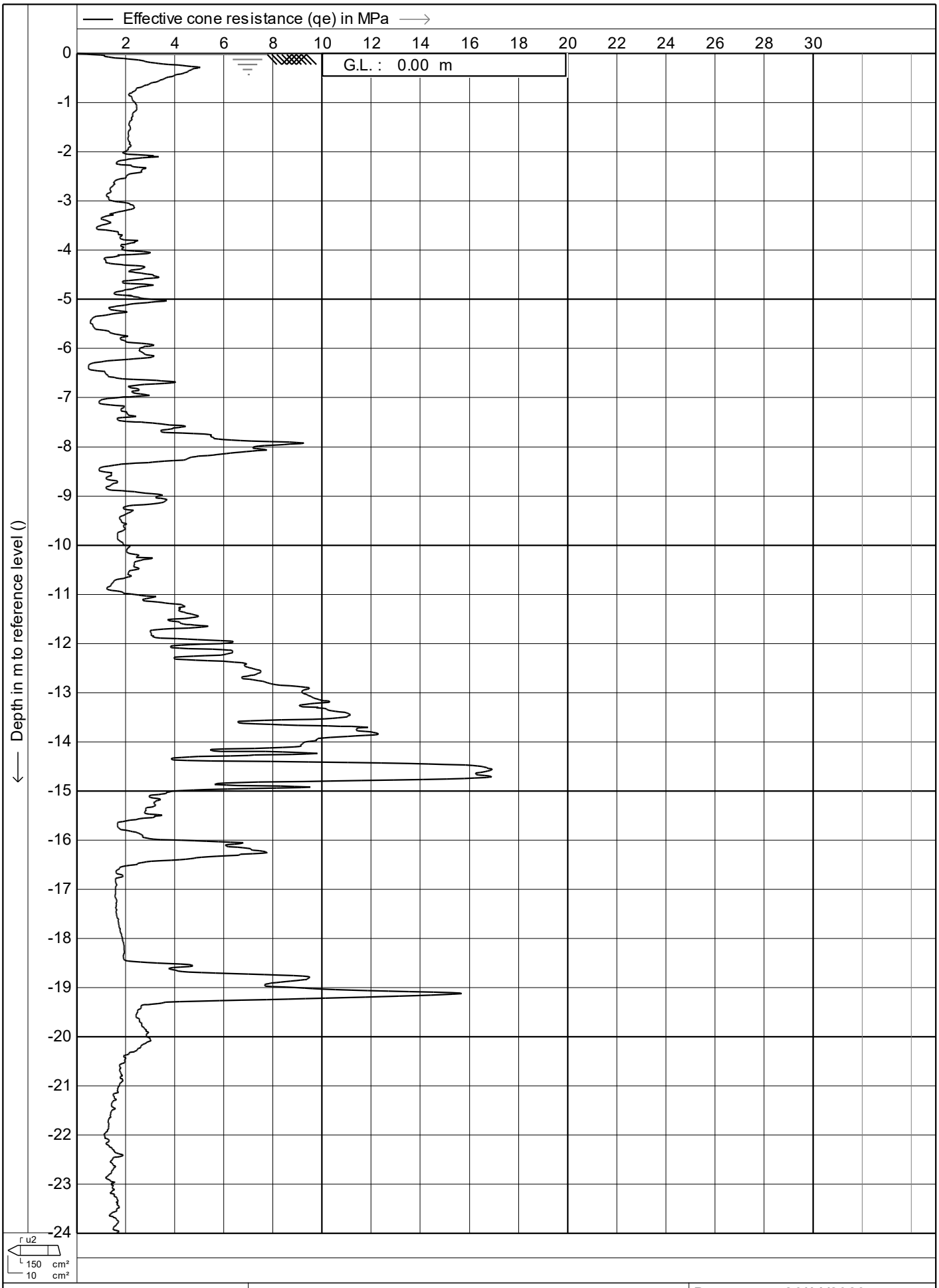
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**8/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

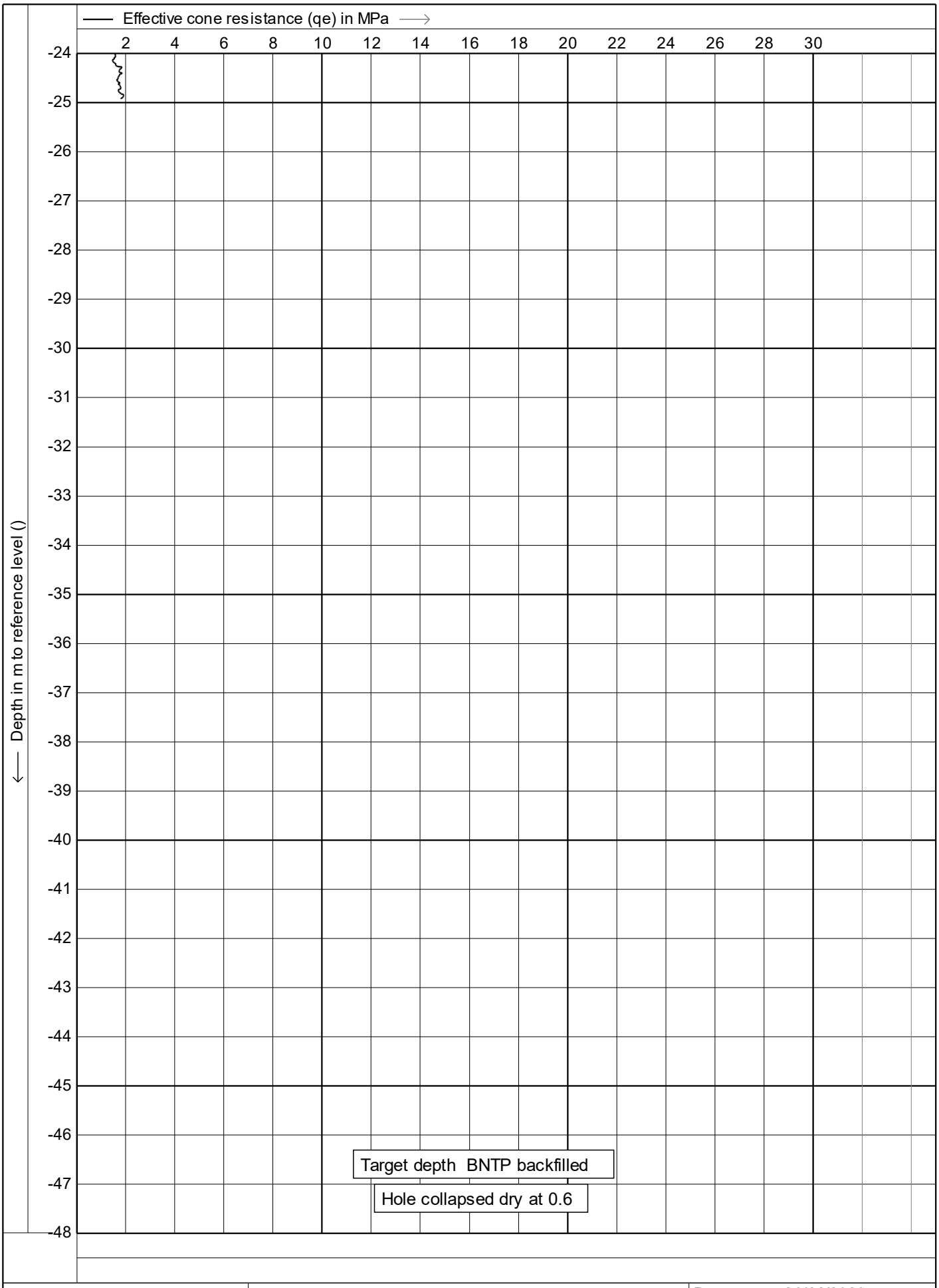
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**9/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

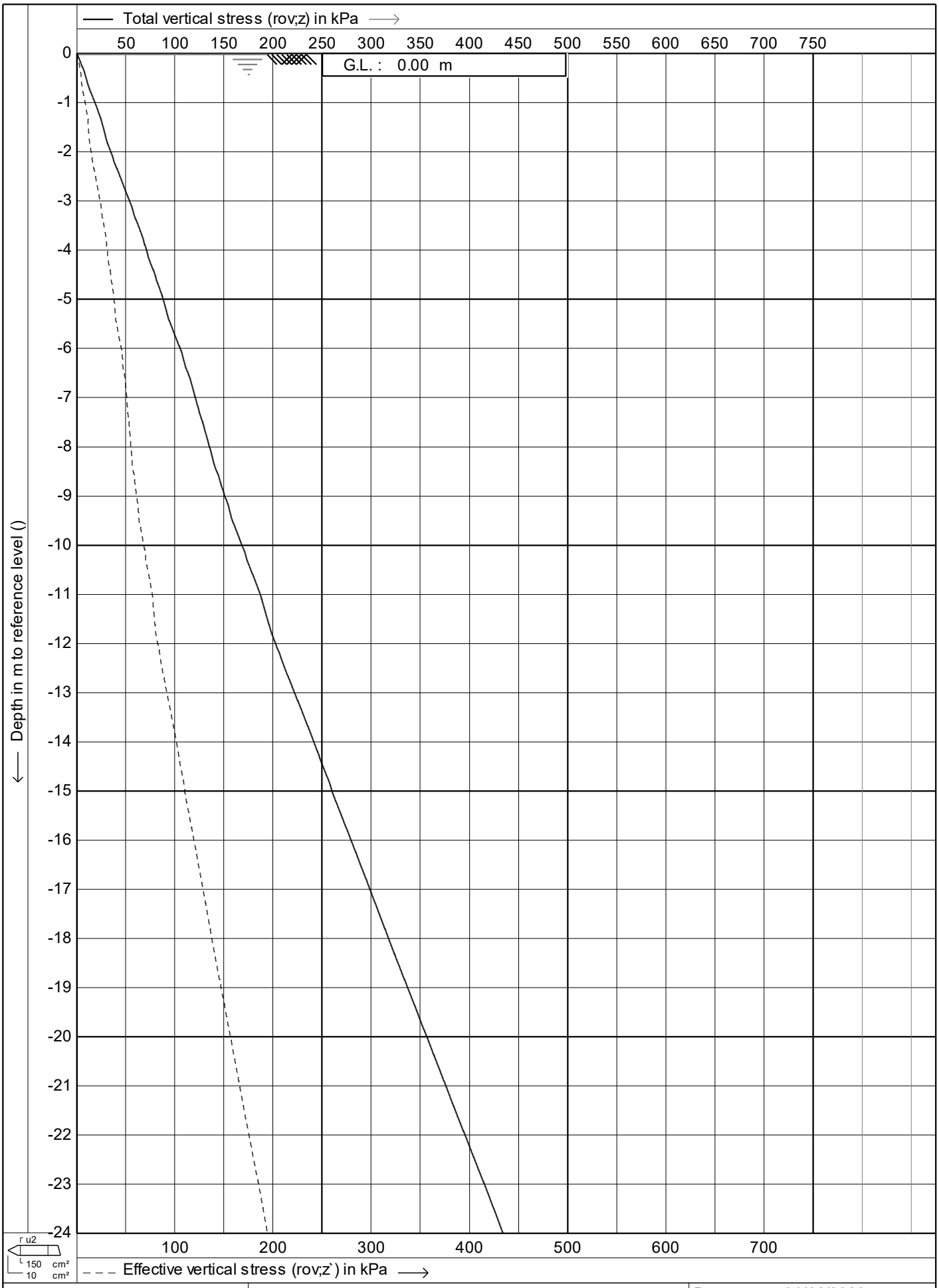
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**10/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

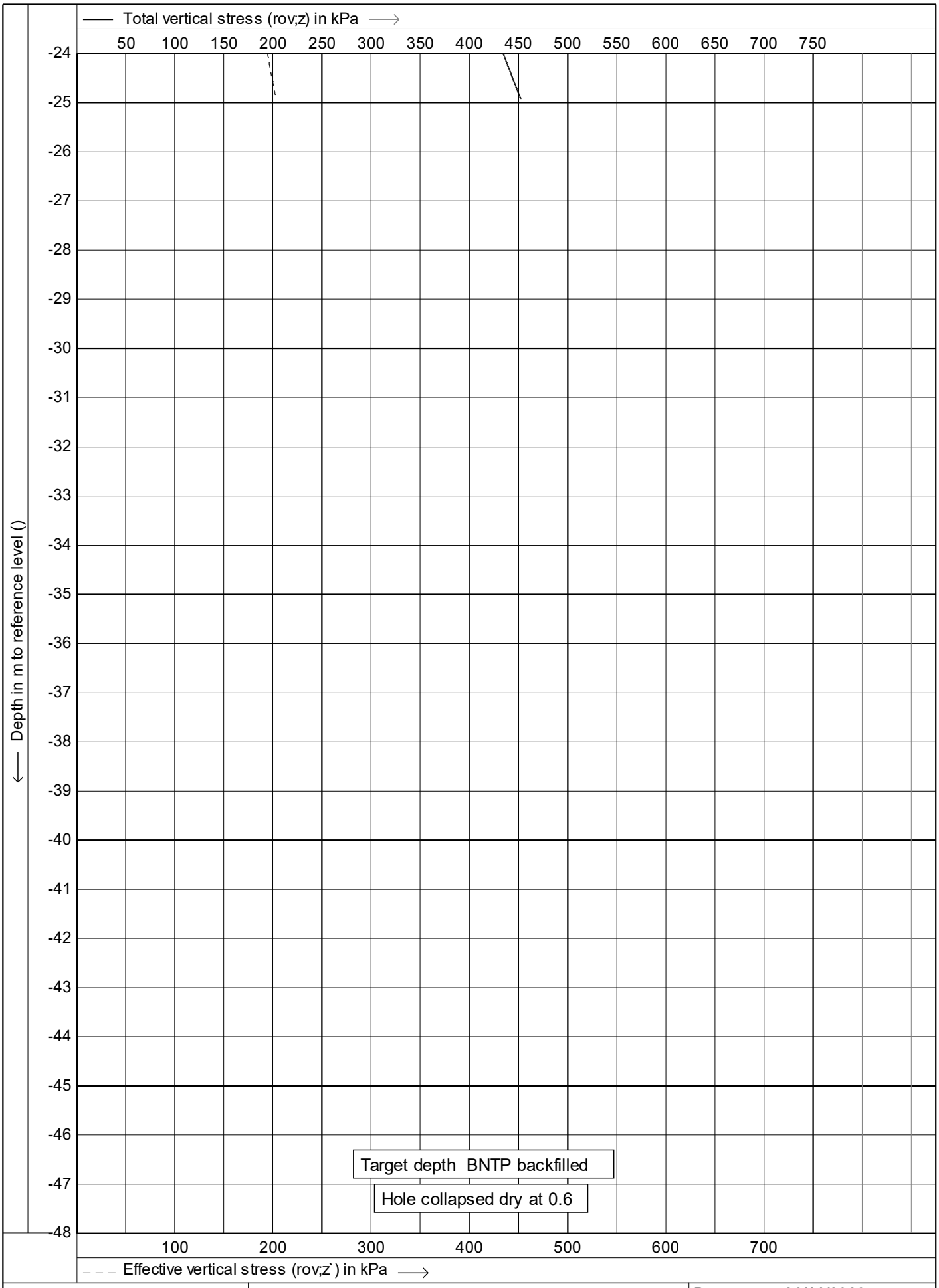
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**11/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

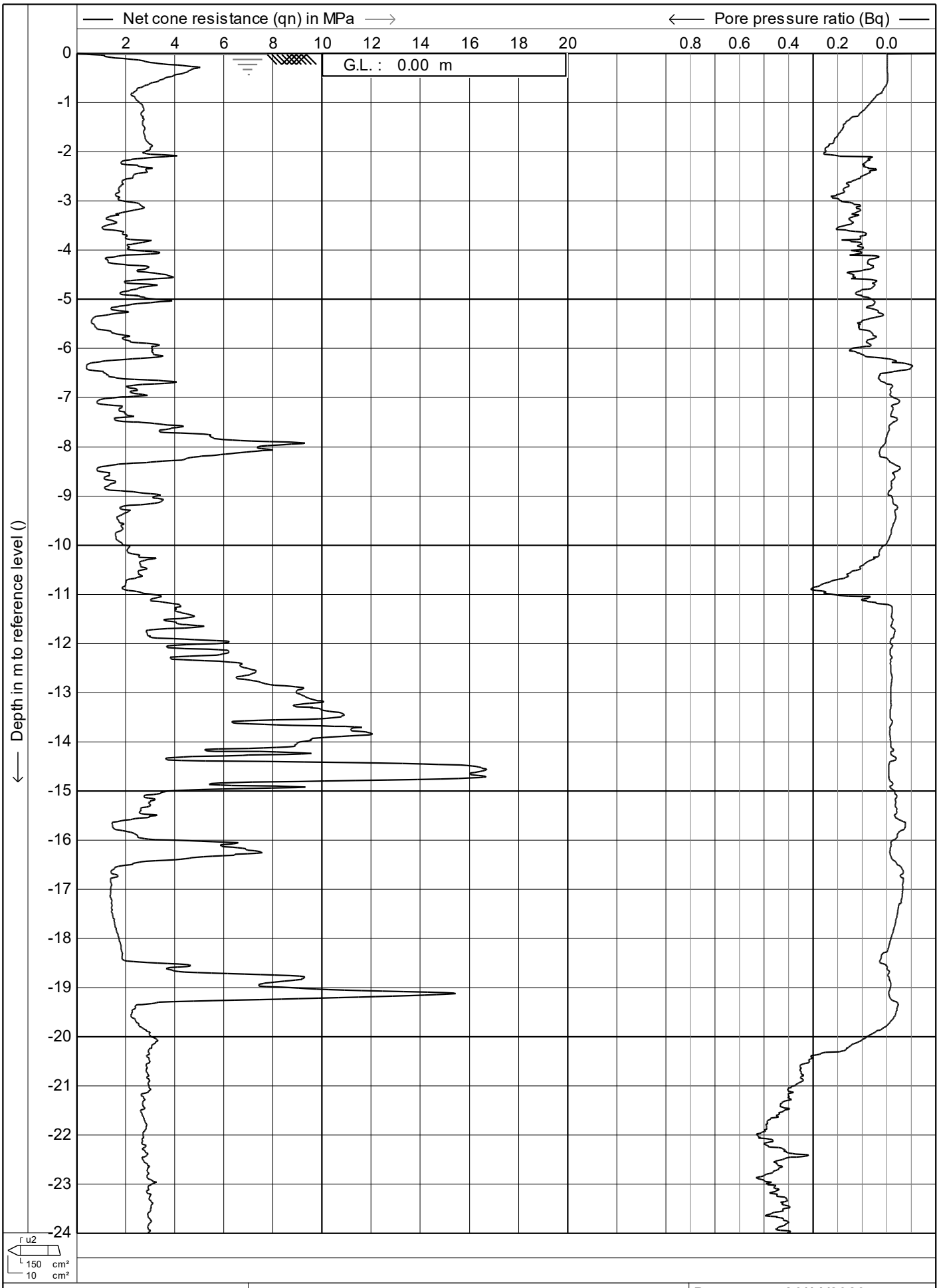
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**12/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

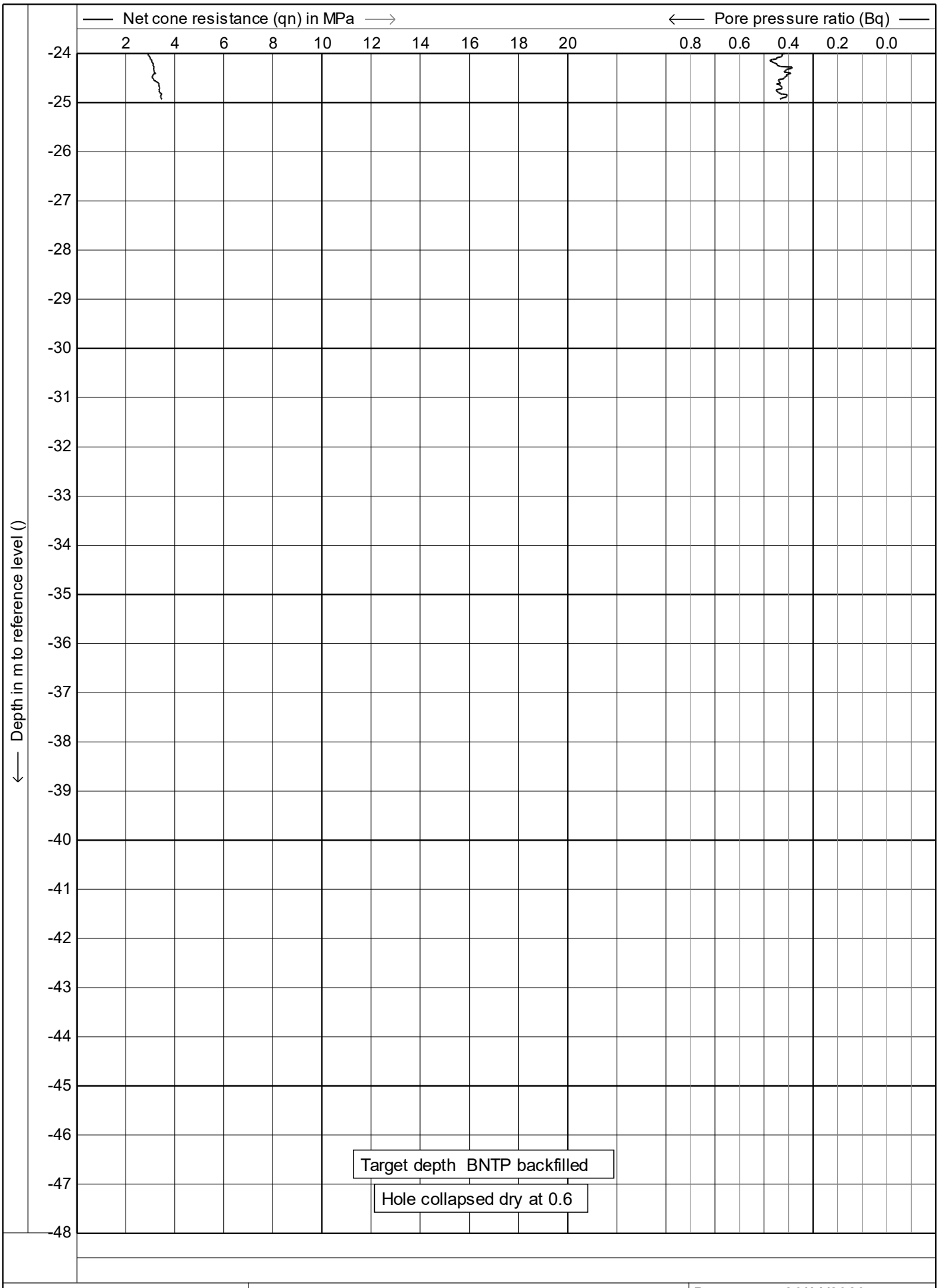
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

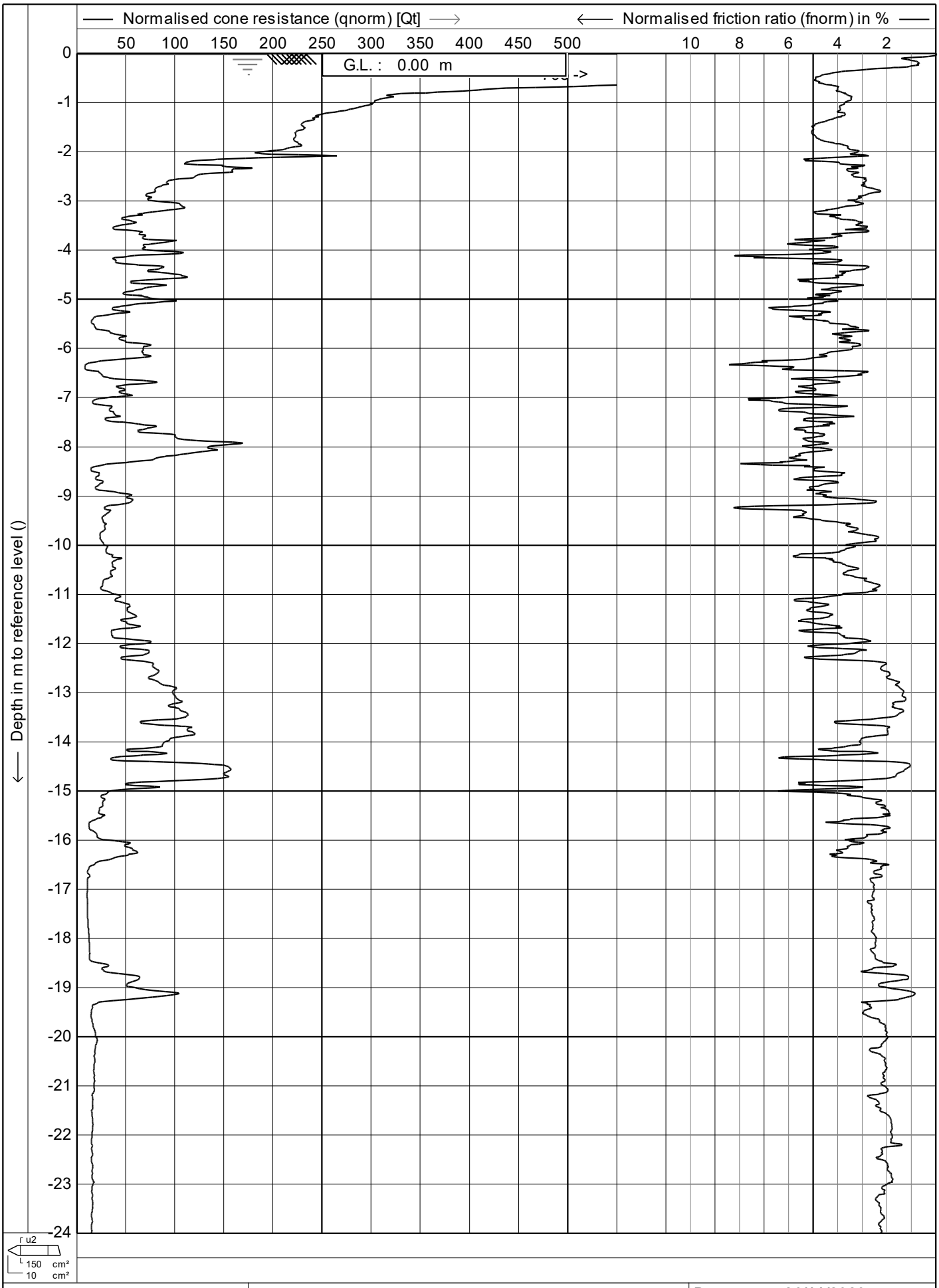
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

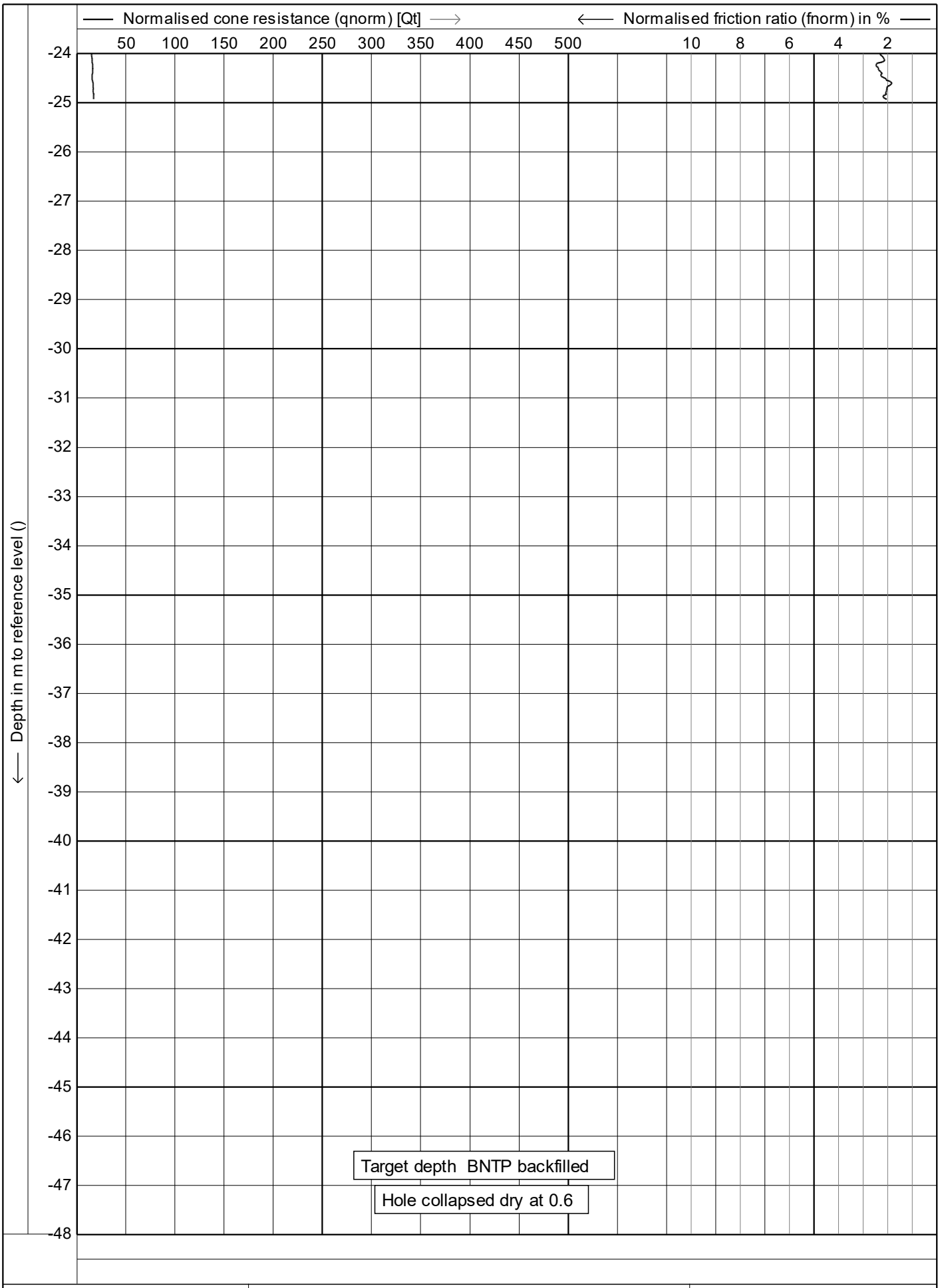
**14/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **047** — **15/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

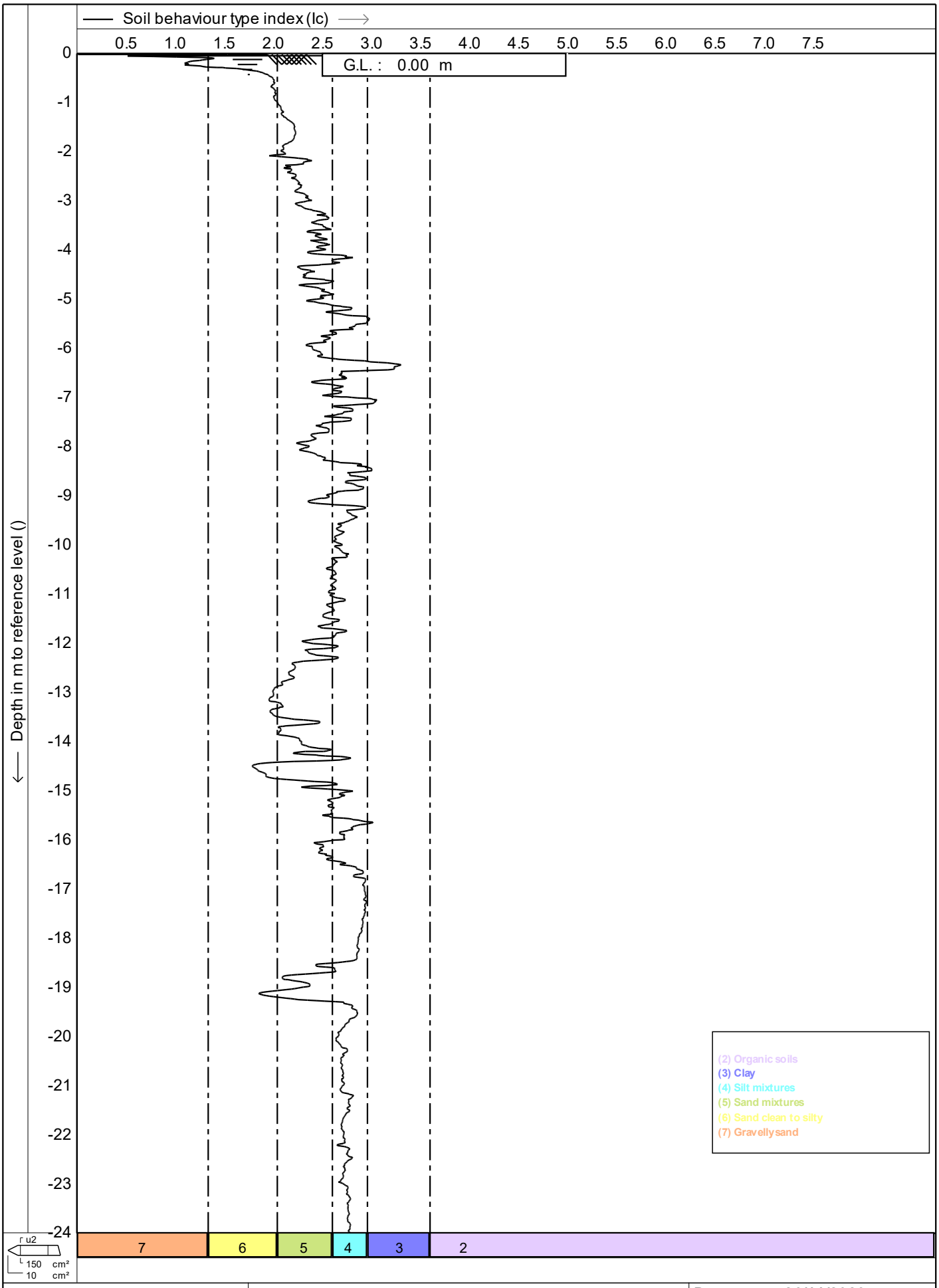
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**16/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

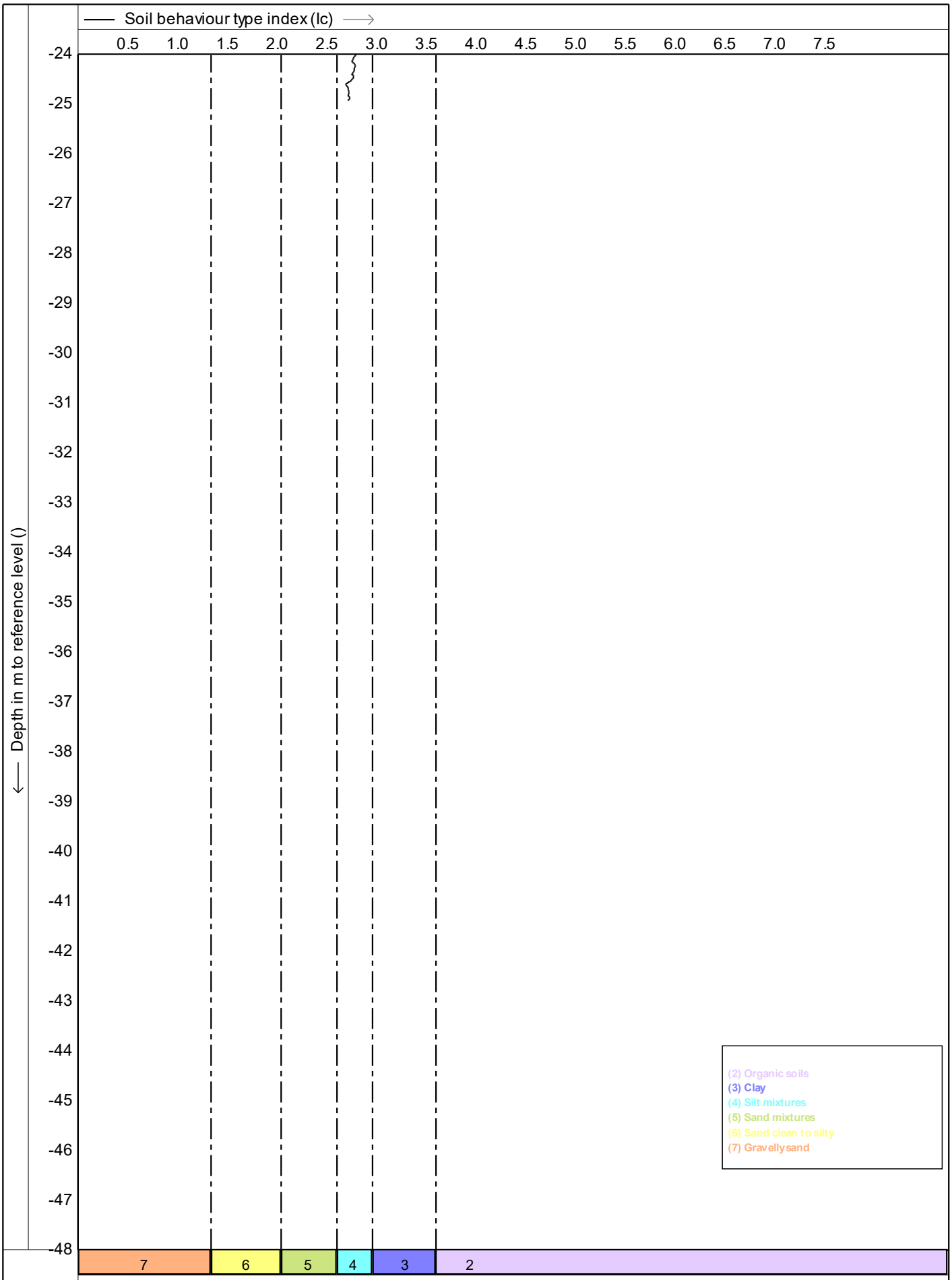
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**17/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

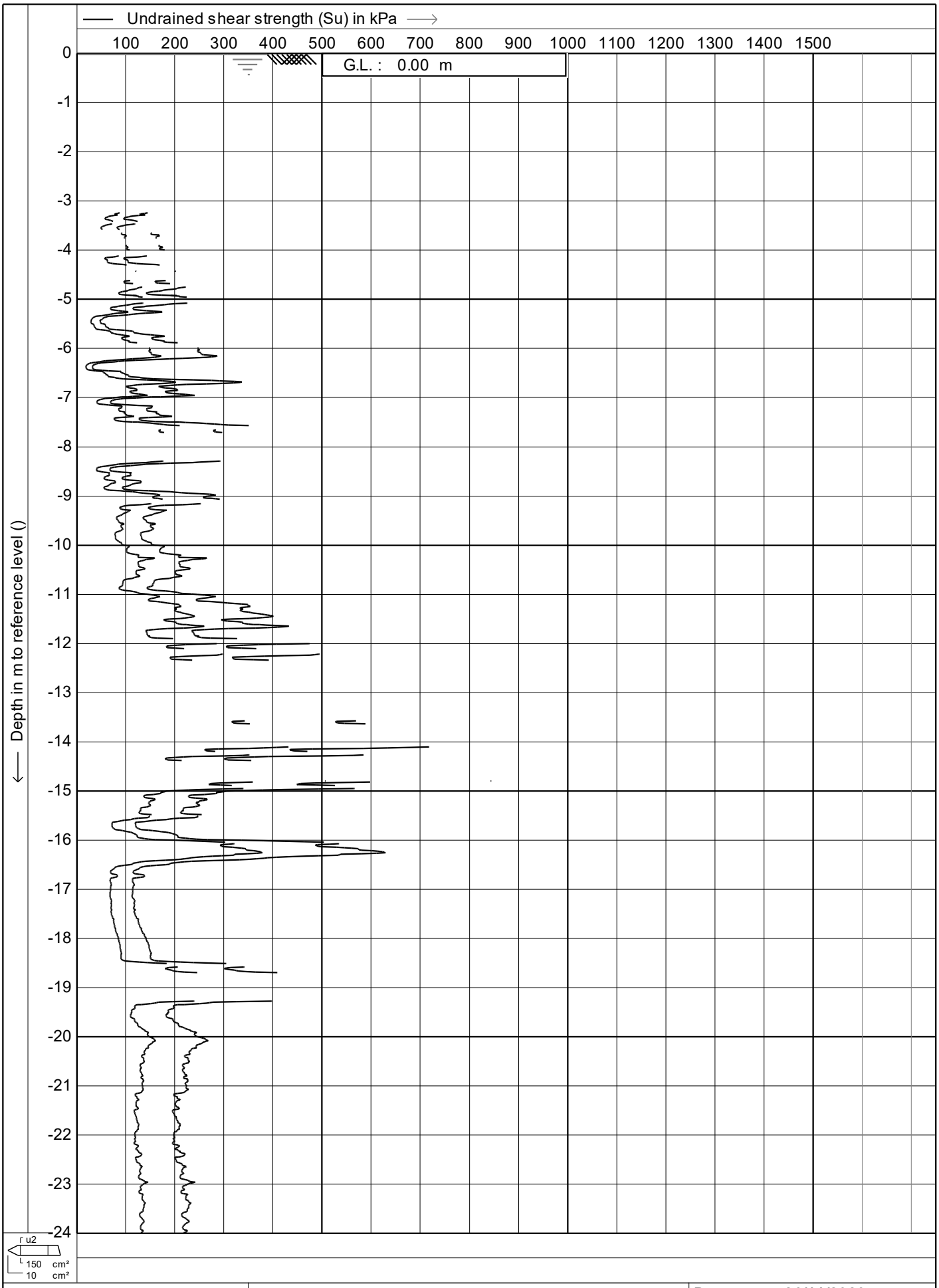
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**18/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

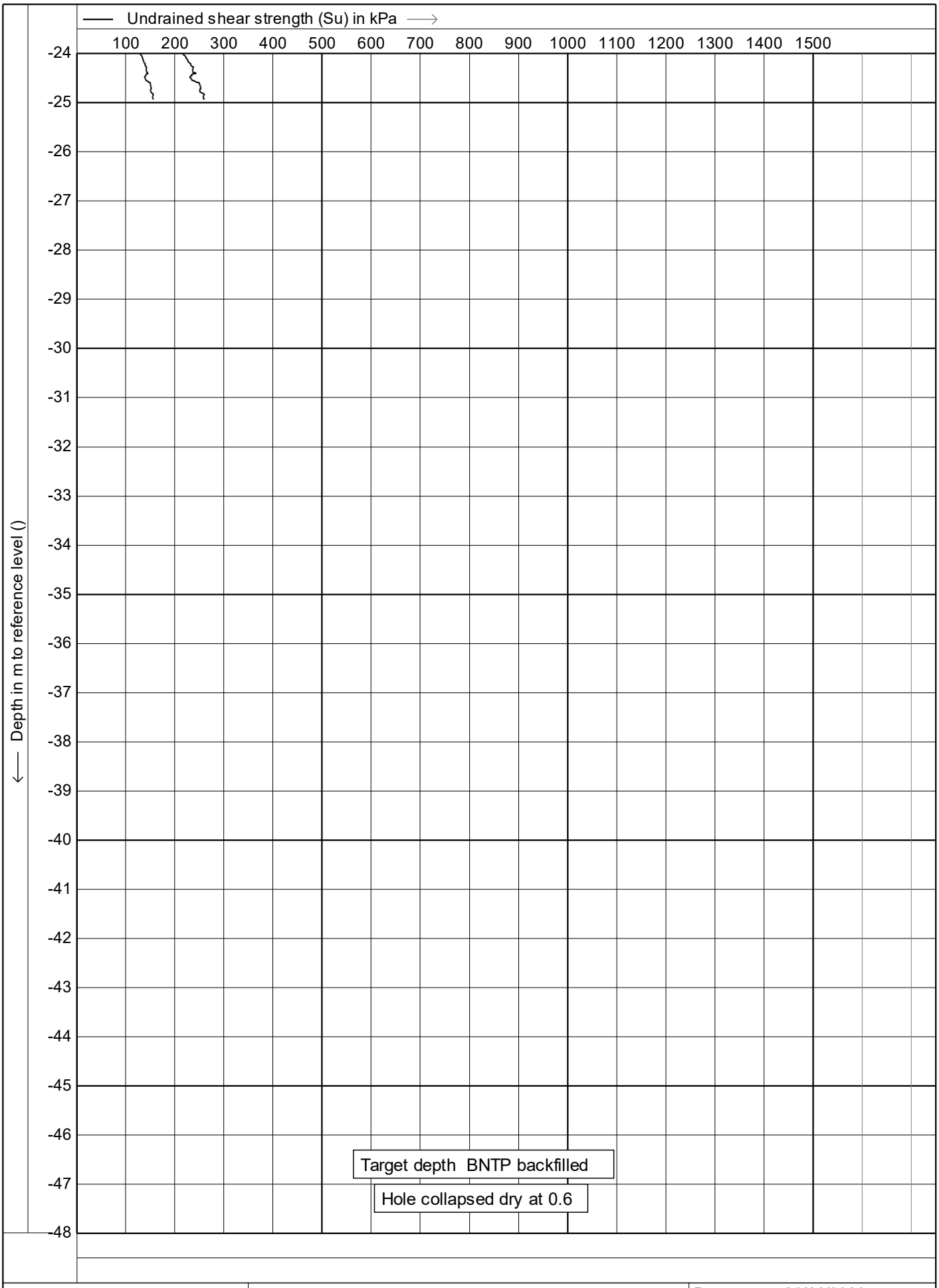
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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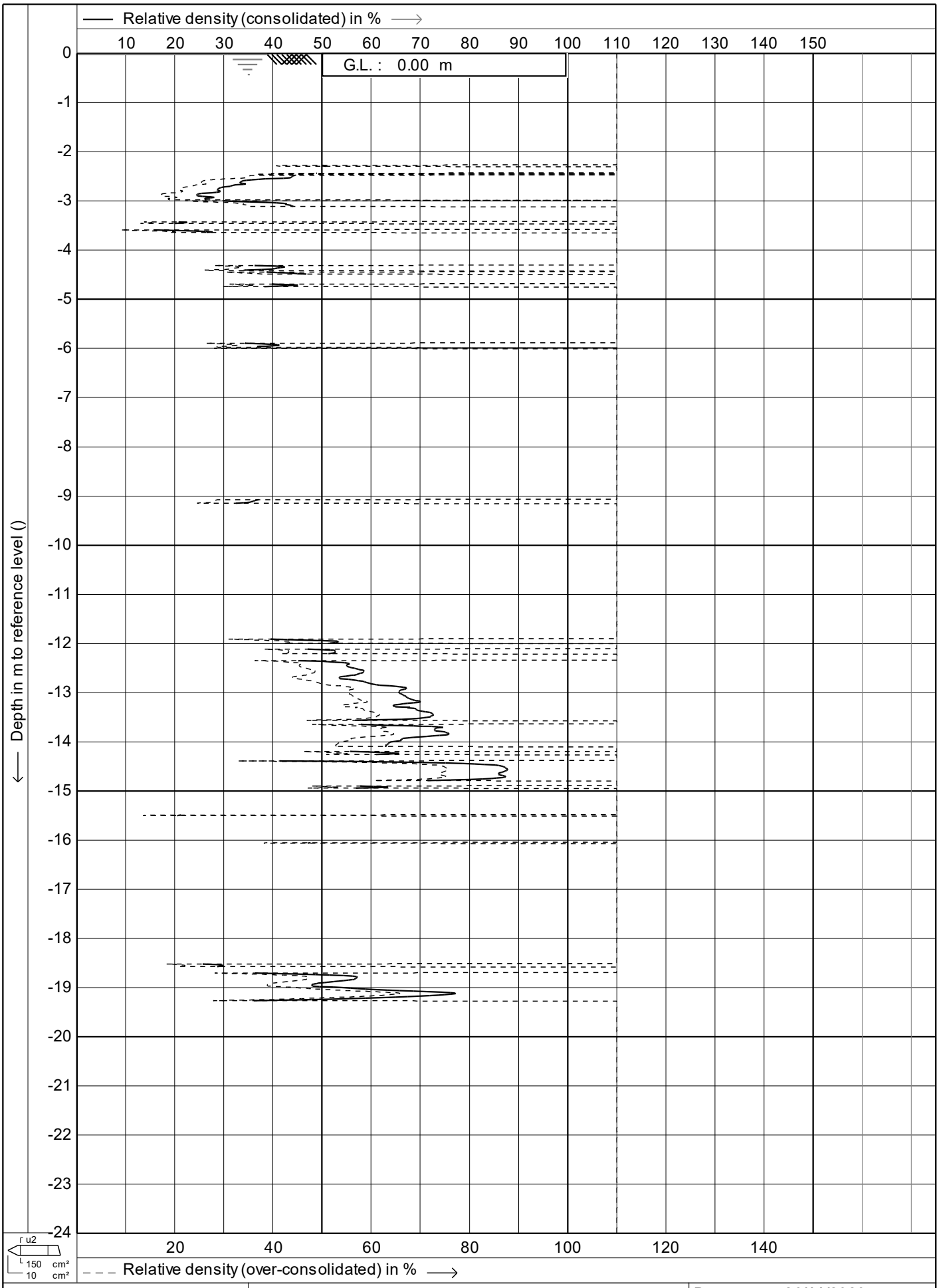
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

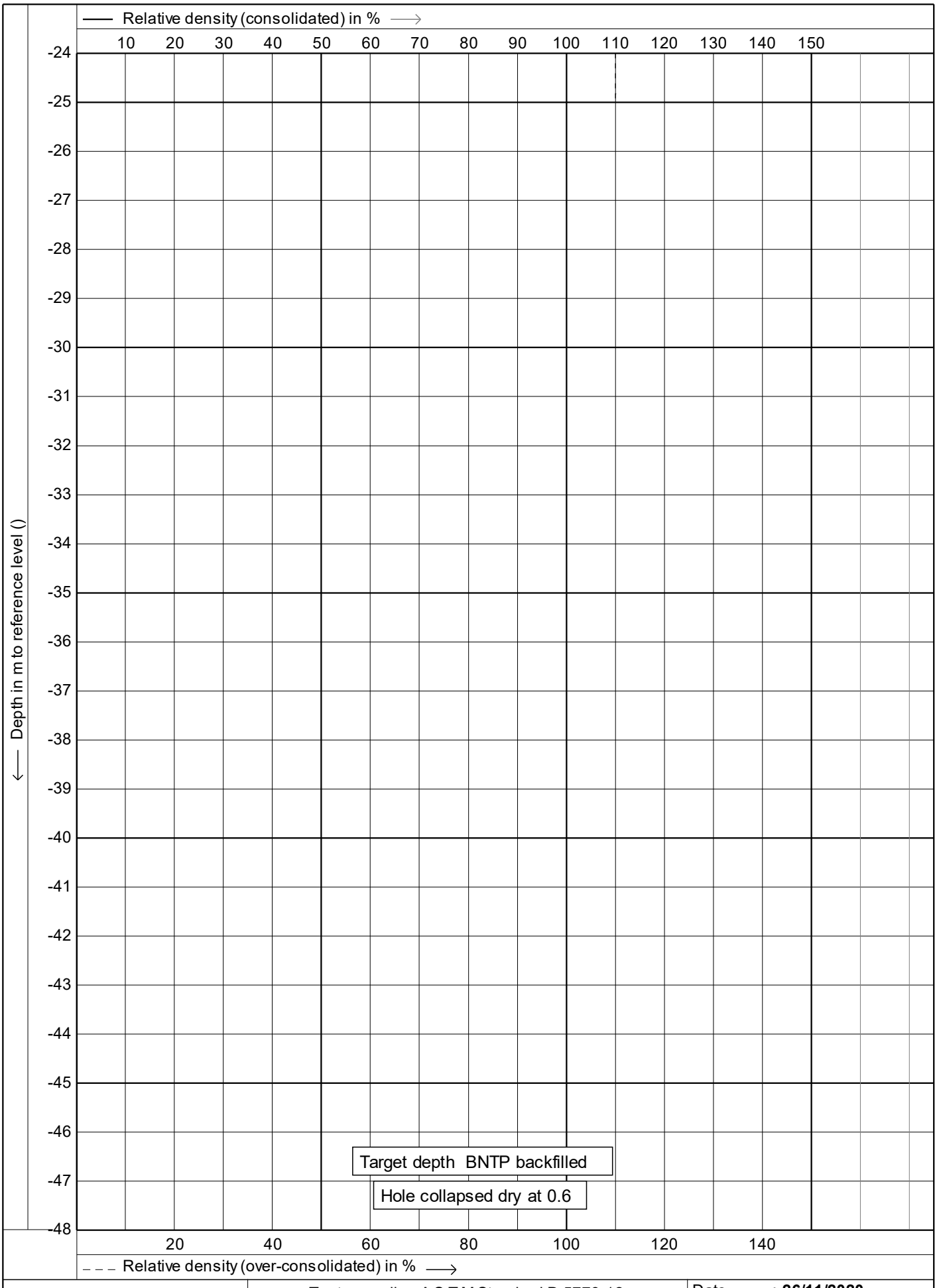


1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **047** — **21/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

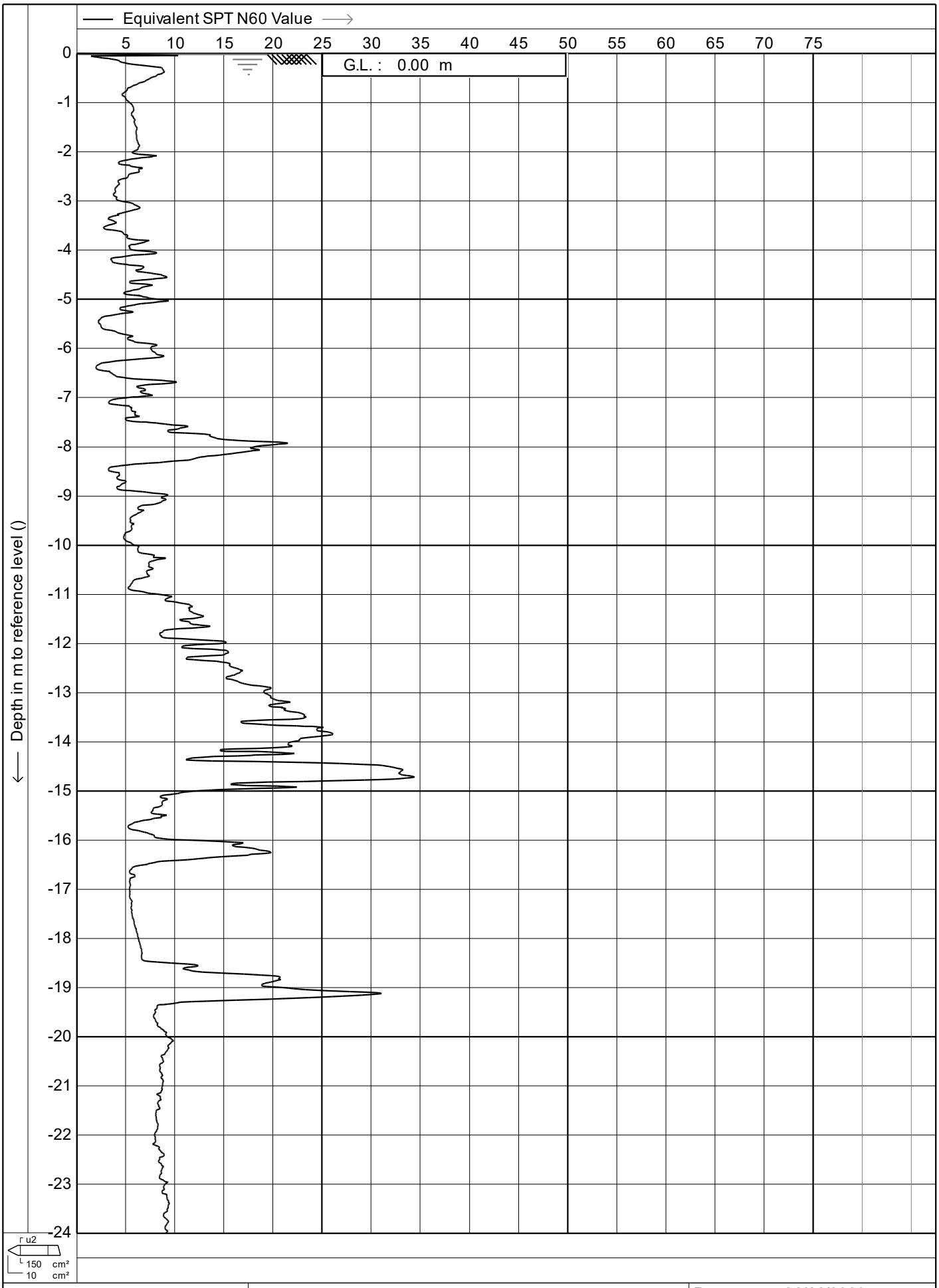
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**22/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

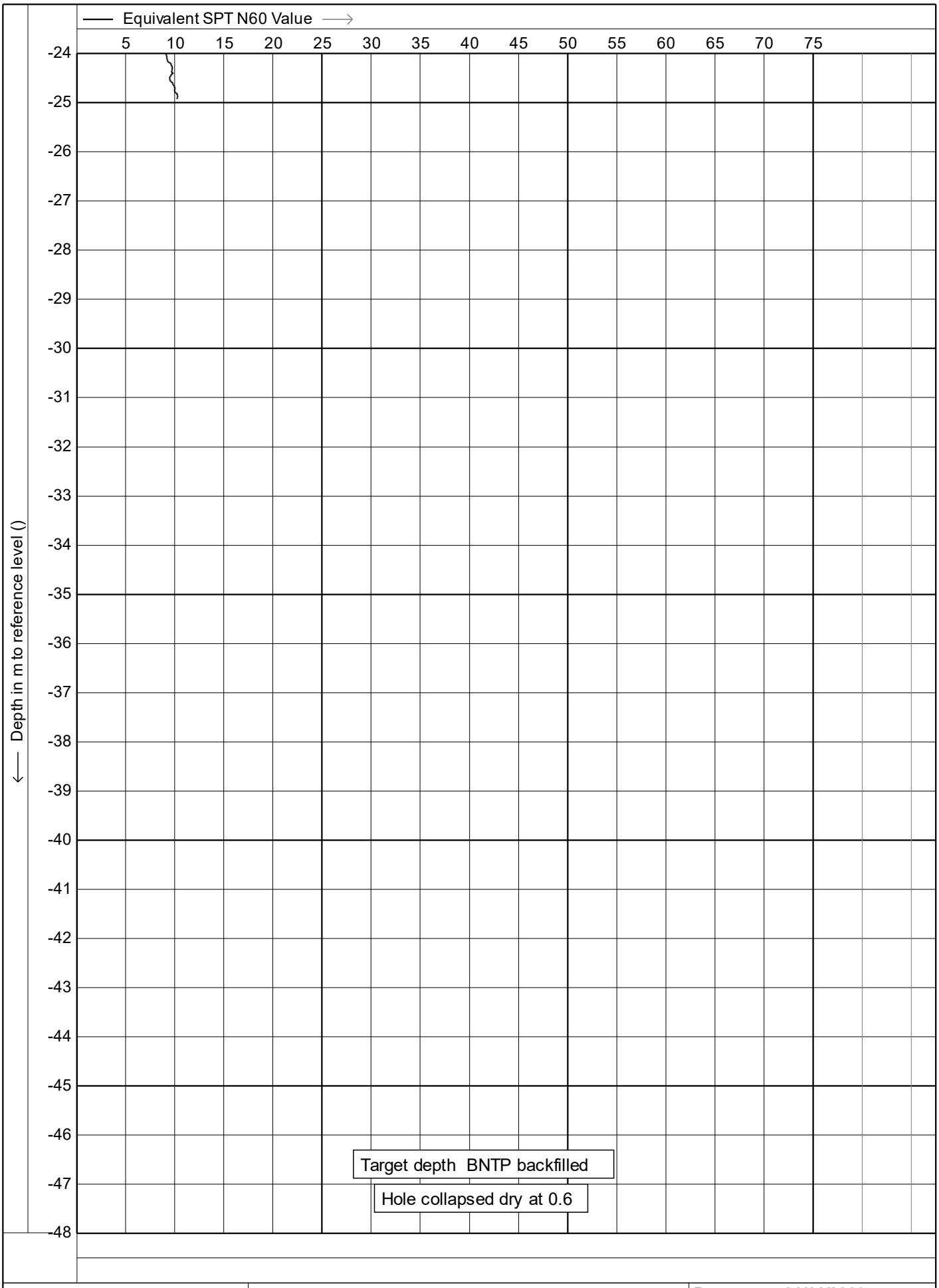
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

**23/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

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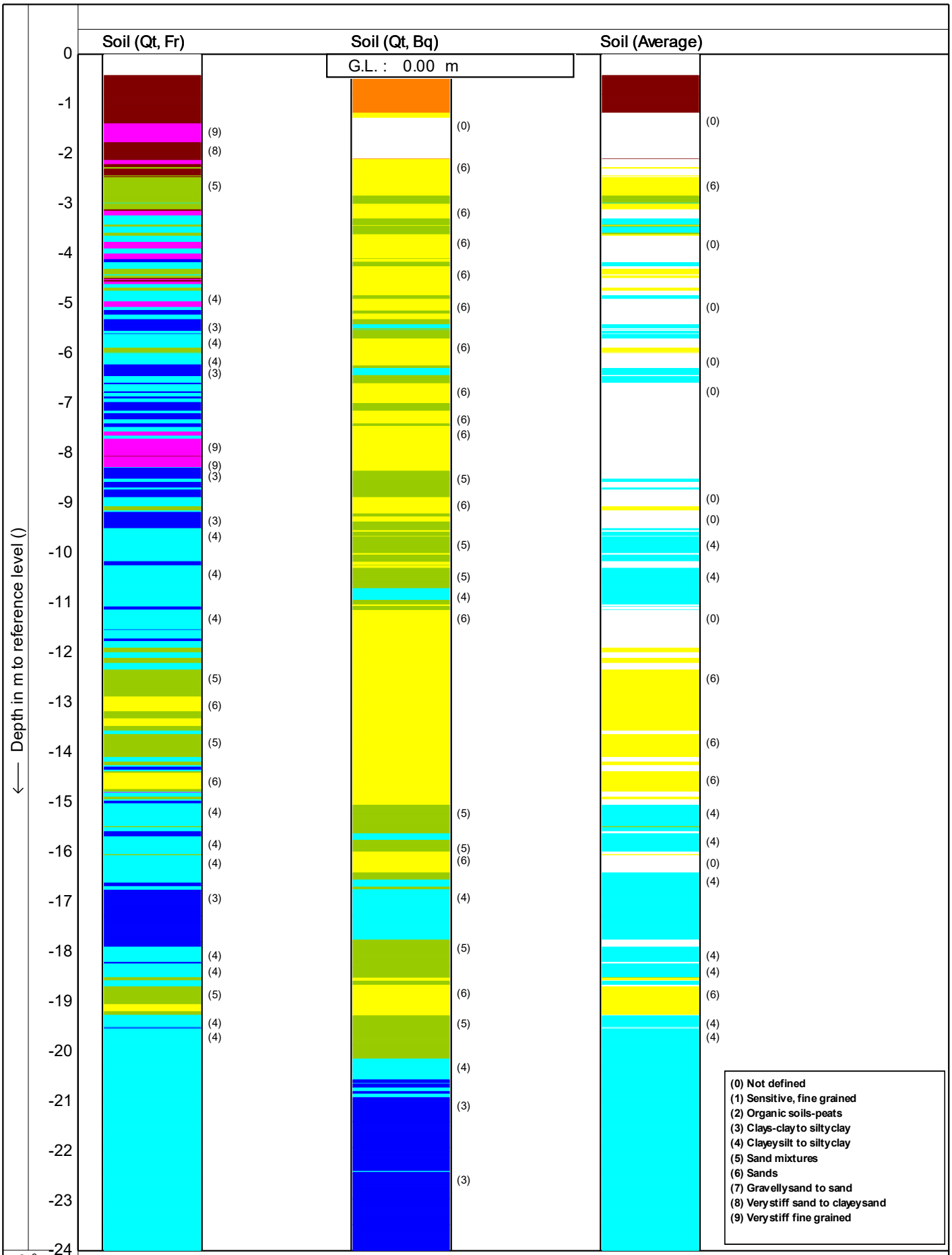
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **26/11/2020**

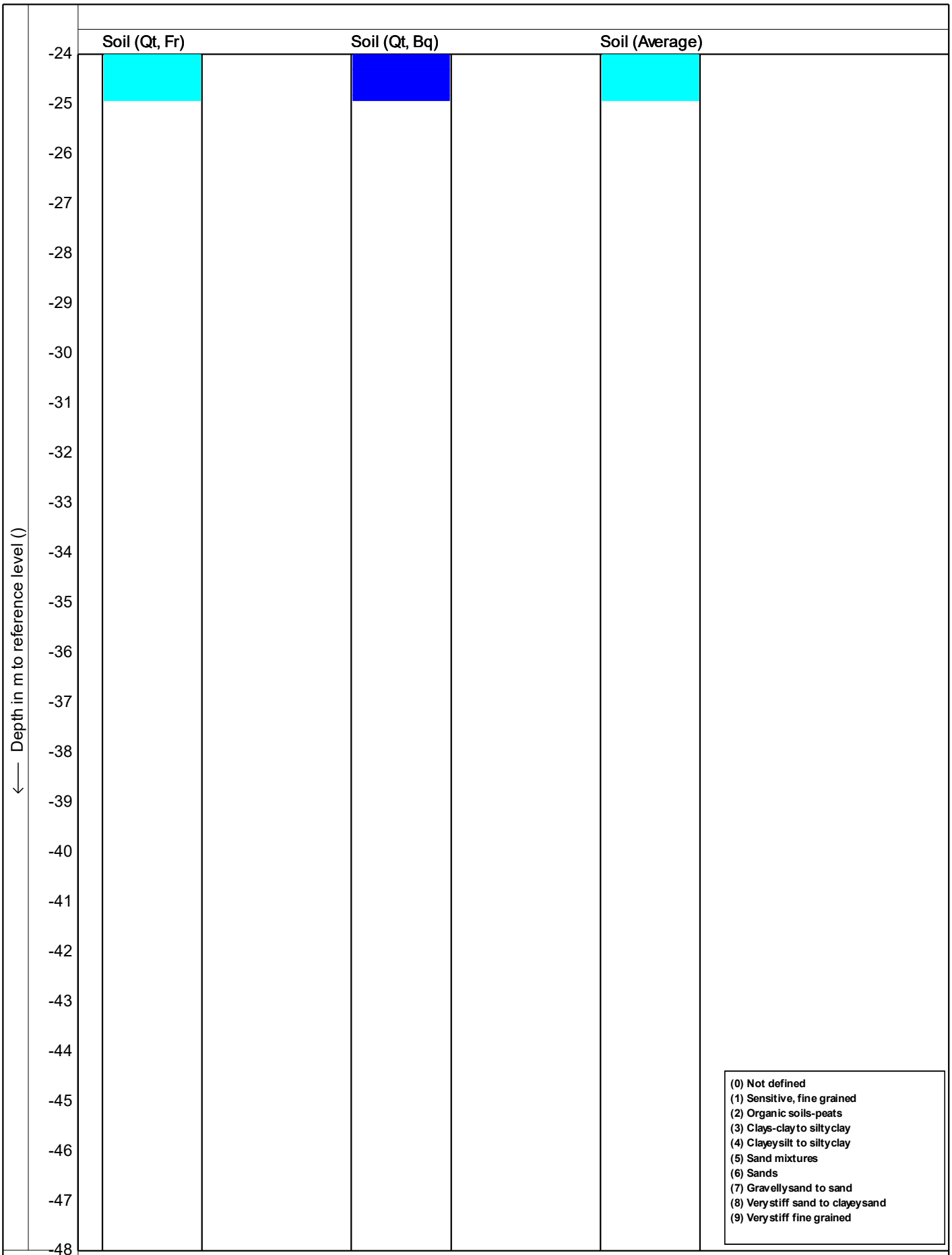
Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **047**



1.48




Soil behaviour type classification after Robertson 1990

PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

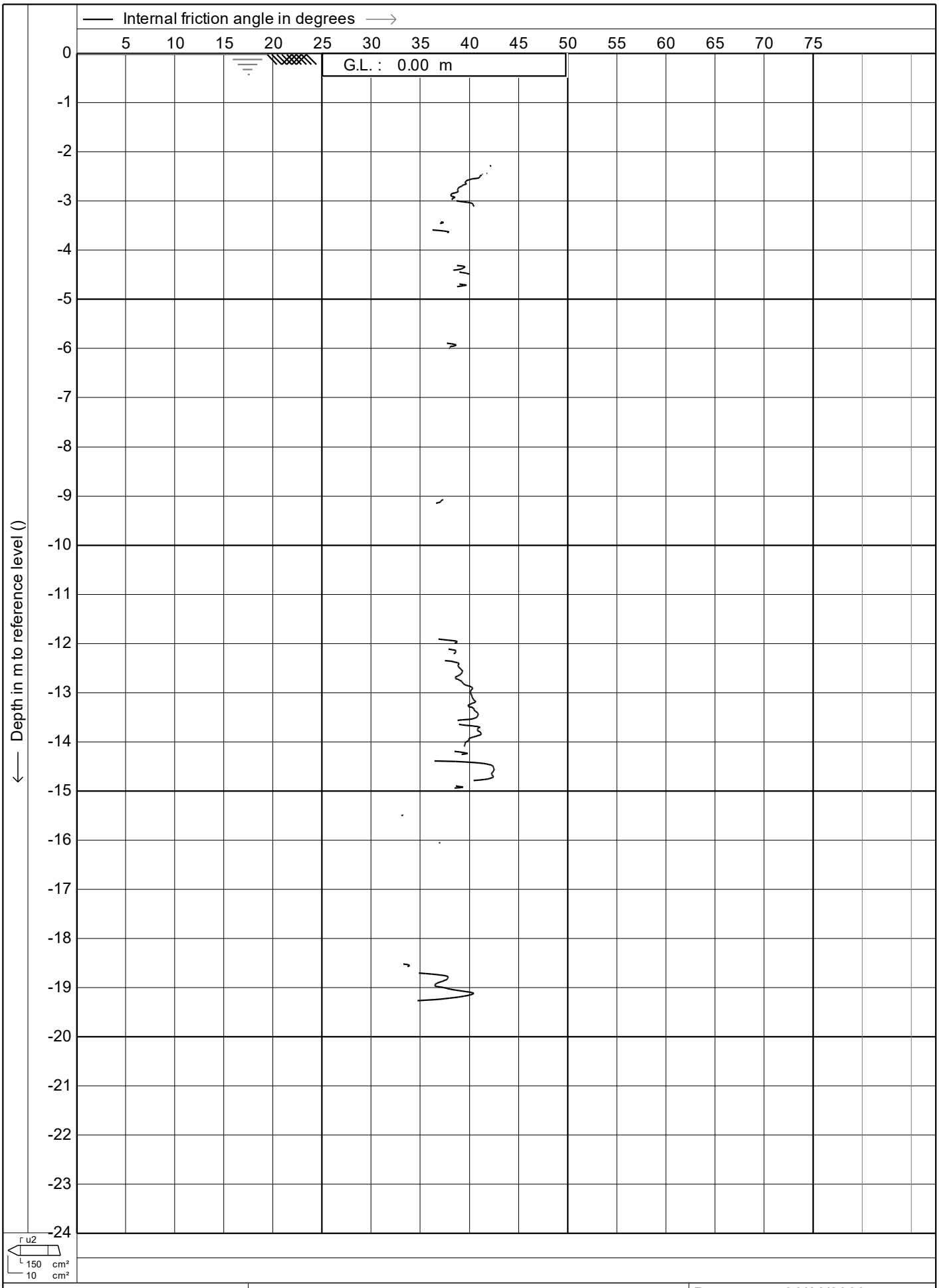
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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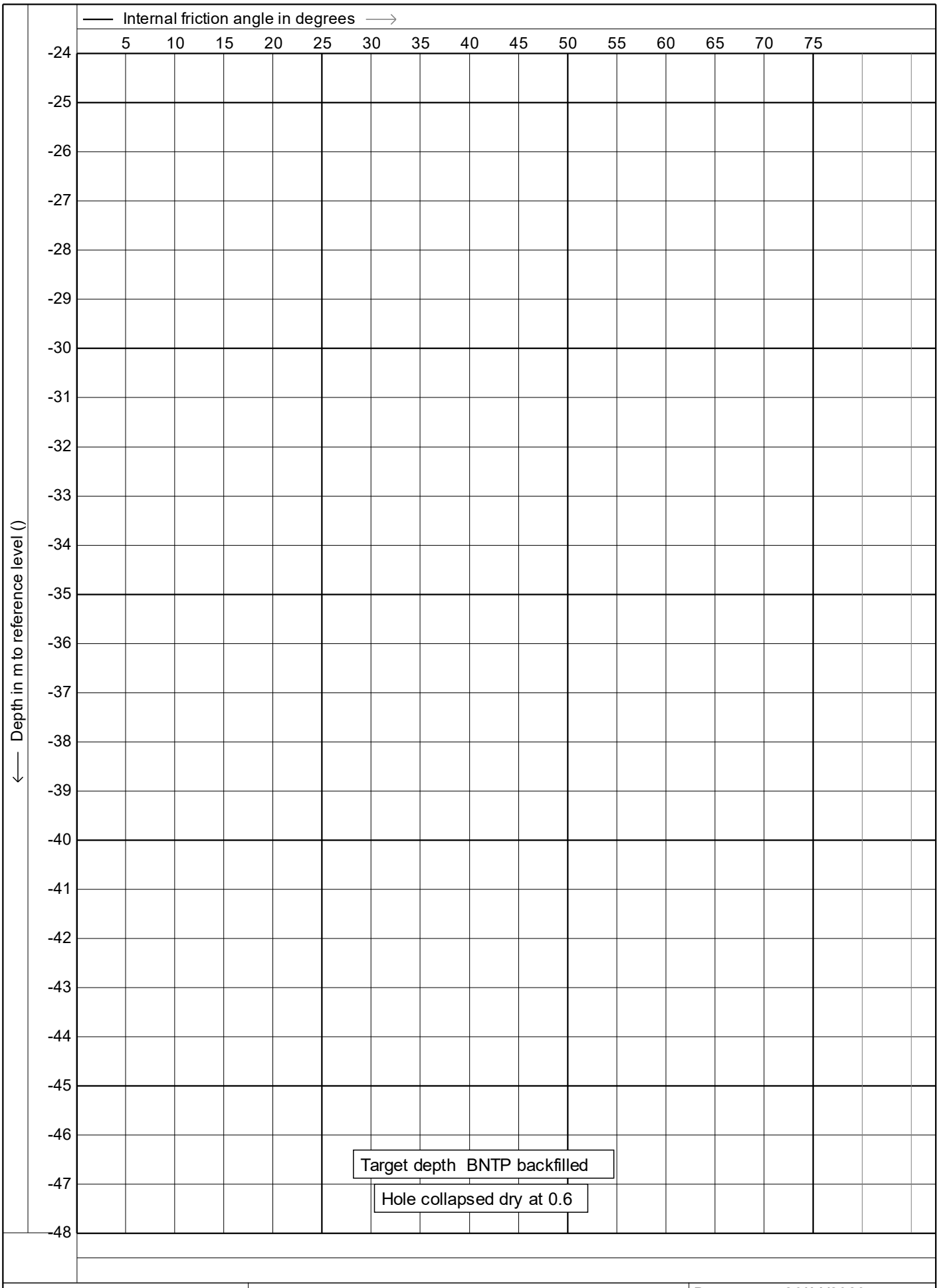
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **047** |

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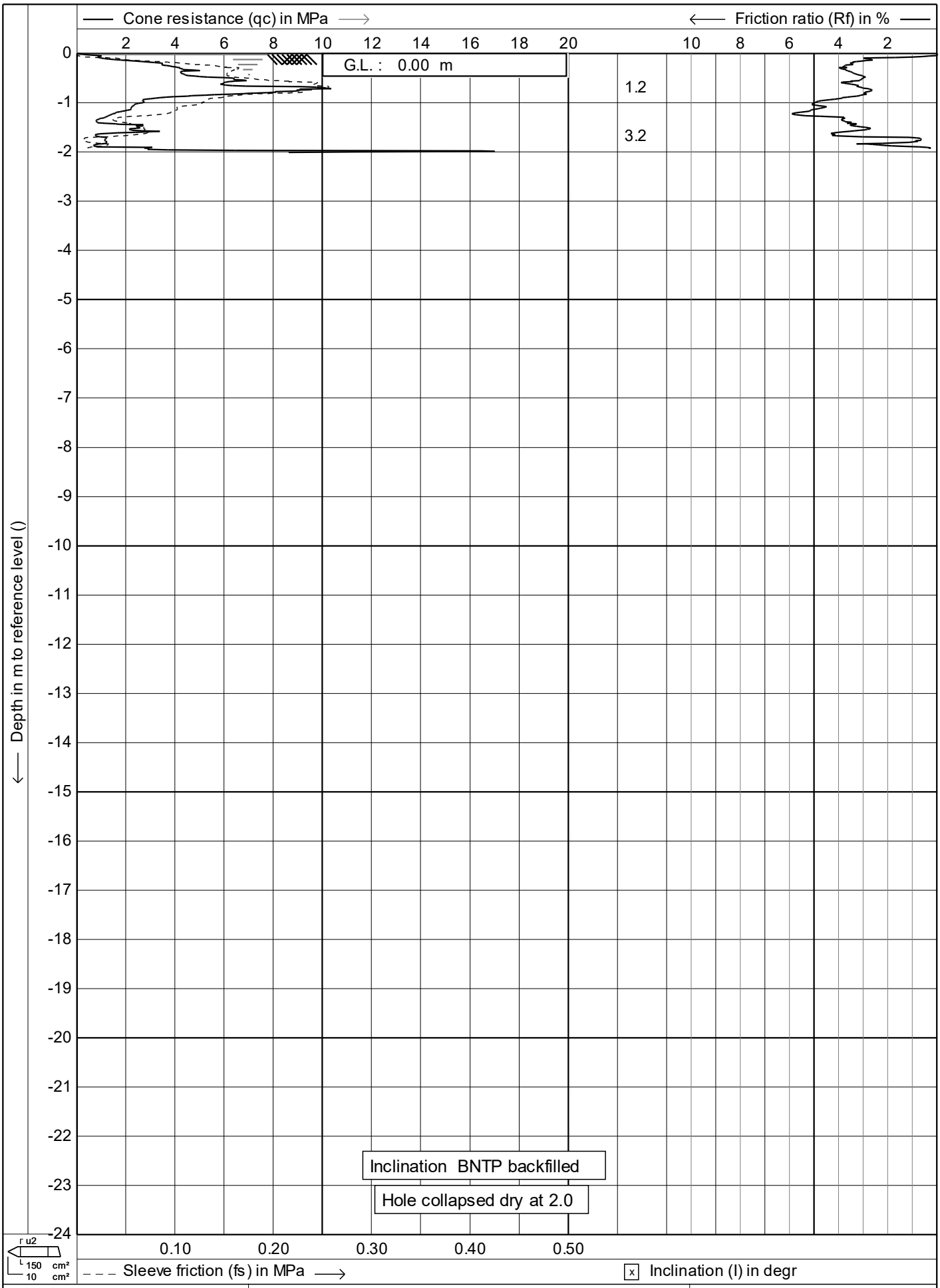
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **26/11/2020**

Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **048**

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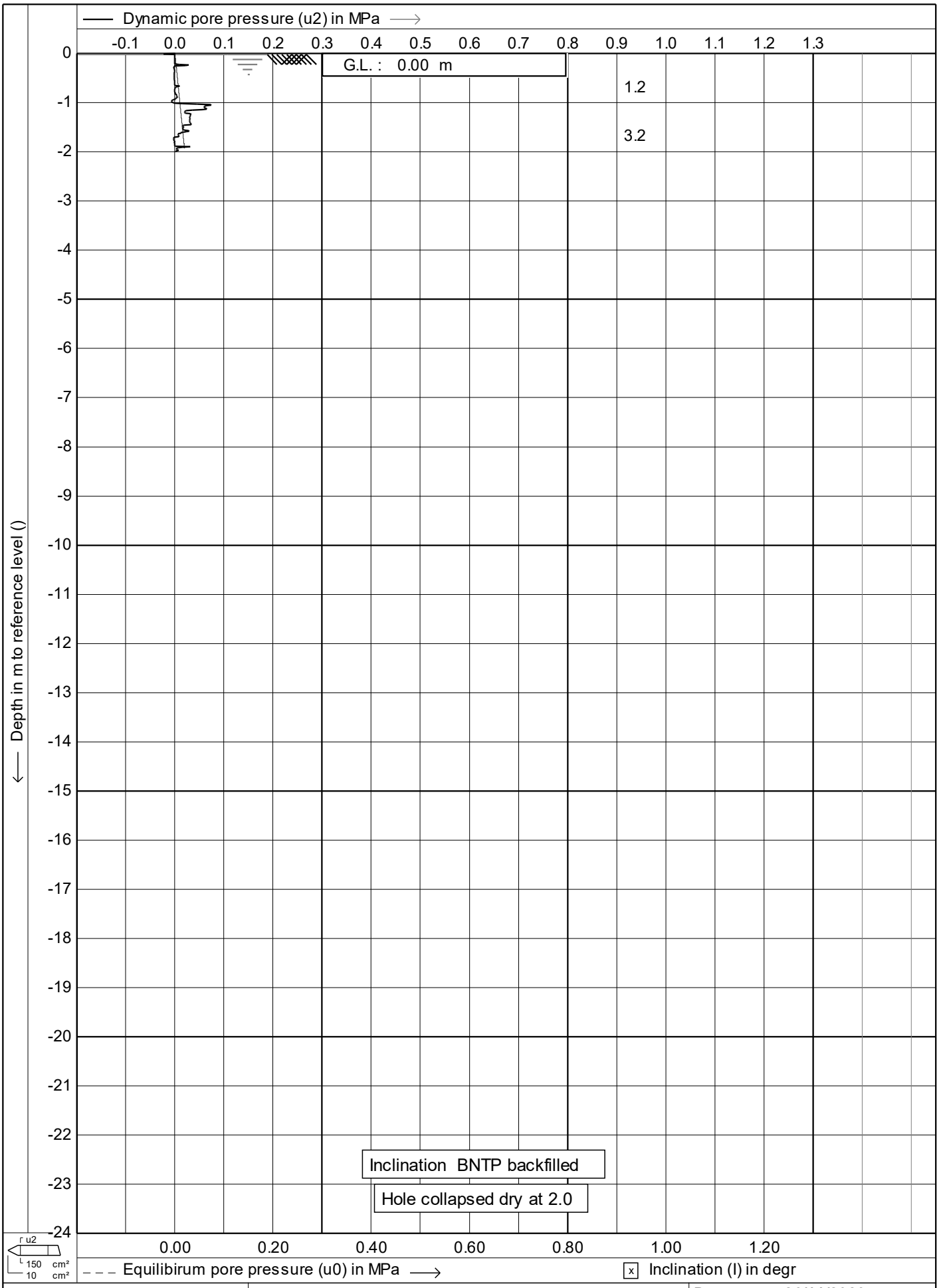
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

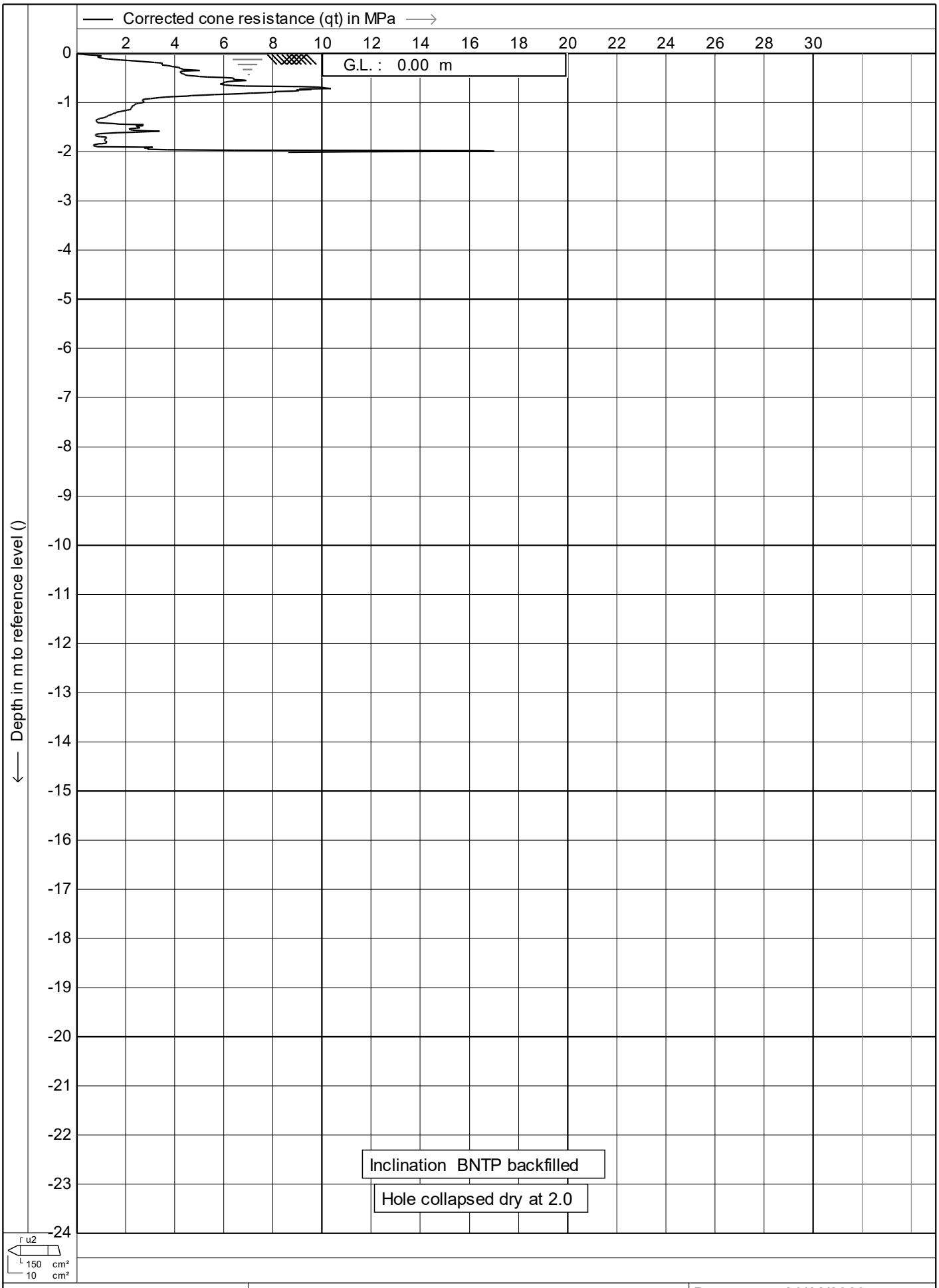
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

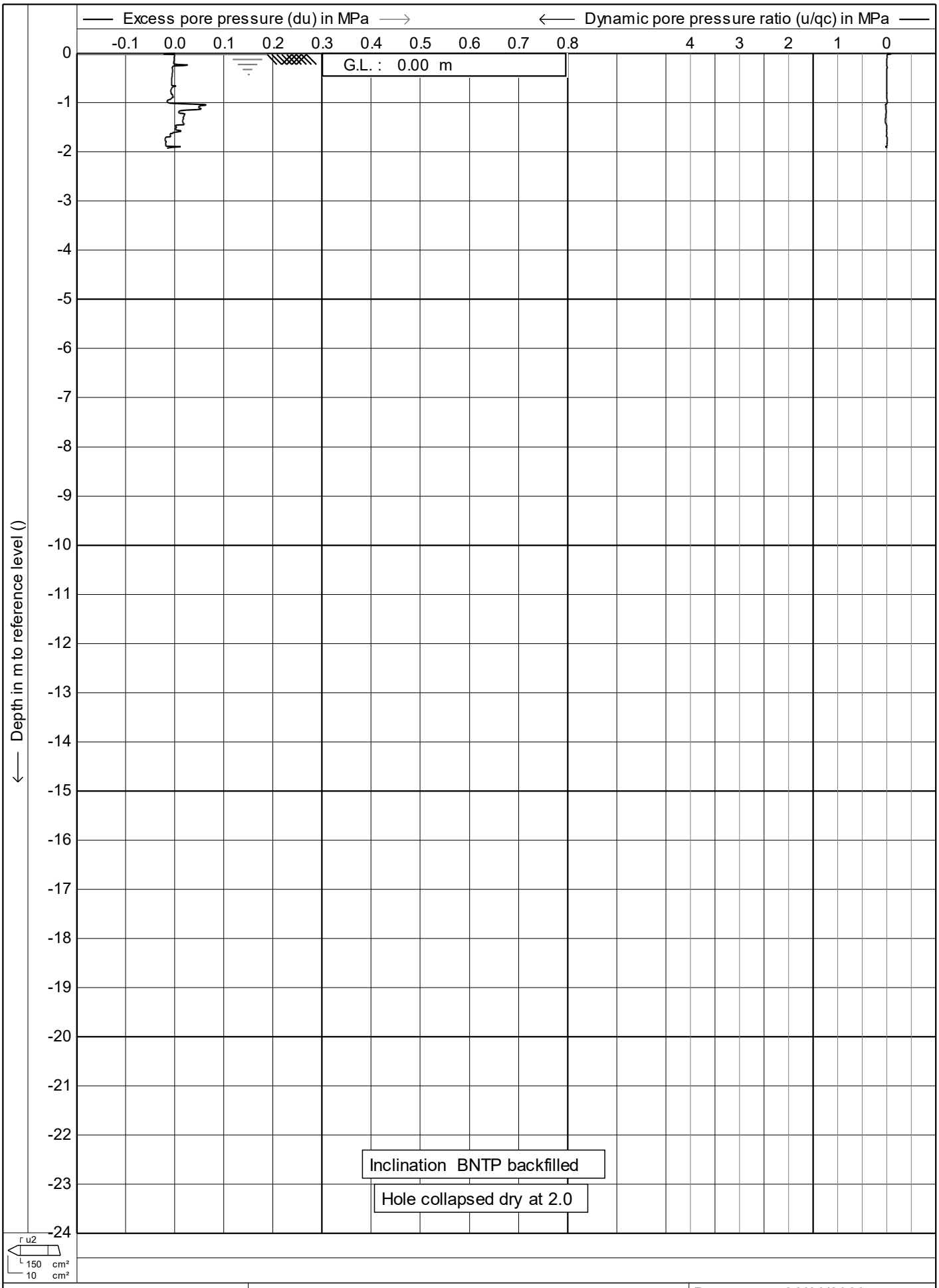
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

**3/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

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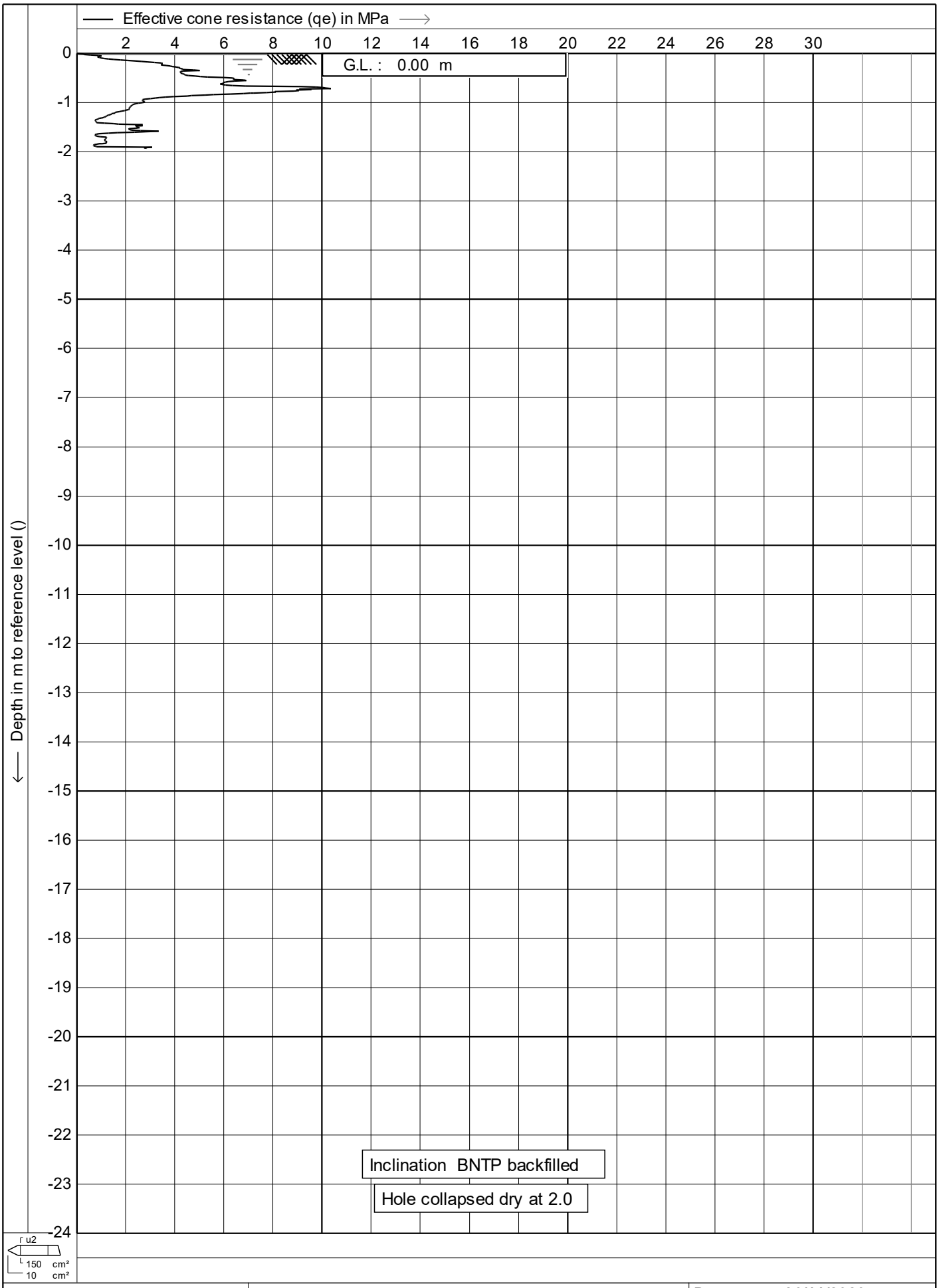
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

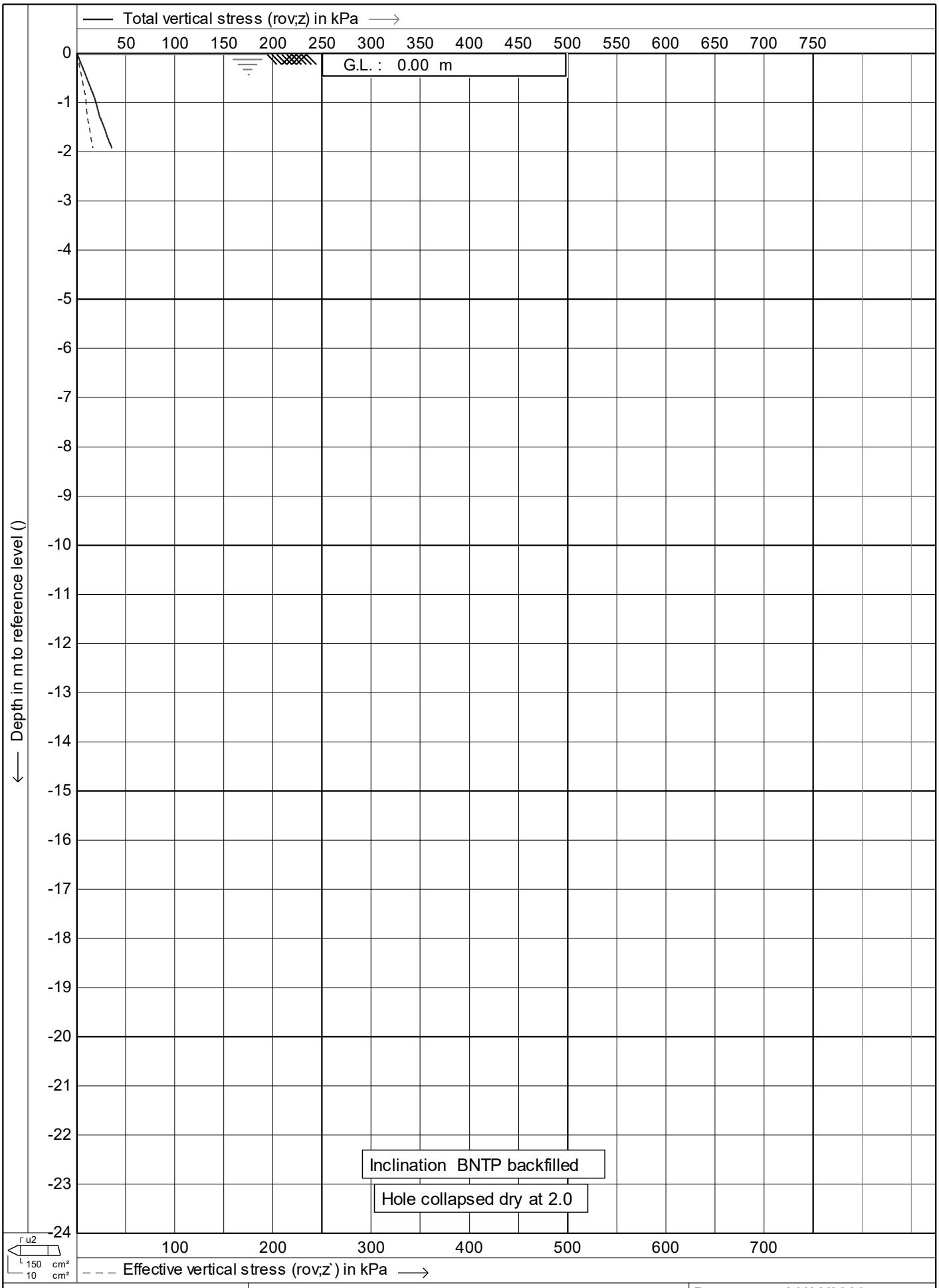
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

**5/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

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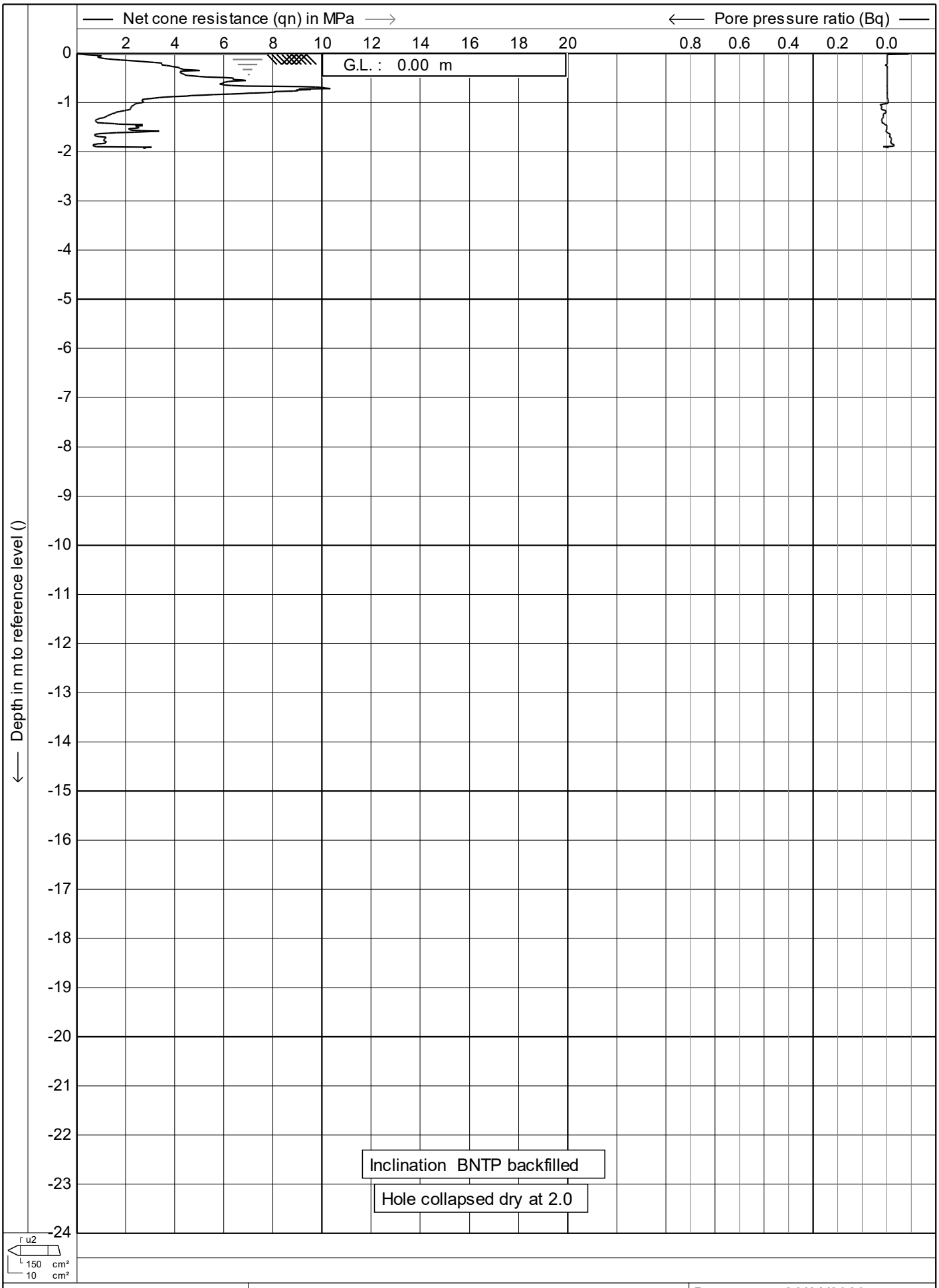
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

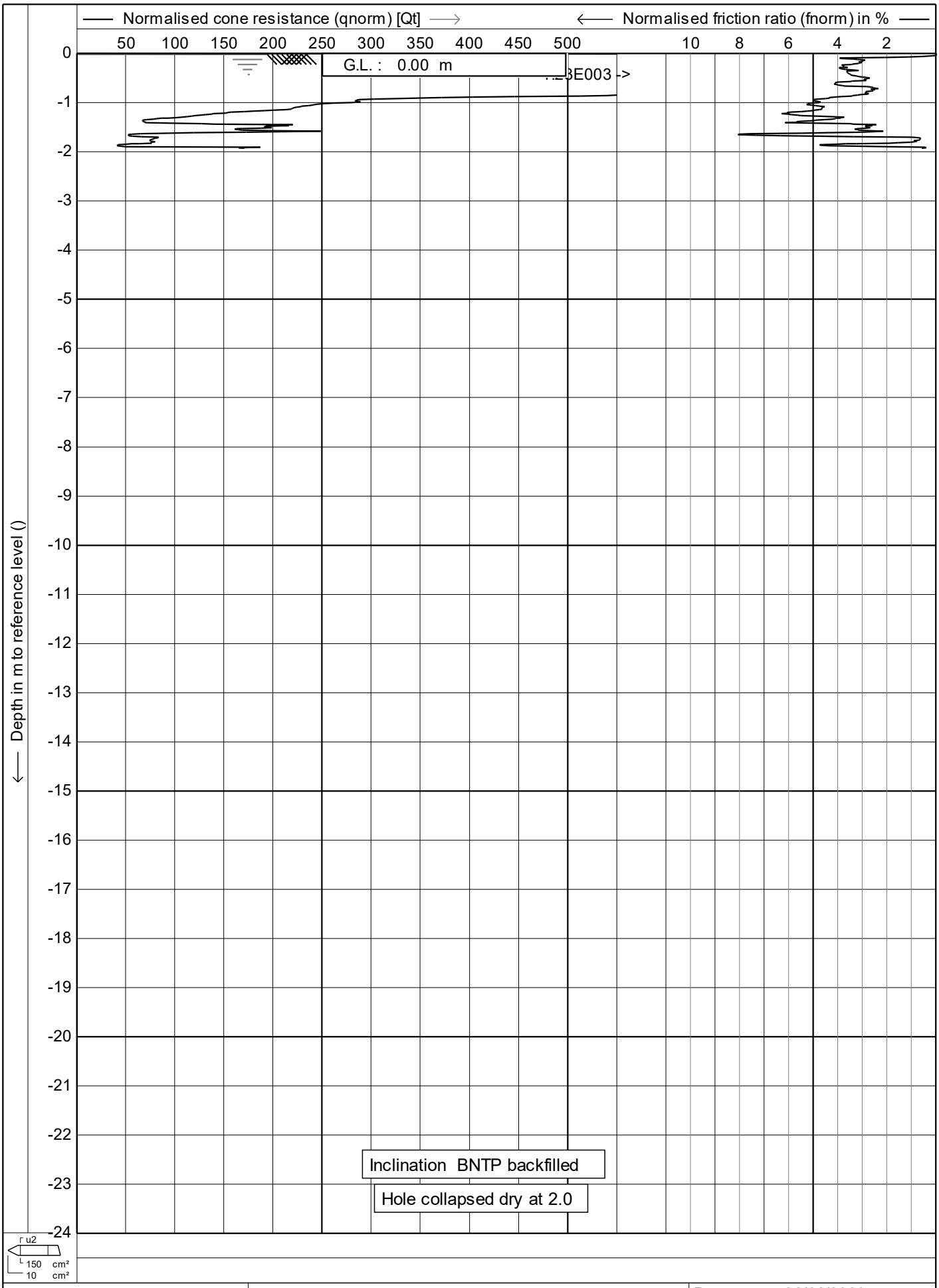
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

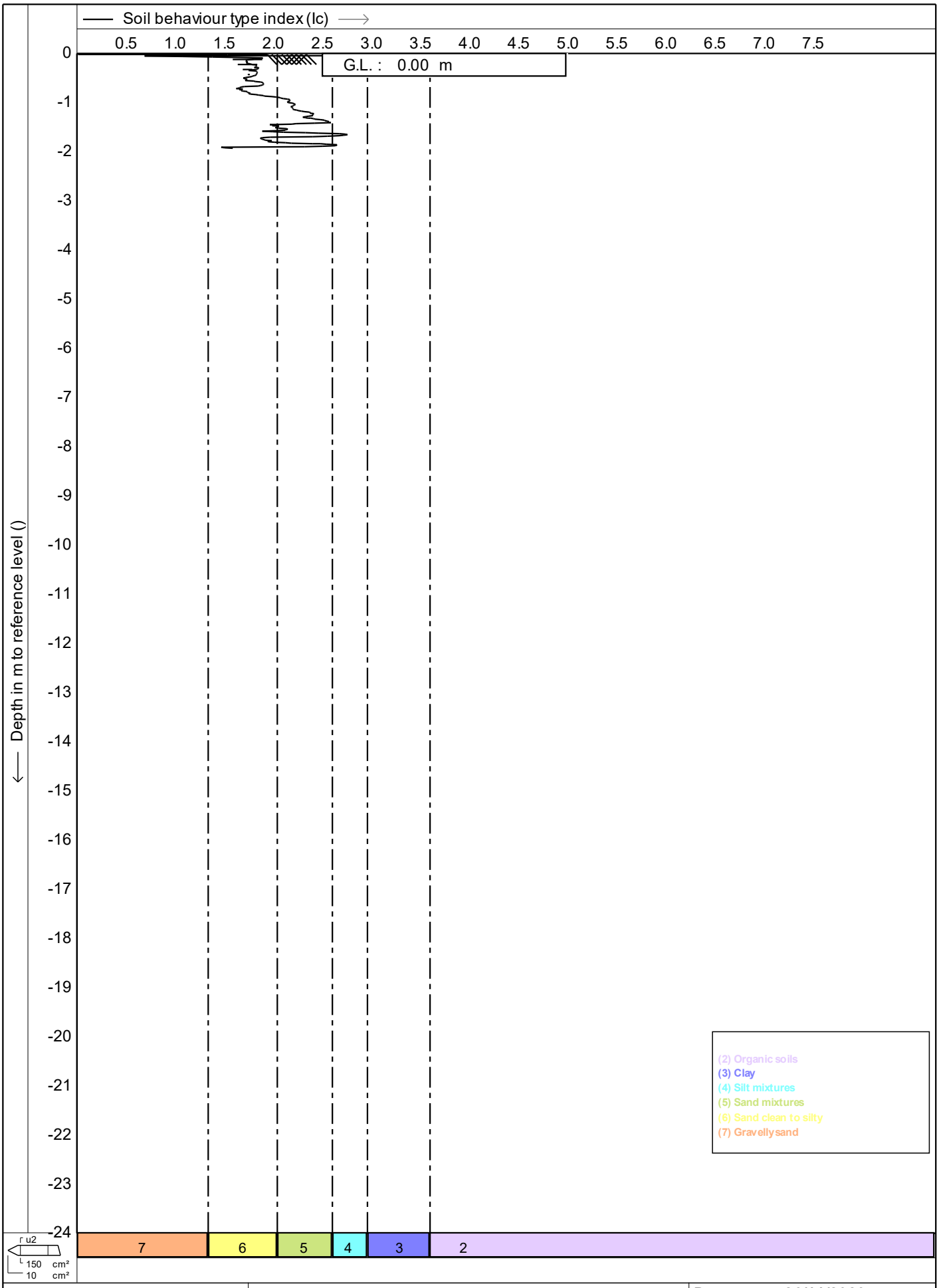
**7/14**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **048** 8/14 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

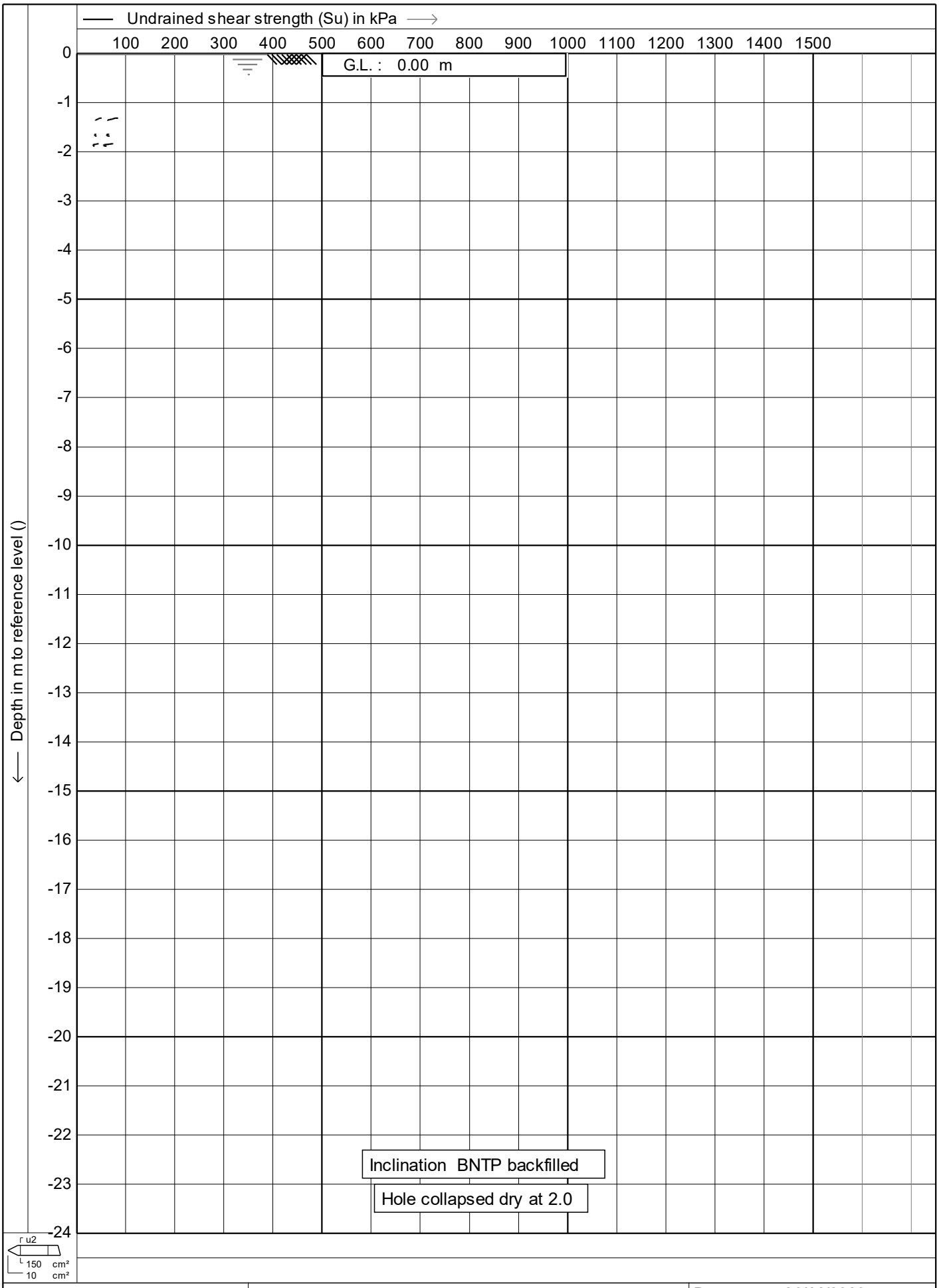
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

**9/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

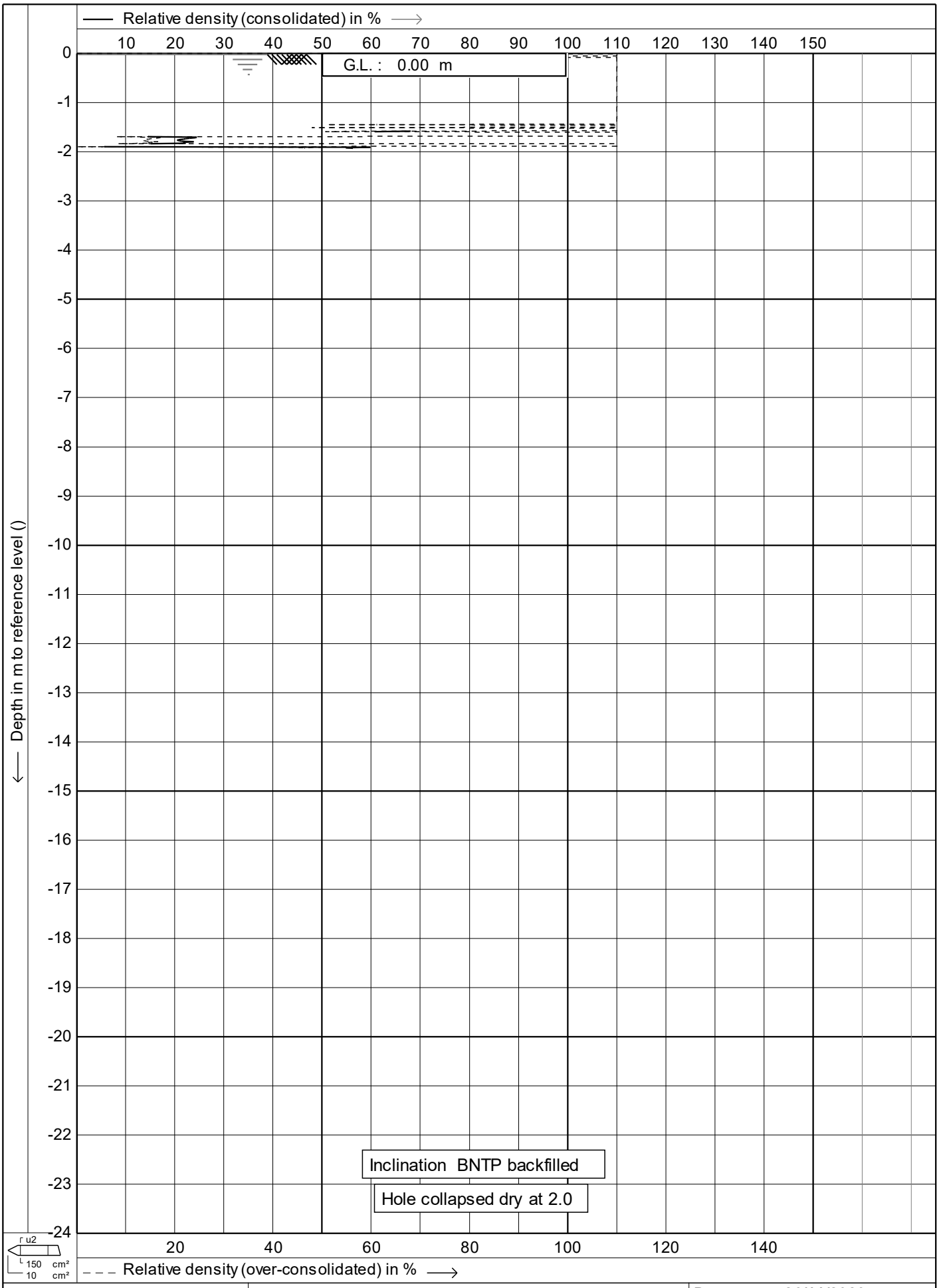
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

**10/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

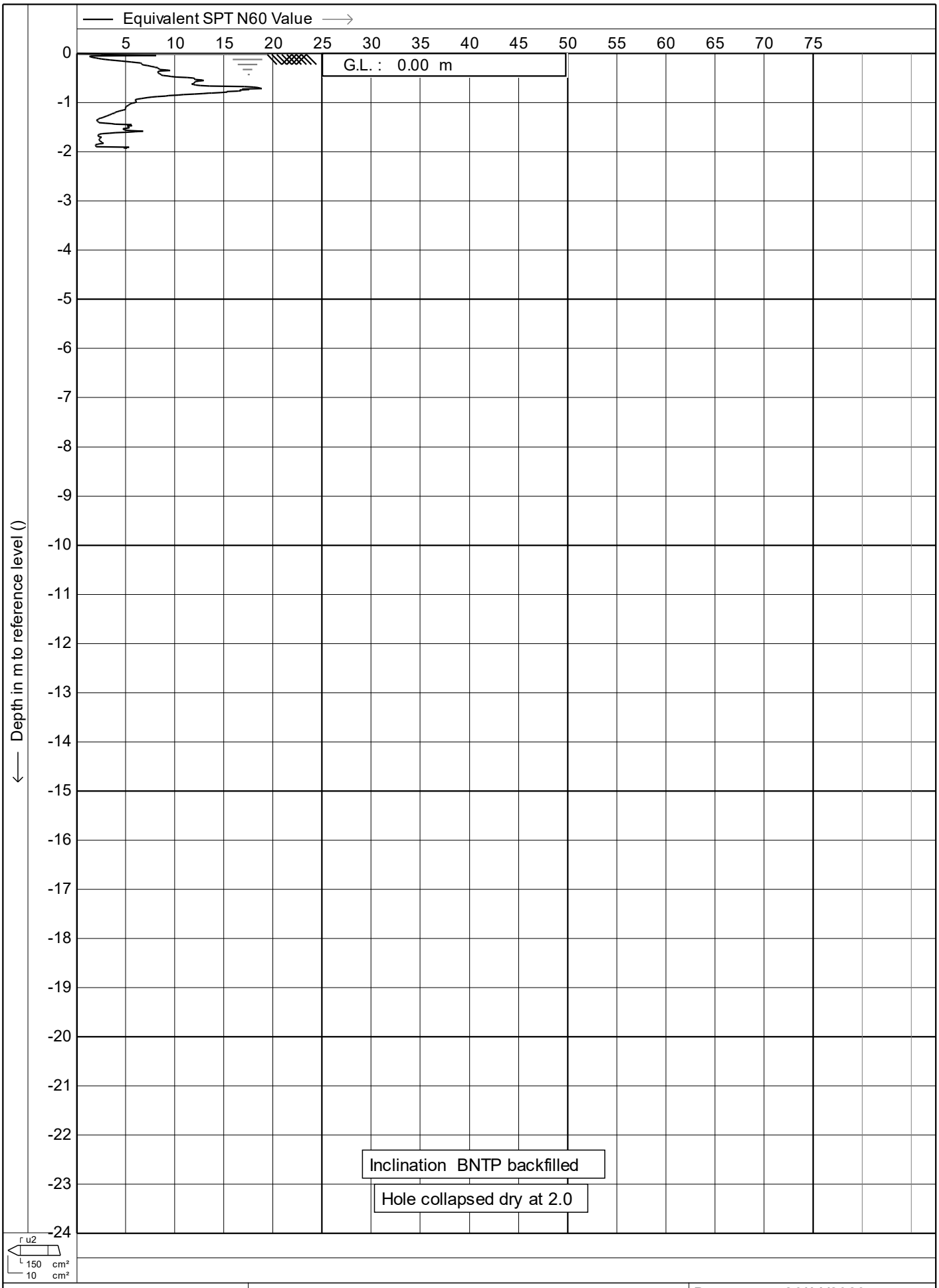
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

**11/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

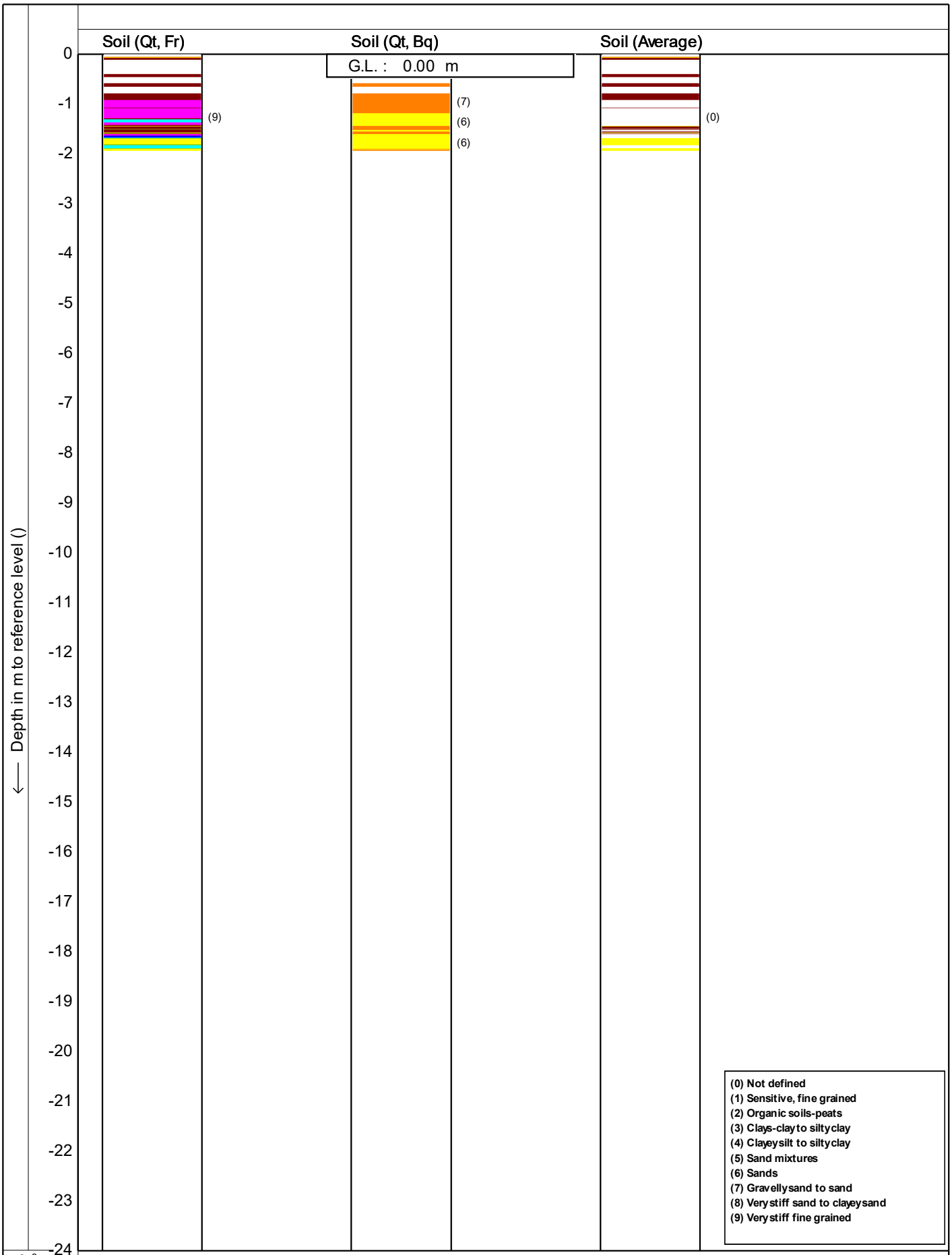
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

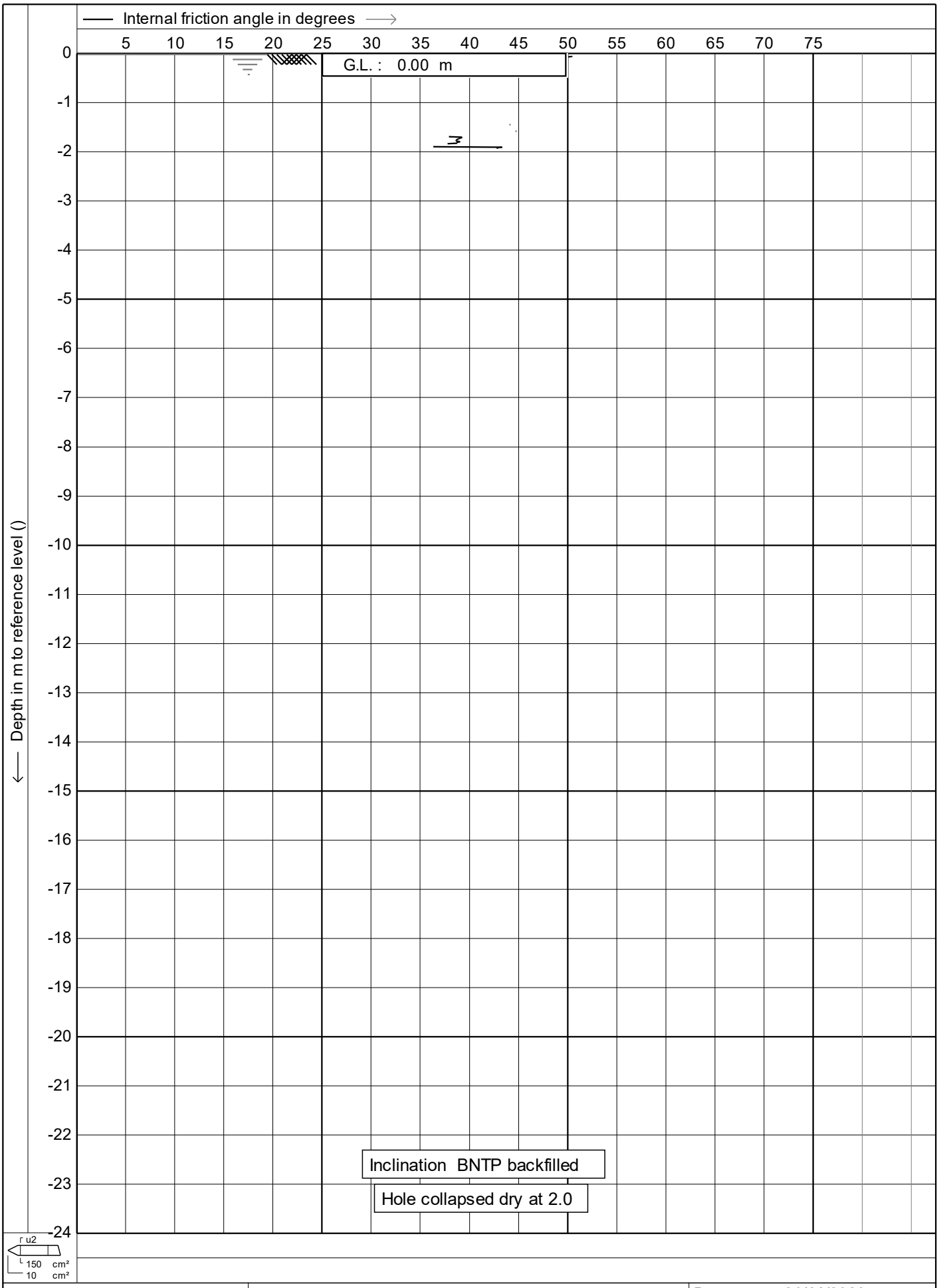
**12/14**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **048** — **13/14** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

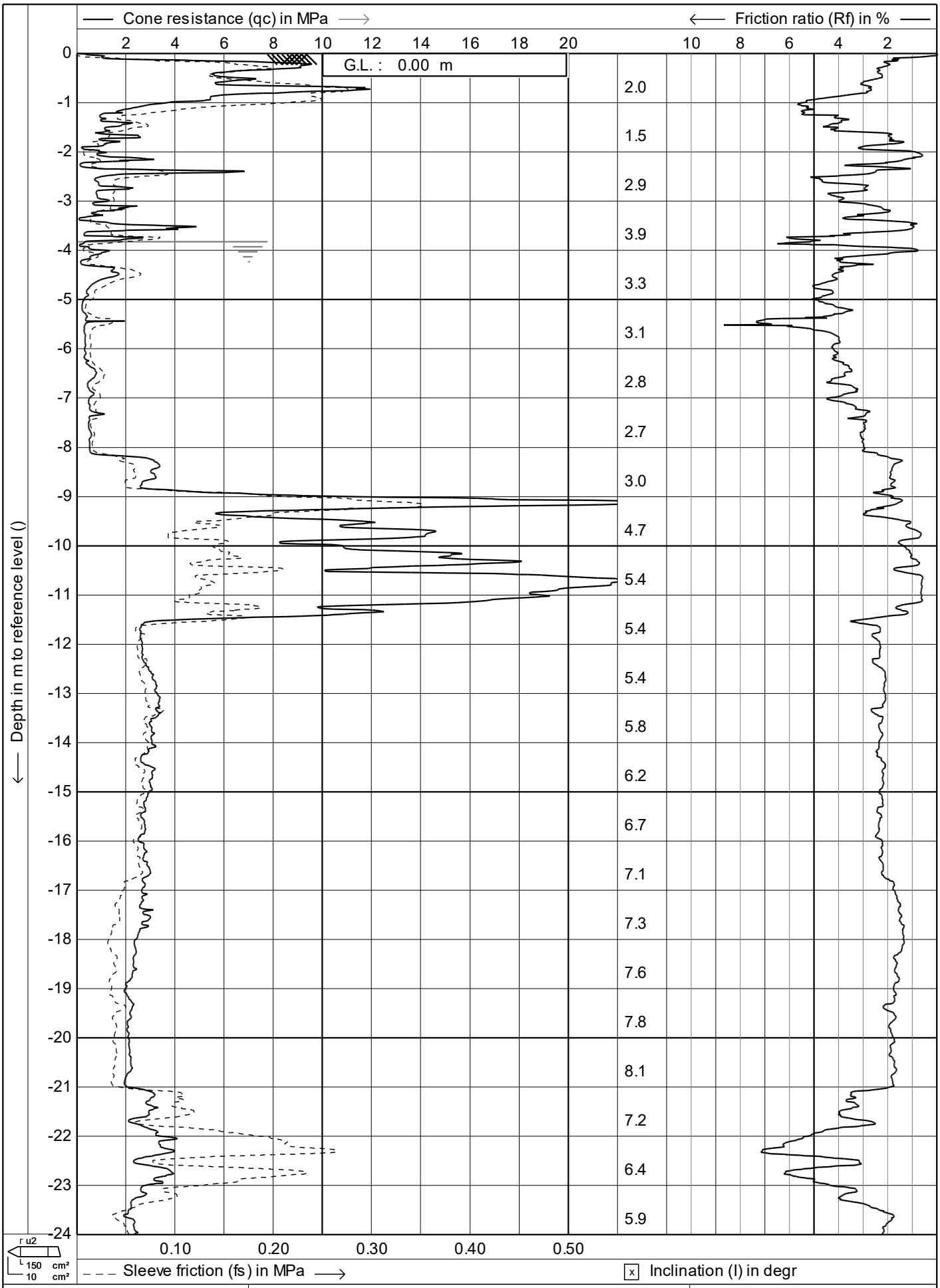
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048** |

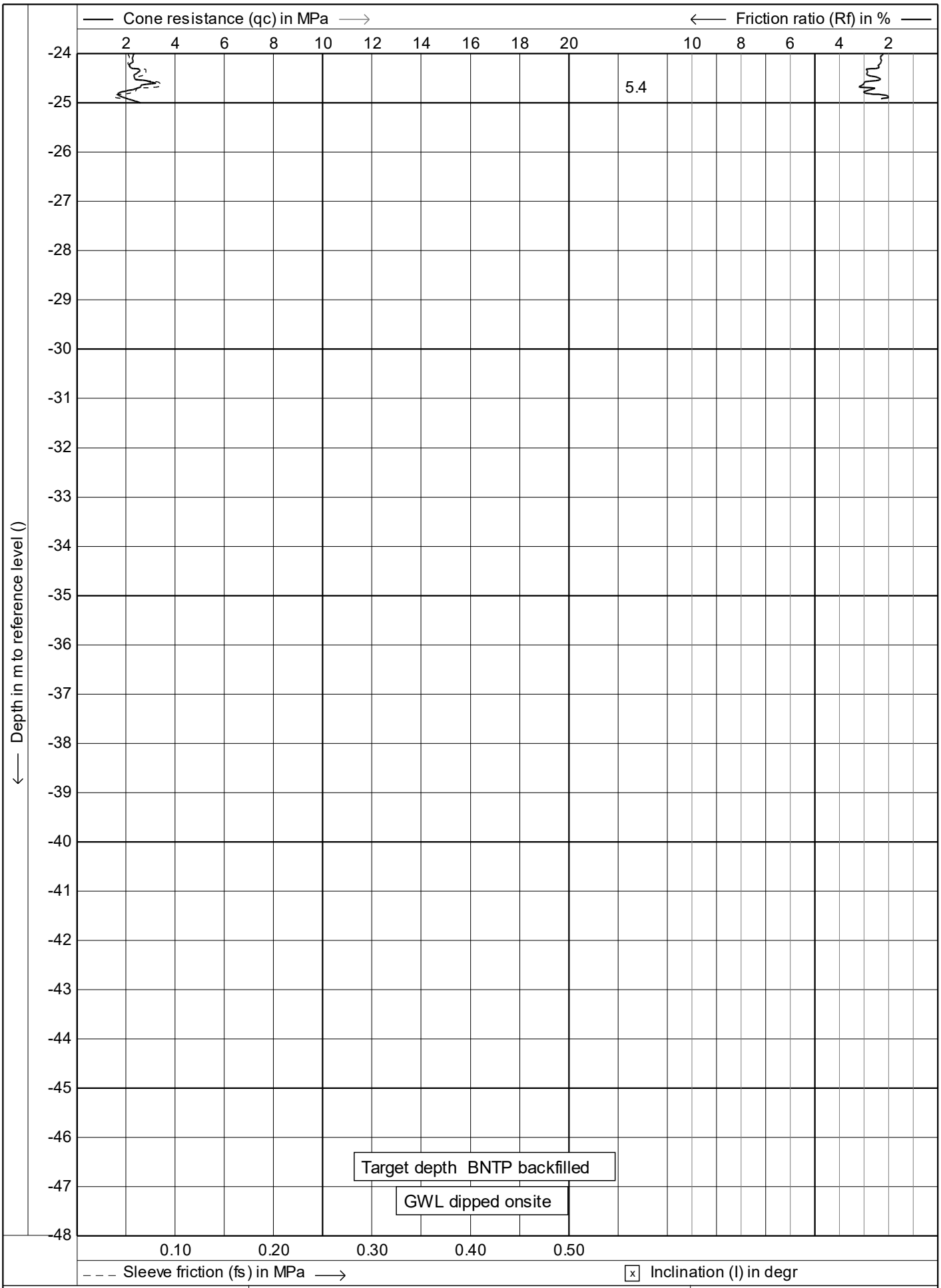
**14/14**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **048a** 1/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

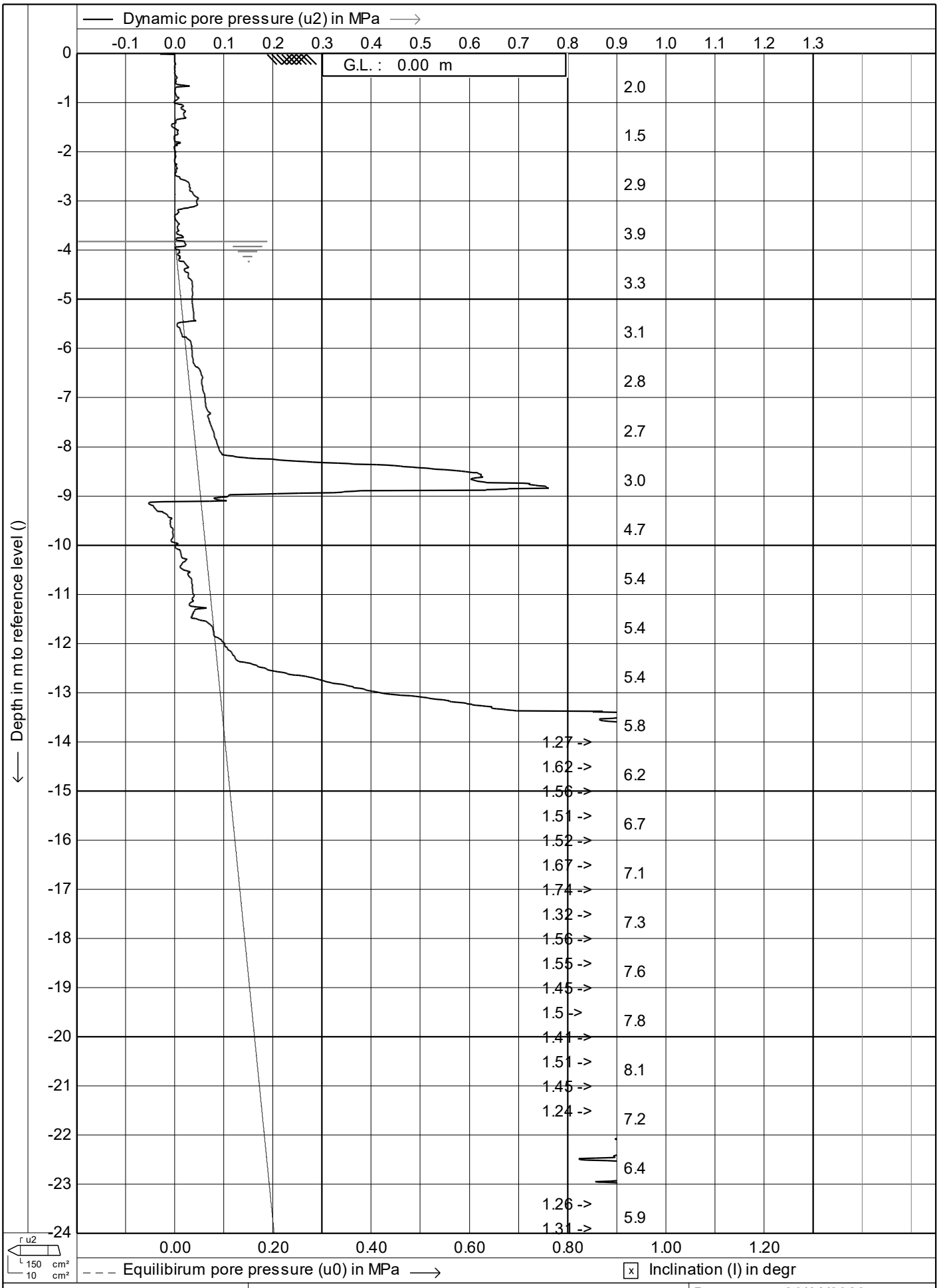
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

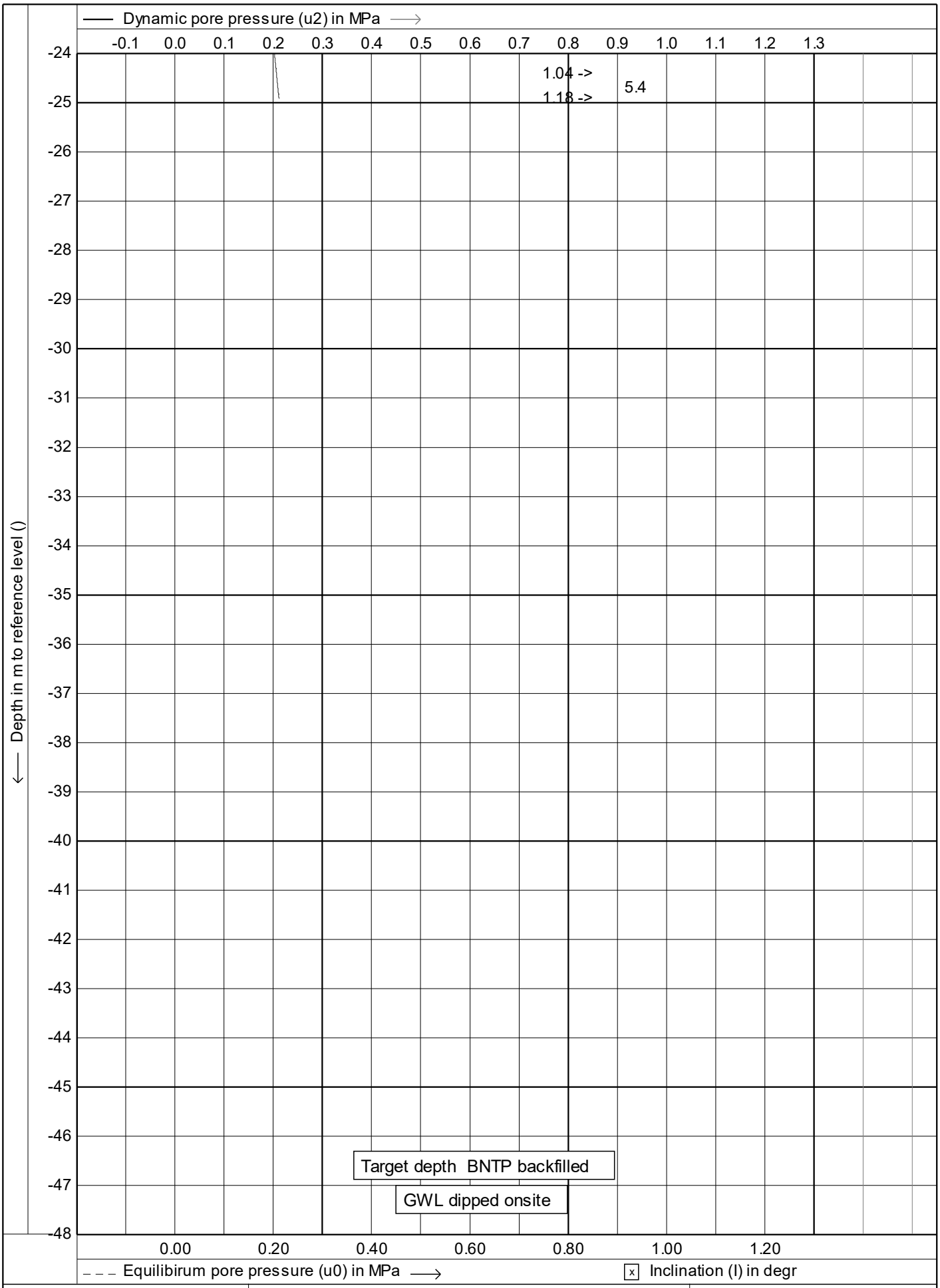


1.48




| | | | |
|---|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date | : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. | : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. | : **05AU7** |
| | Position: **0, 0** | CPT no. | : **048a** 3/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **26/11/2020**

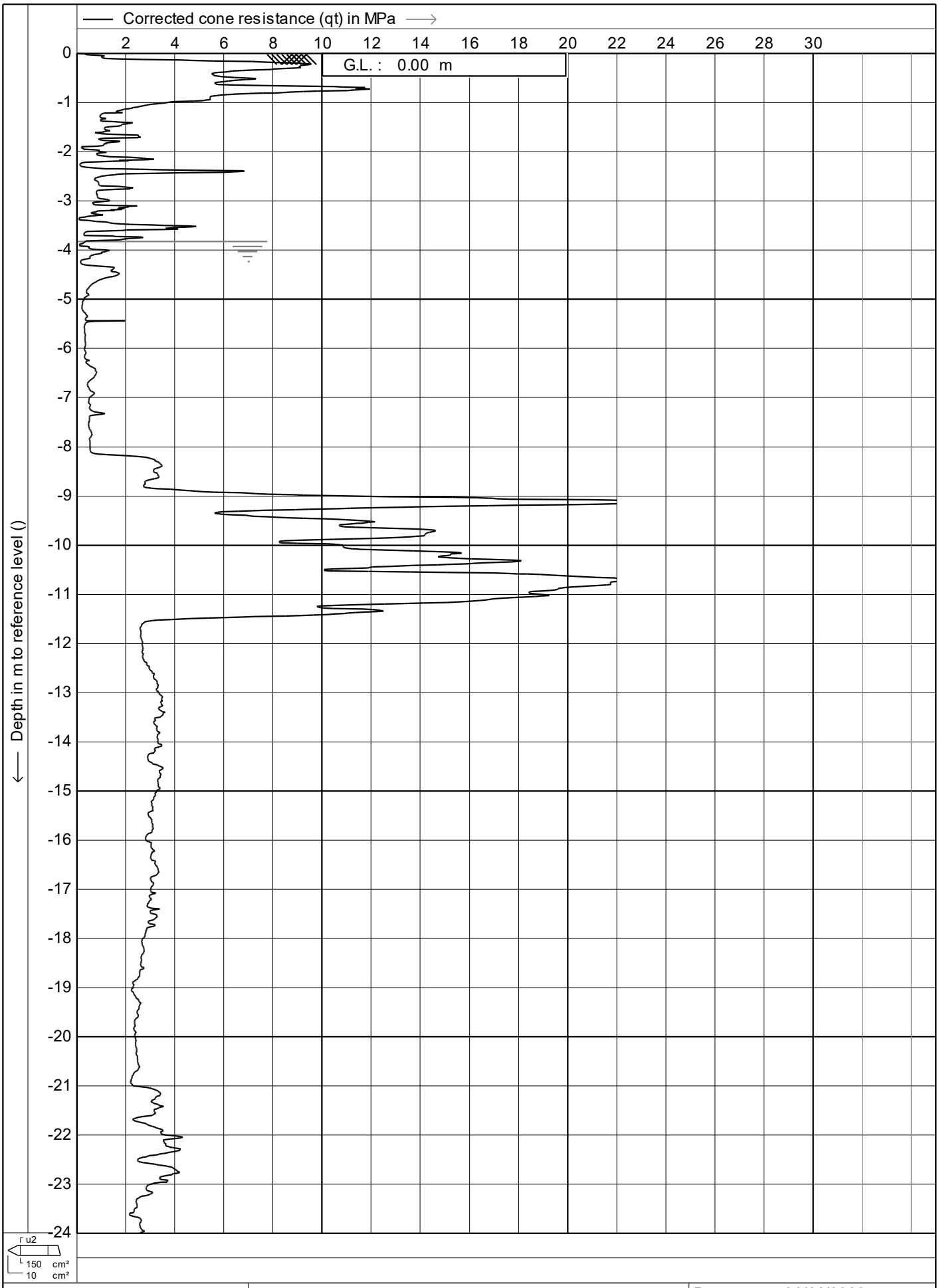
Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **048a**



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

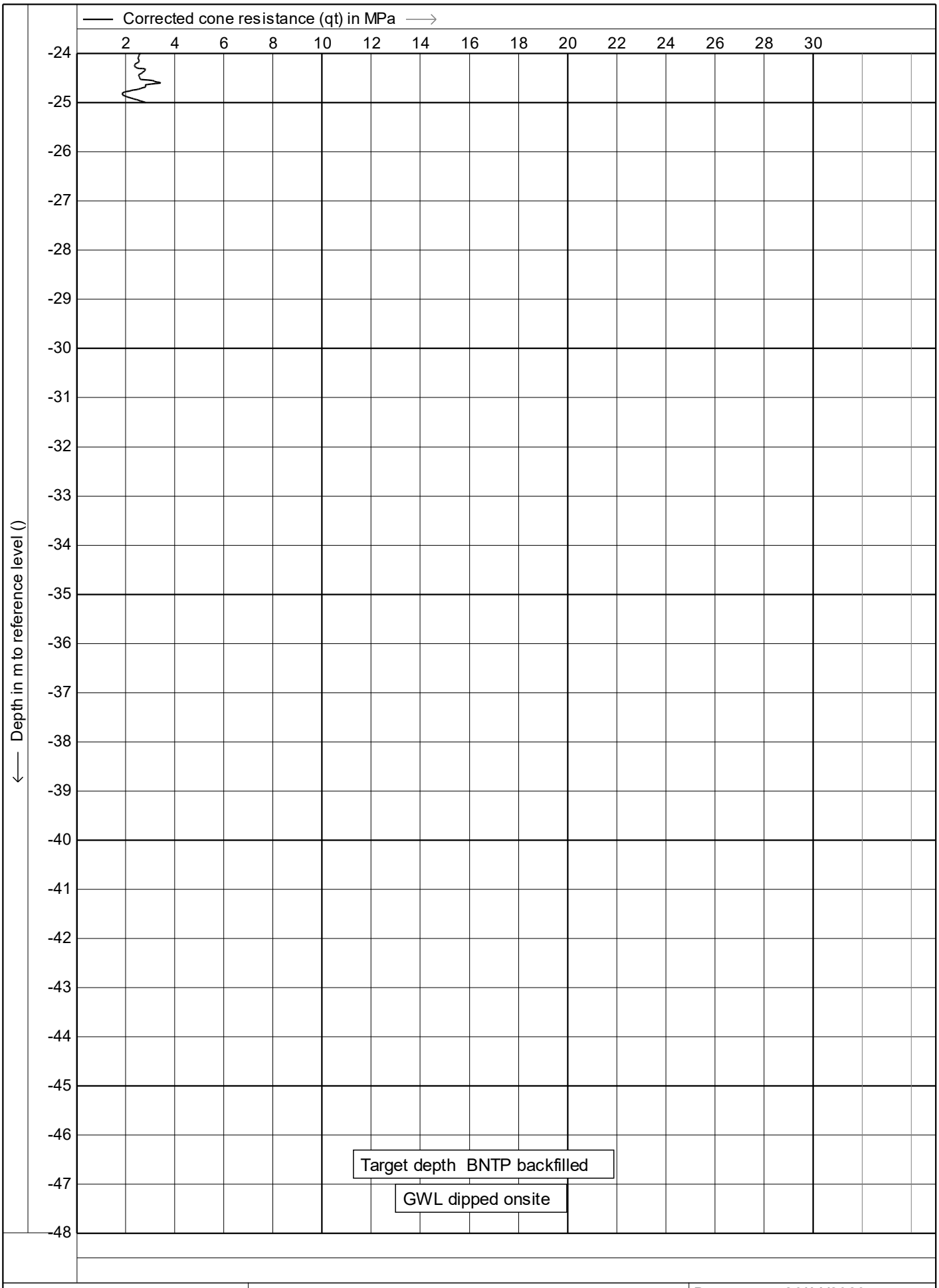
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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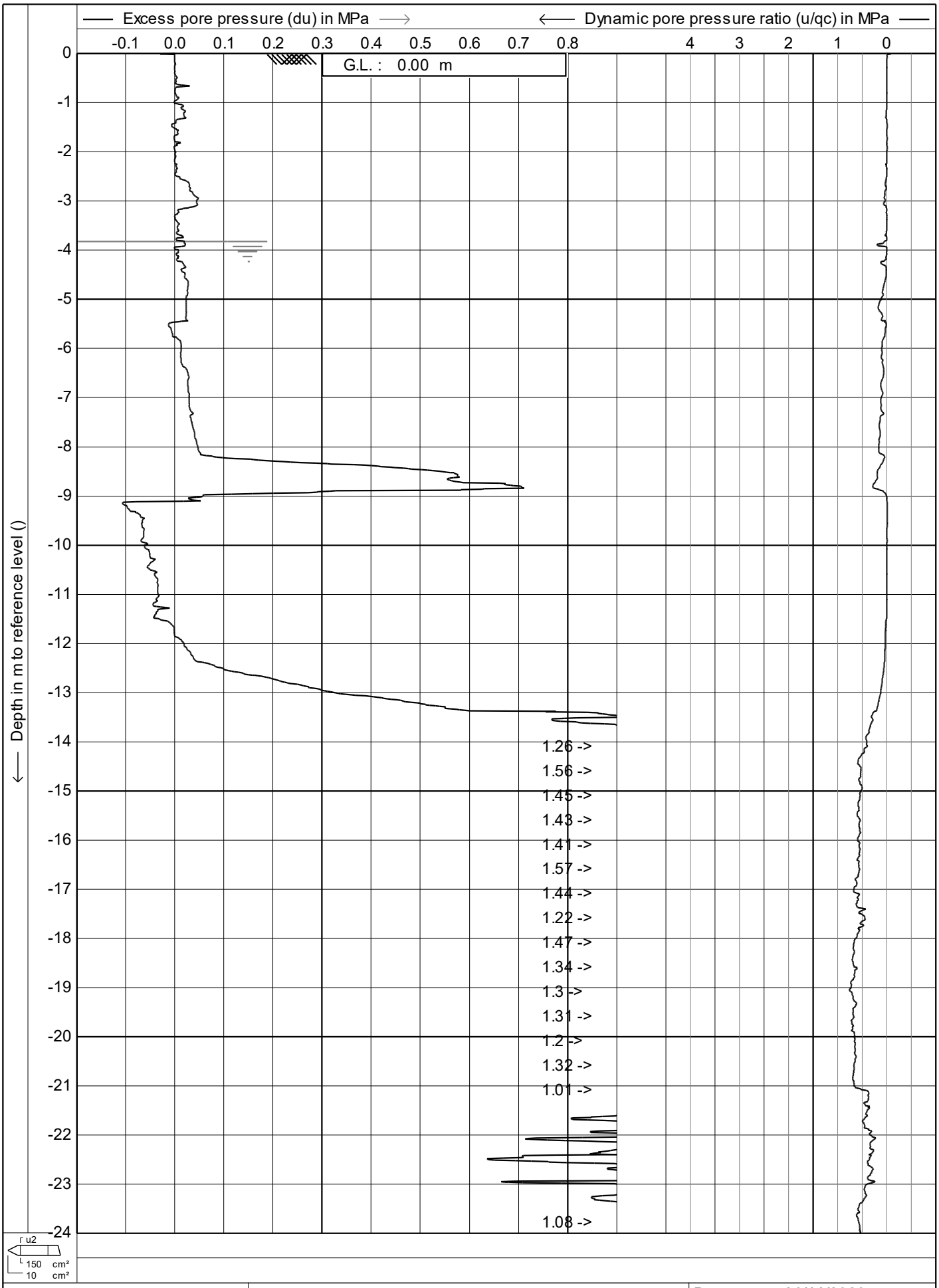
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

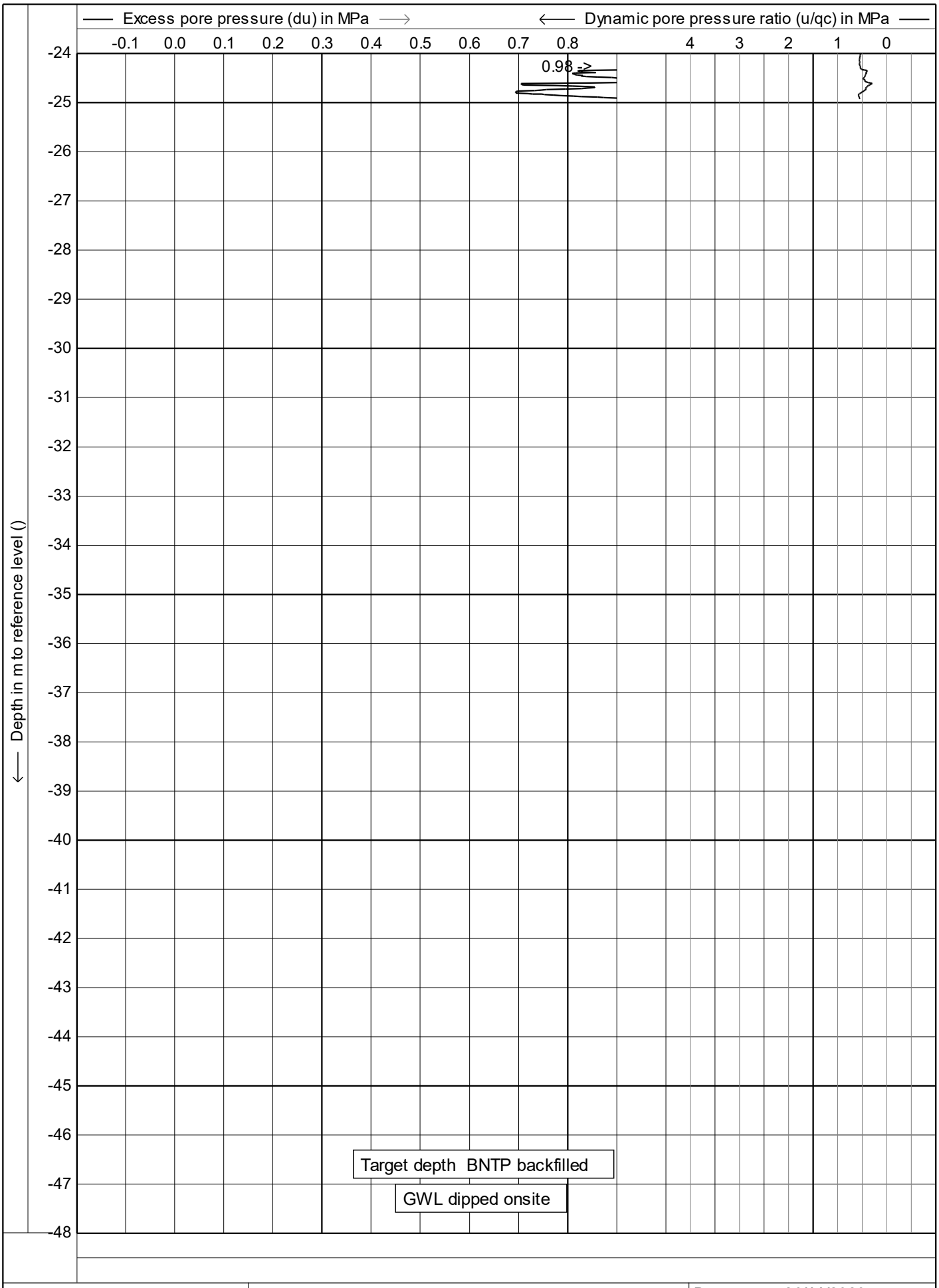
**6/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **048a** 7/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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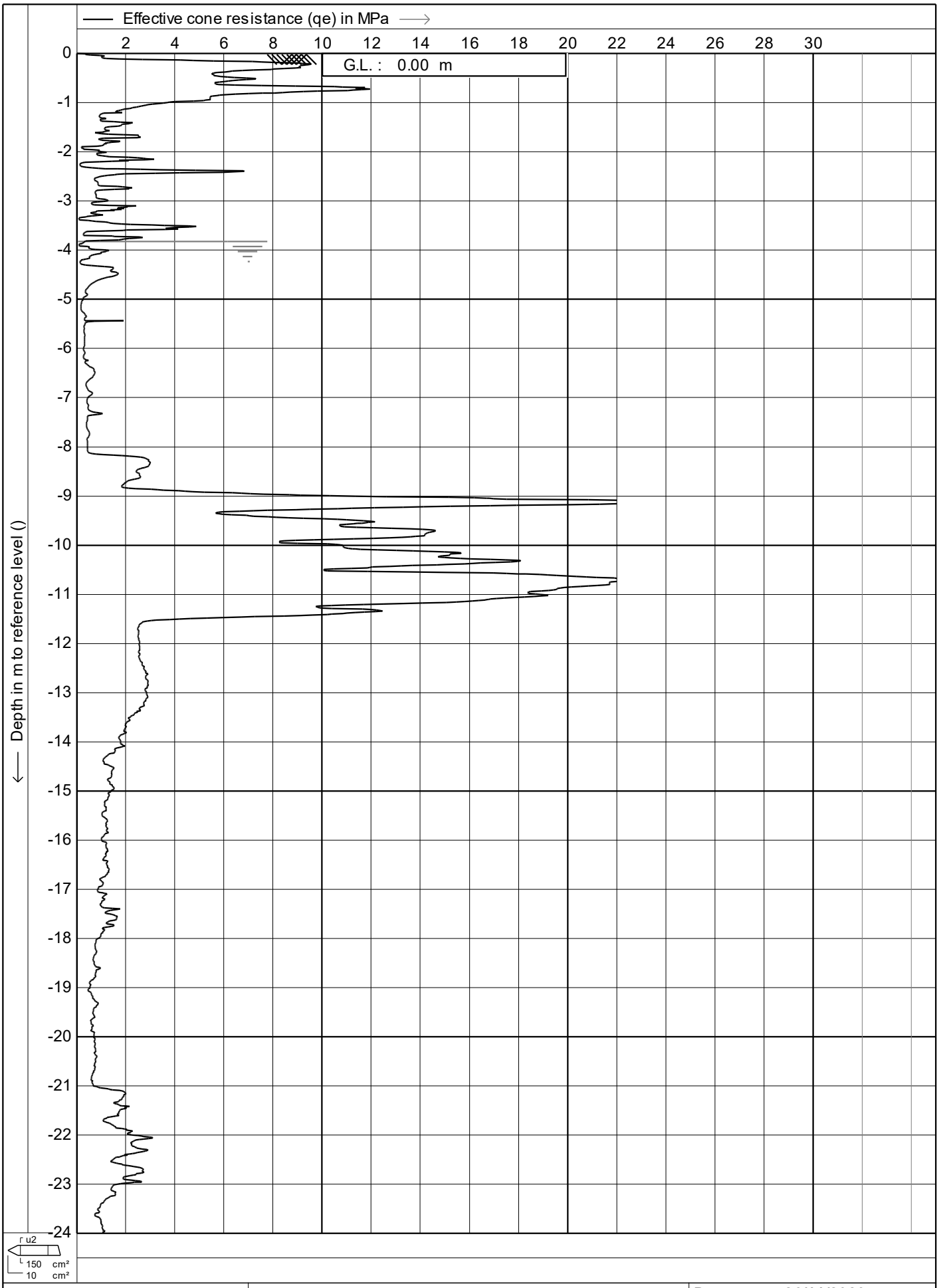
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |



1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

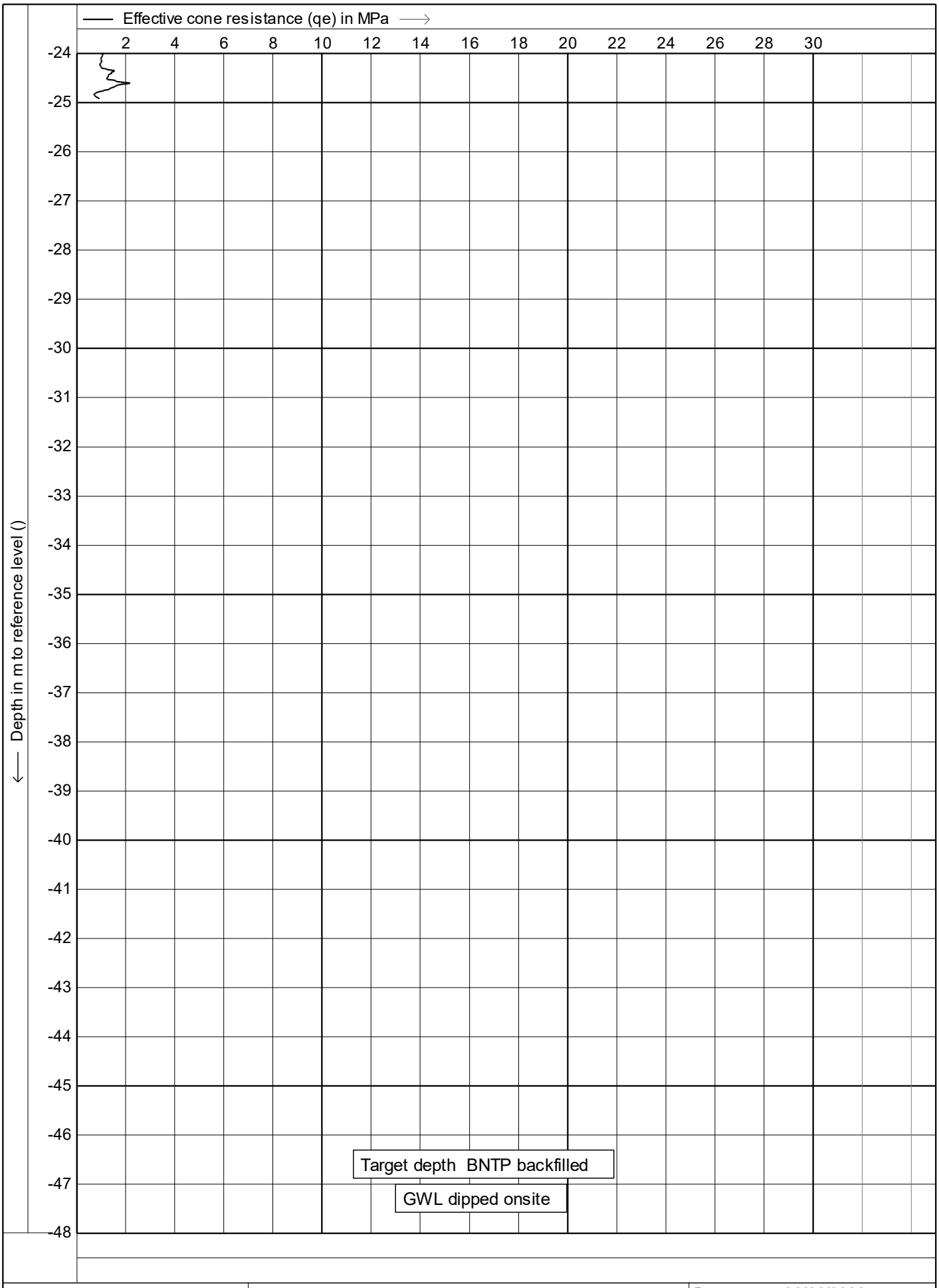
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**9/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

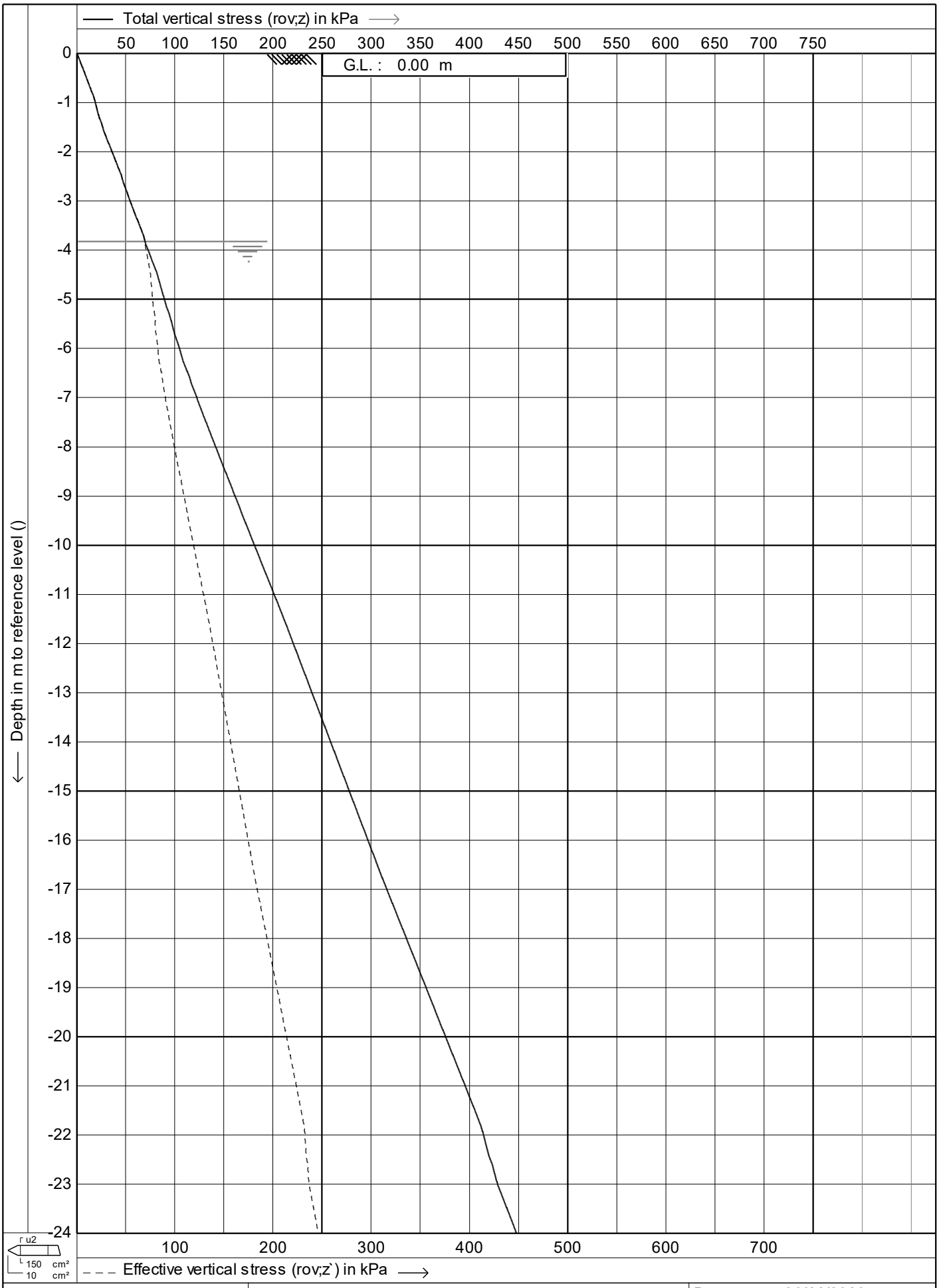
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**10/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

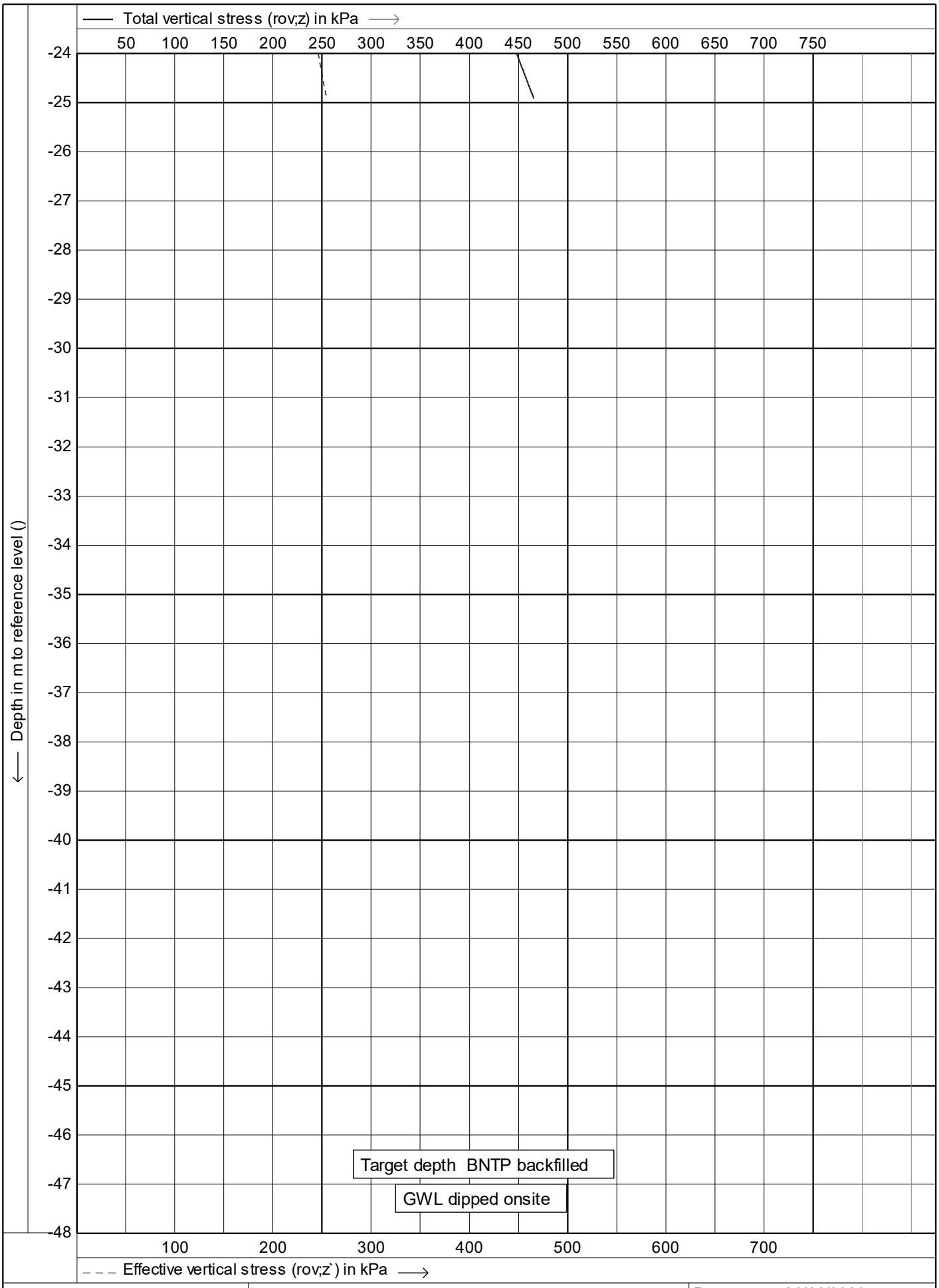
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**11/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

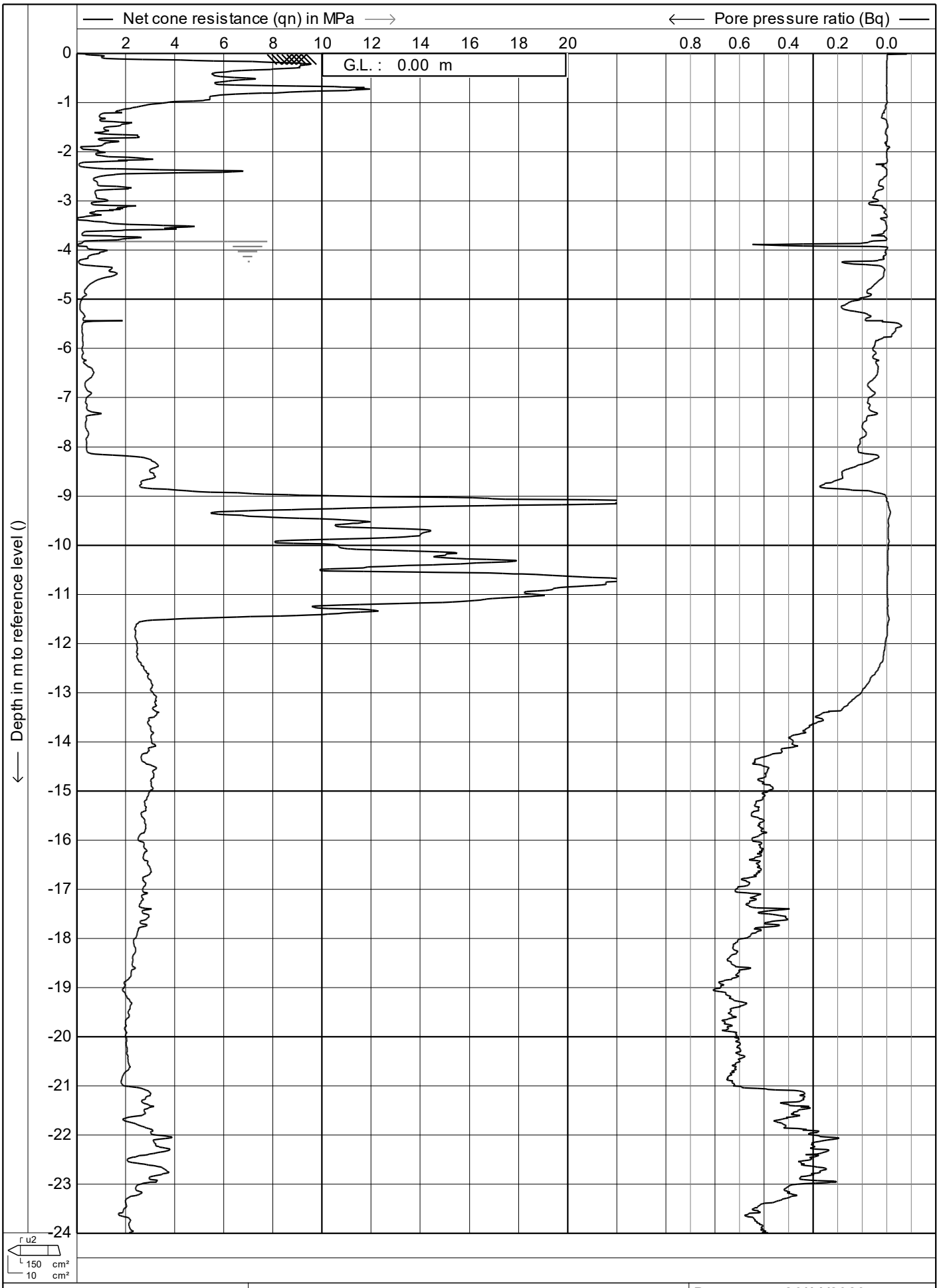
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**12/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

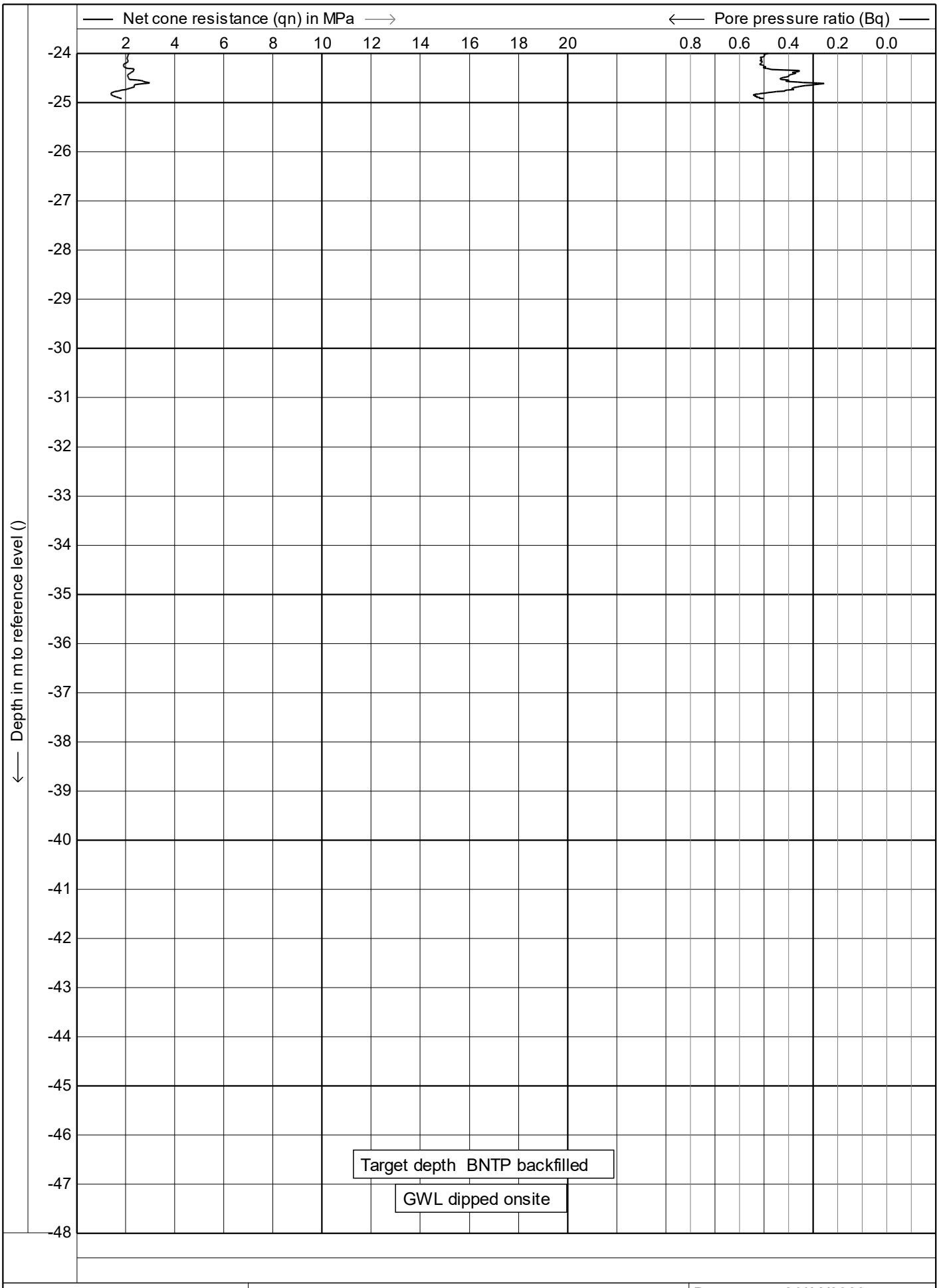
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

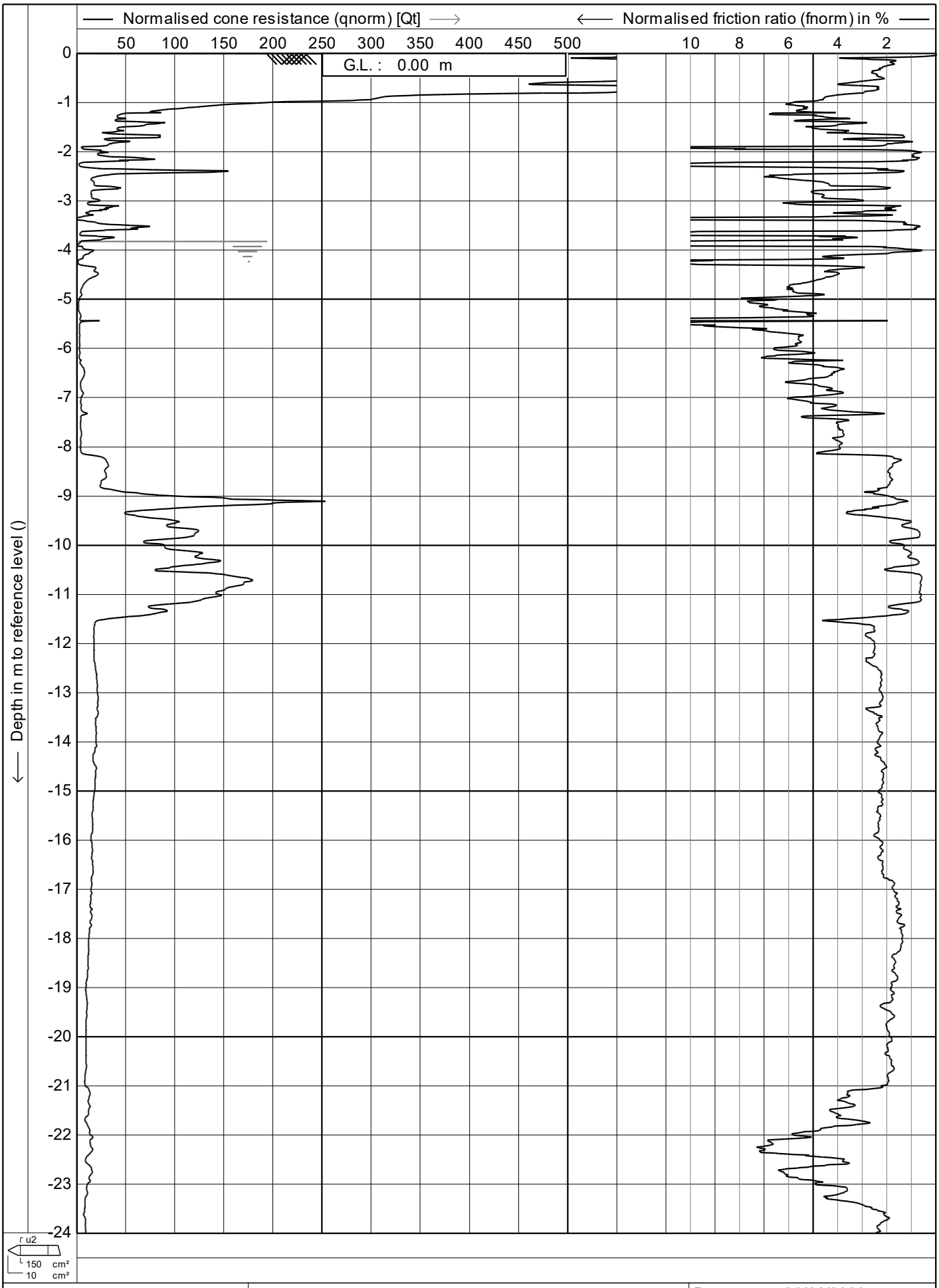
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

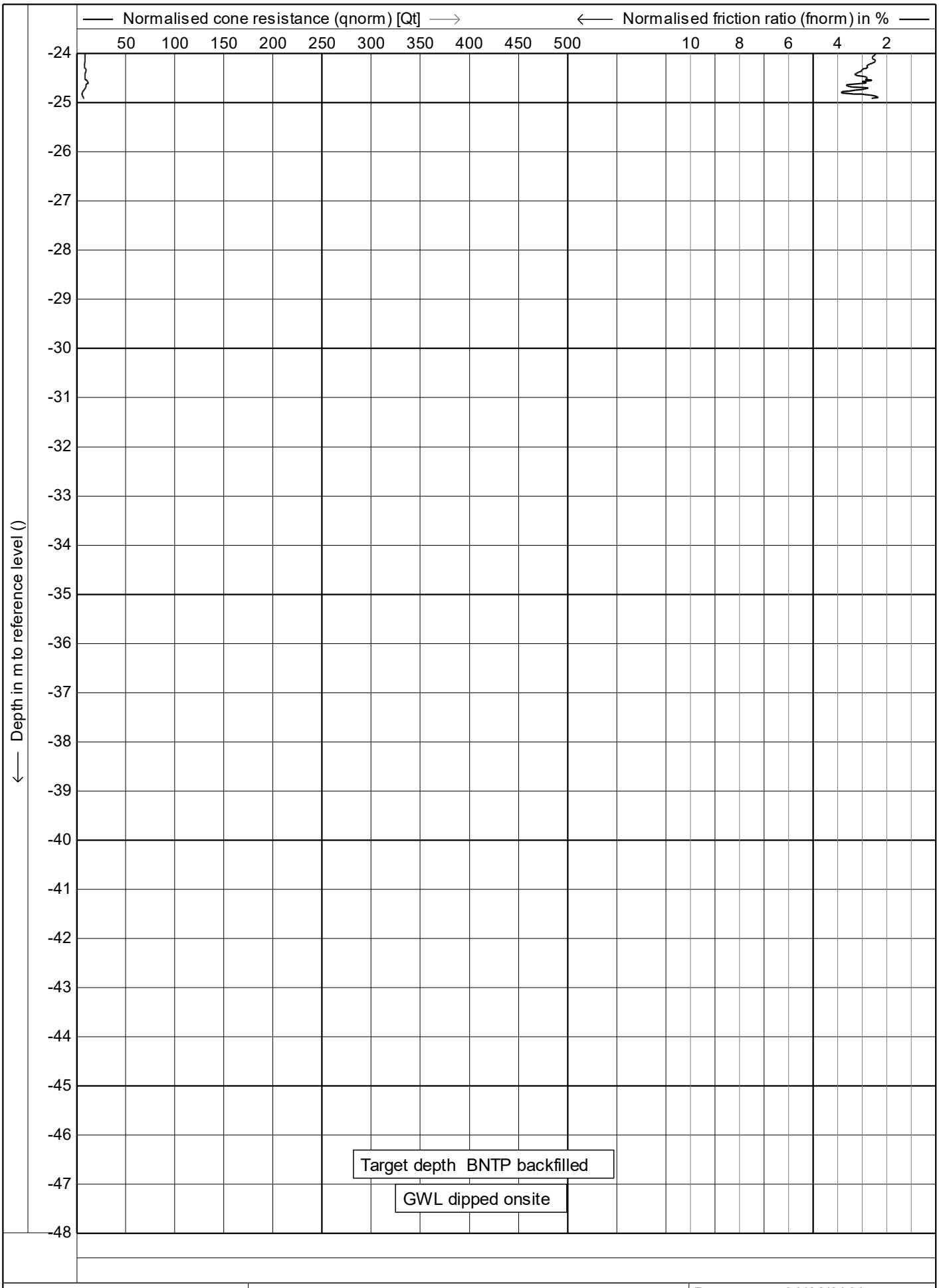
**14/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **048a** — **15/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

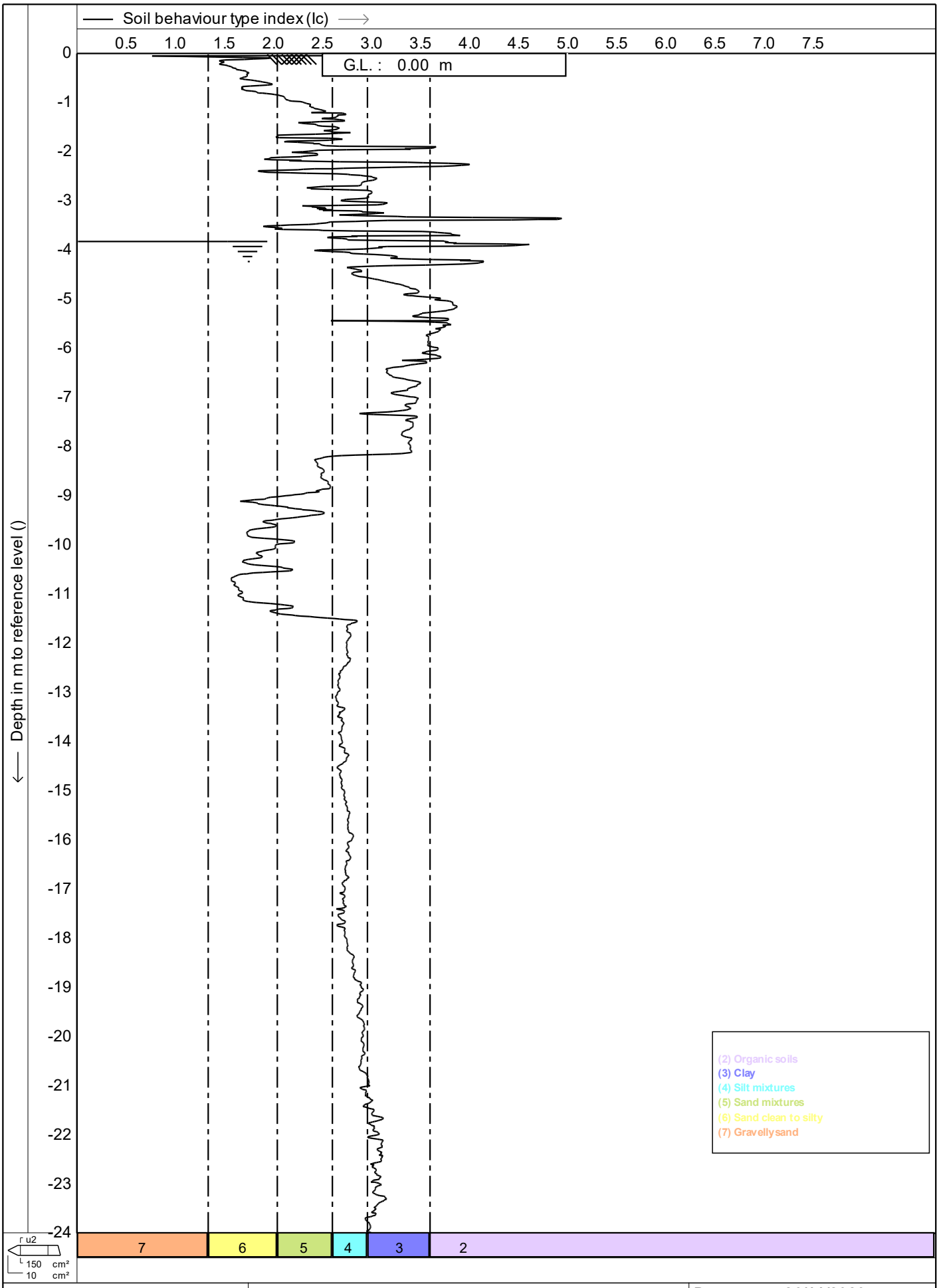
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

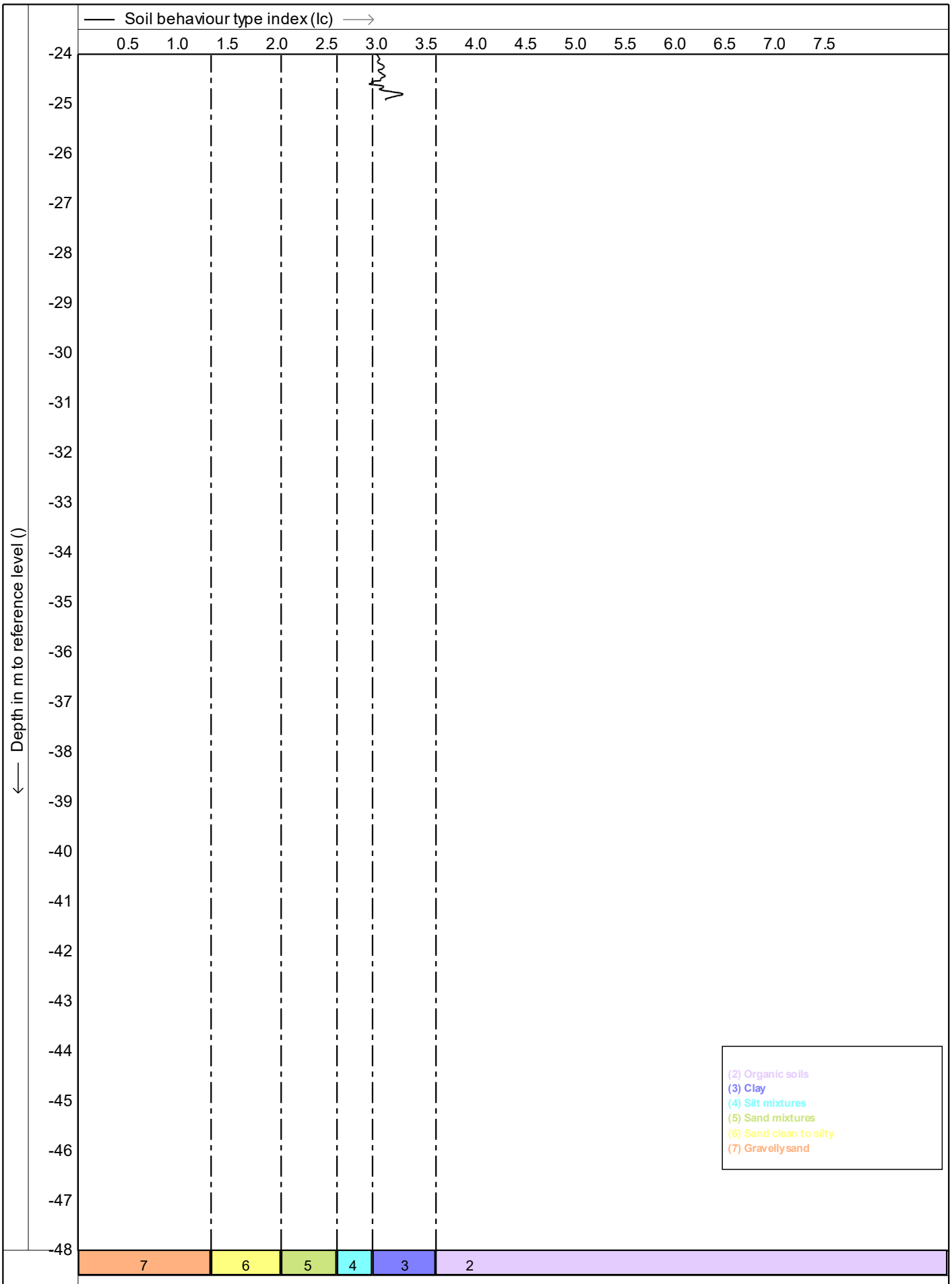
**16/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **048a** — **17/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

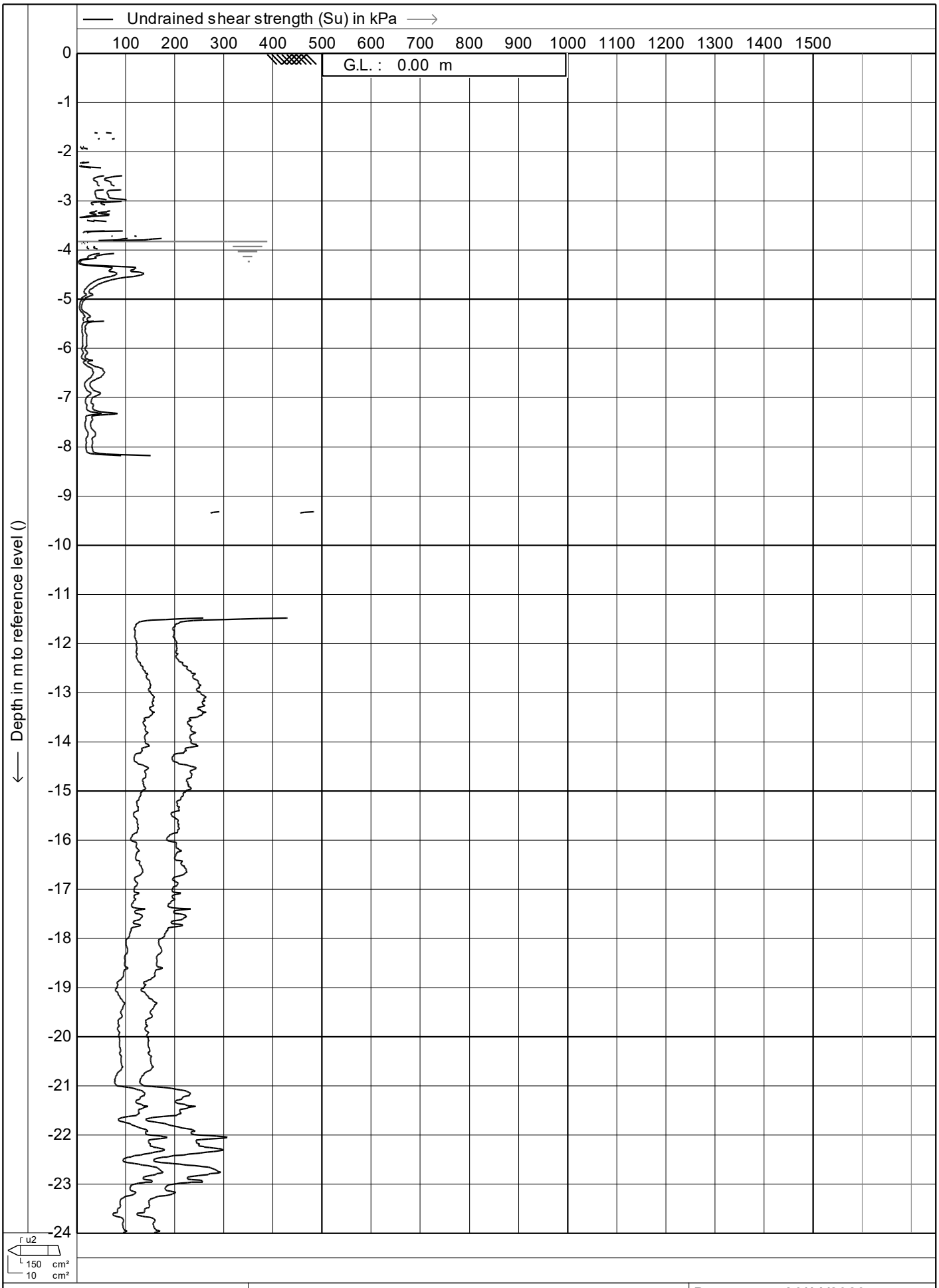
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**18/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

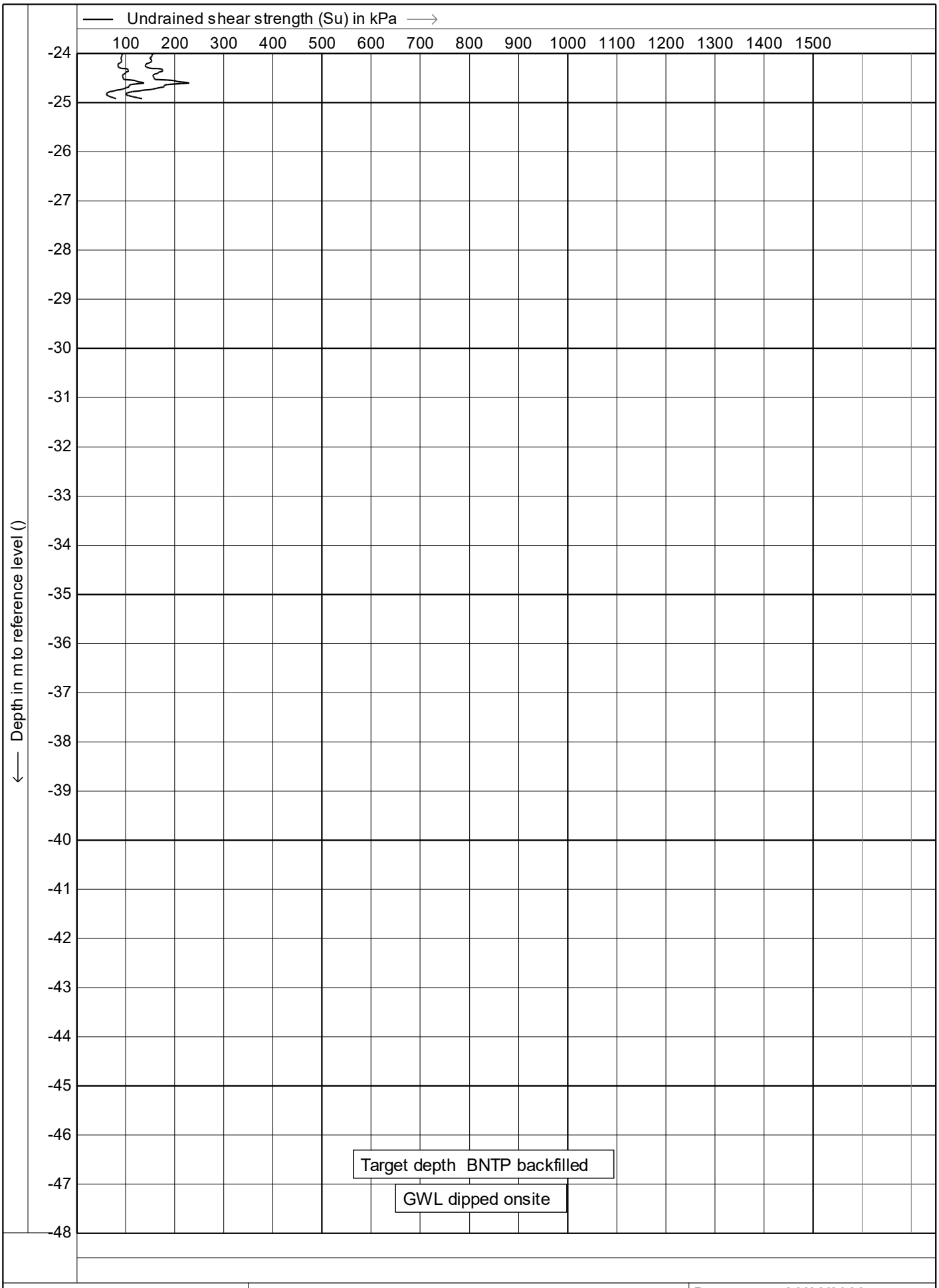
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**19/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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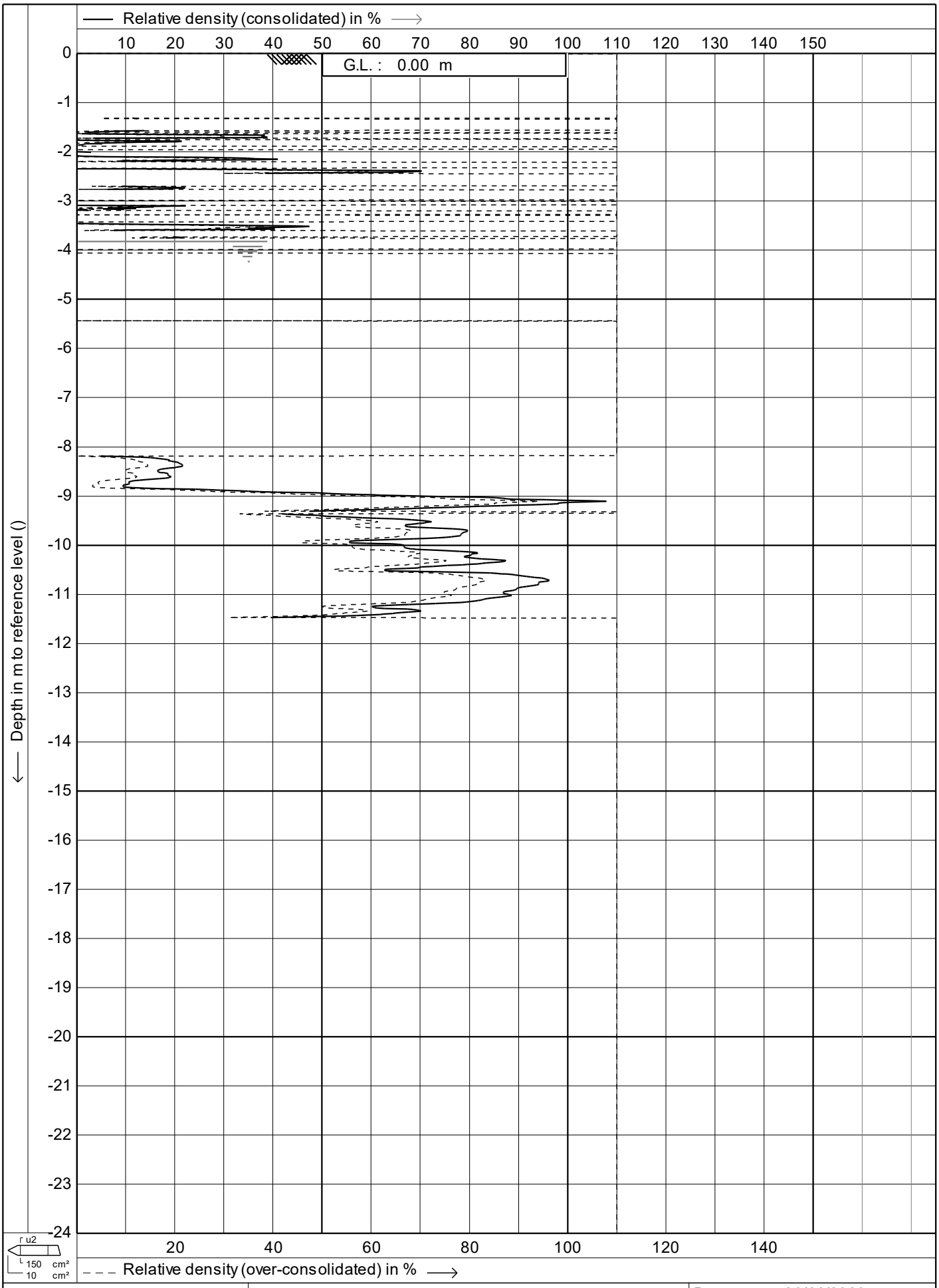
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**20/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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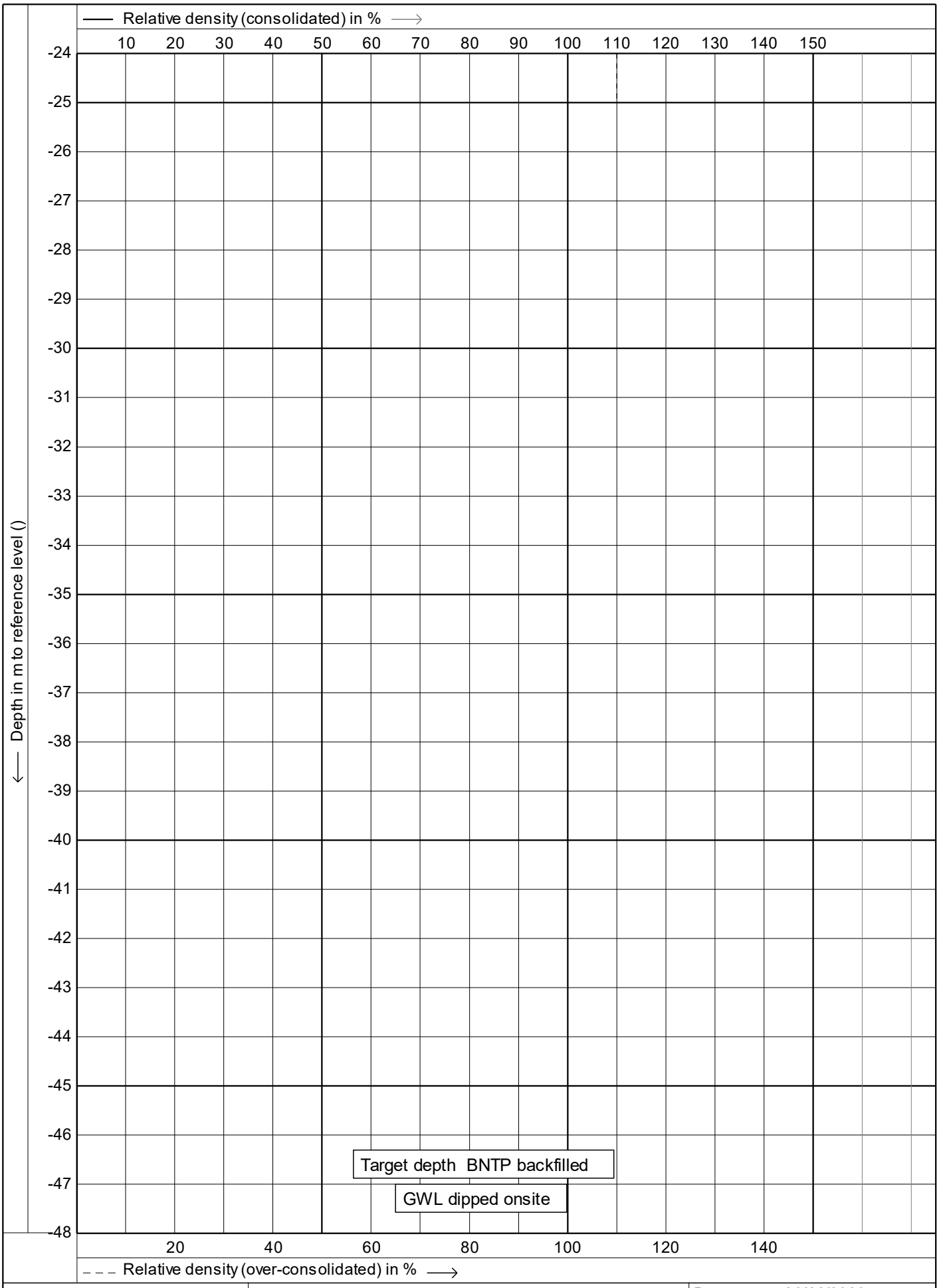
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**21/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

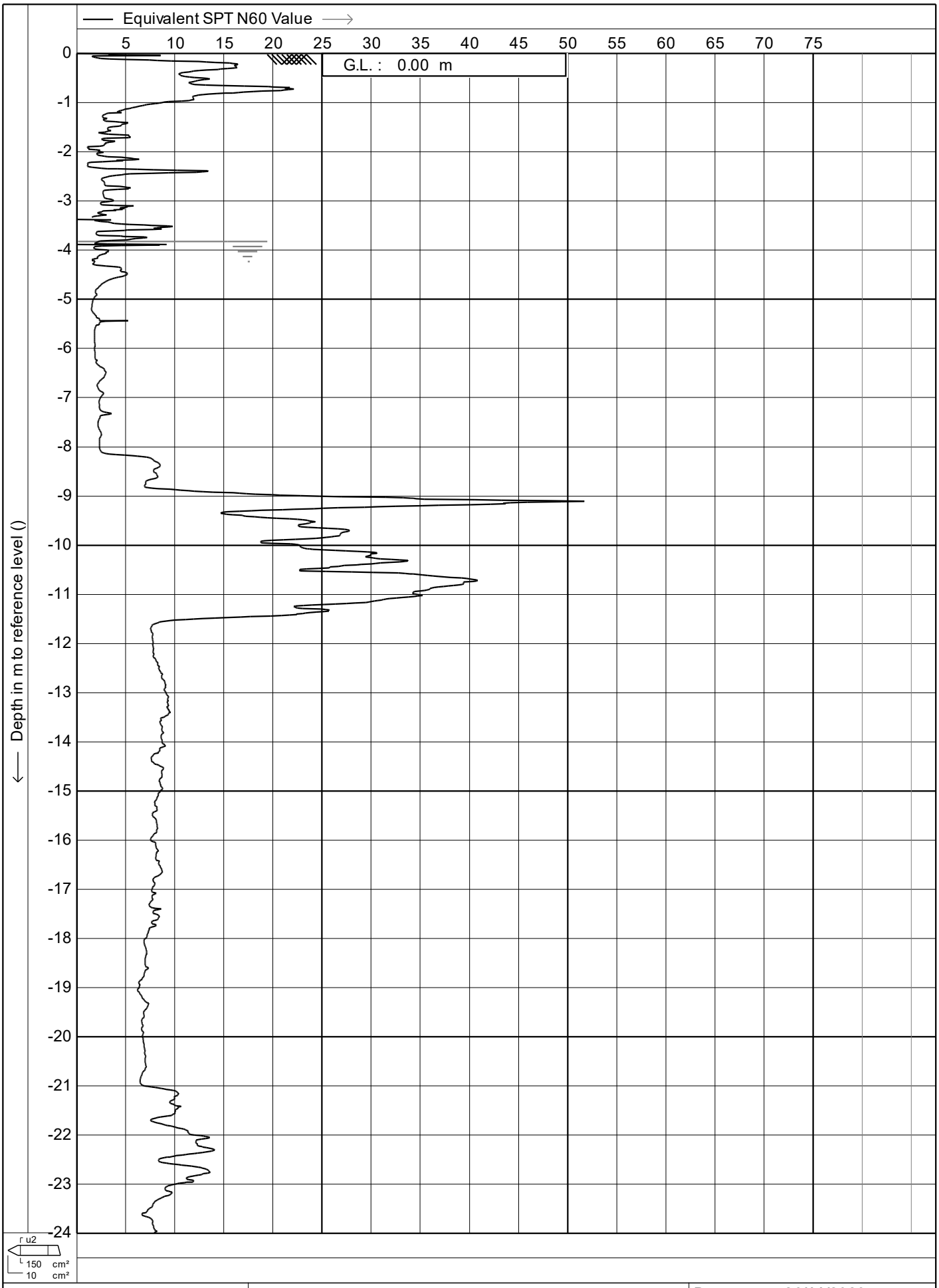
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**22/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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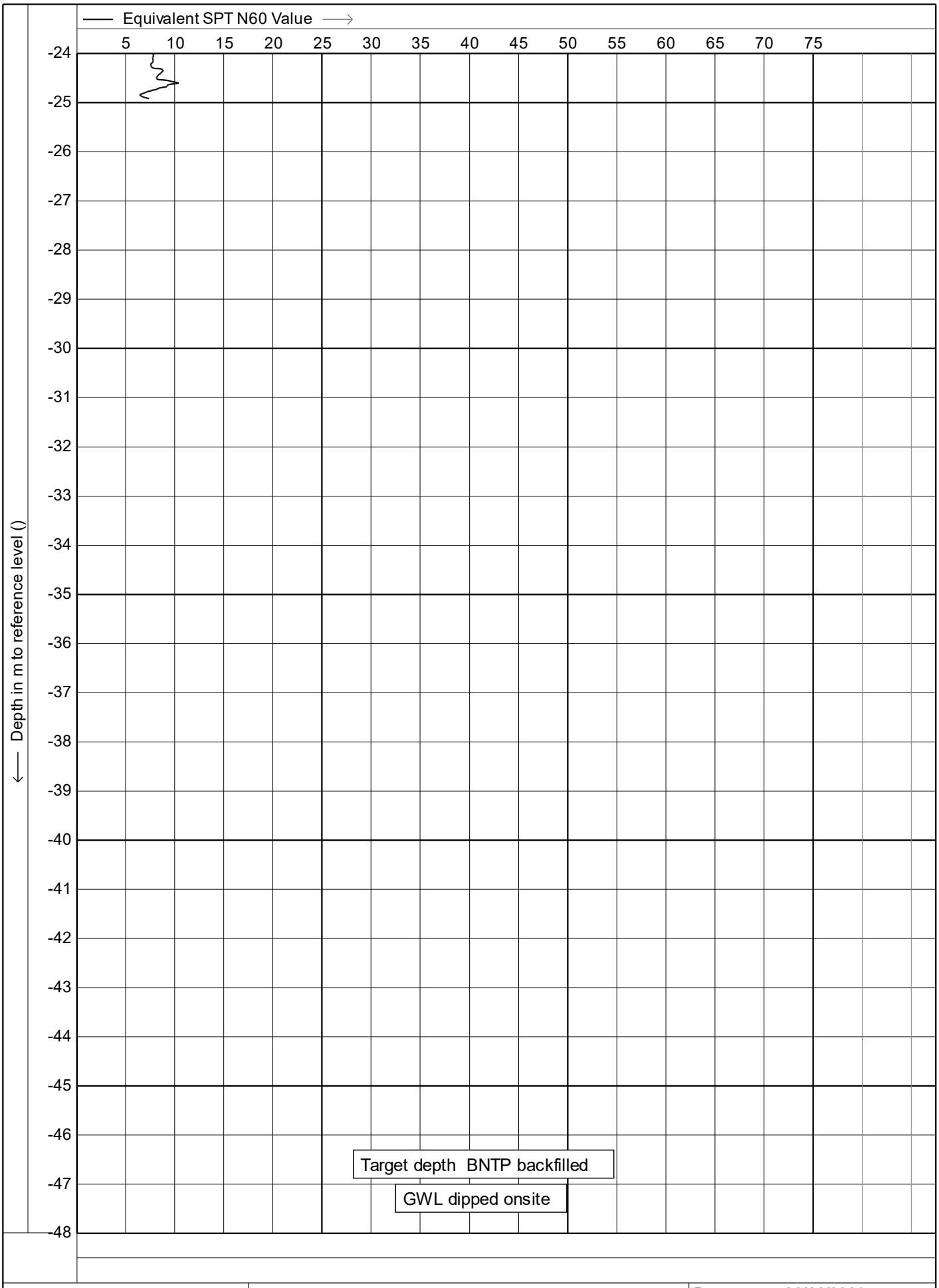
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**23/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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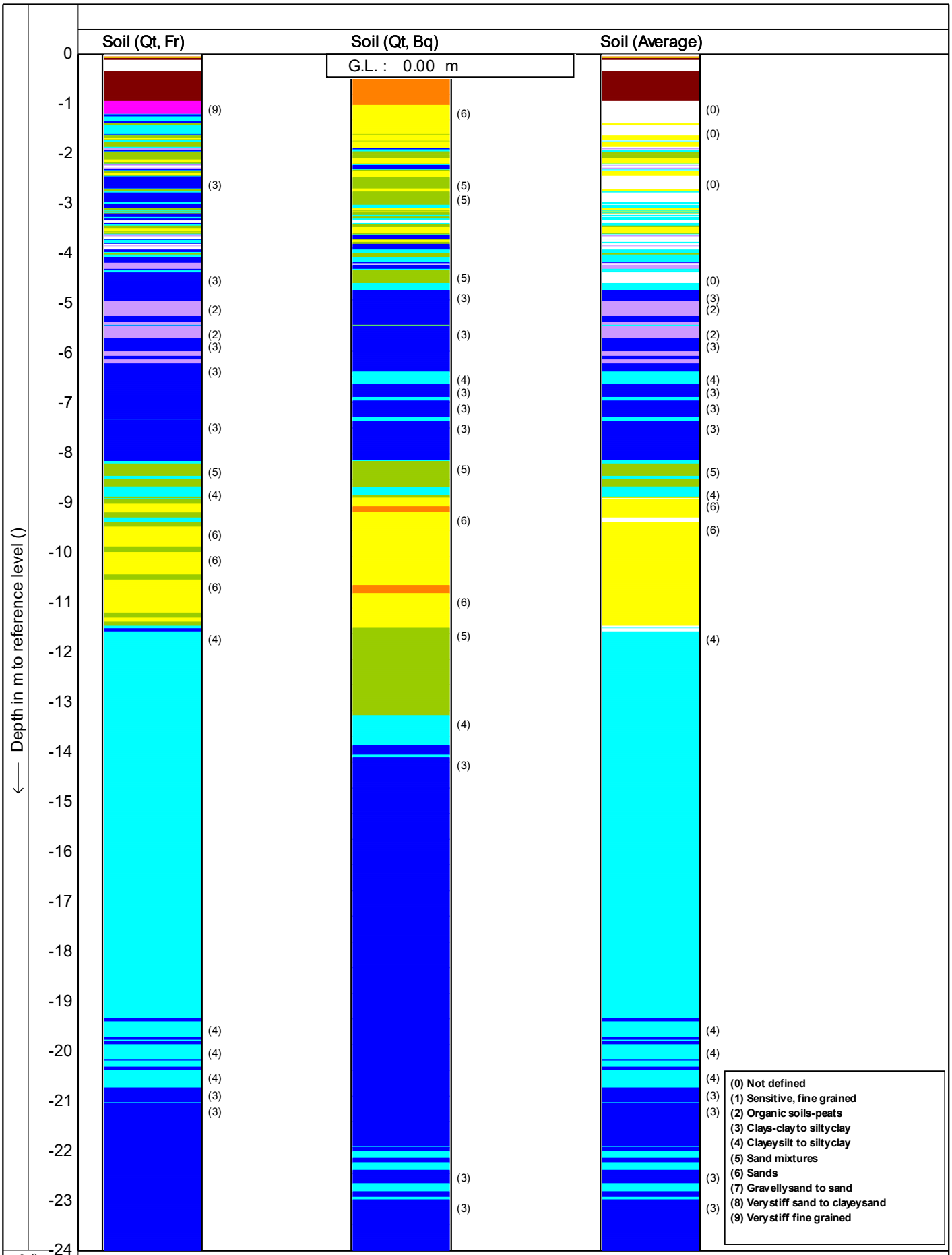
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

**24/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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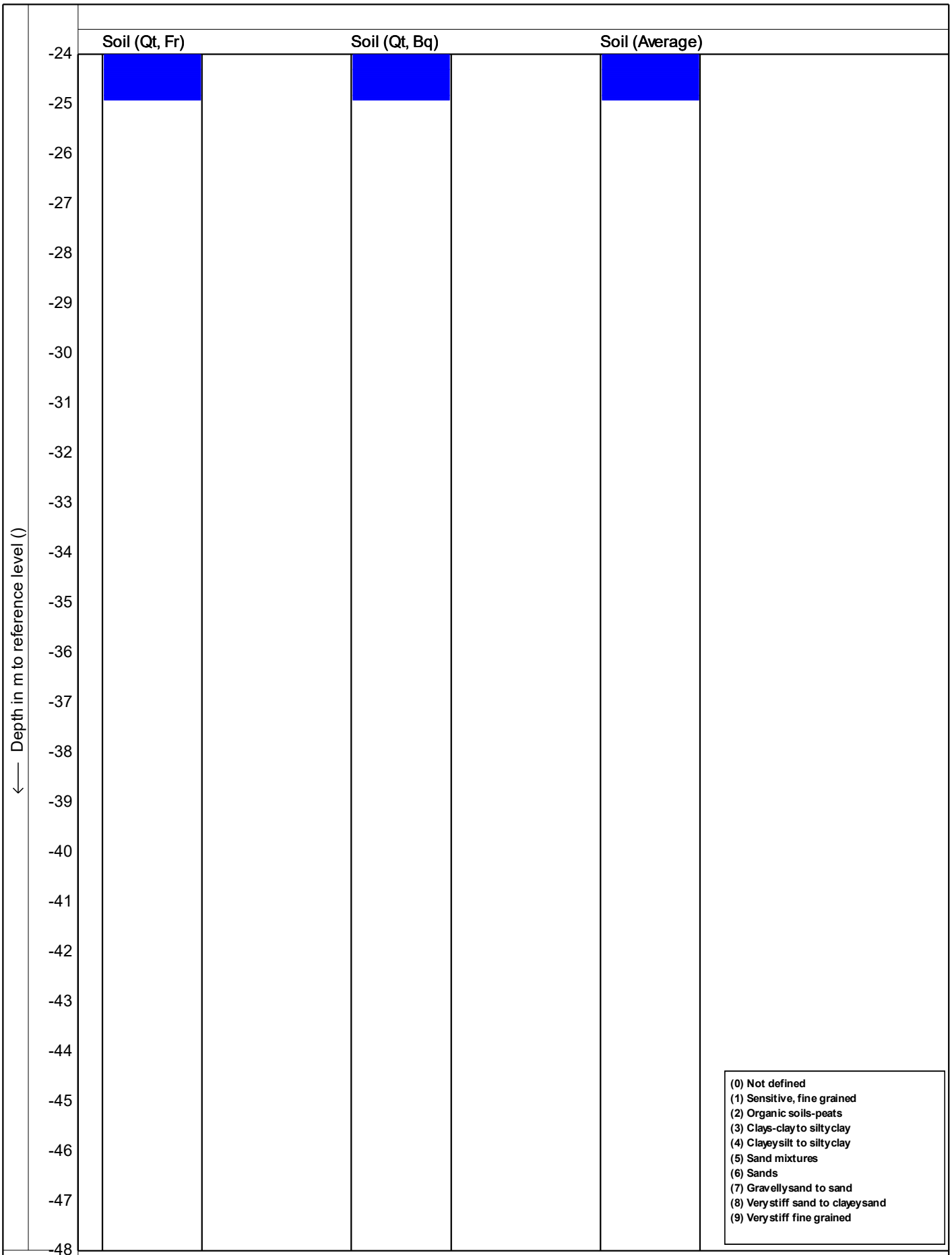
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |



1.48




Soil behaviour type classification after Robertson 1990

PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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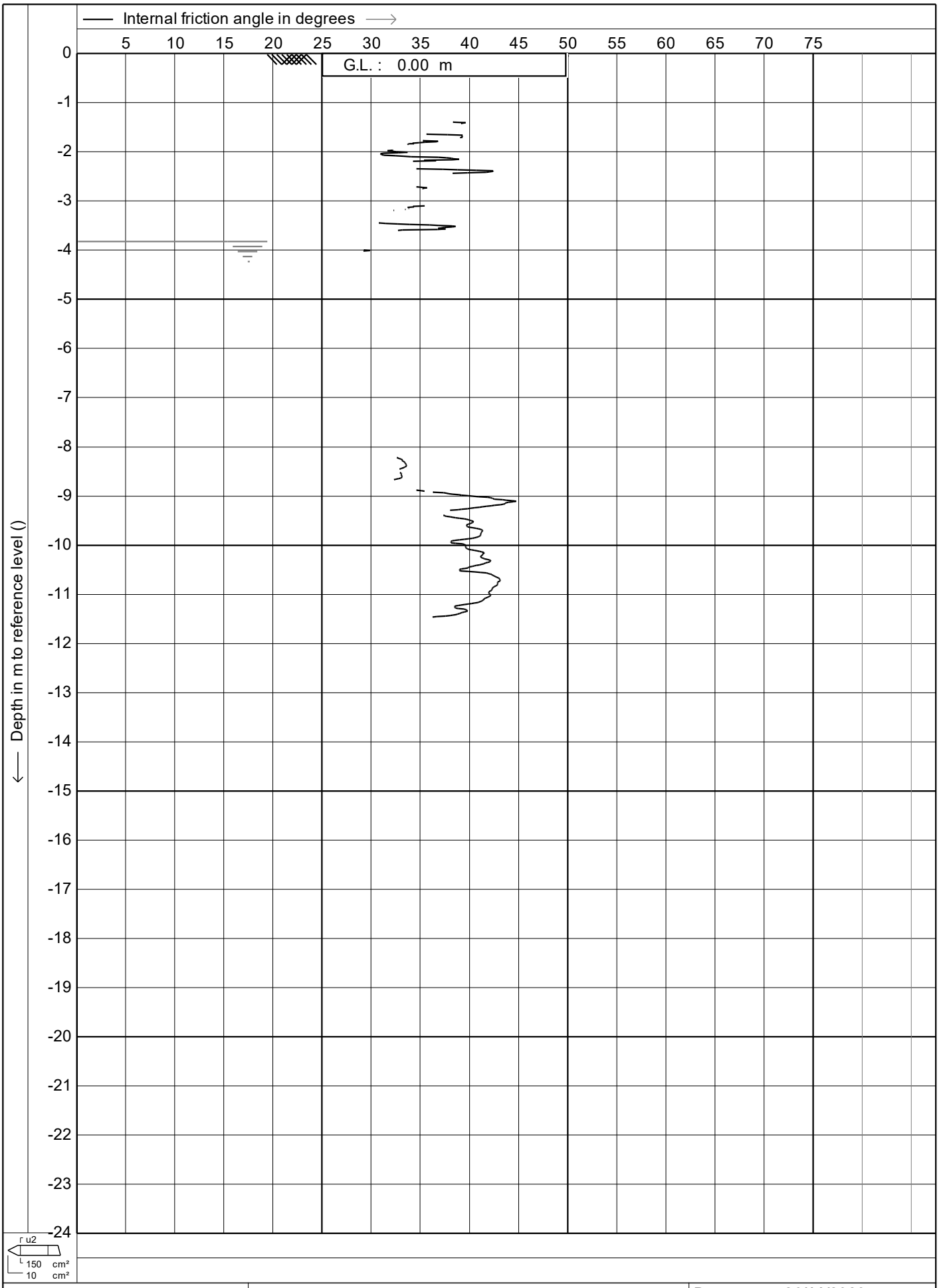
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |



1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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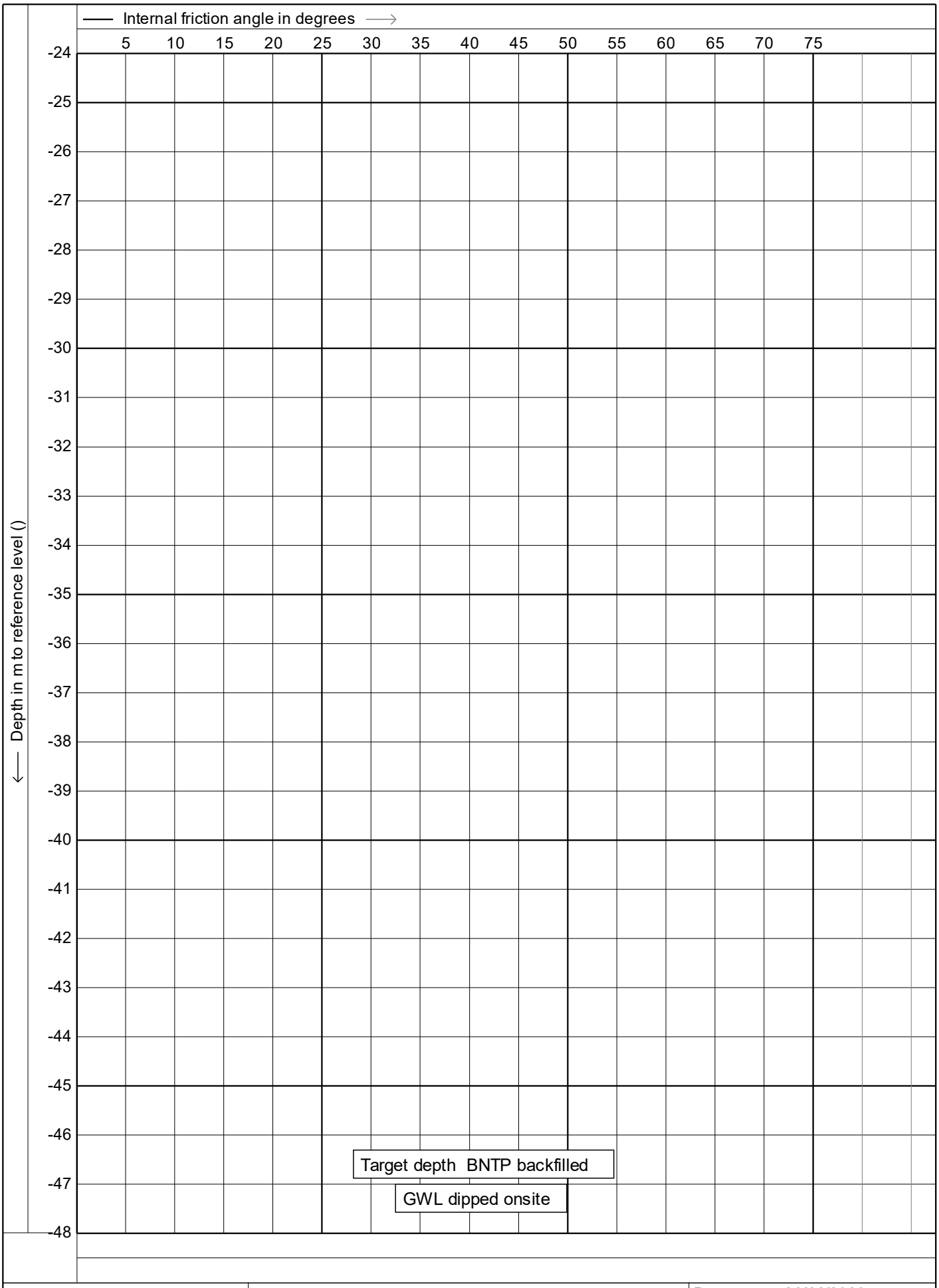
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **048a** |

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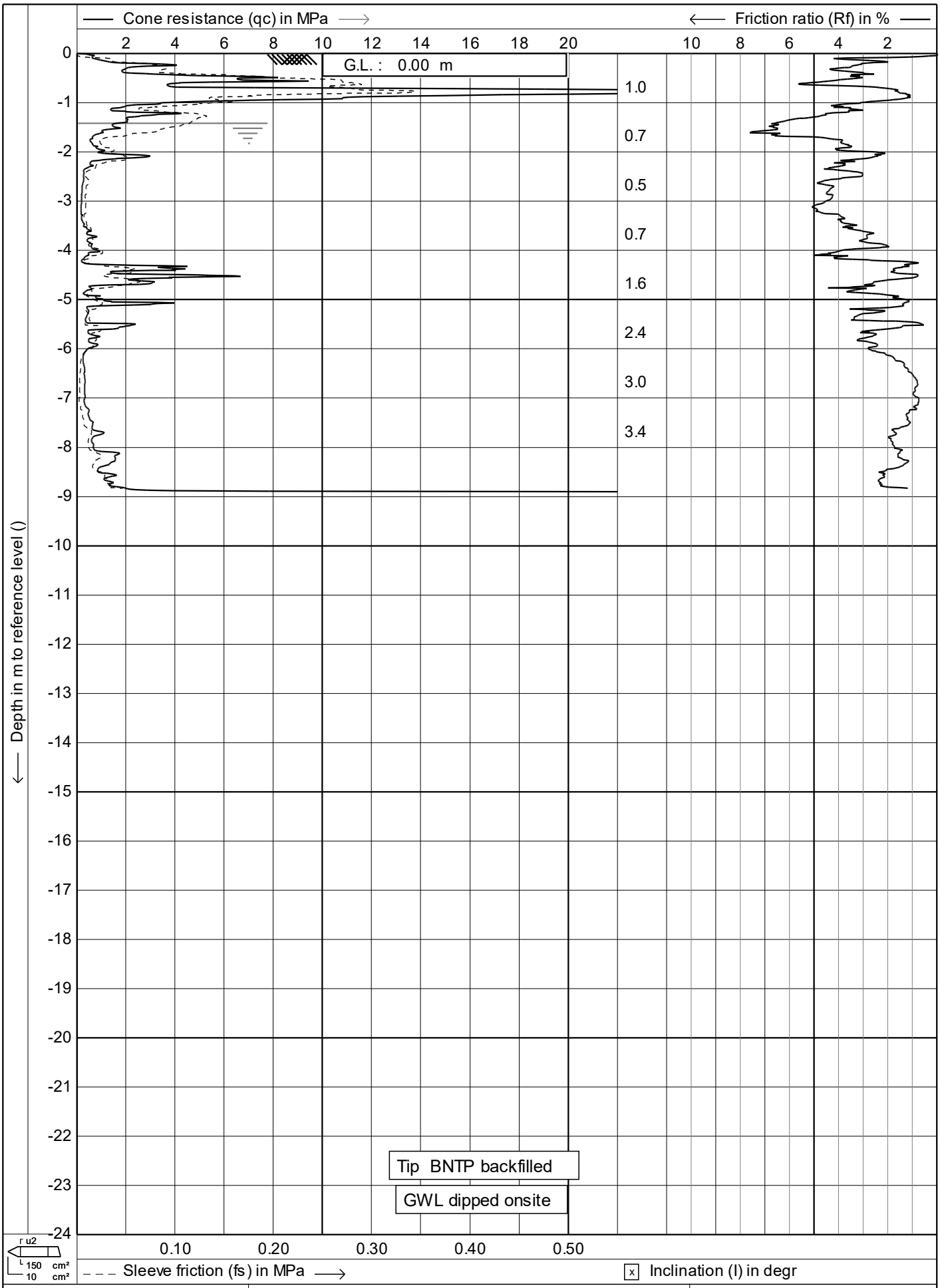
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **26/11/2020**

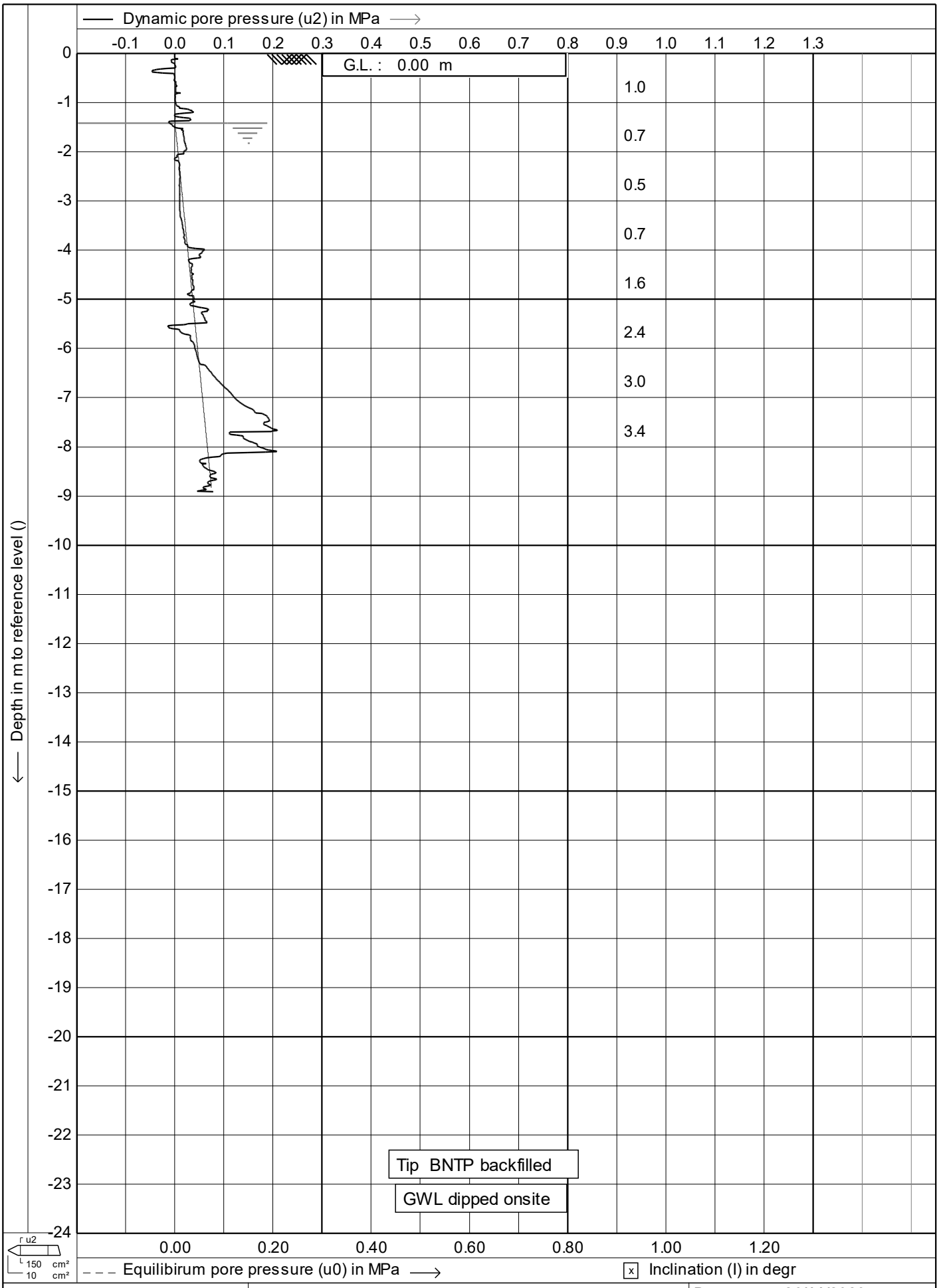
Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **049**

**1/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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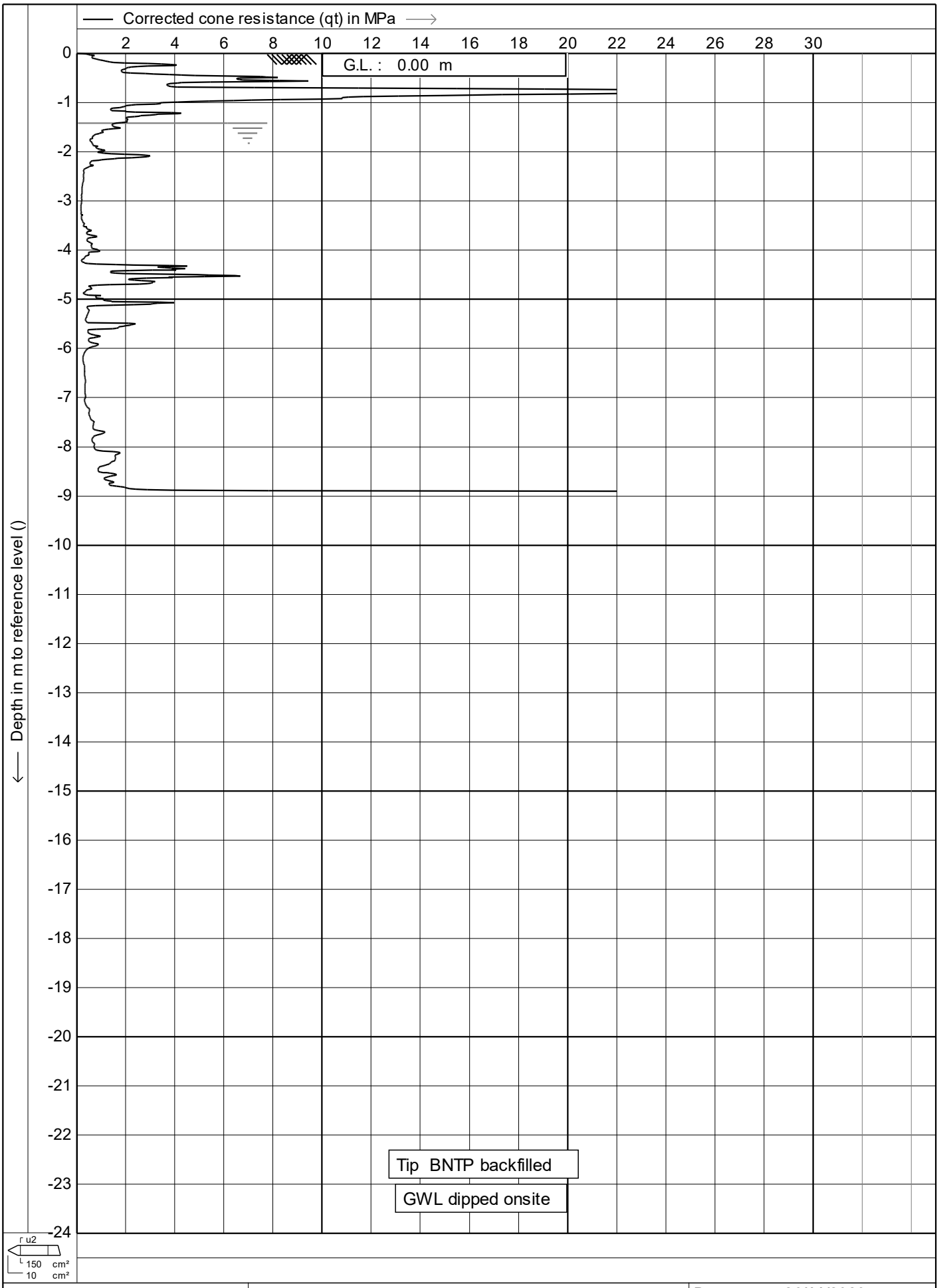
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**2/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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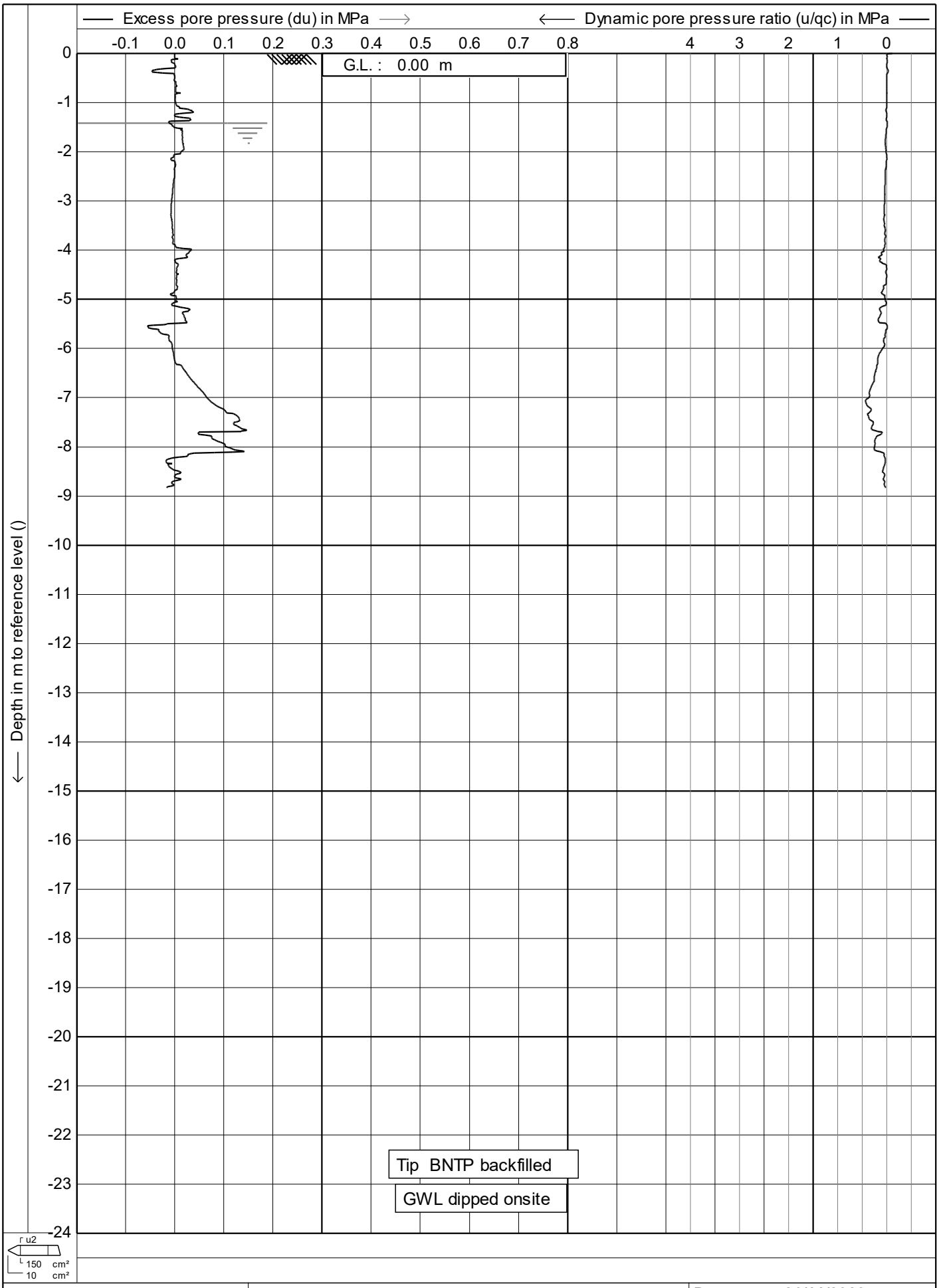
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**3/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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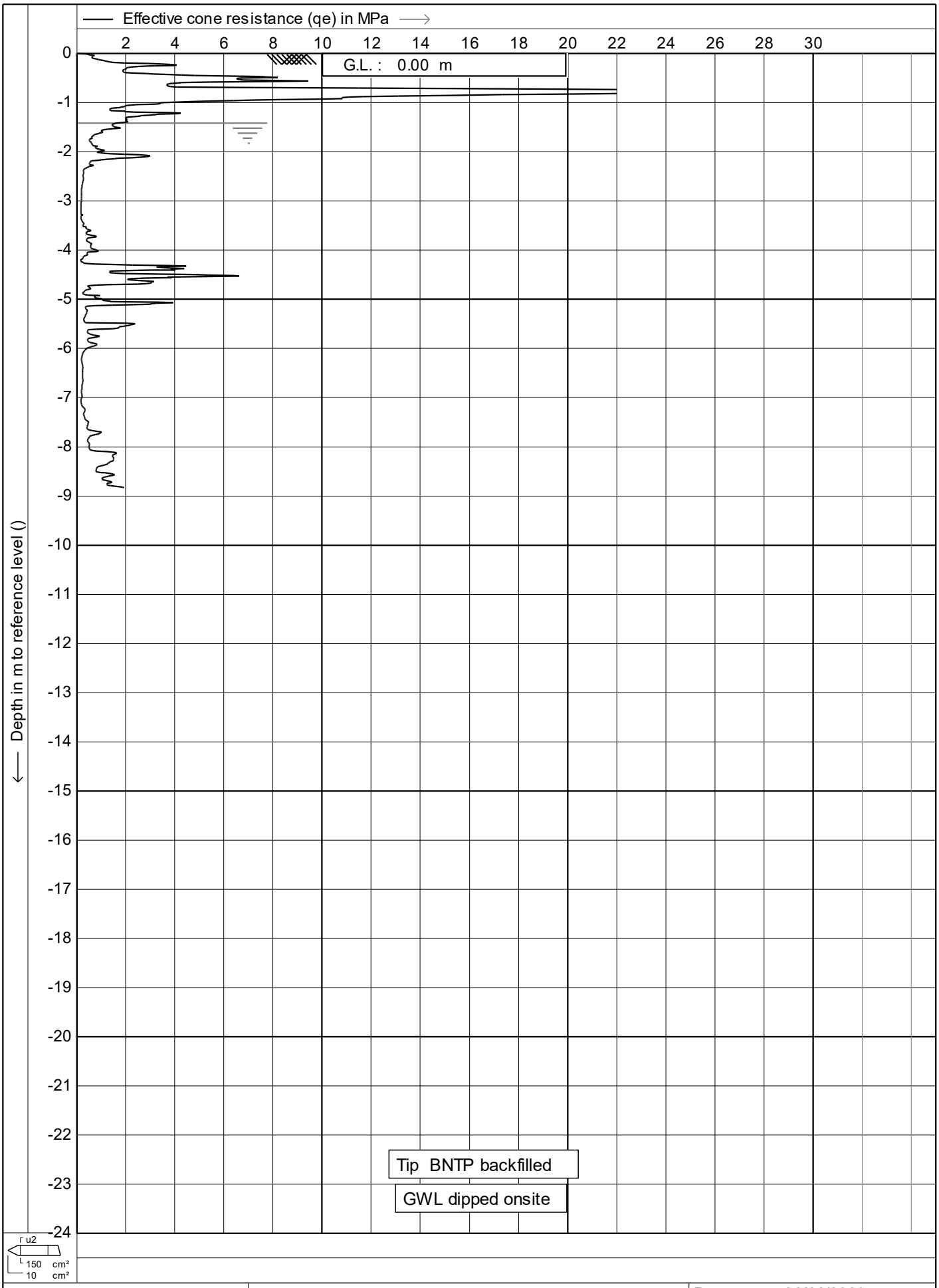
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**4/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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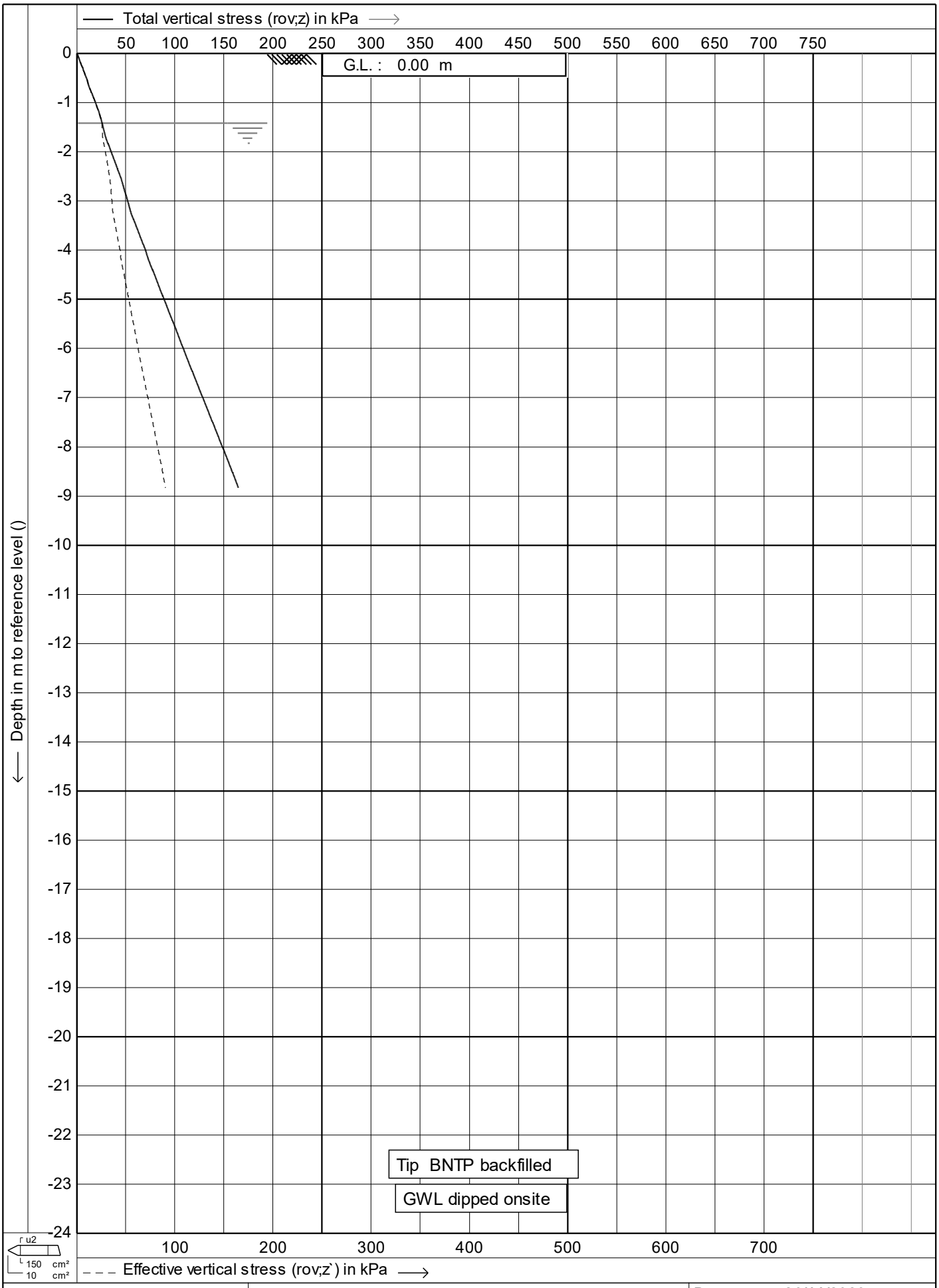
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**5/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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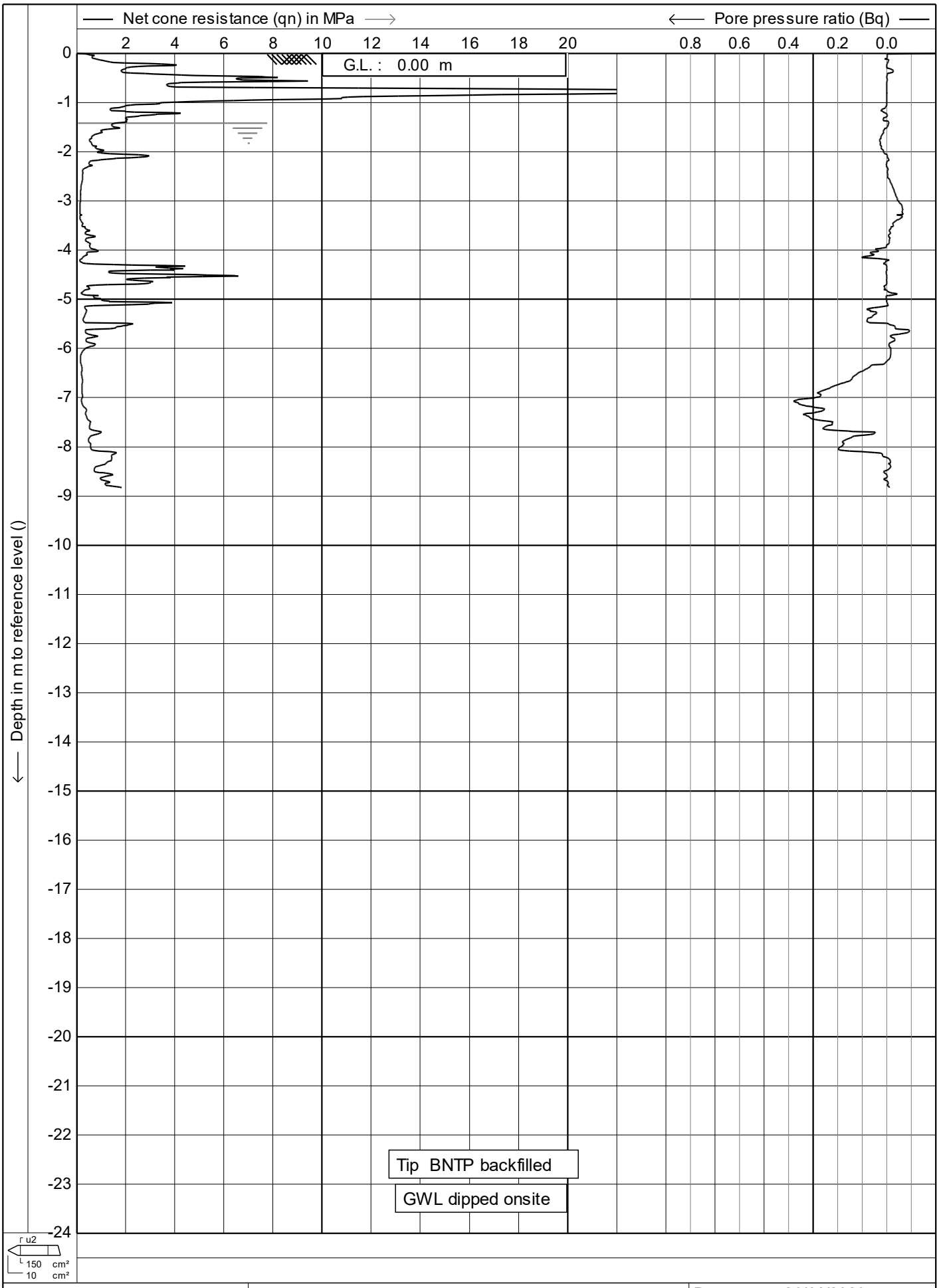
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**6/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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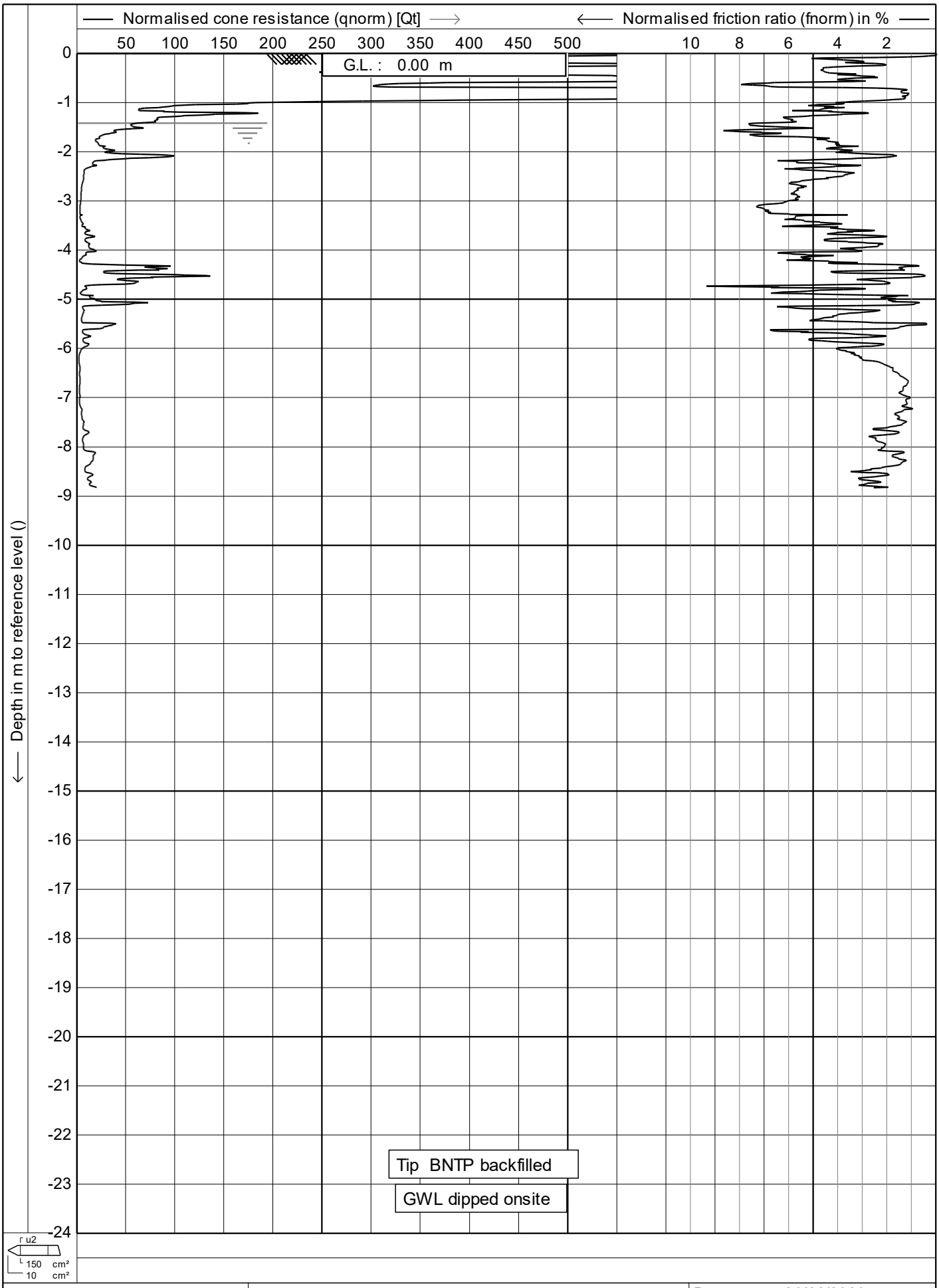
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**7/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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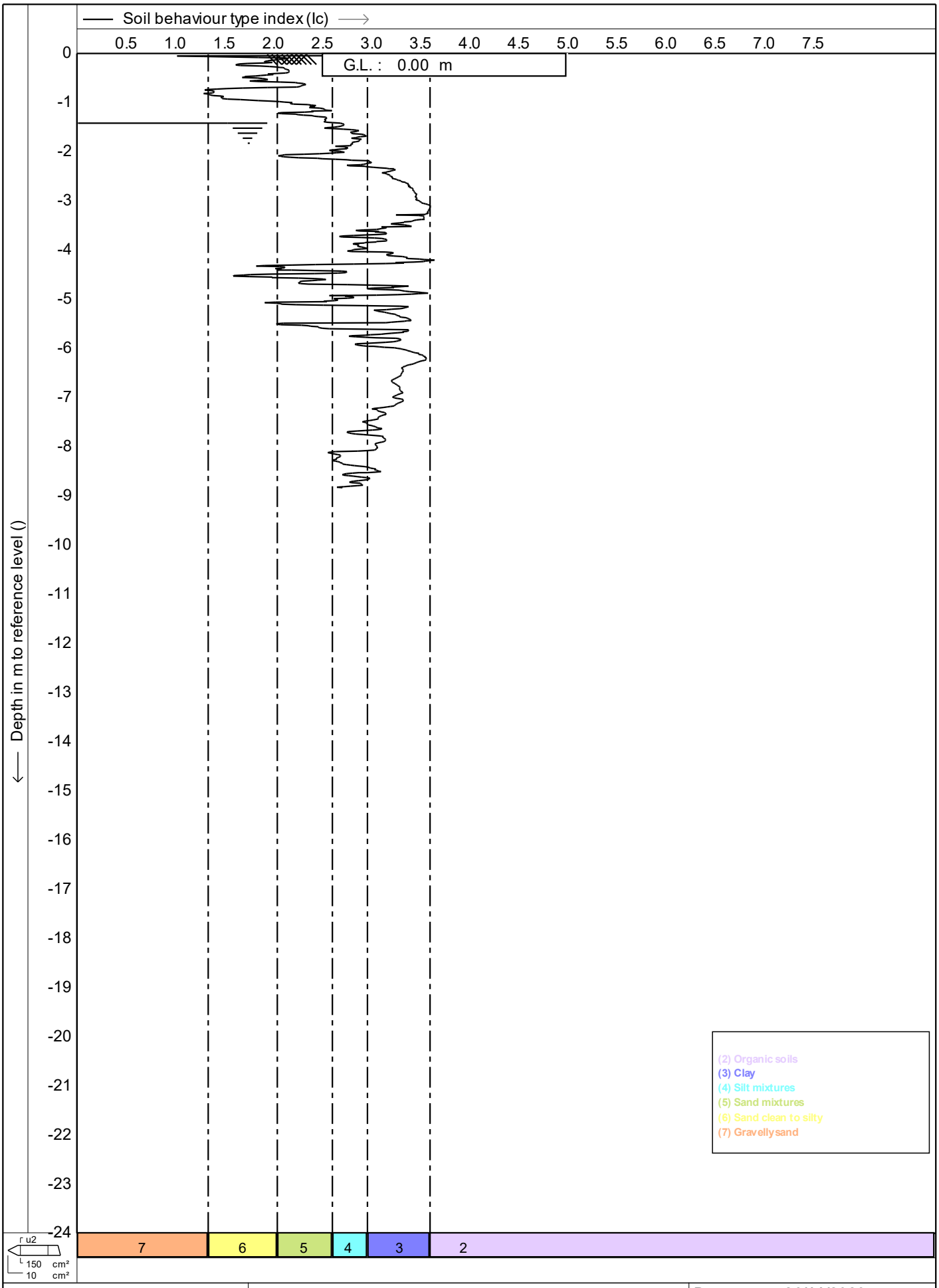
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**8/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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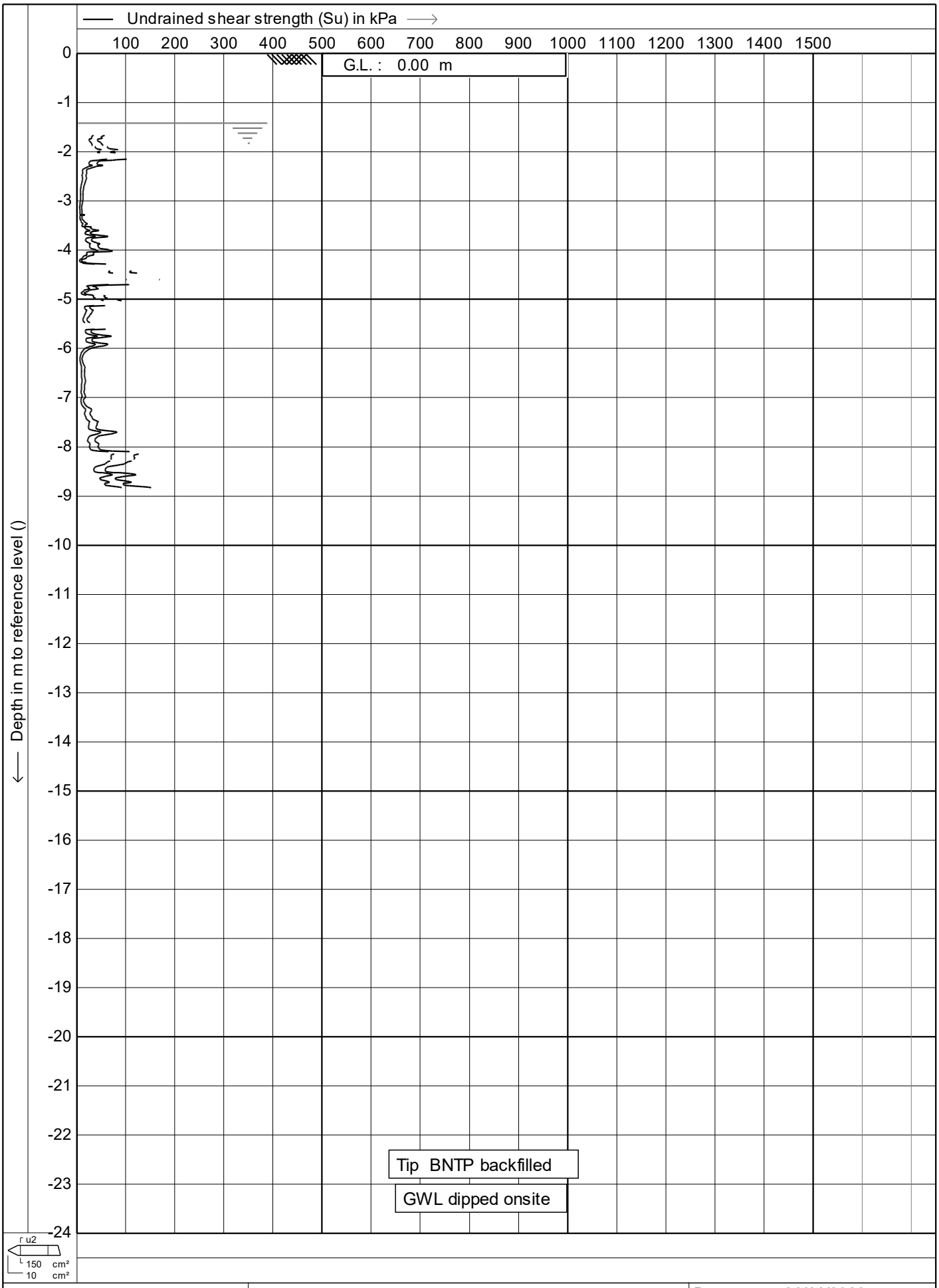
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**9/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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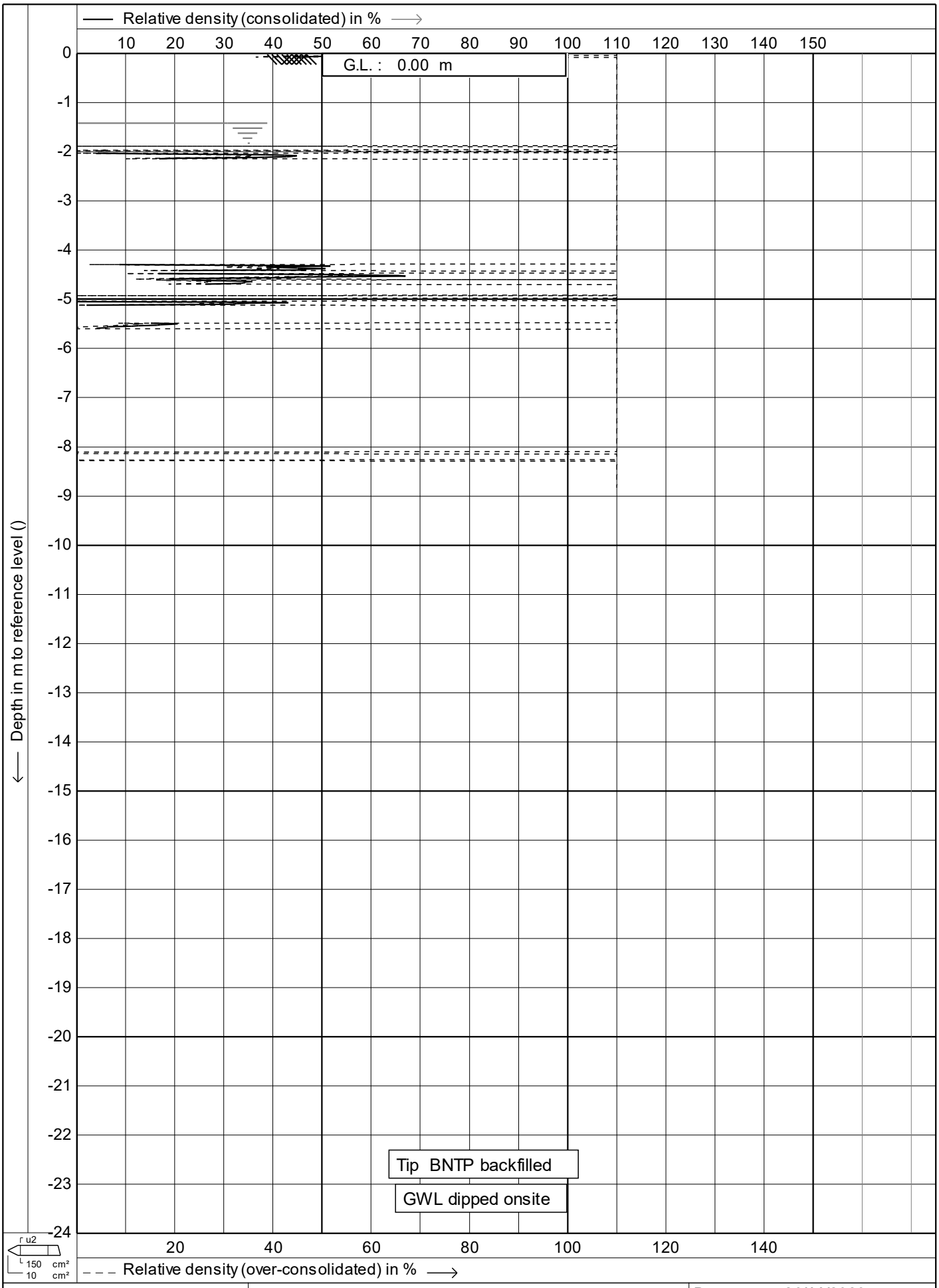
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**10/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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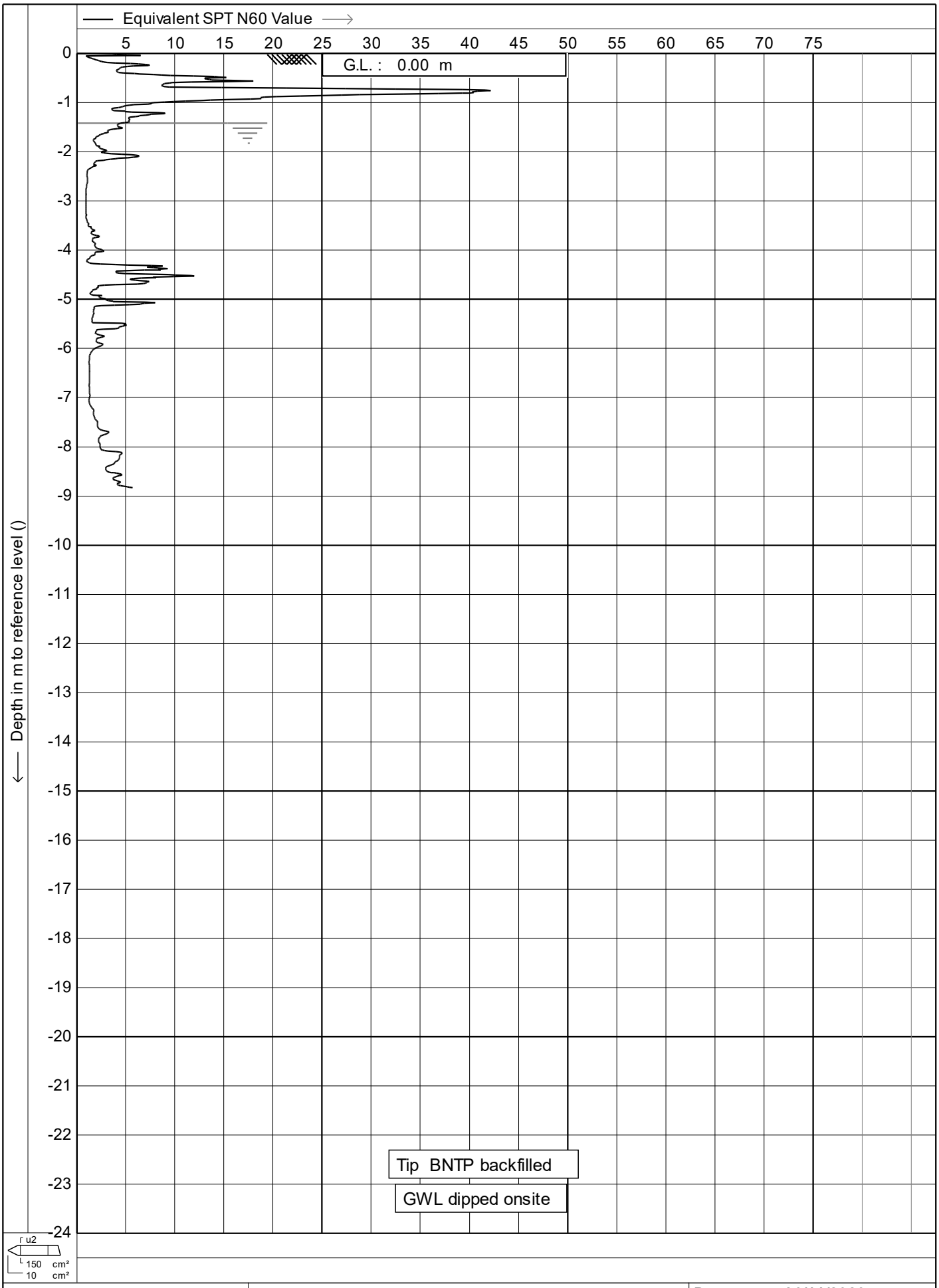
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**11/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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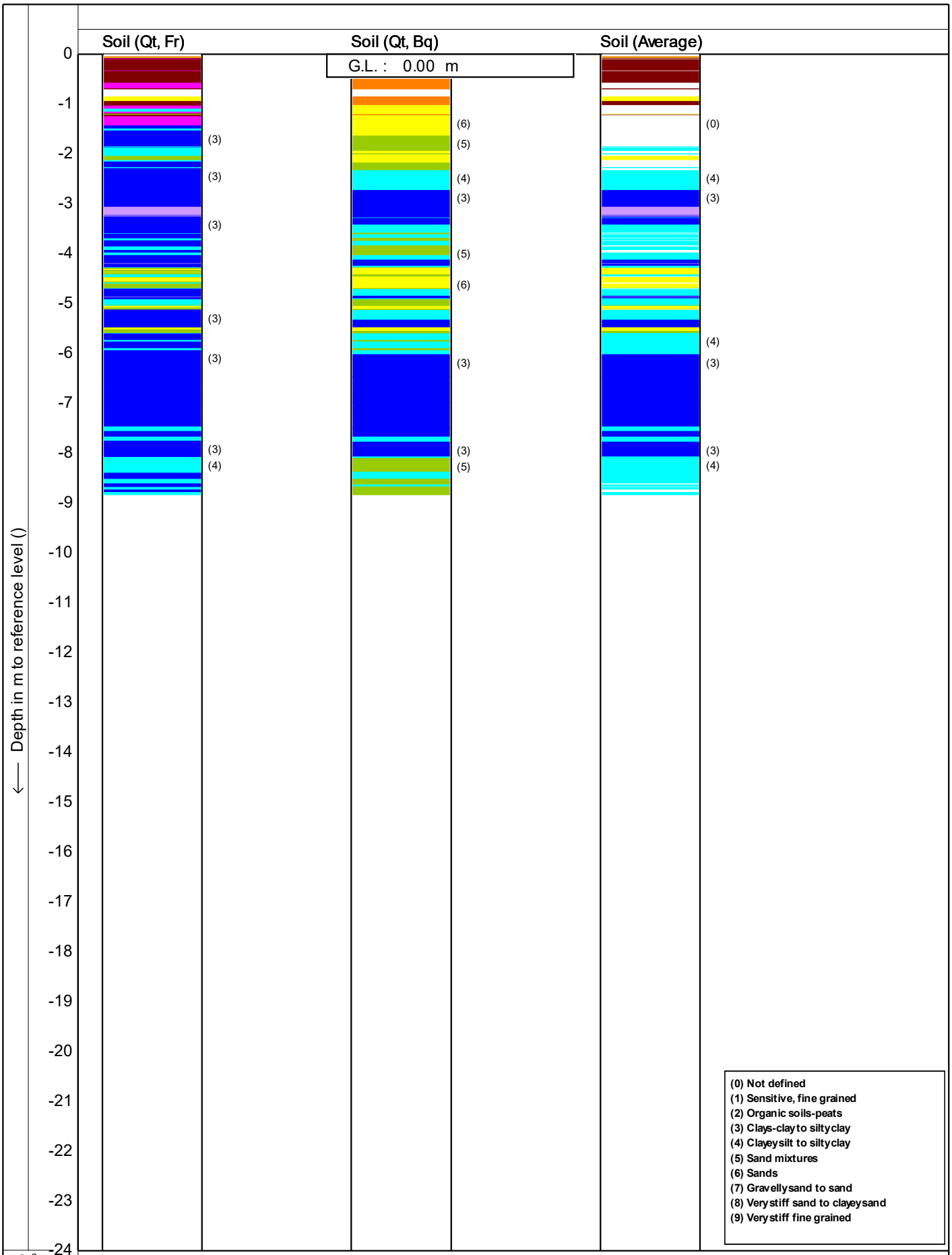
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**12/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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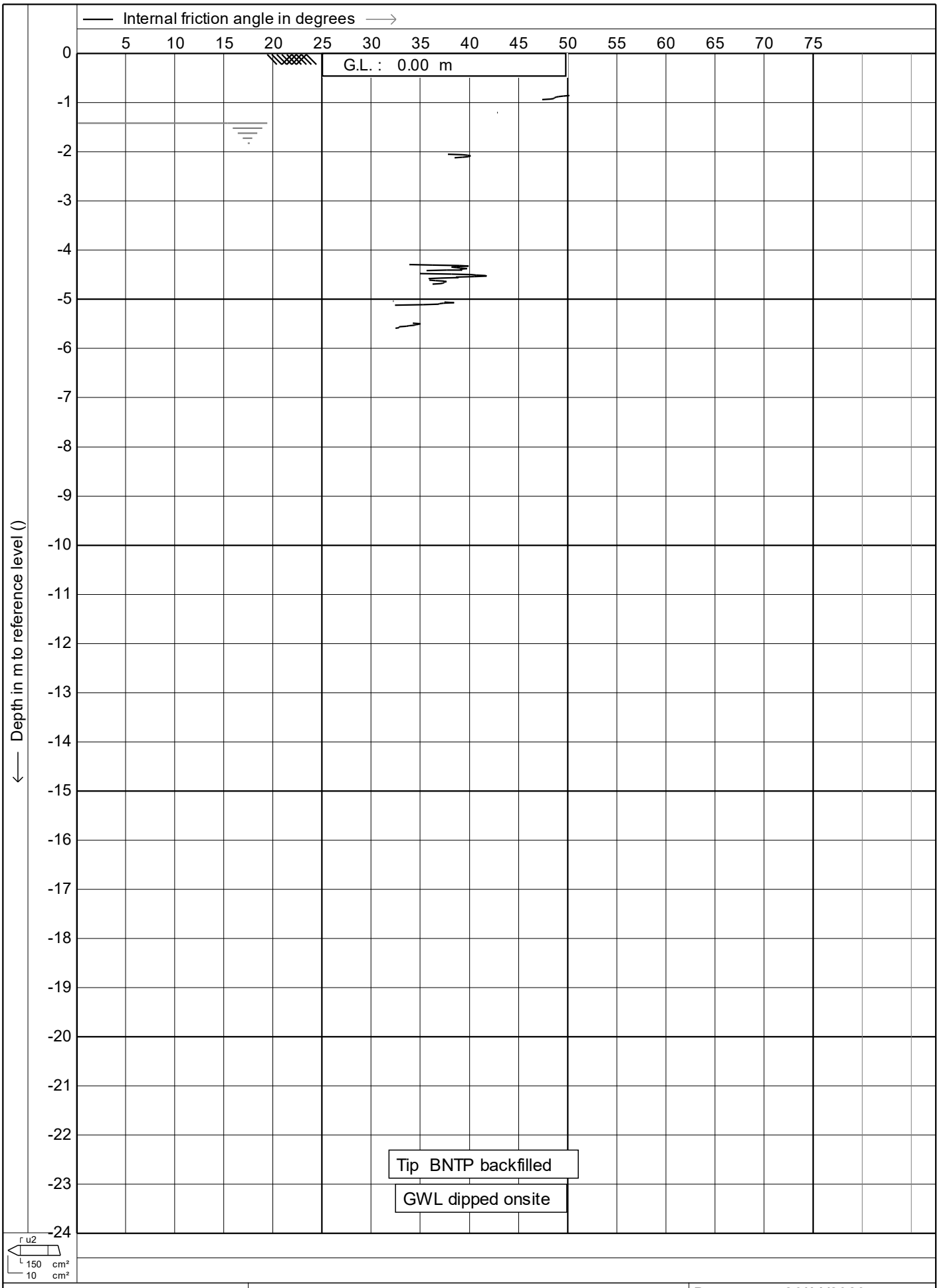
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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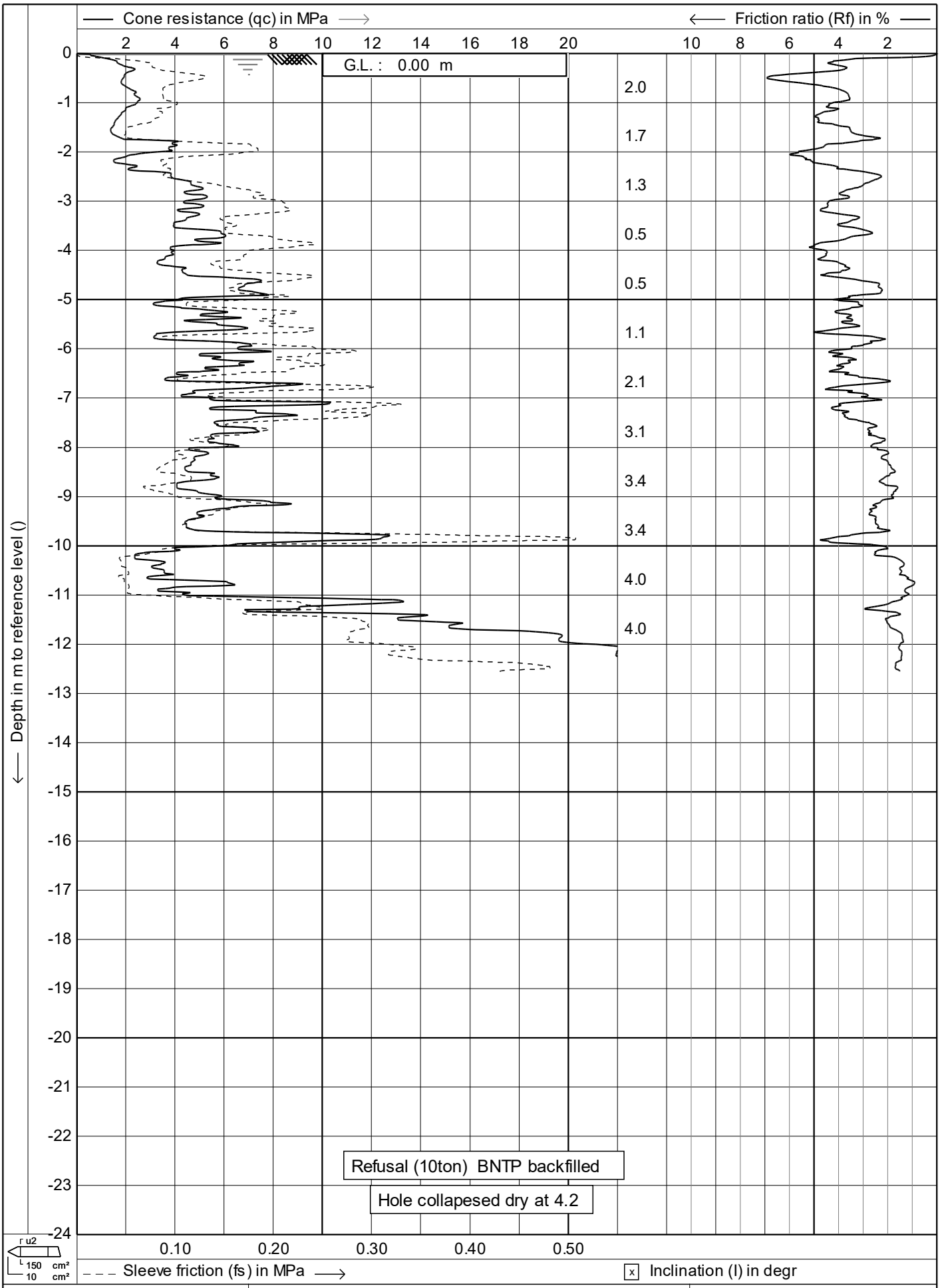
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **049** |

**14/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **26/11/2020**

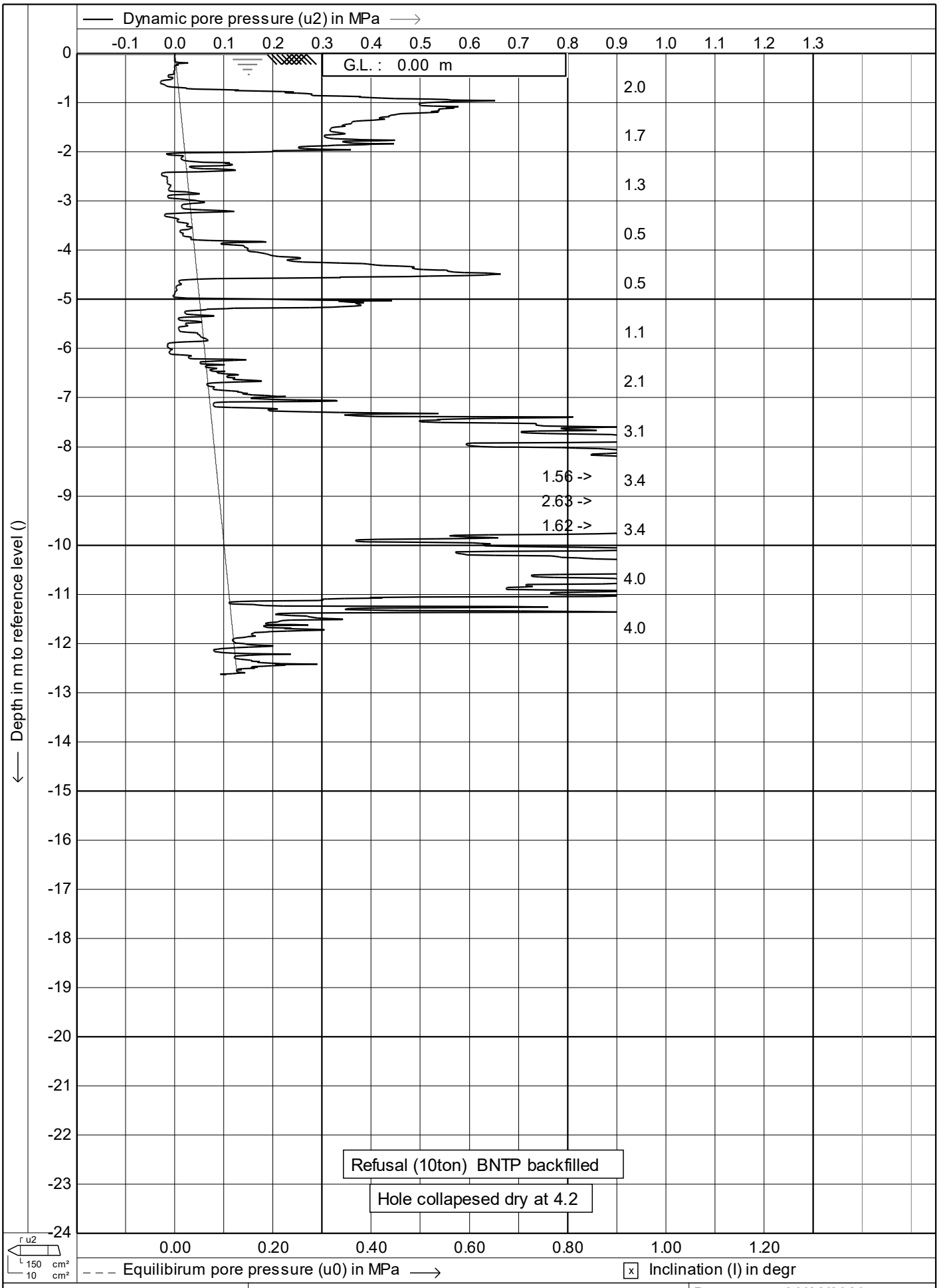
Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **050**

**1/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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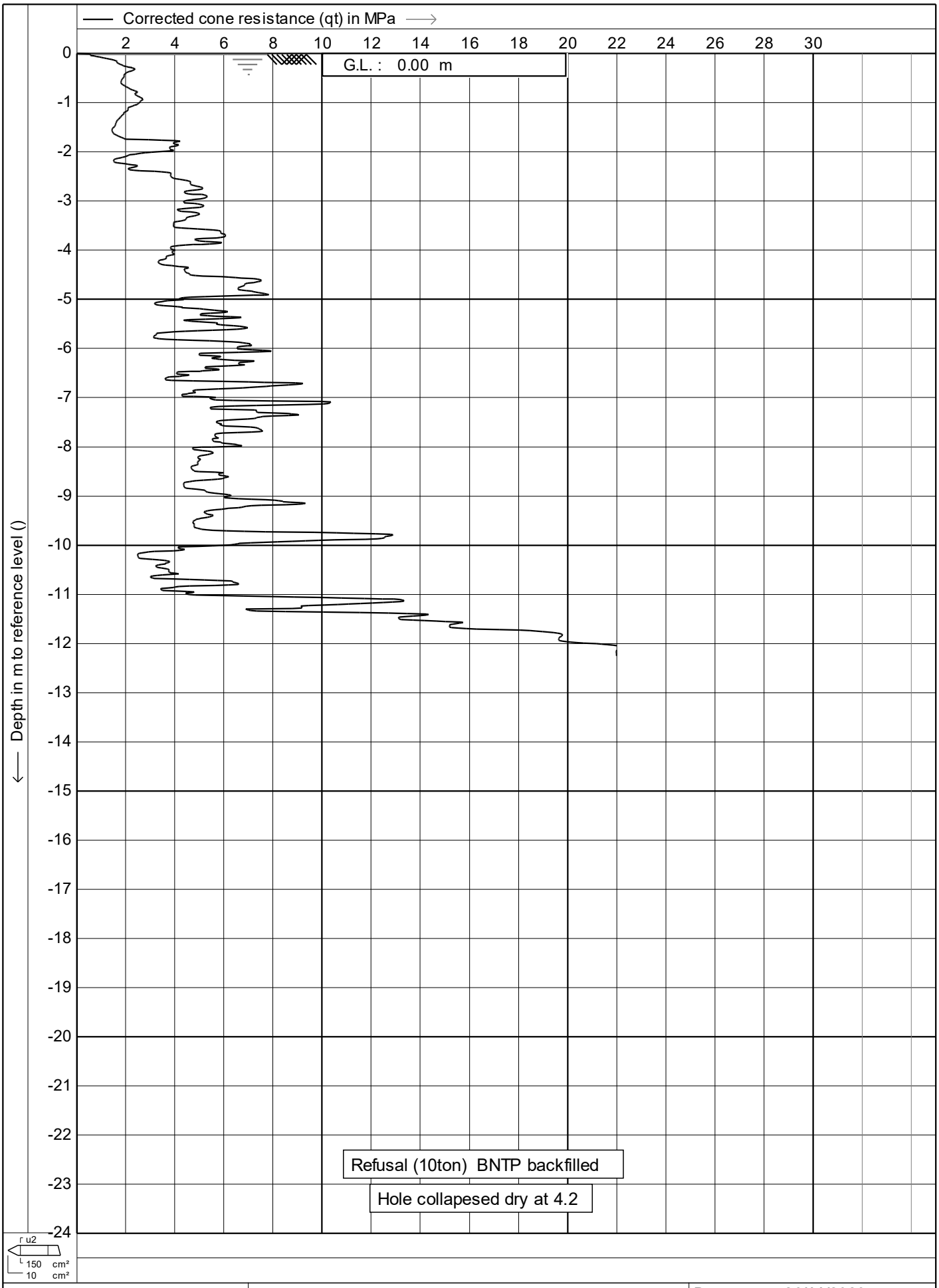
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **050** |

**2/14**

1.48

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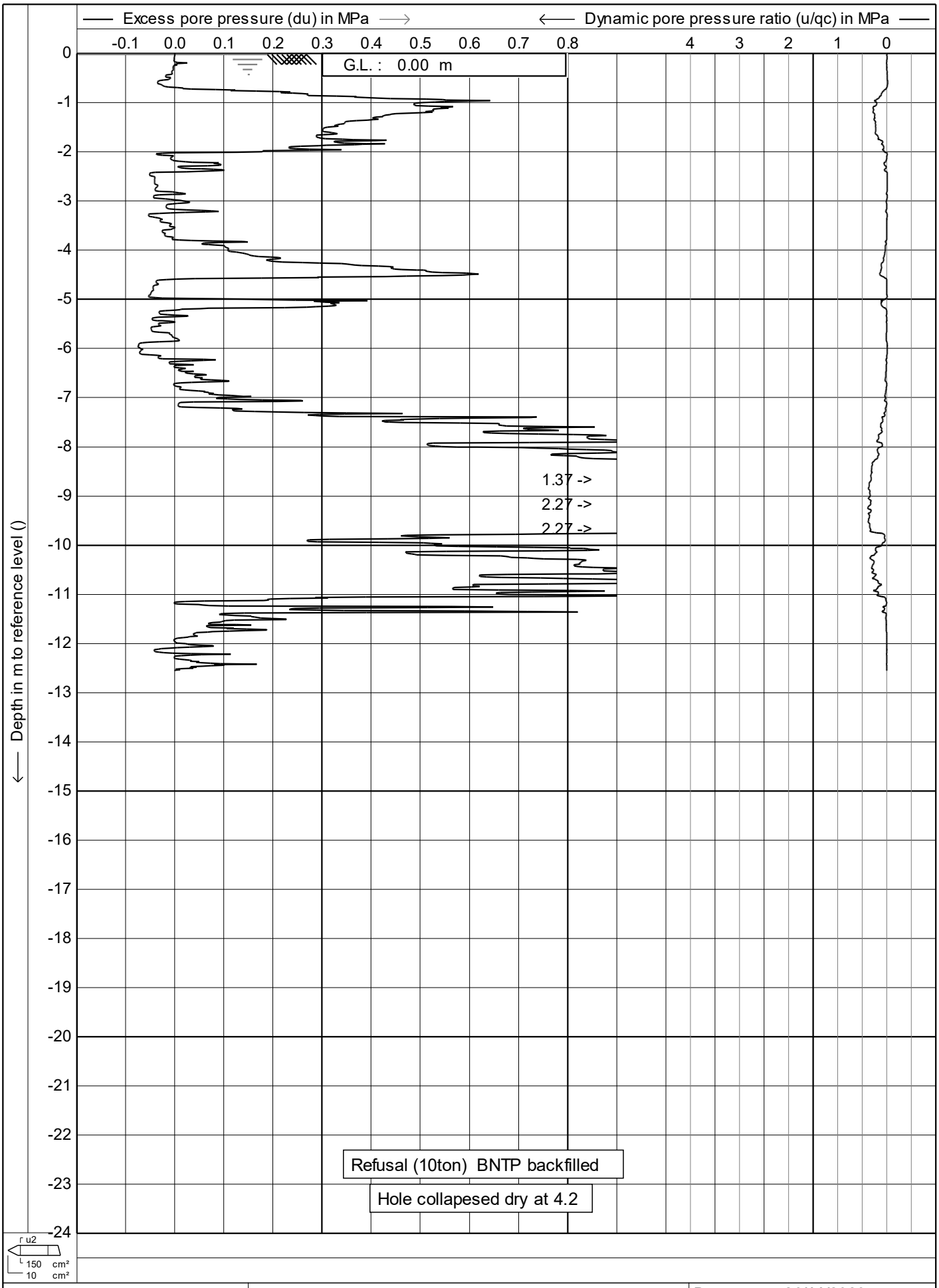
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **050** — **3/14** |

1.48

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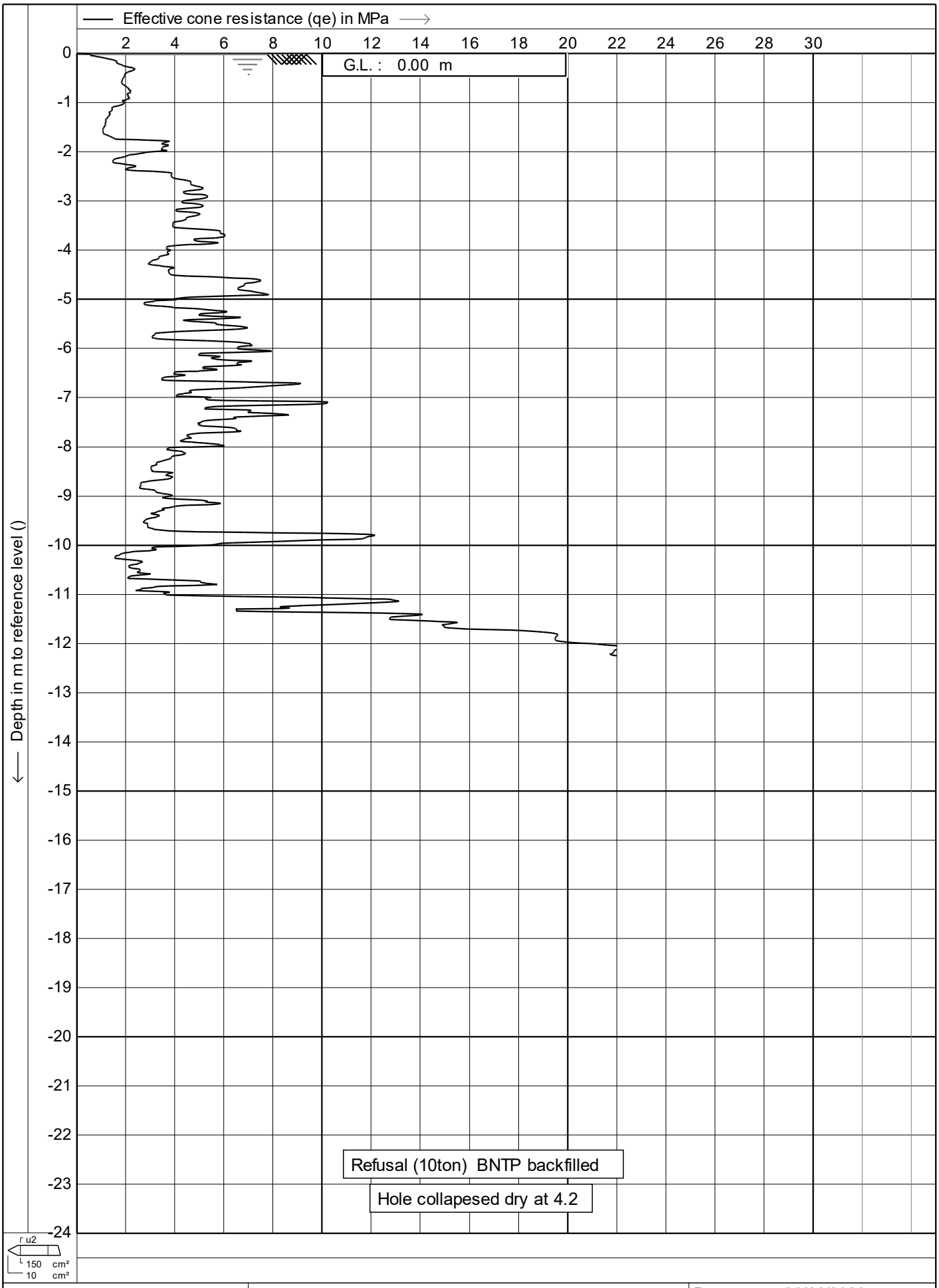
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **050** 4/14 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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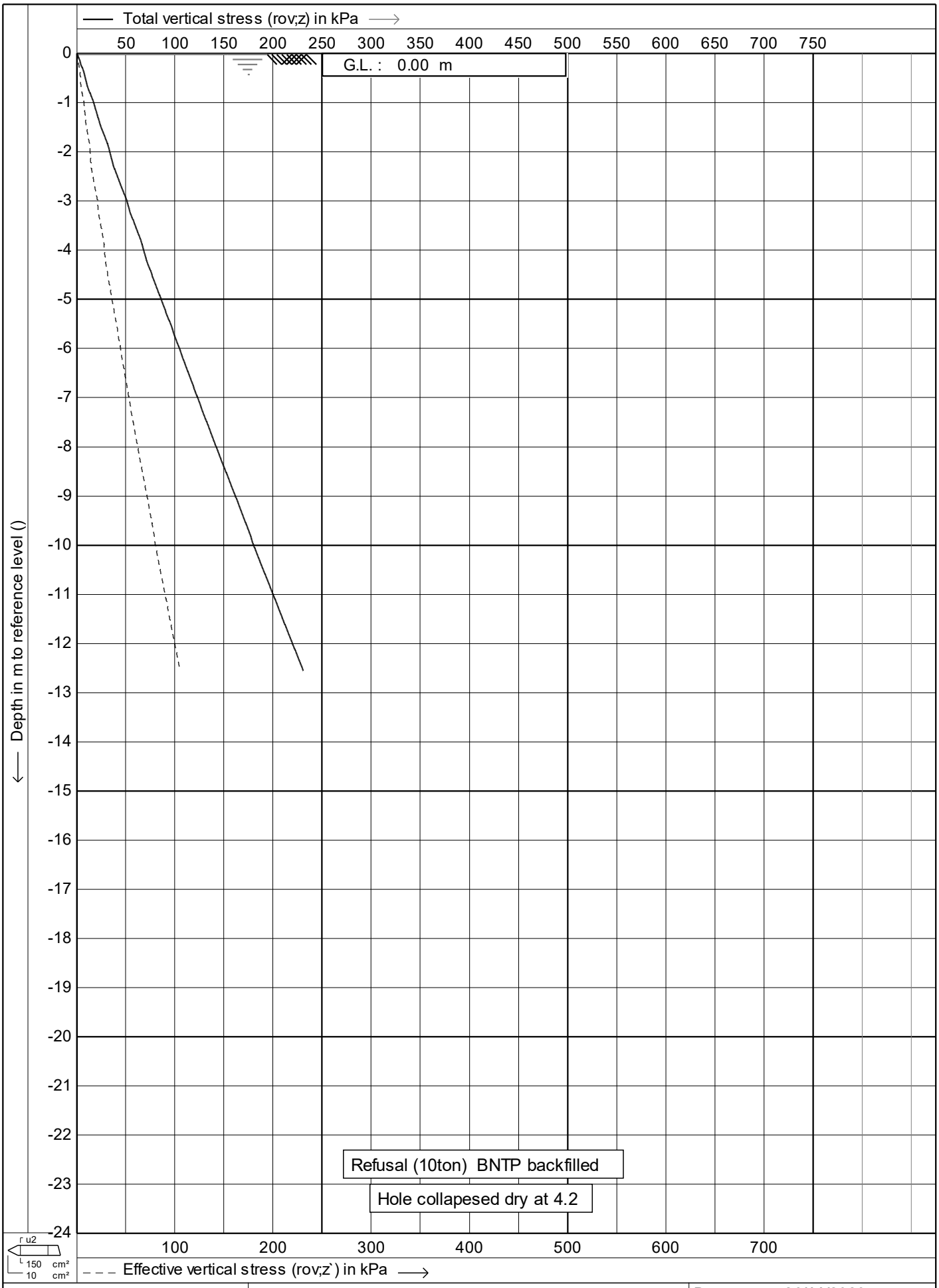
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **050** |

**5/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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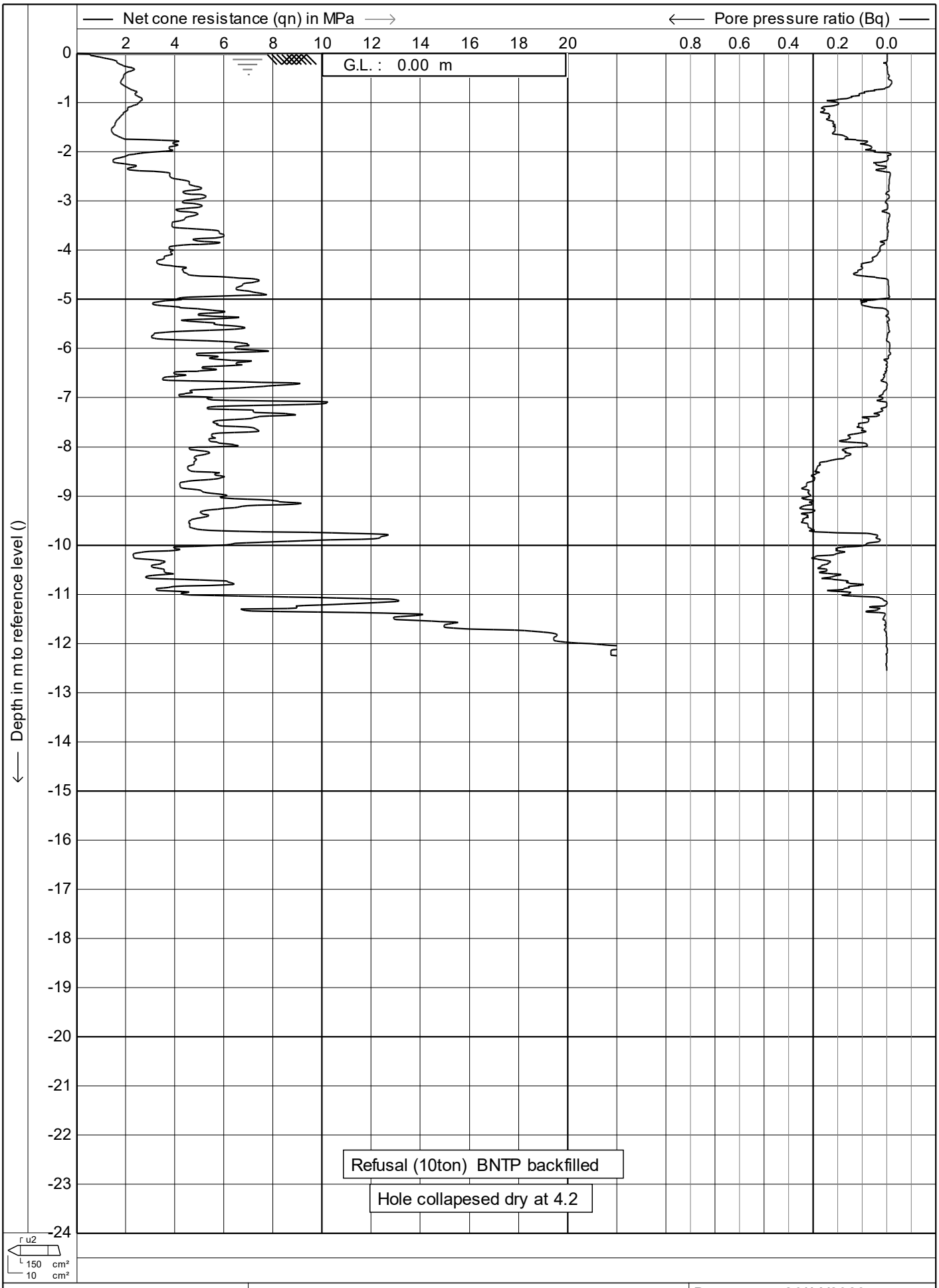
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **050** |

**6/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

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| Date | : **26/11/2020** |
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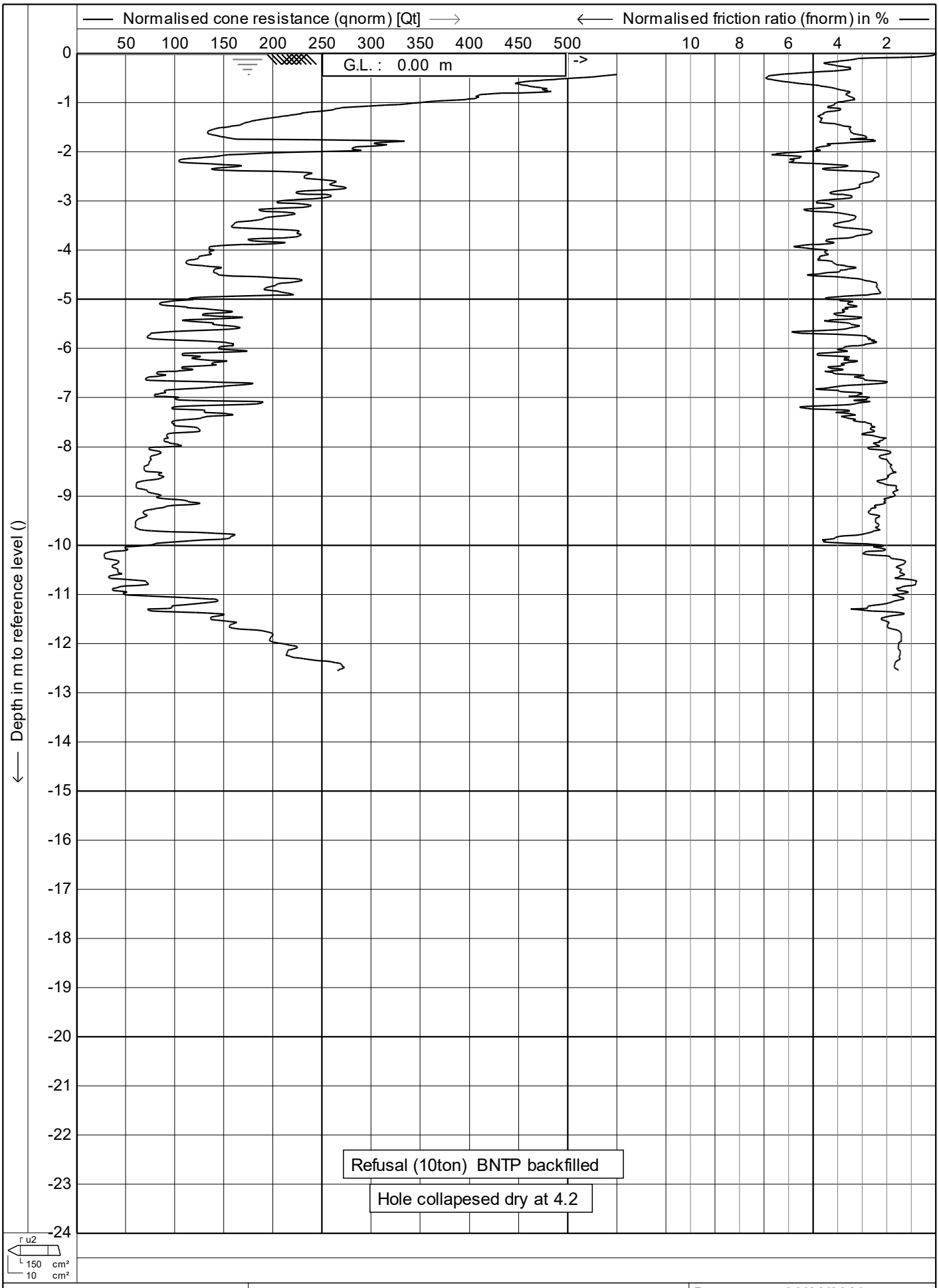
| Project no. | : **05AU7** |
| CPT no. | : **050** |

**7/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

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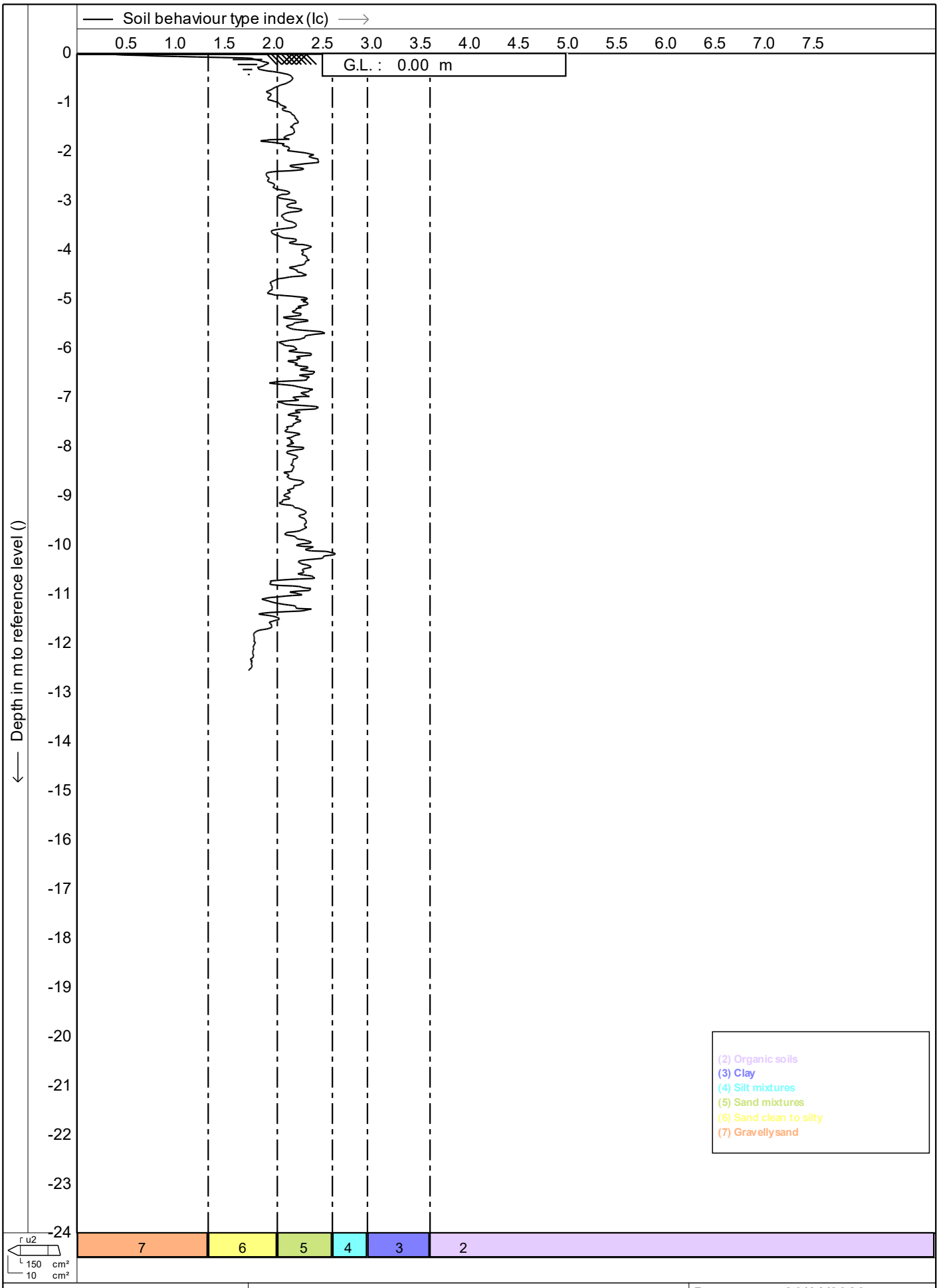
| Project no. | : **05AU7** |
| CPT no. | : **050** |

**8/14**

1.48




PERRY GEOTECH

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Project : **Site Investigations**

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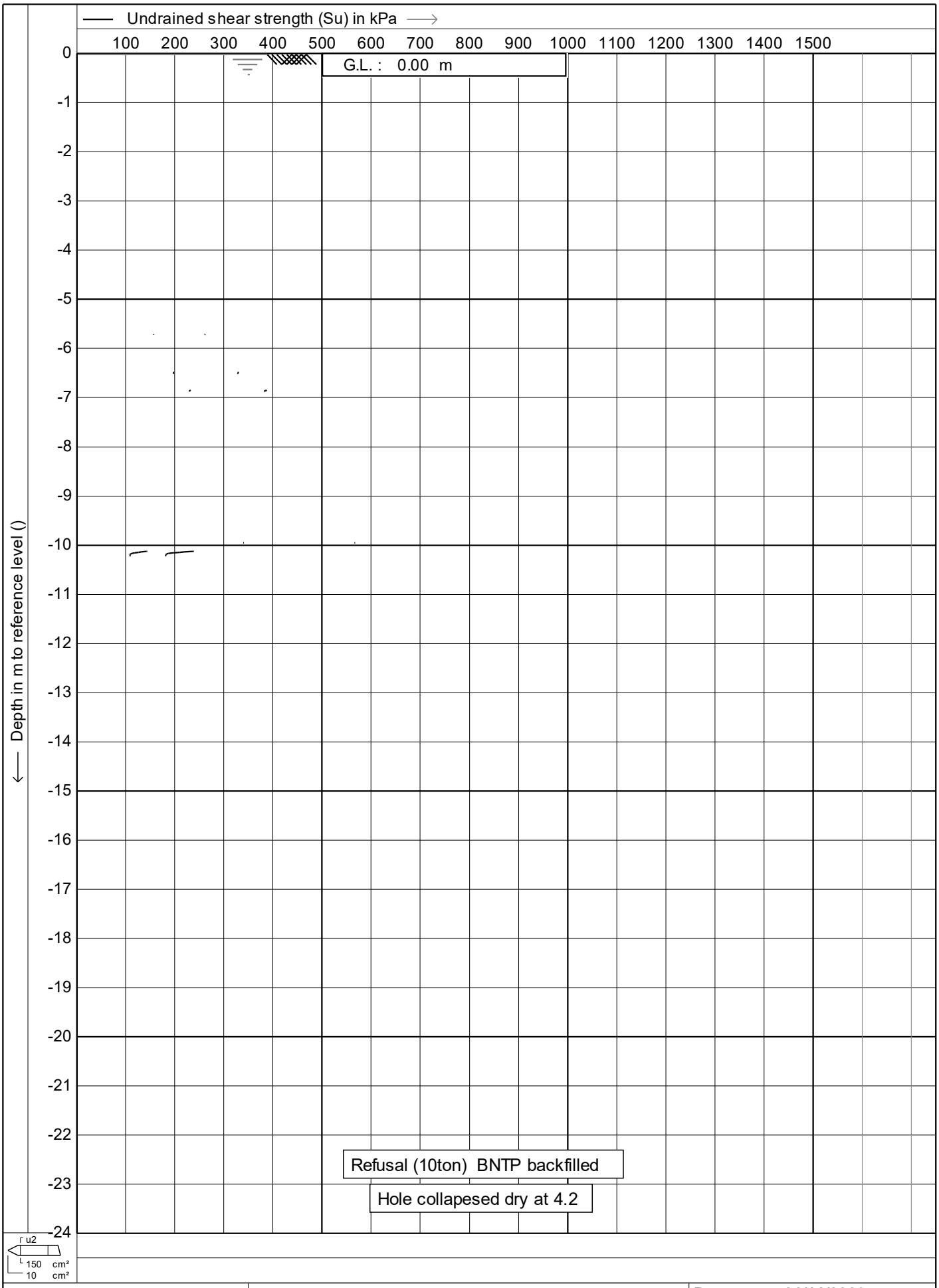
**9/14**

1.48

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Location: **Fitzgerald Rd - Drury**

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| Date | : **26/11/2020** |
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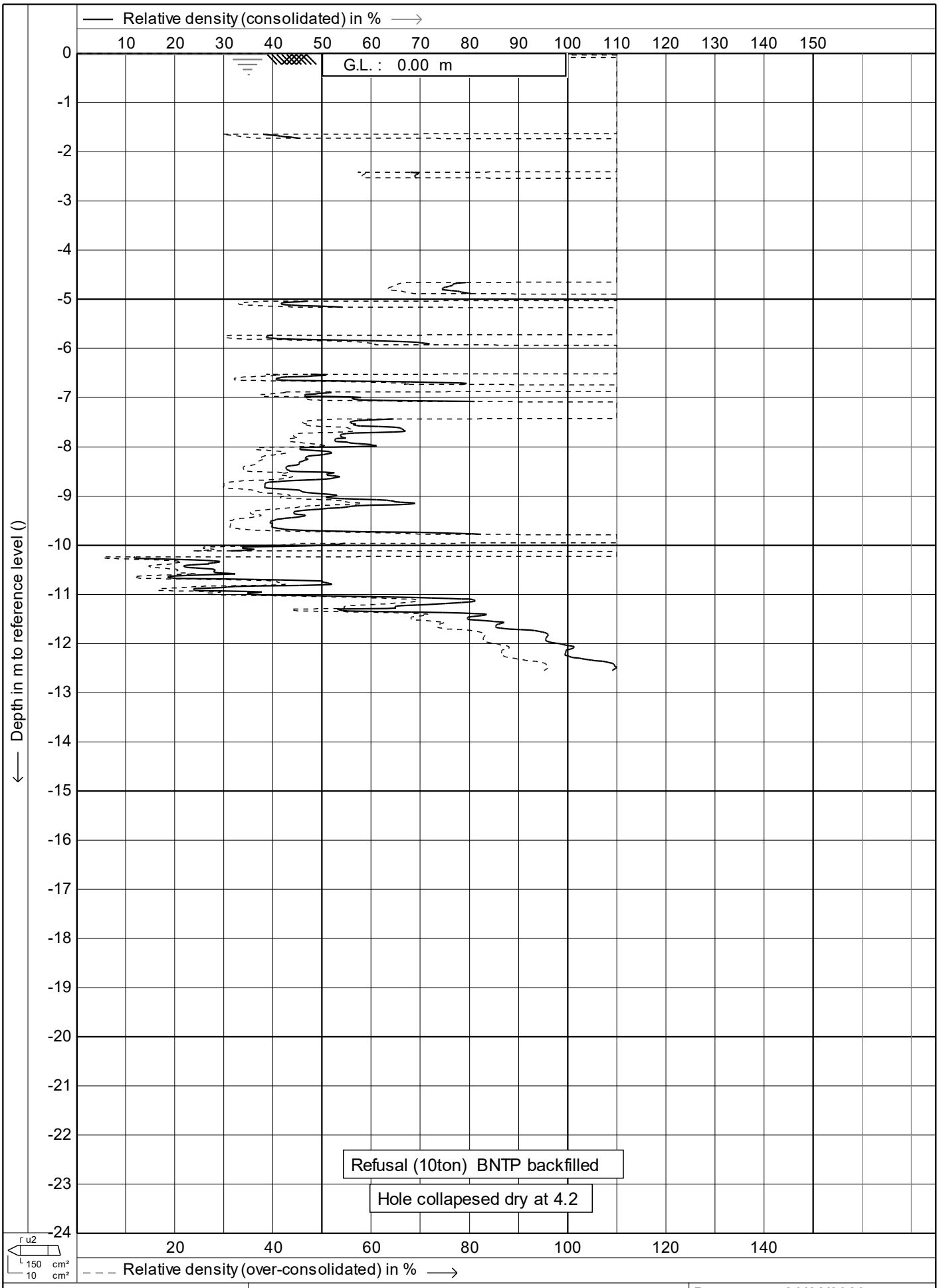
**10/14**

1.48




PERRY GEOTECH

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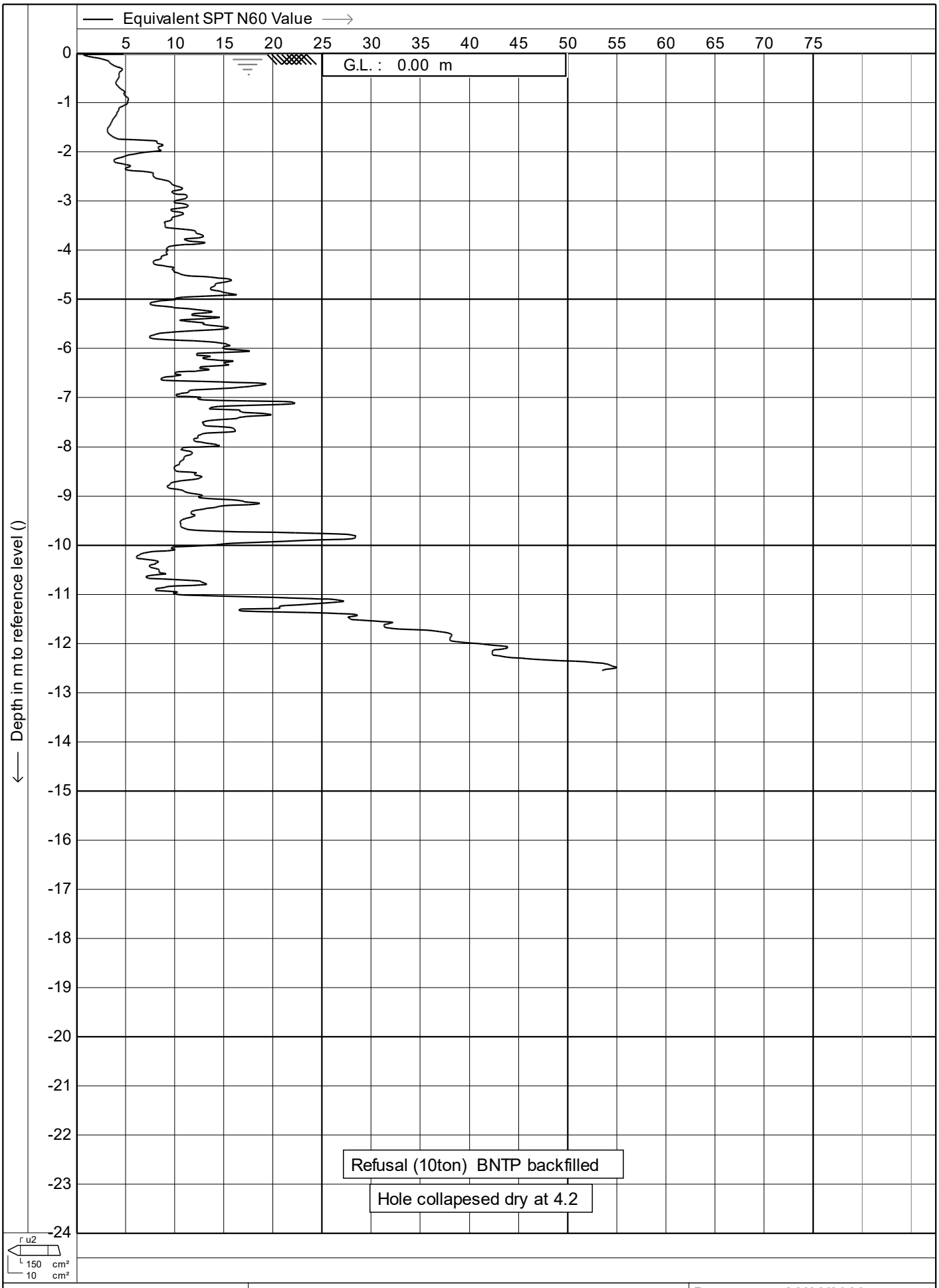
**11/14**

1.48




PERRY GEOTECH

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Project : **Site Investigations**

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| Date | : **26/11/2020** |
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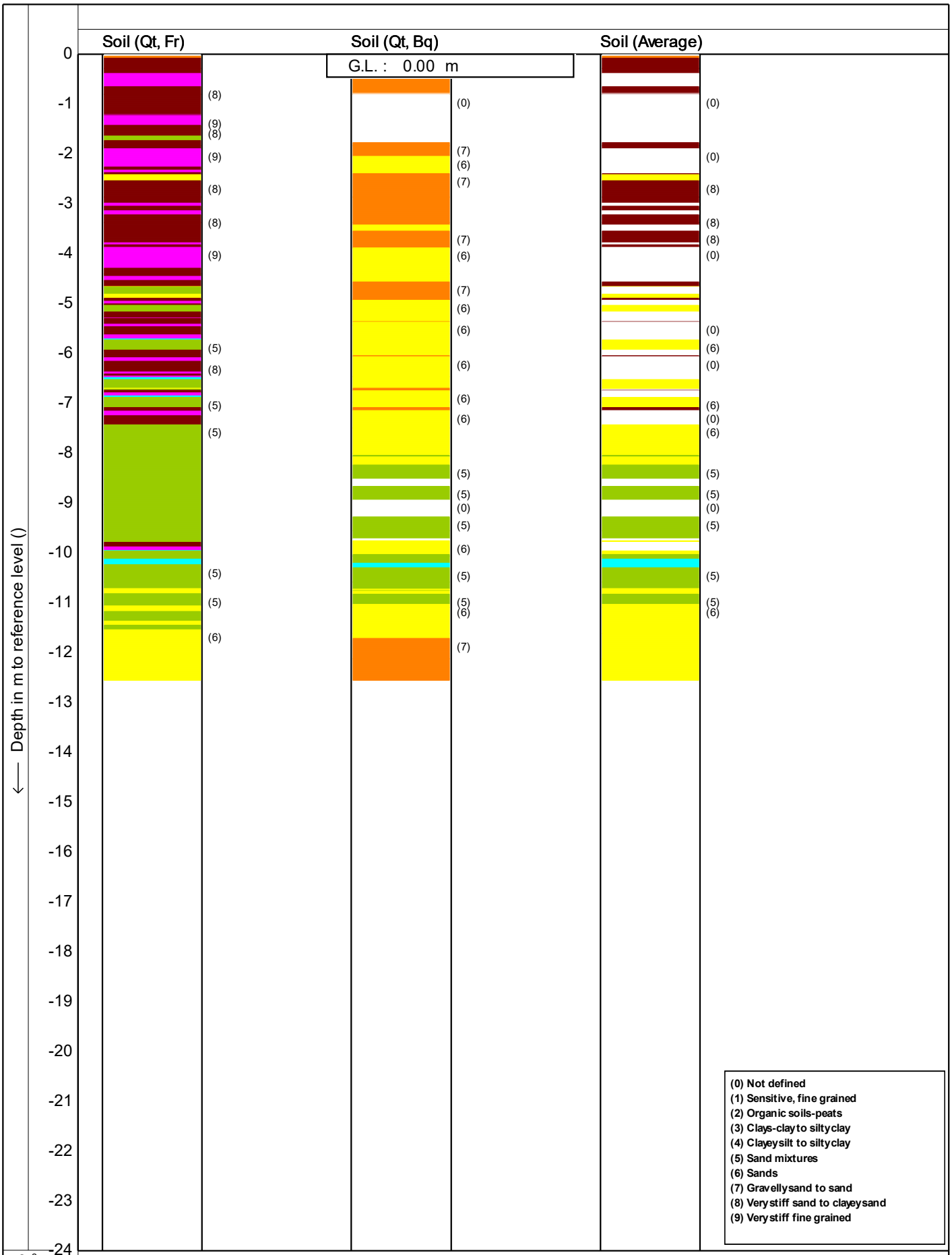
**12/14**

1.48




Soil behaviour type classification after Robertson 1990

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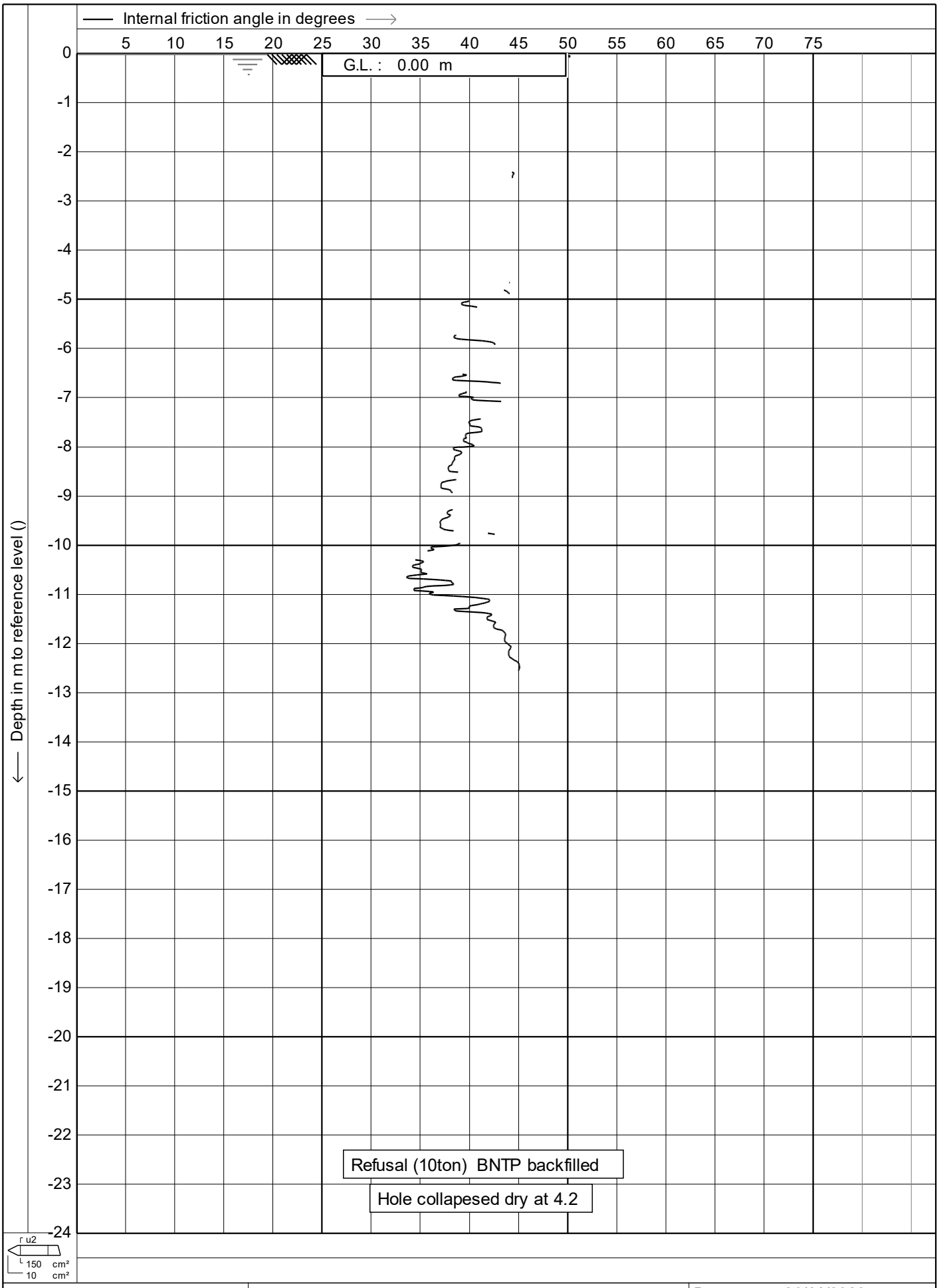
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **050** — **13/14** |

1.48




PERRY GEOTECH

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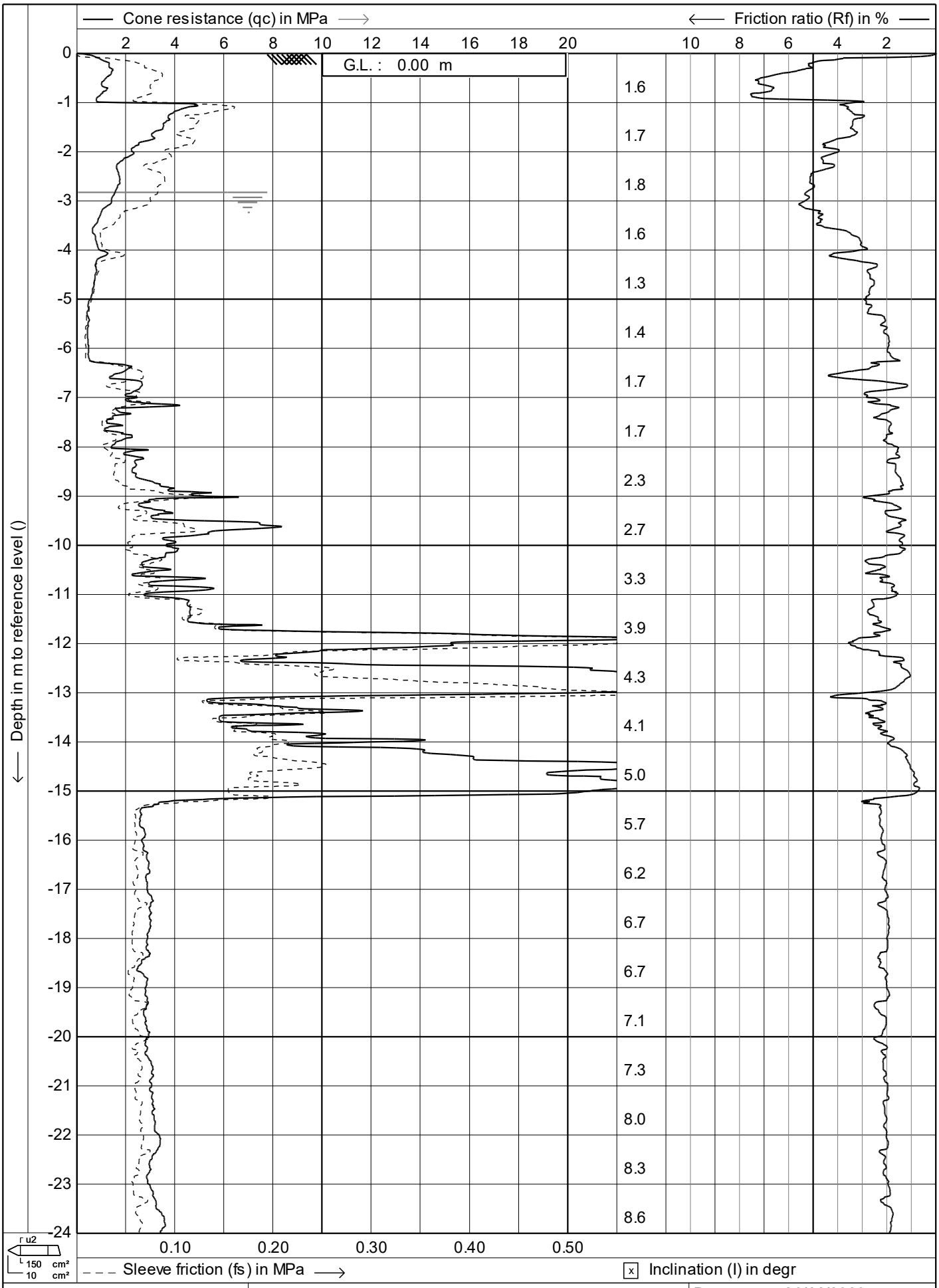
**14/14**

1.48

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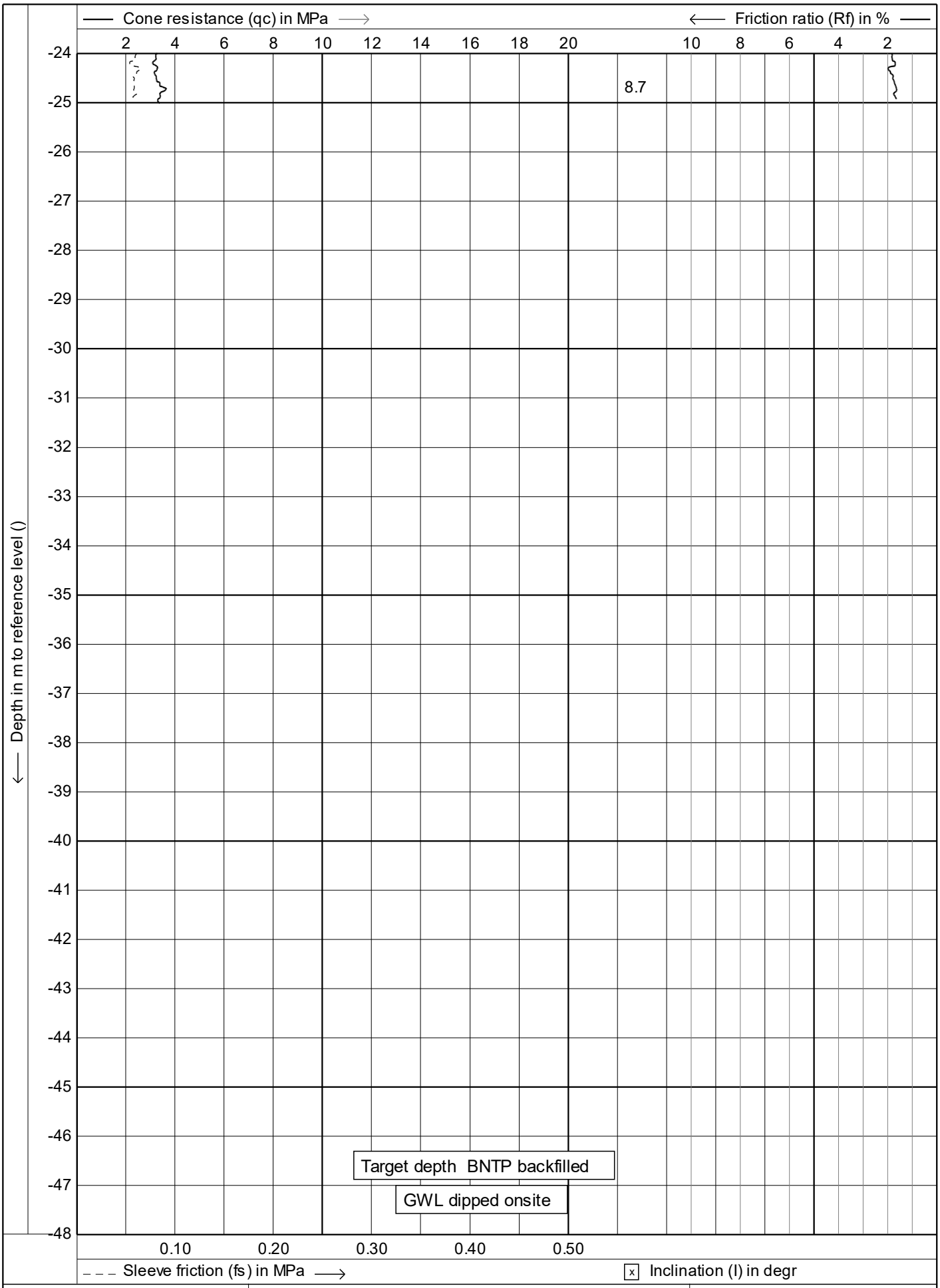
|---|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date | : 26/11/2020 |
| | Project : **Site Investigations** | Cone no. | : C10CFIIP.C14426 |
| | Location: **Fitzgerald Rd - Drury** | Project no. : | 05AU7 |
| | Position: **0, 0** | CPT no. : | 051 — 1/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

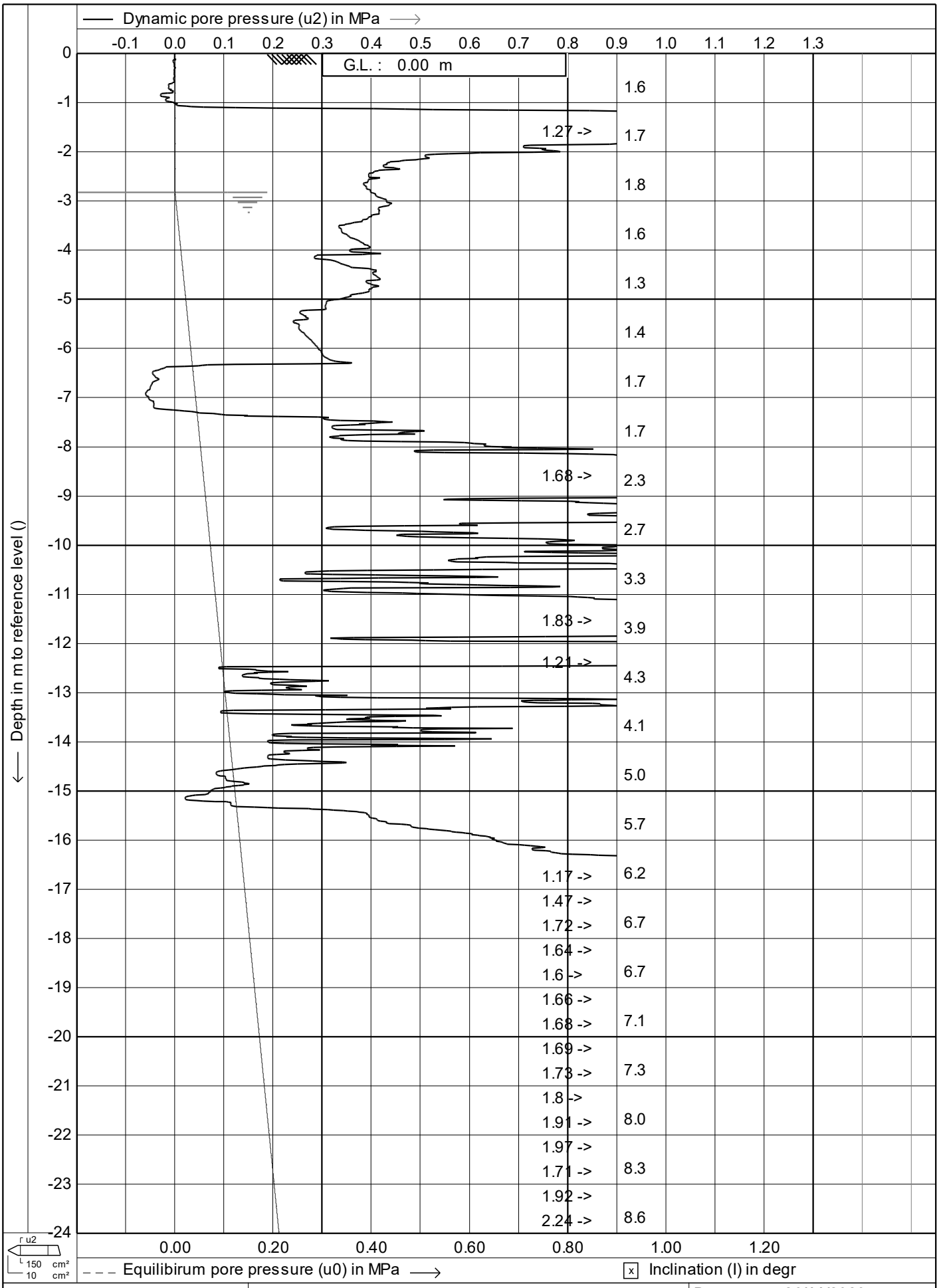
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

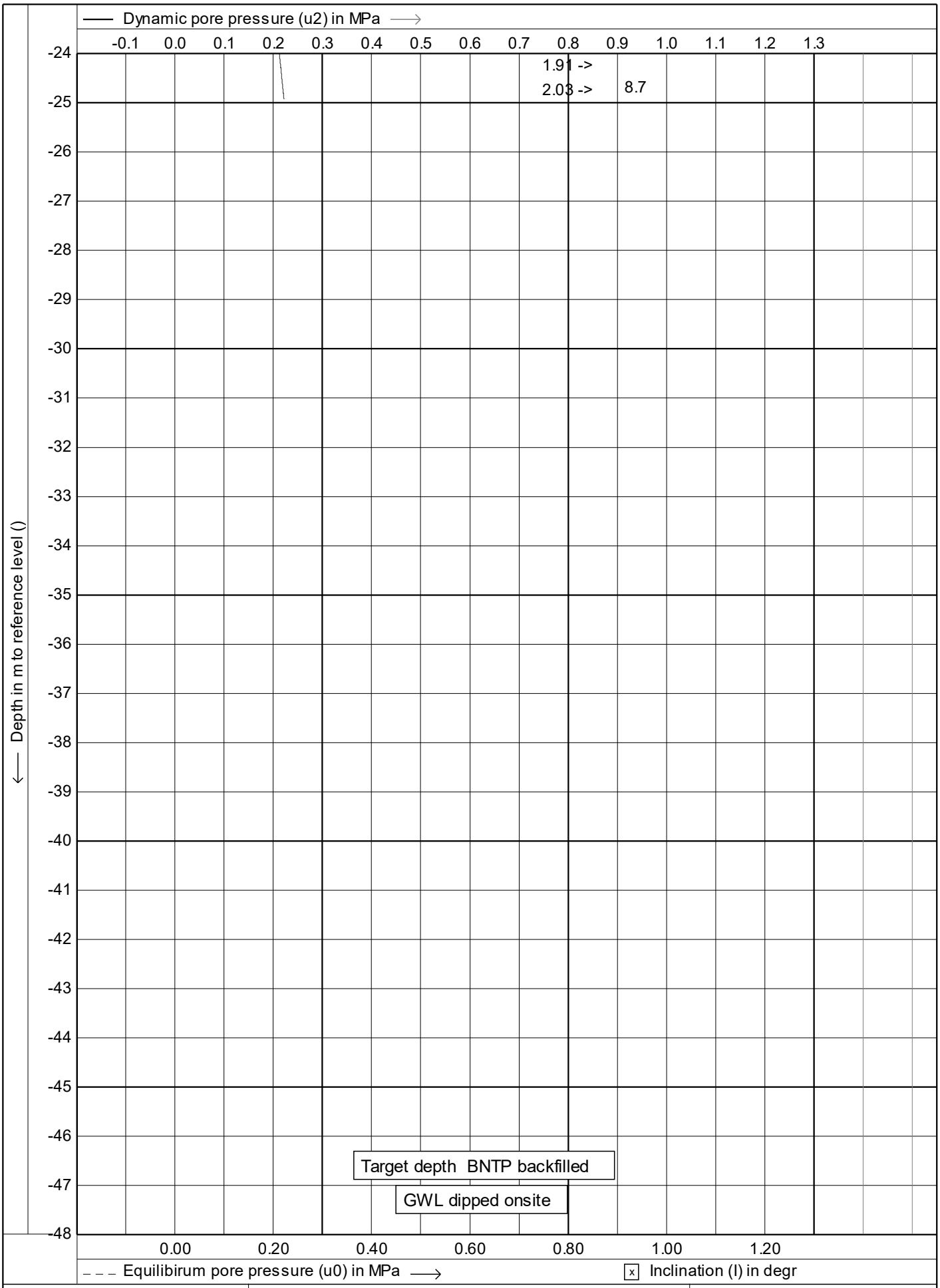
**2/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **051** 3/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

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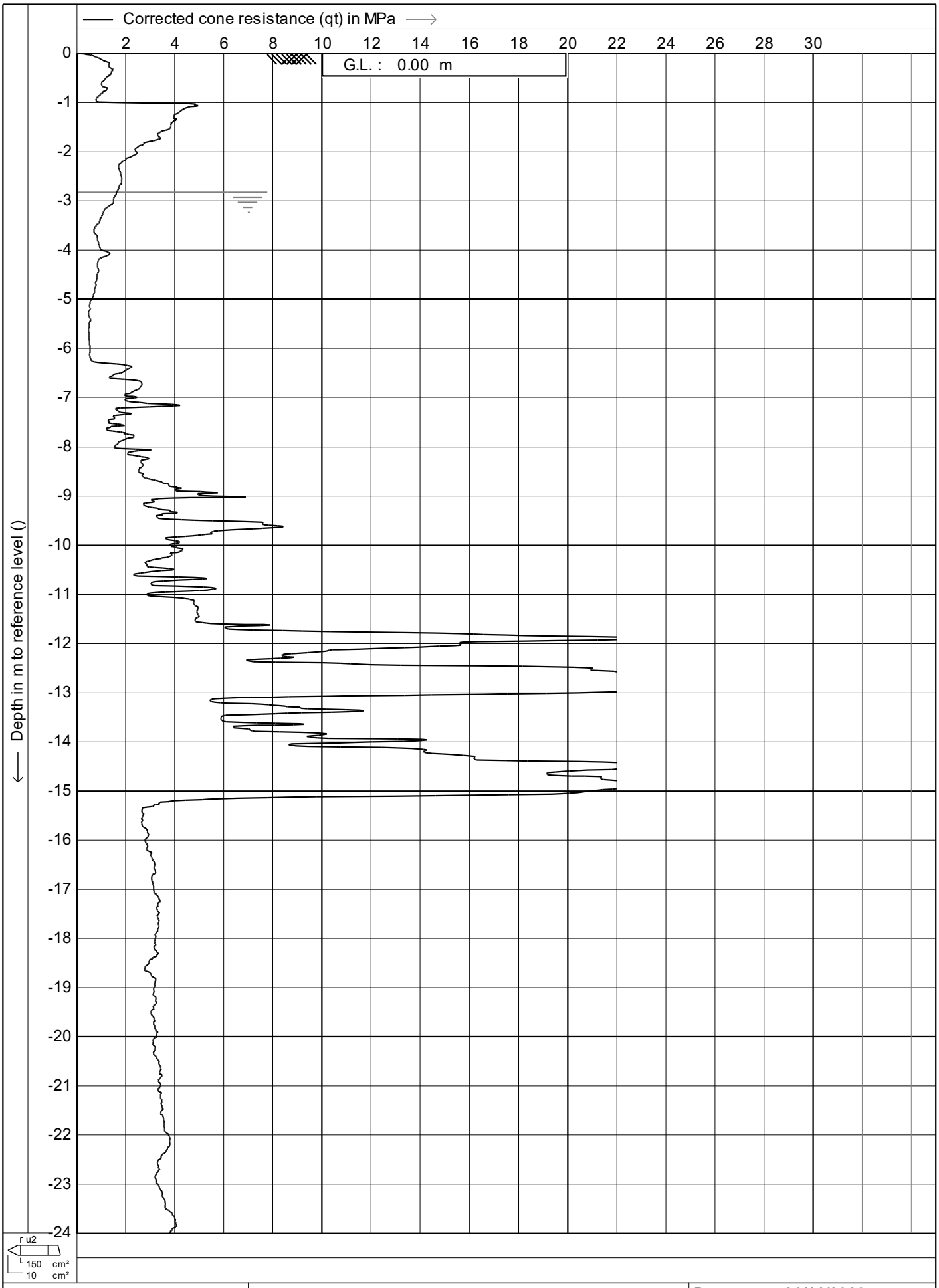
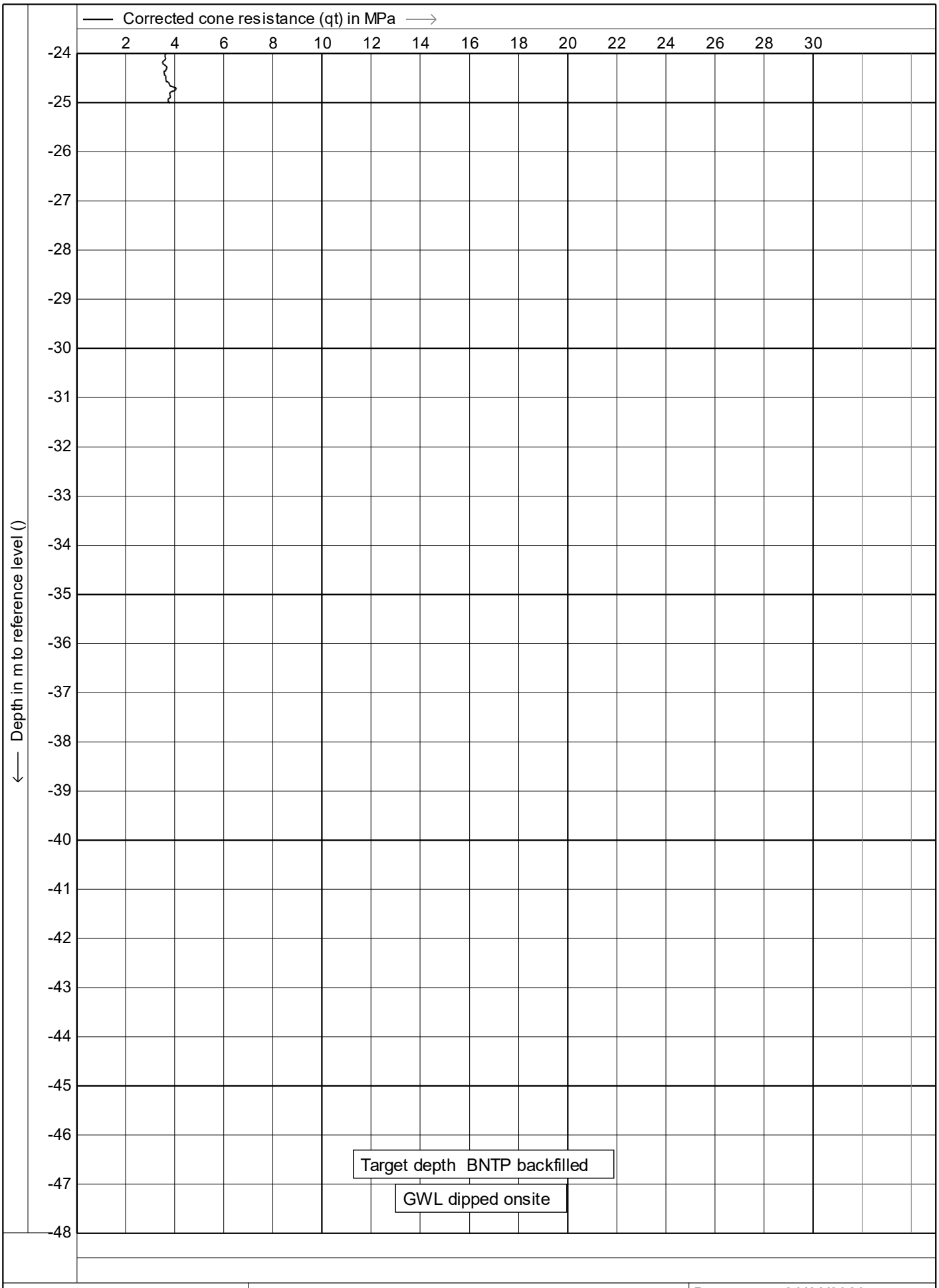
1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **051** — **5/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

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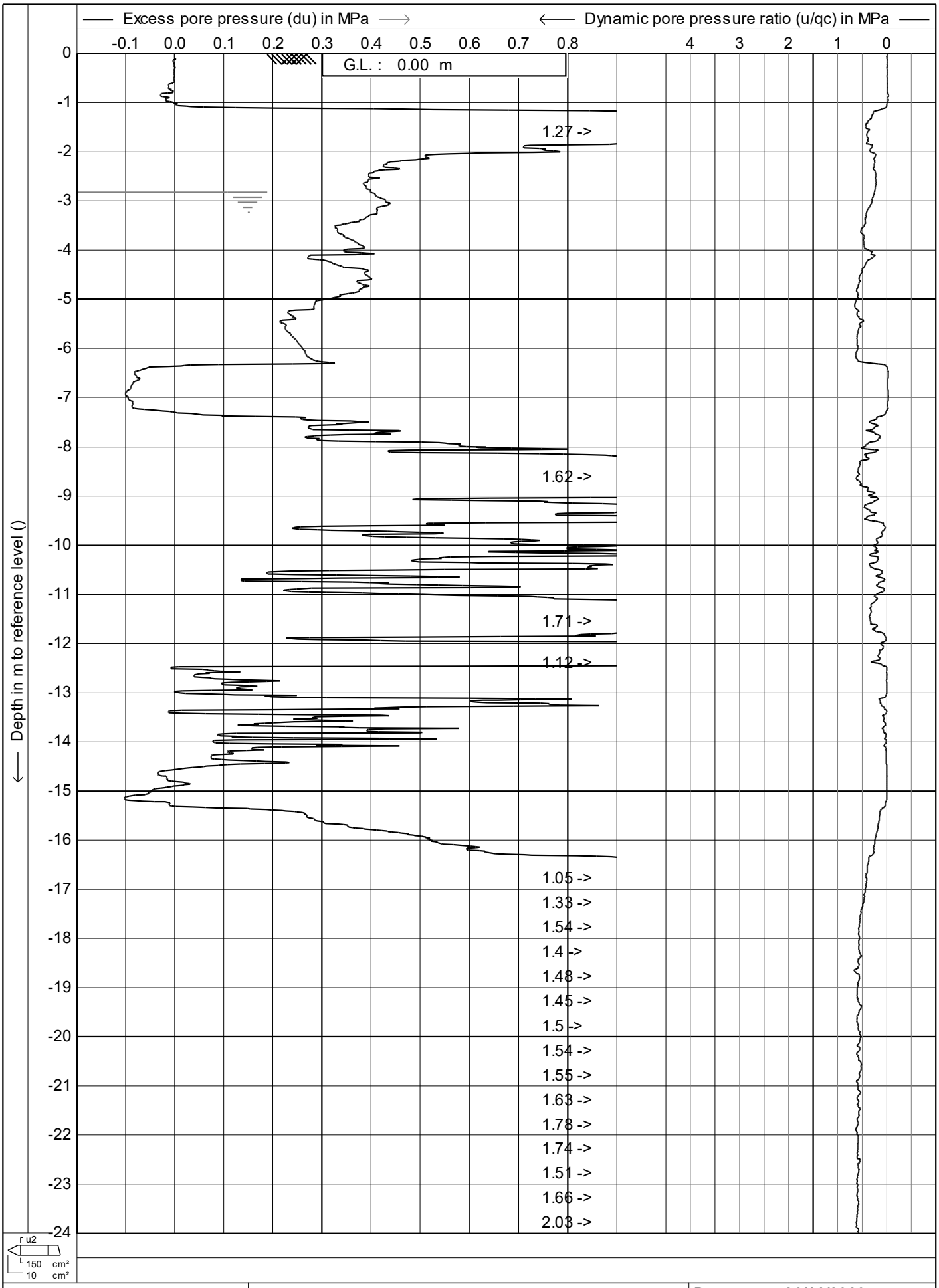
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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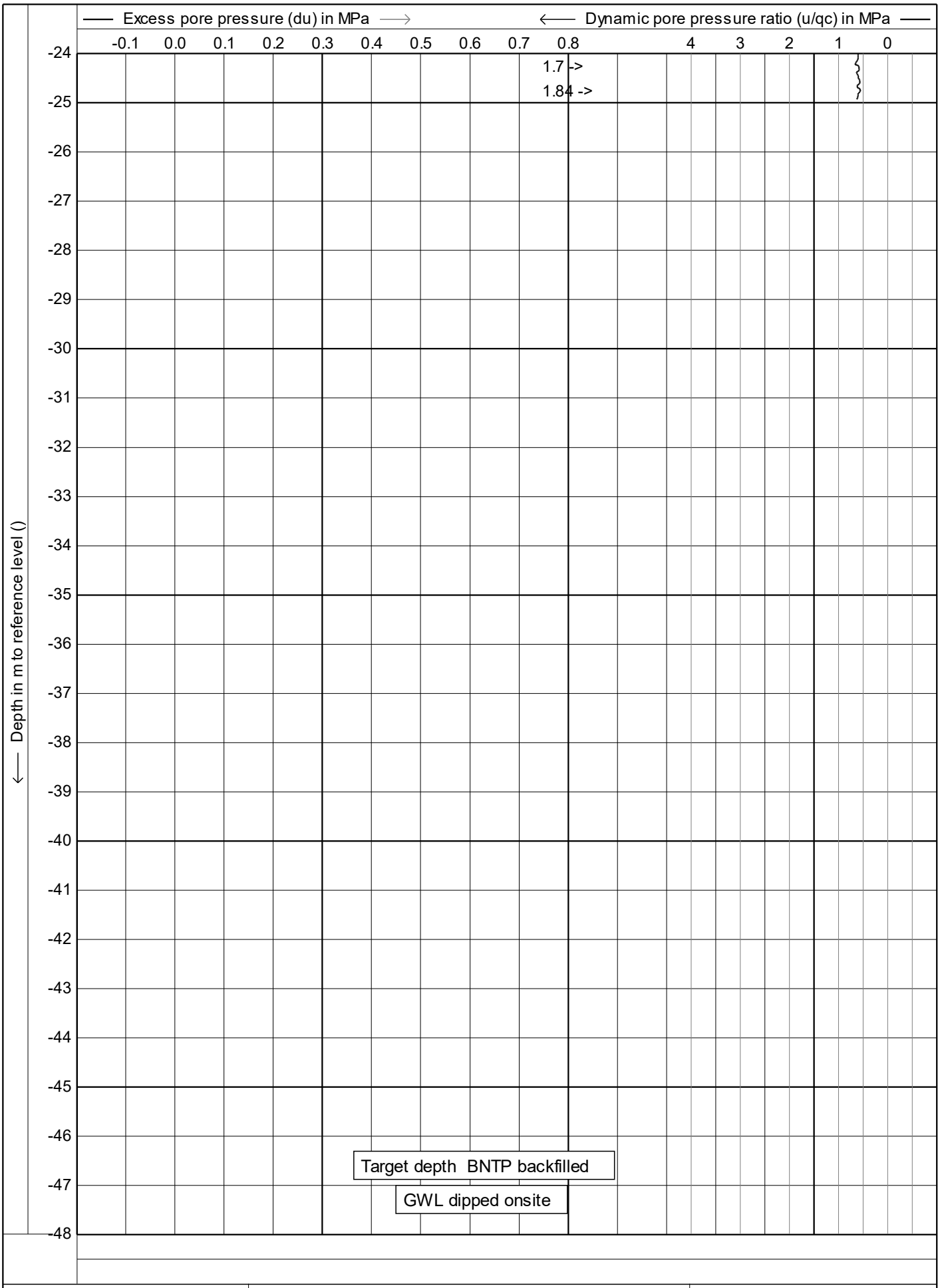
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

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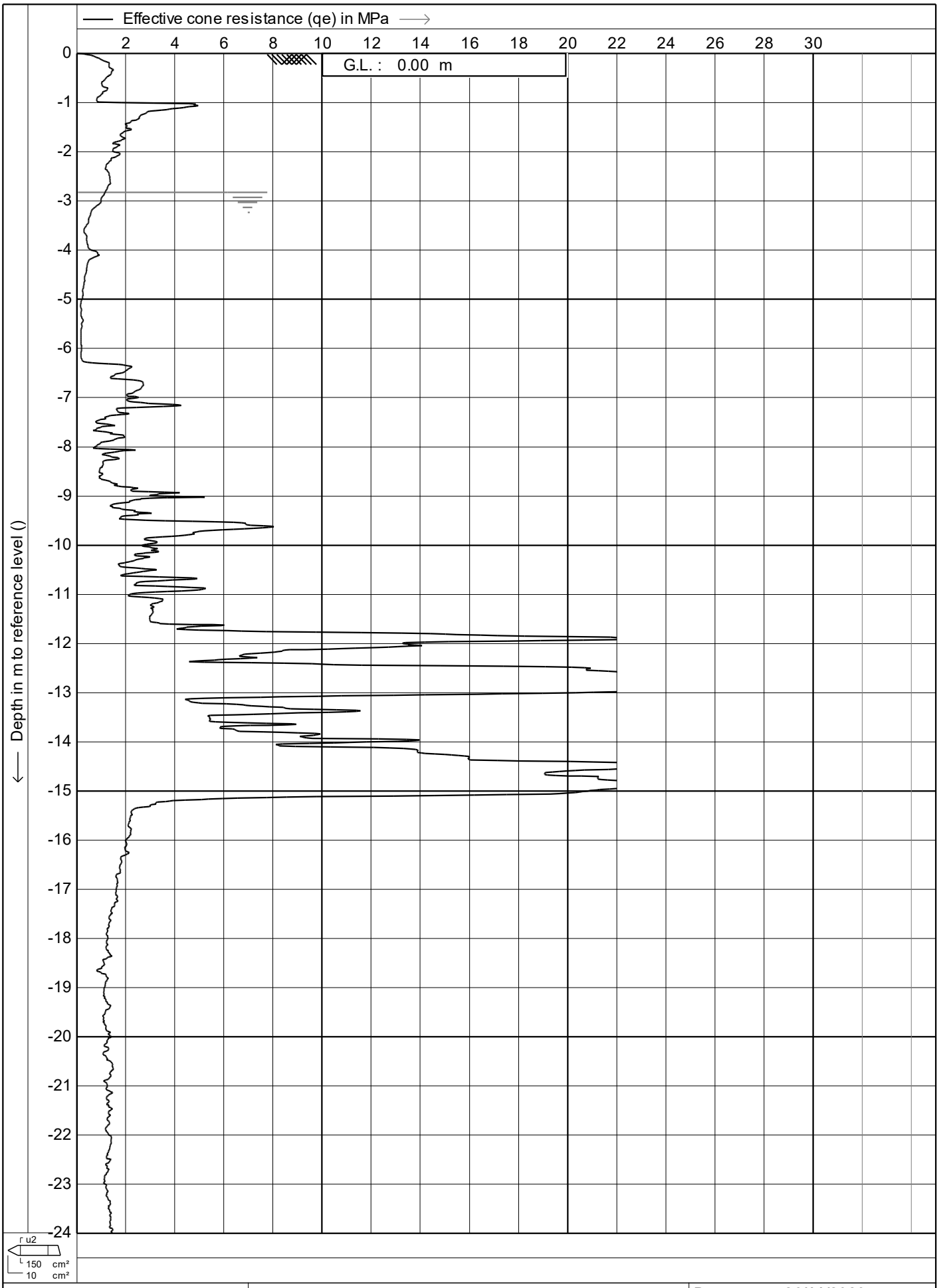
1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

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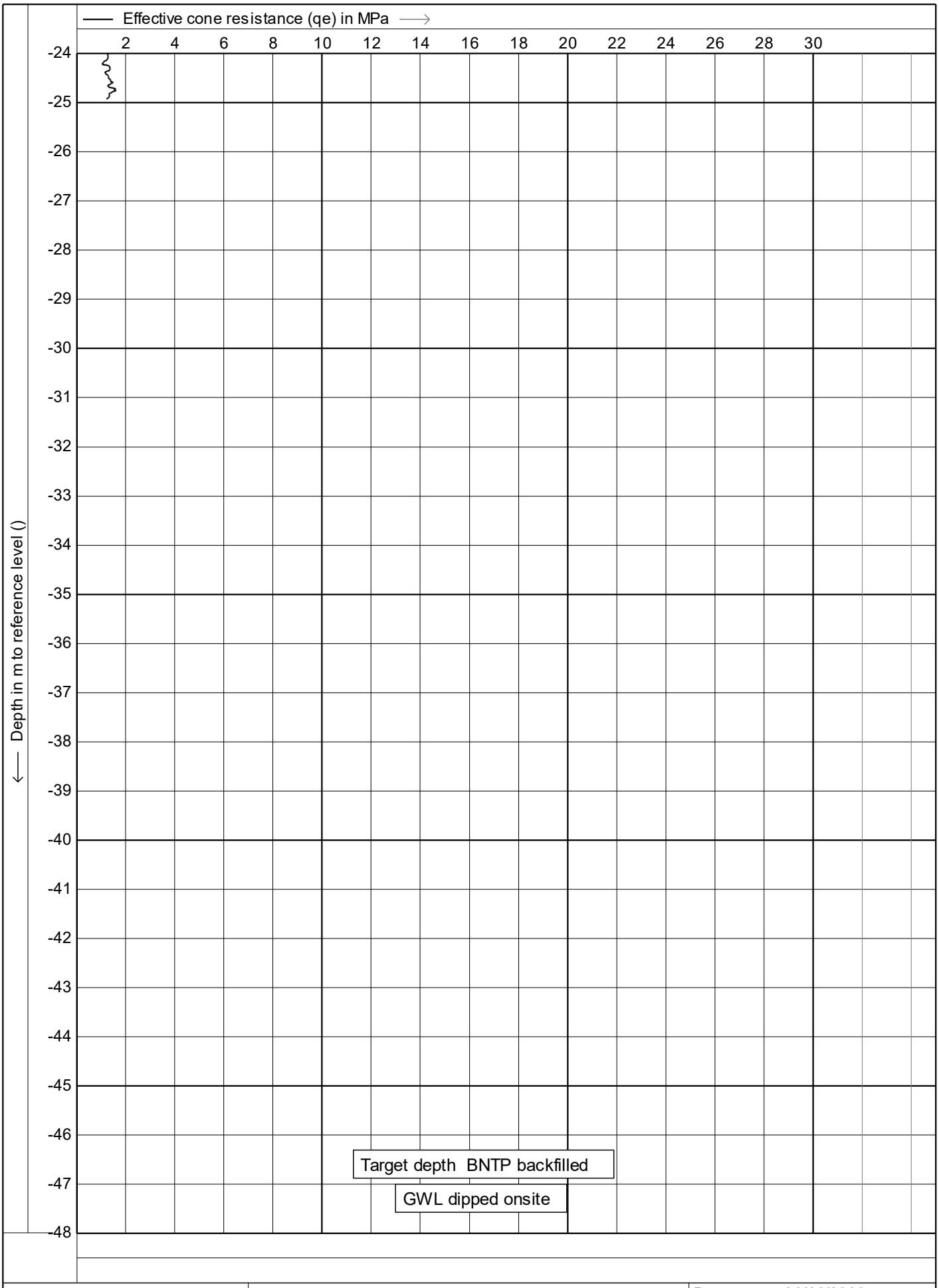
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

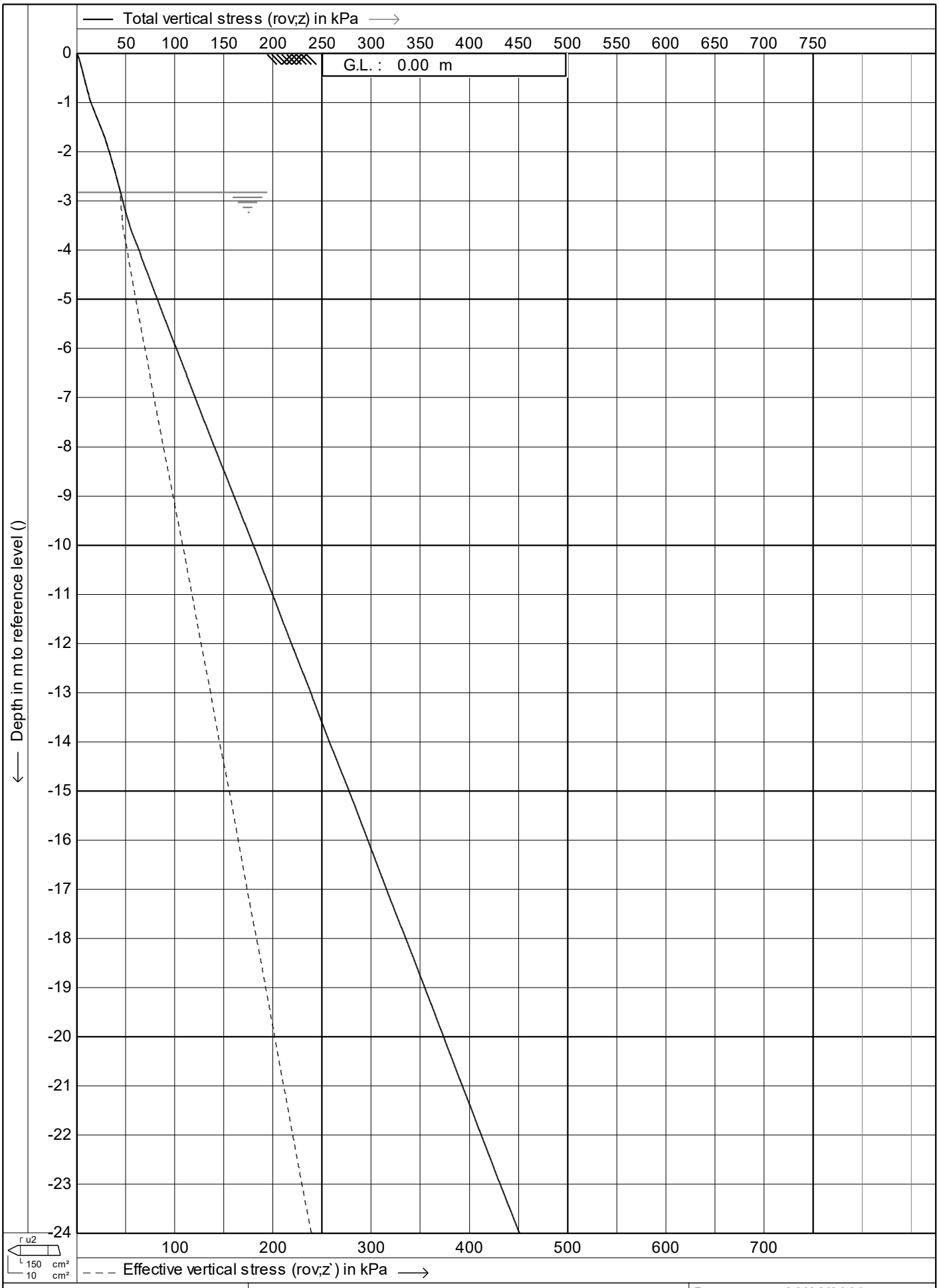
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

**10/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

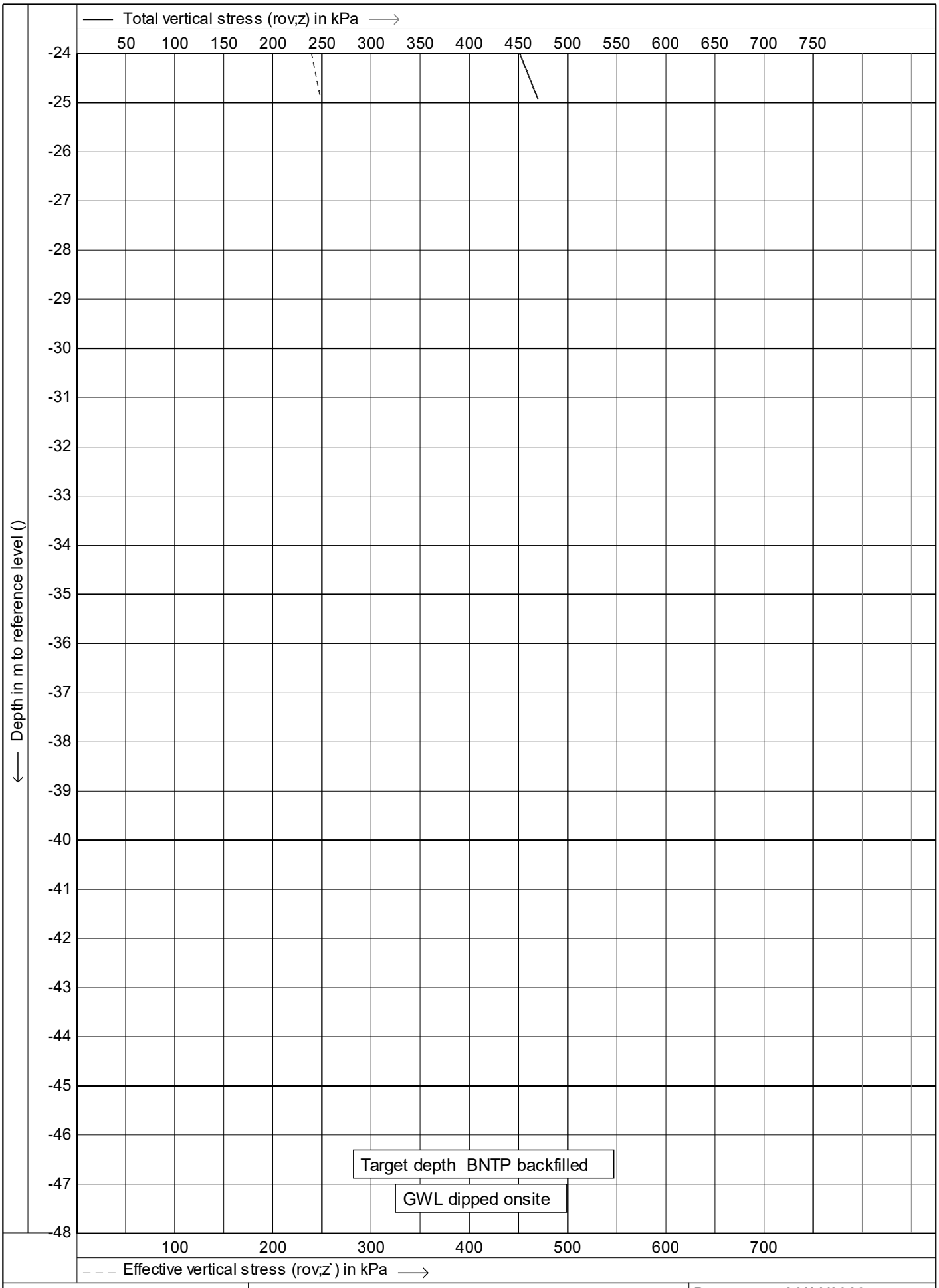
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

**11/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

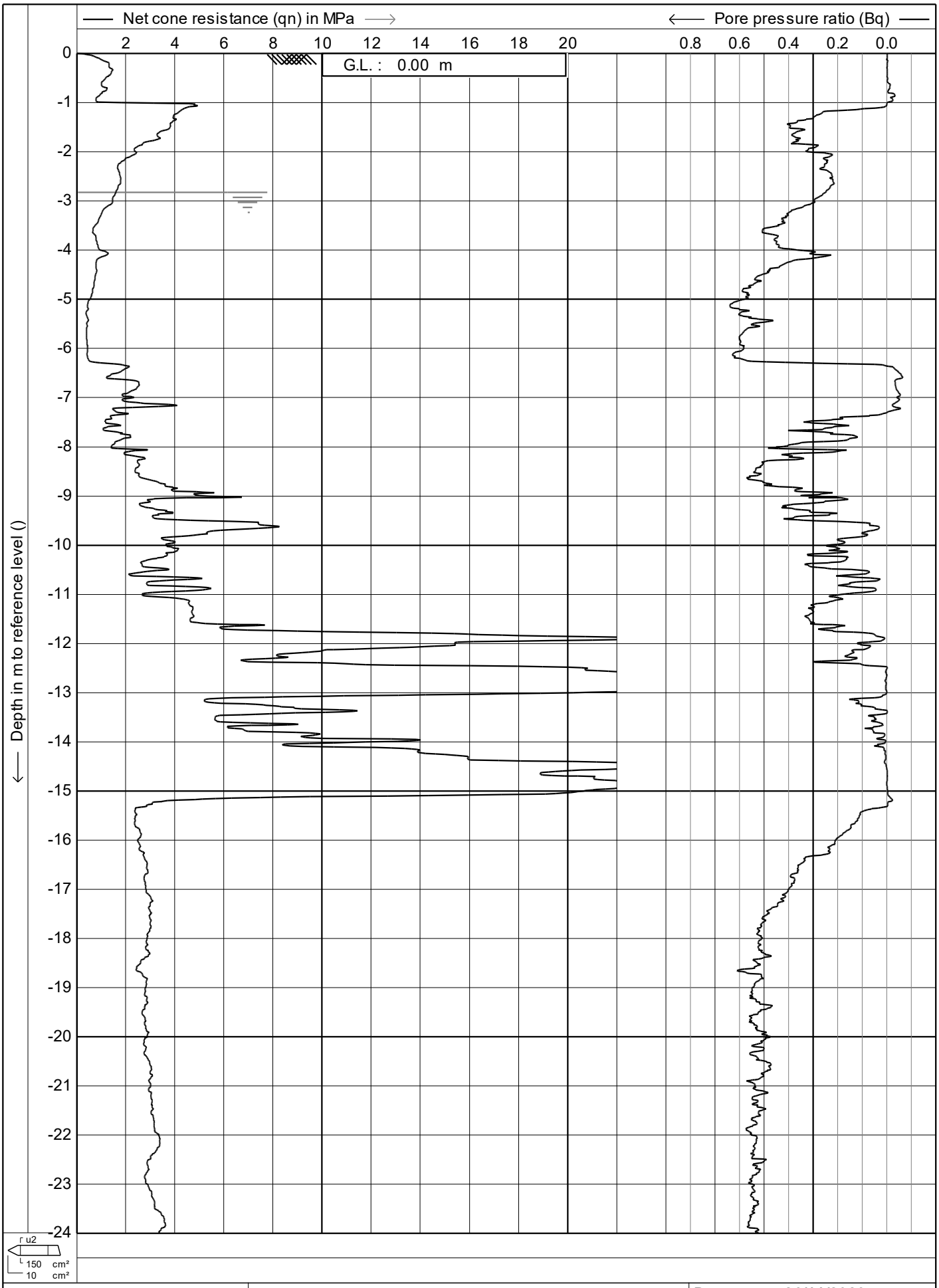
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

**12/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

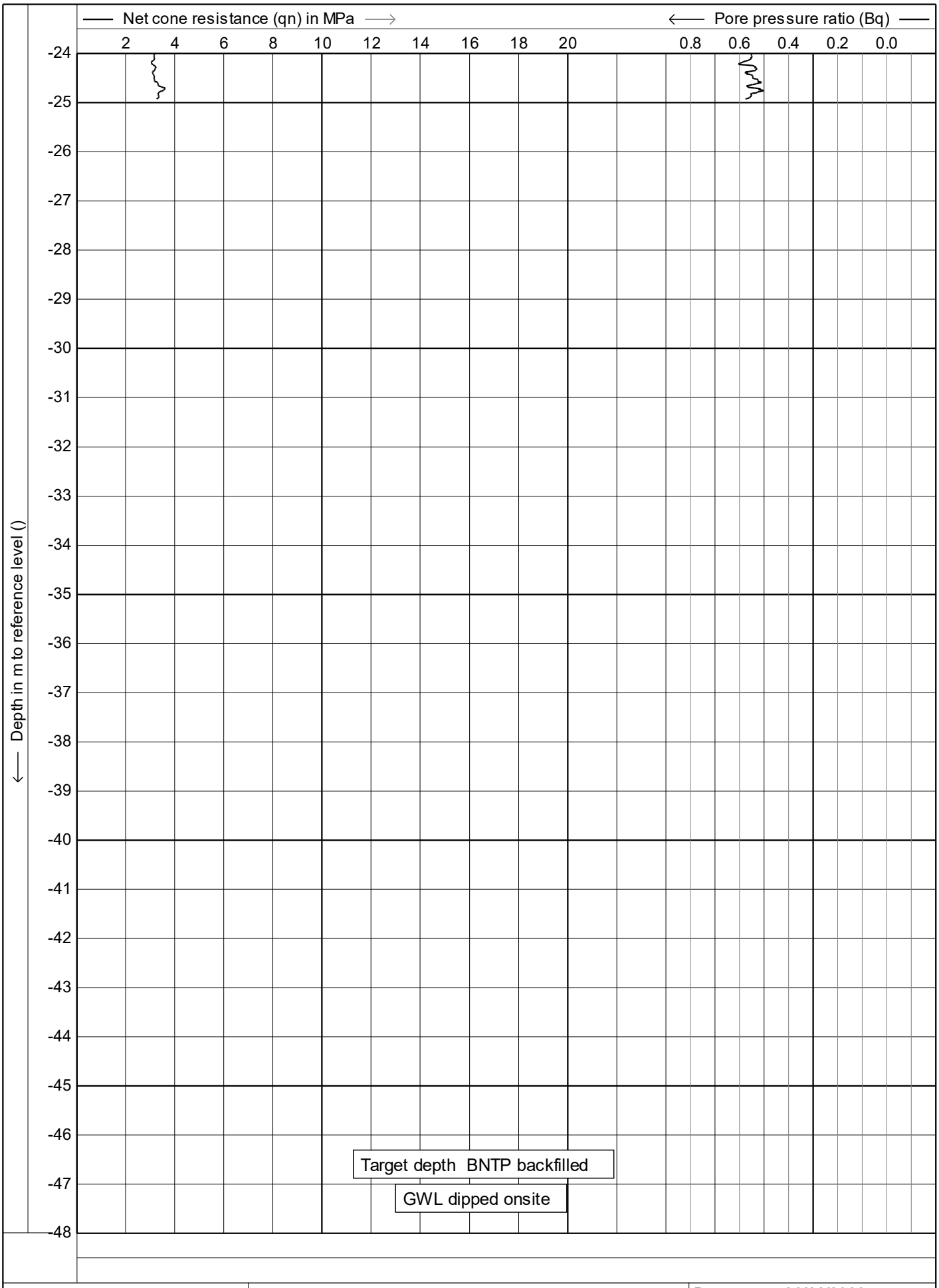
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

**13/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

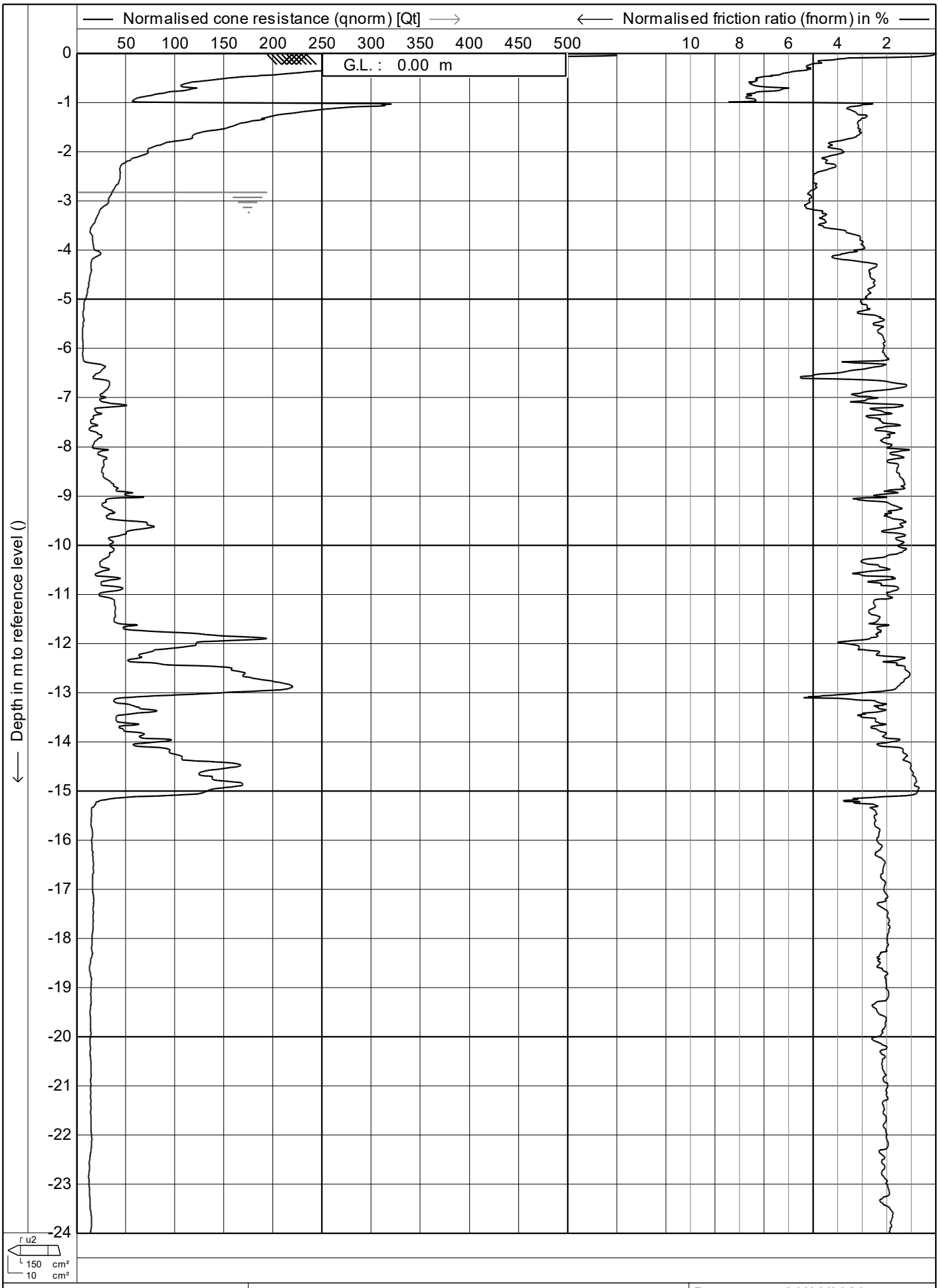
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

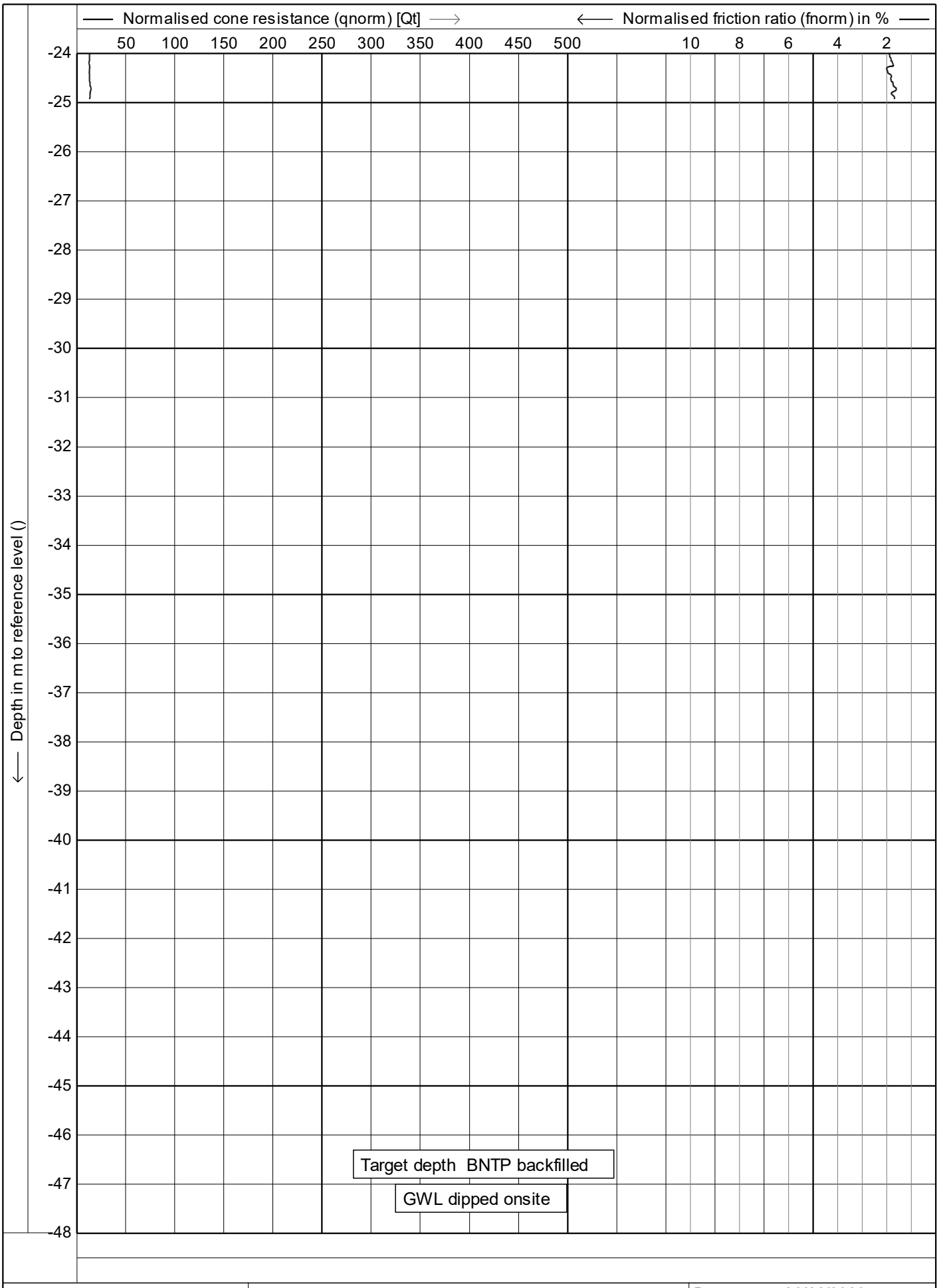
**14/28**

1.48




| | | | |
|---|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** | |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** | |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** | |
| | Position: **0, 0** | CPT no. : **051** | **15/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

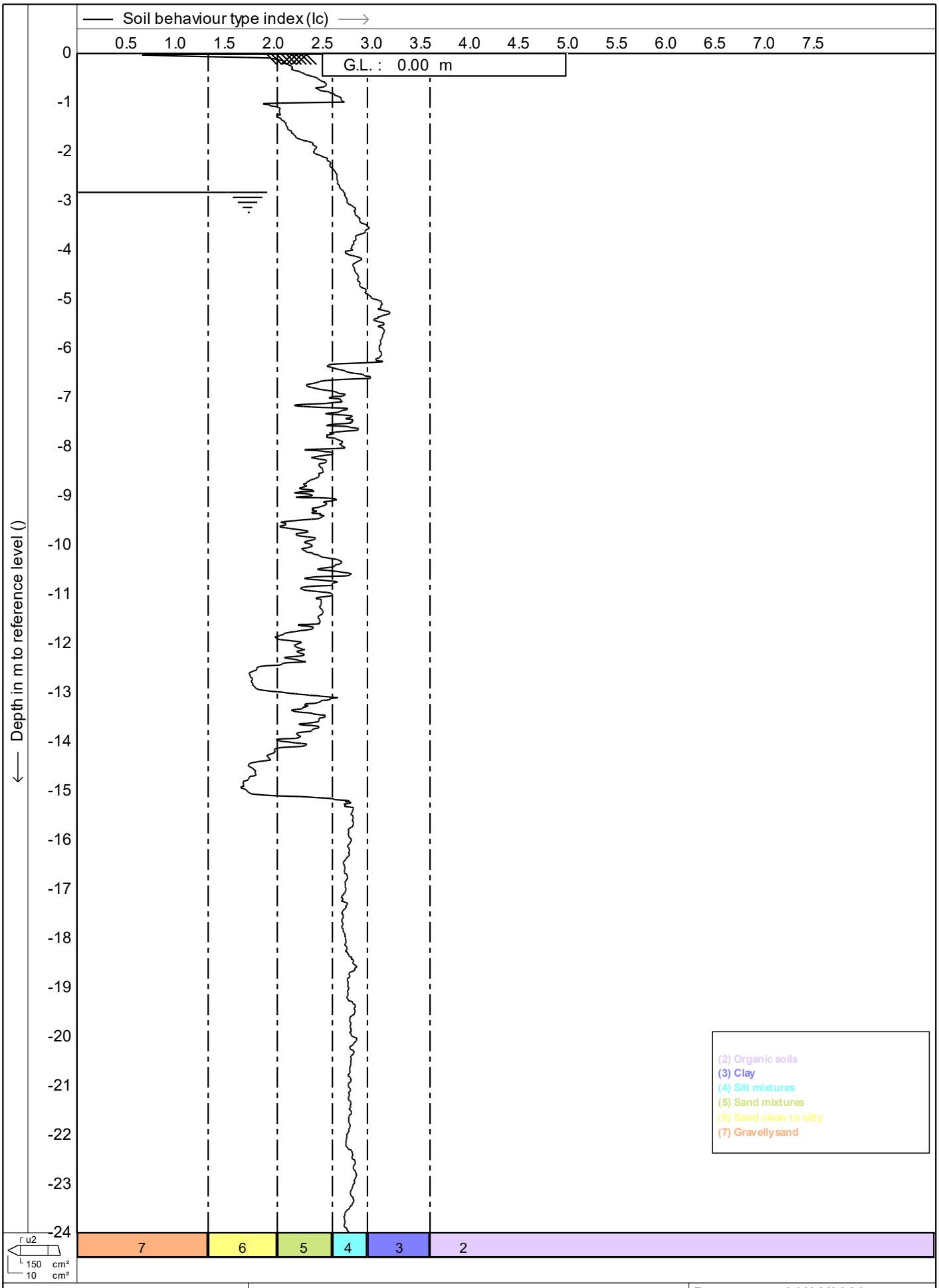
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

**16/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

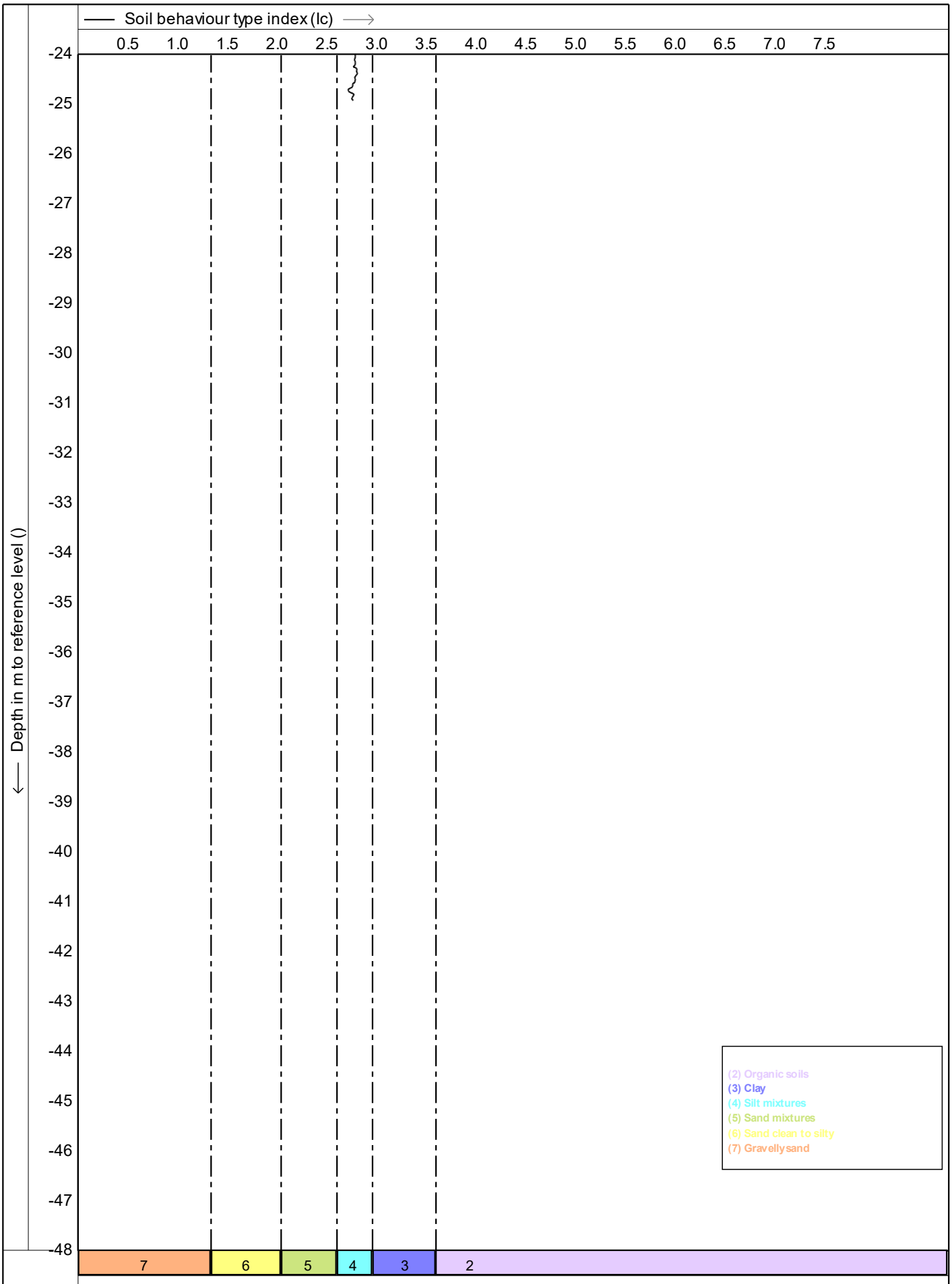
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

**17/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

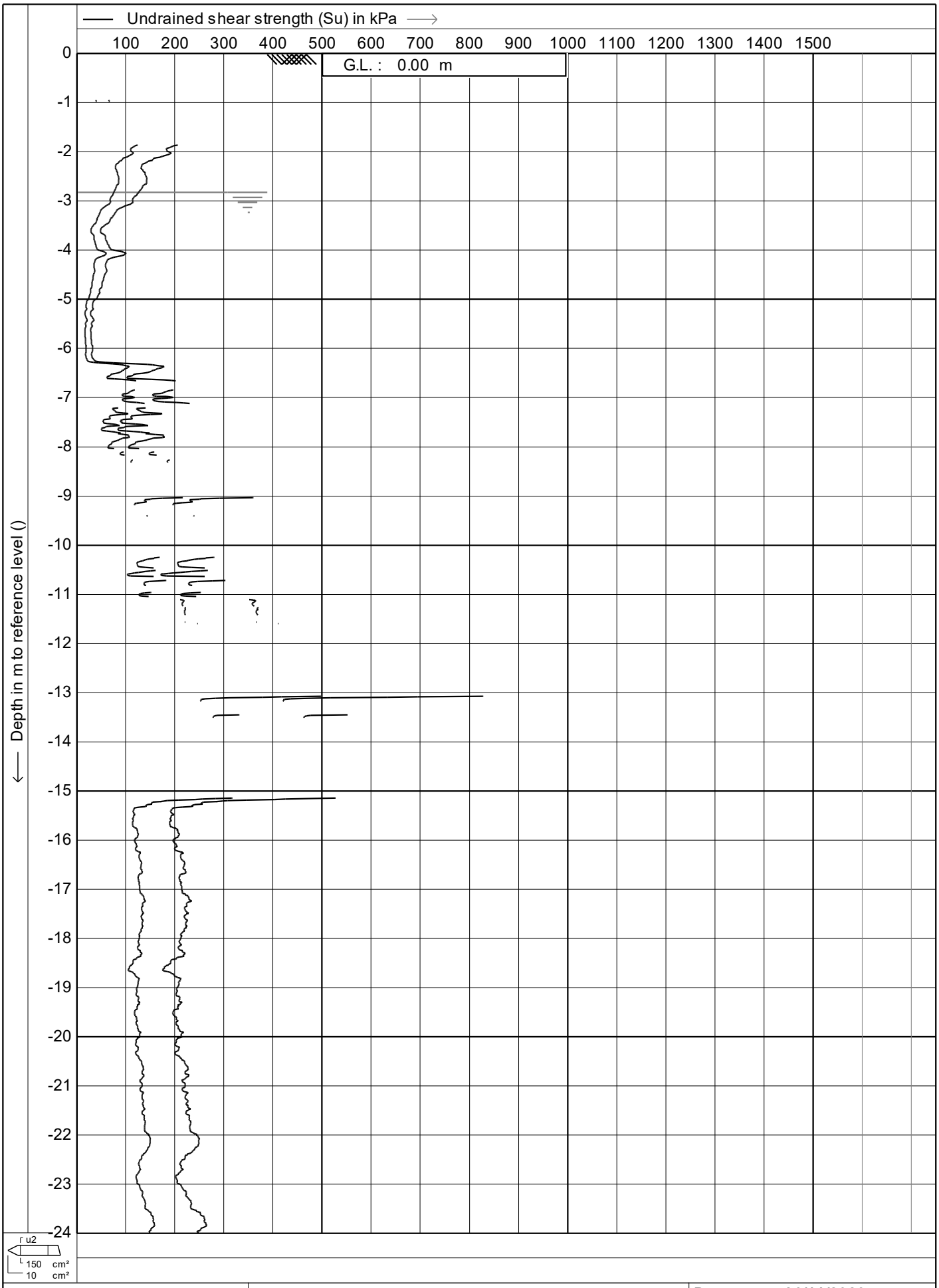
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

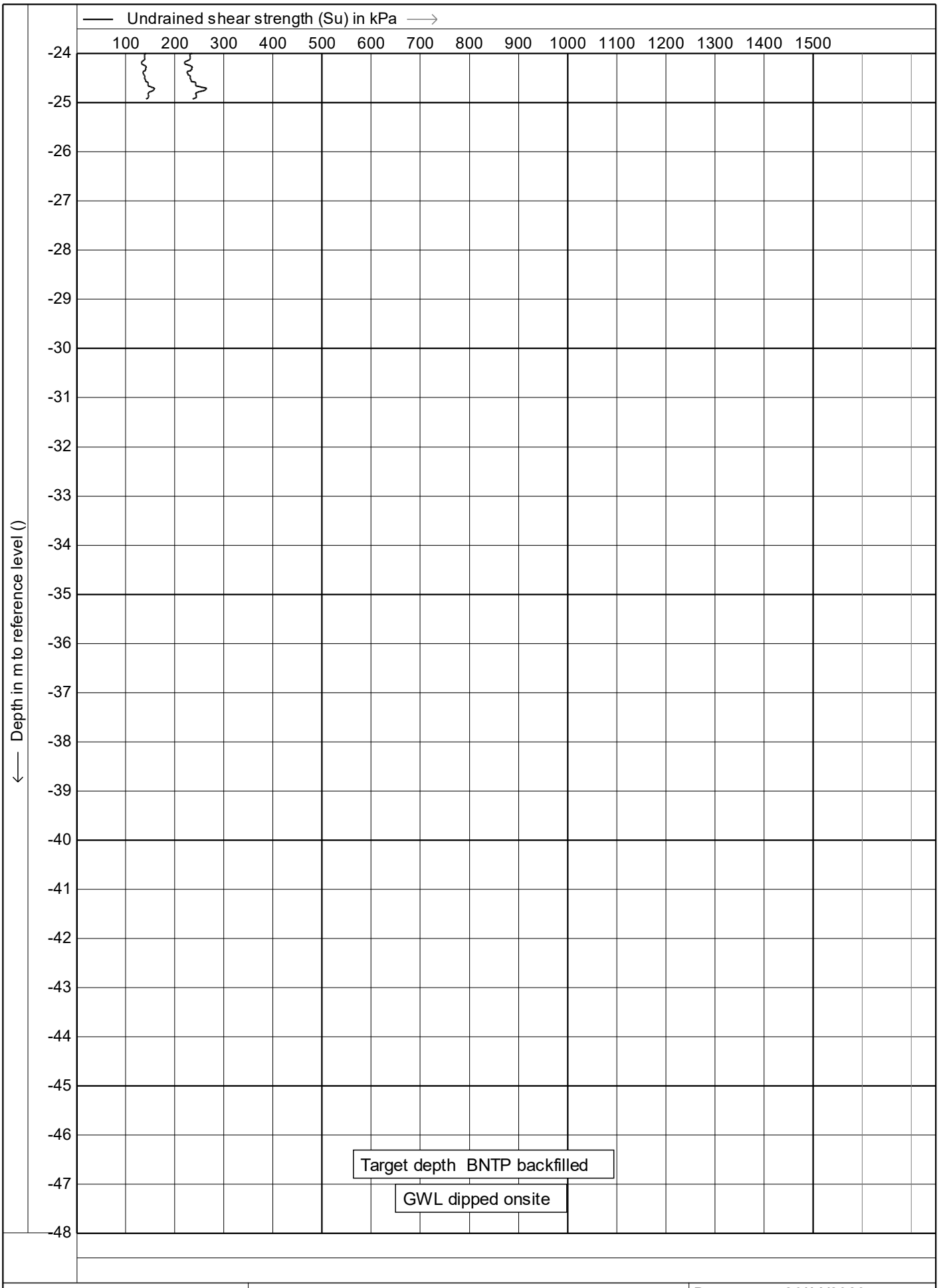
**18/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **051** — **19/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

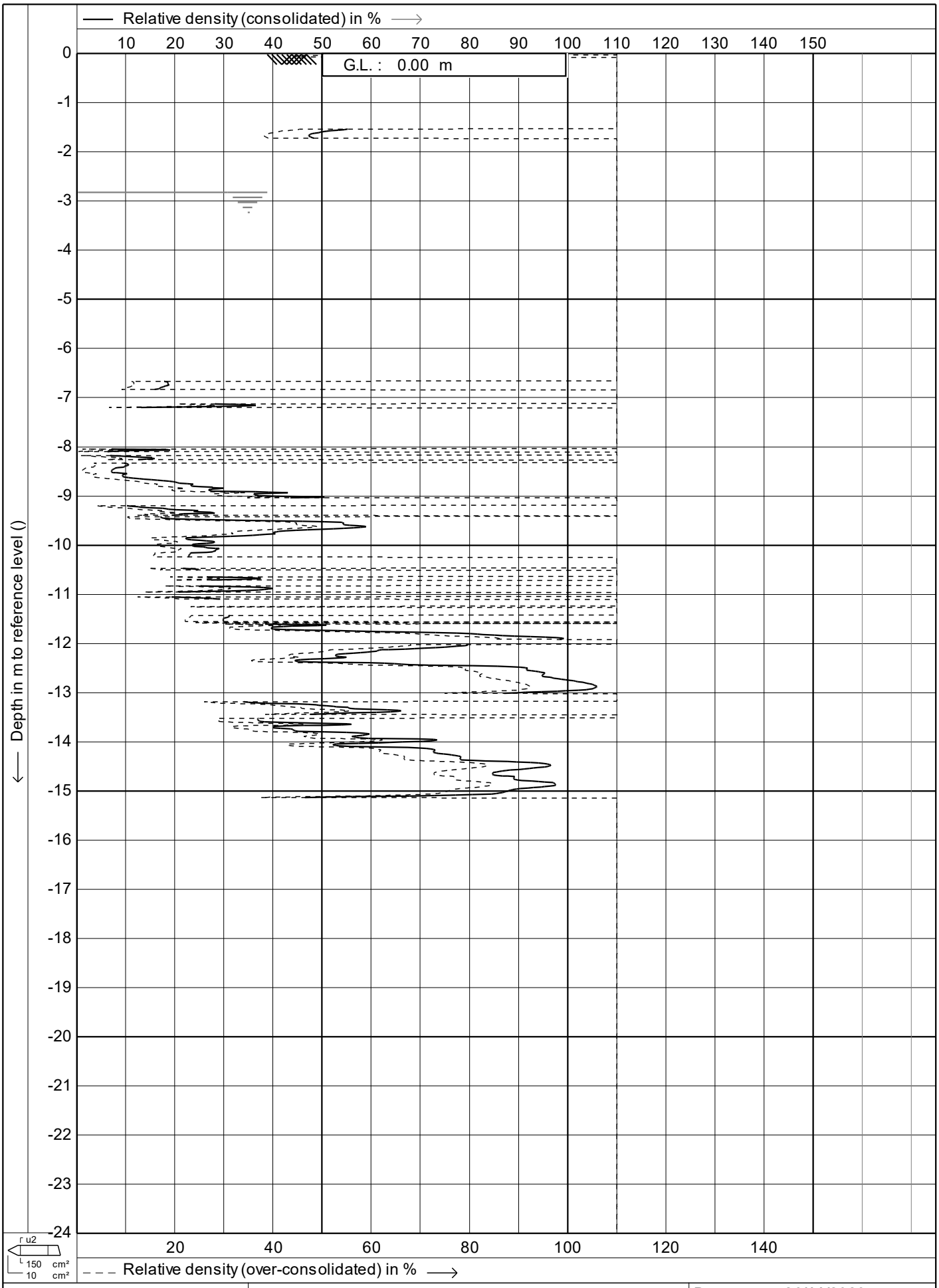
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |



1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

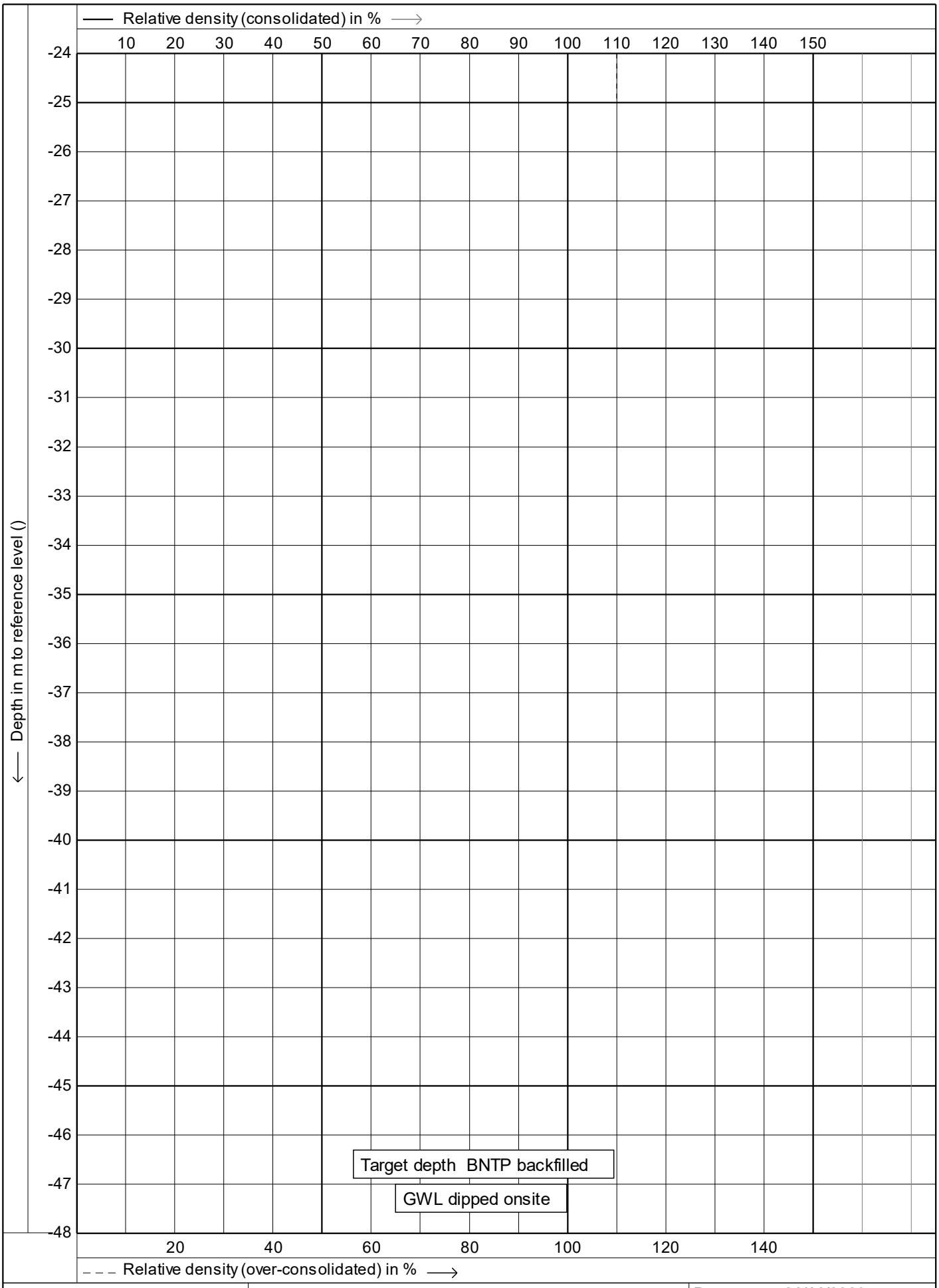
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

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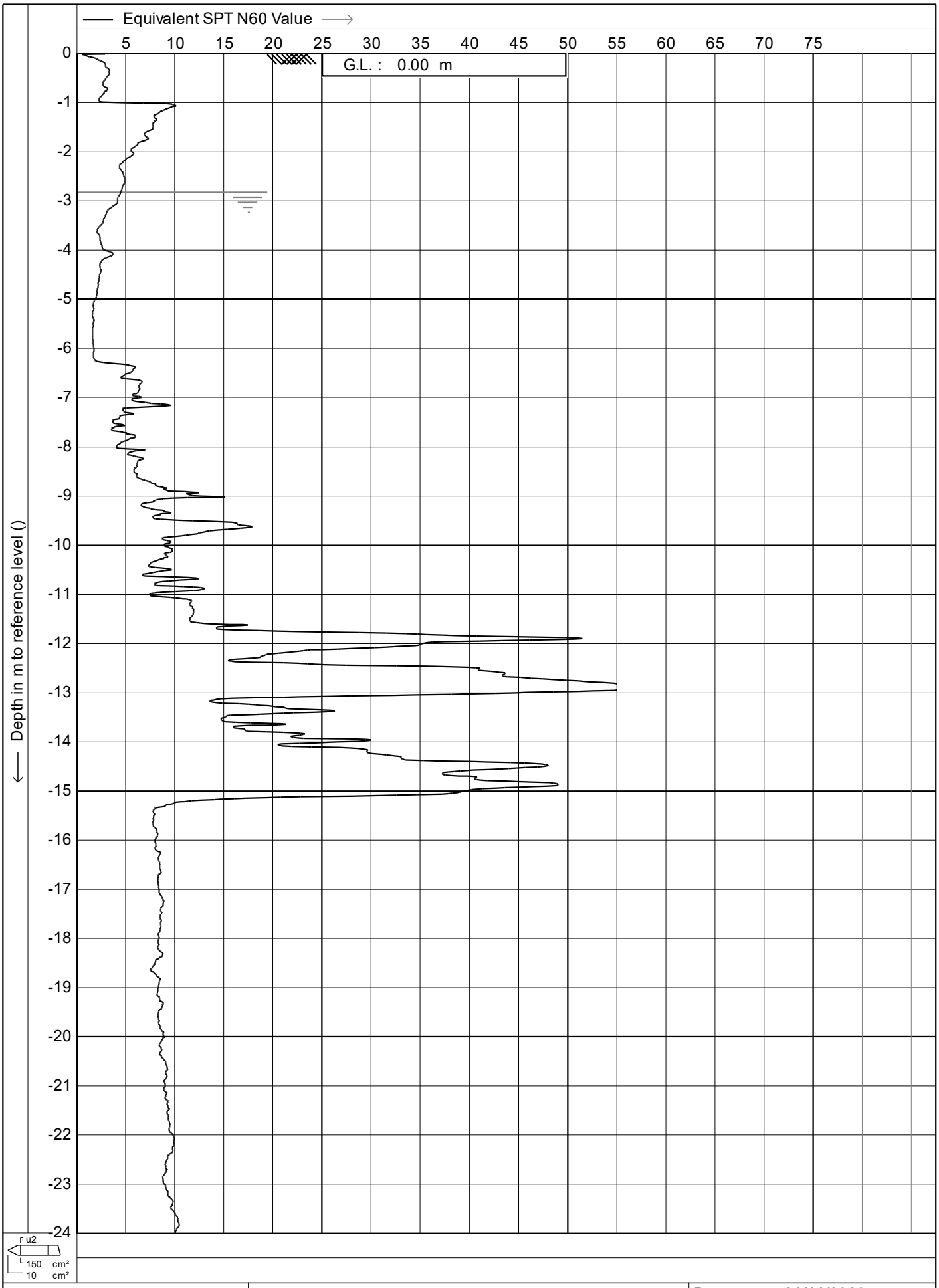
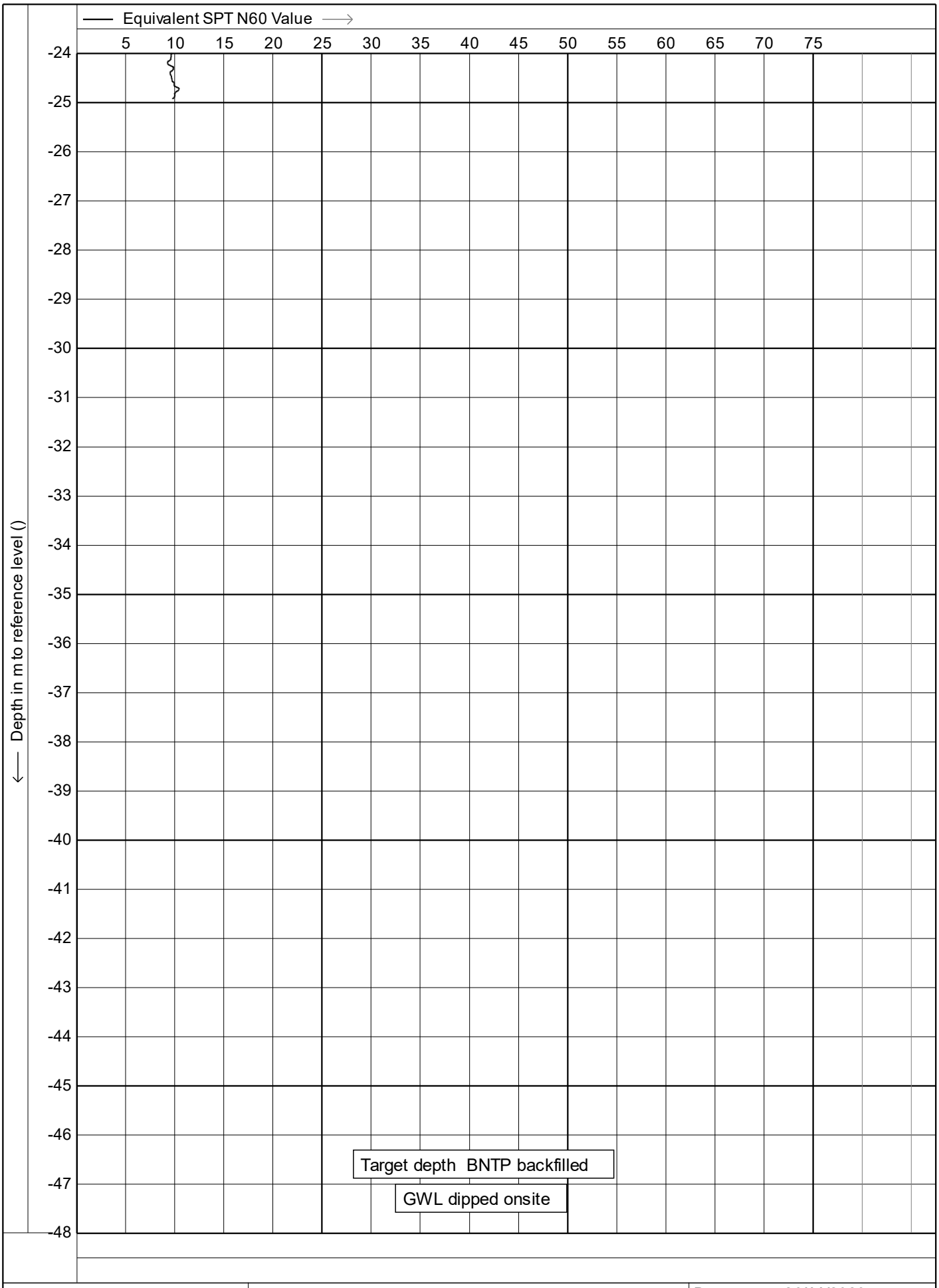
1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **051** — **23/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

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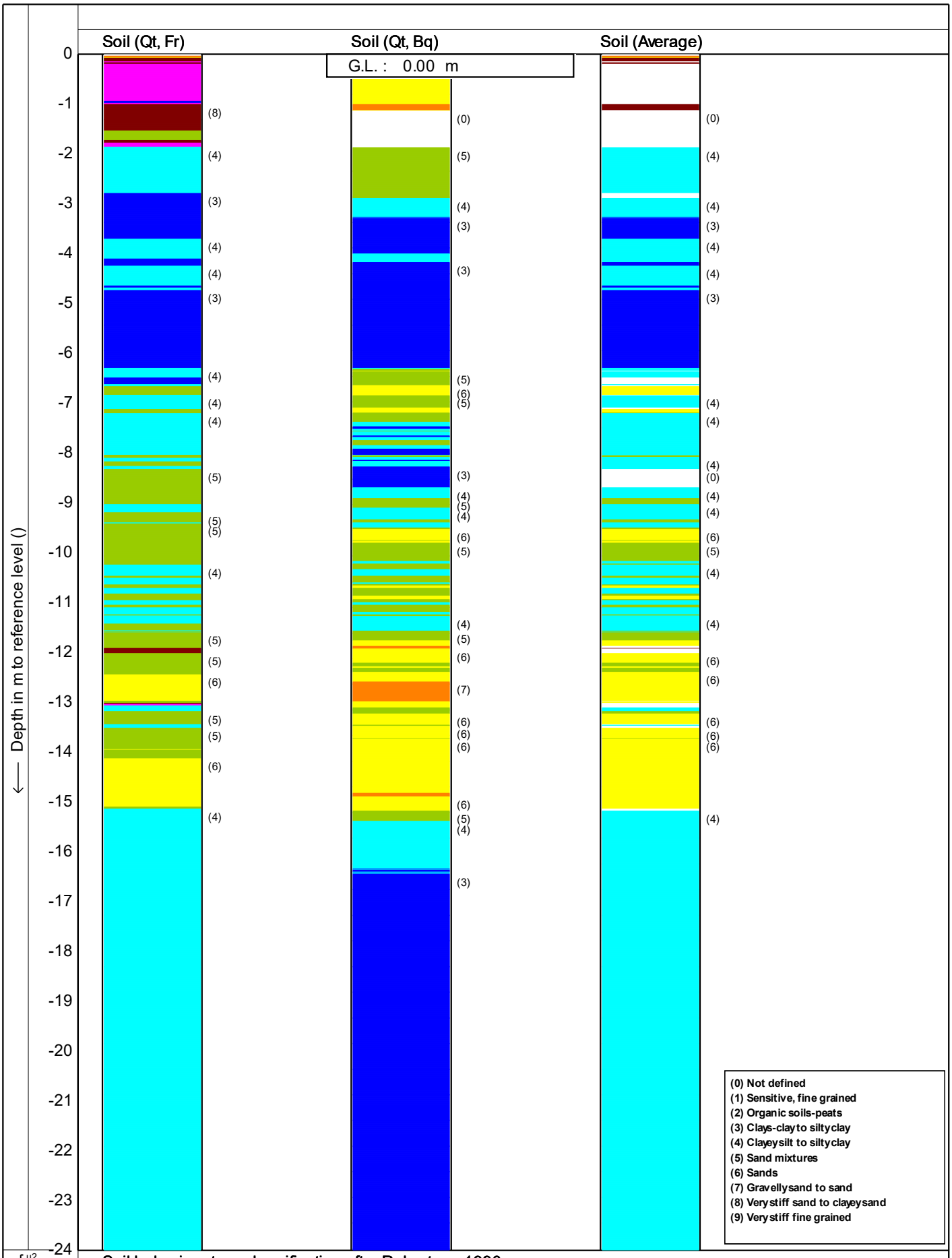
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **26/11/2020**

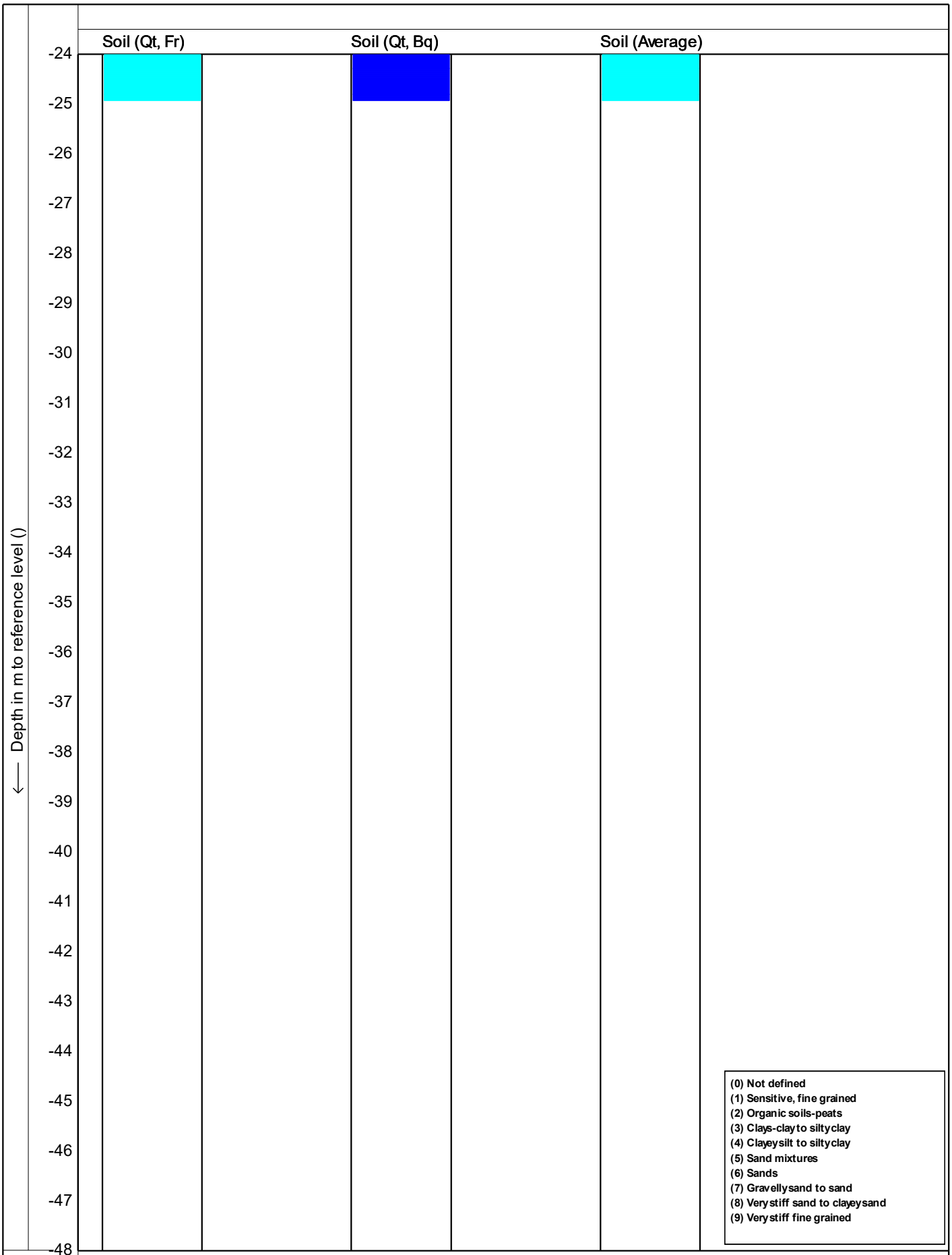
Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **051**



1.48




Soil behaviour type classification after Robertson 1990

PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

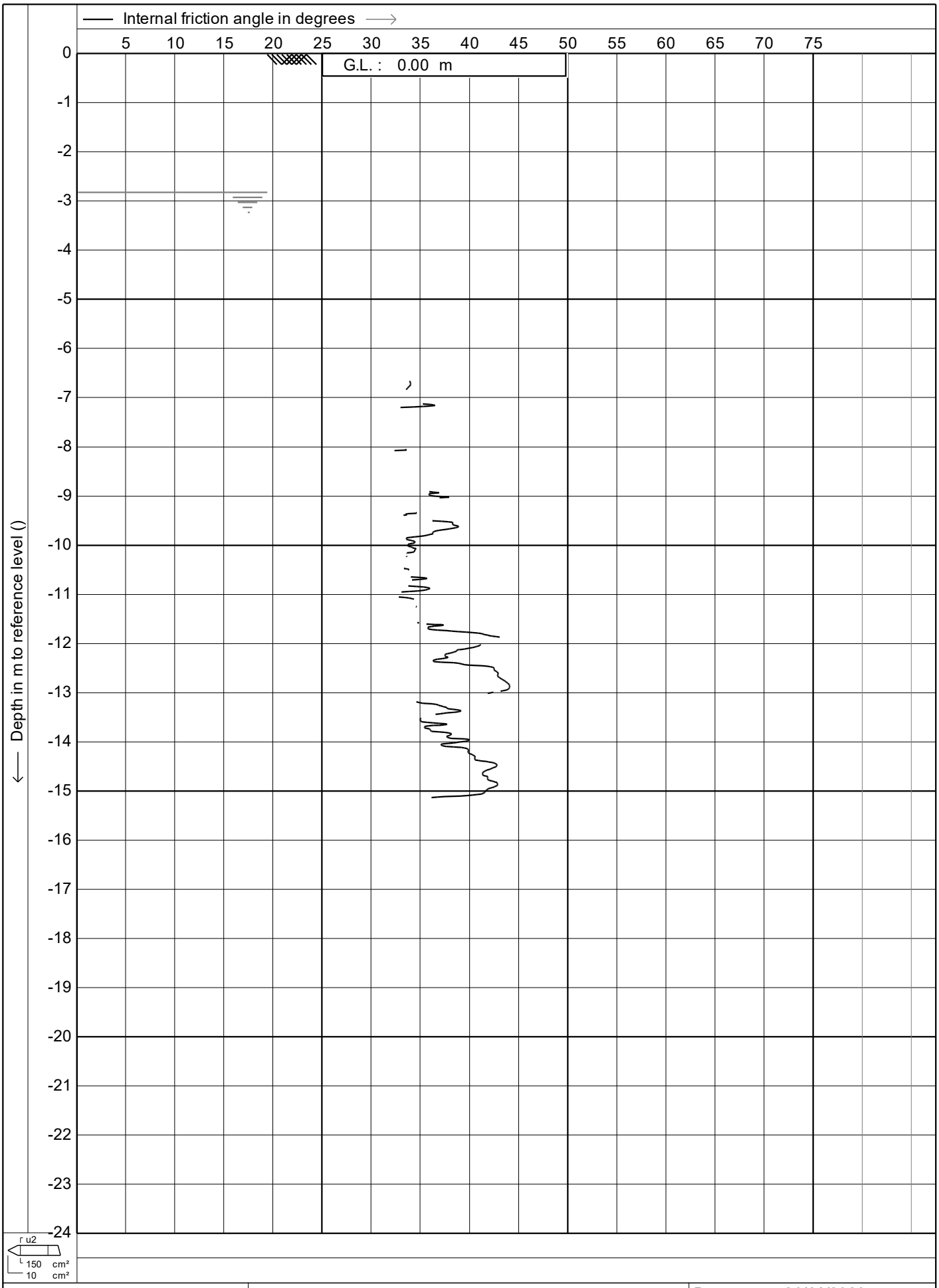
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

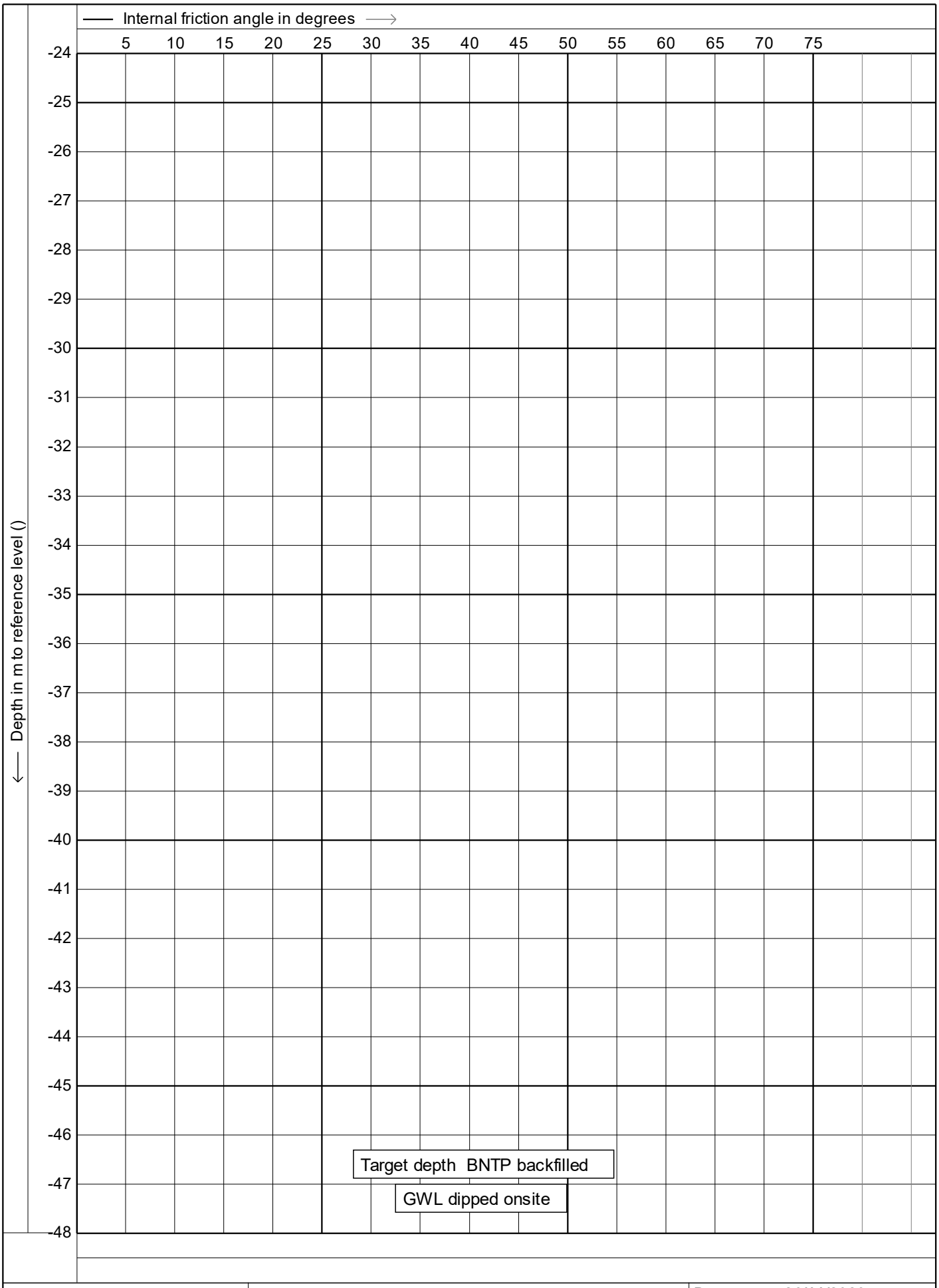
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **051** |

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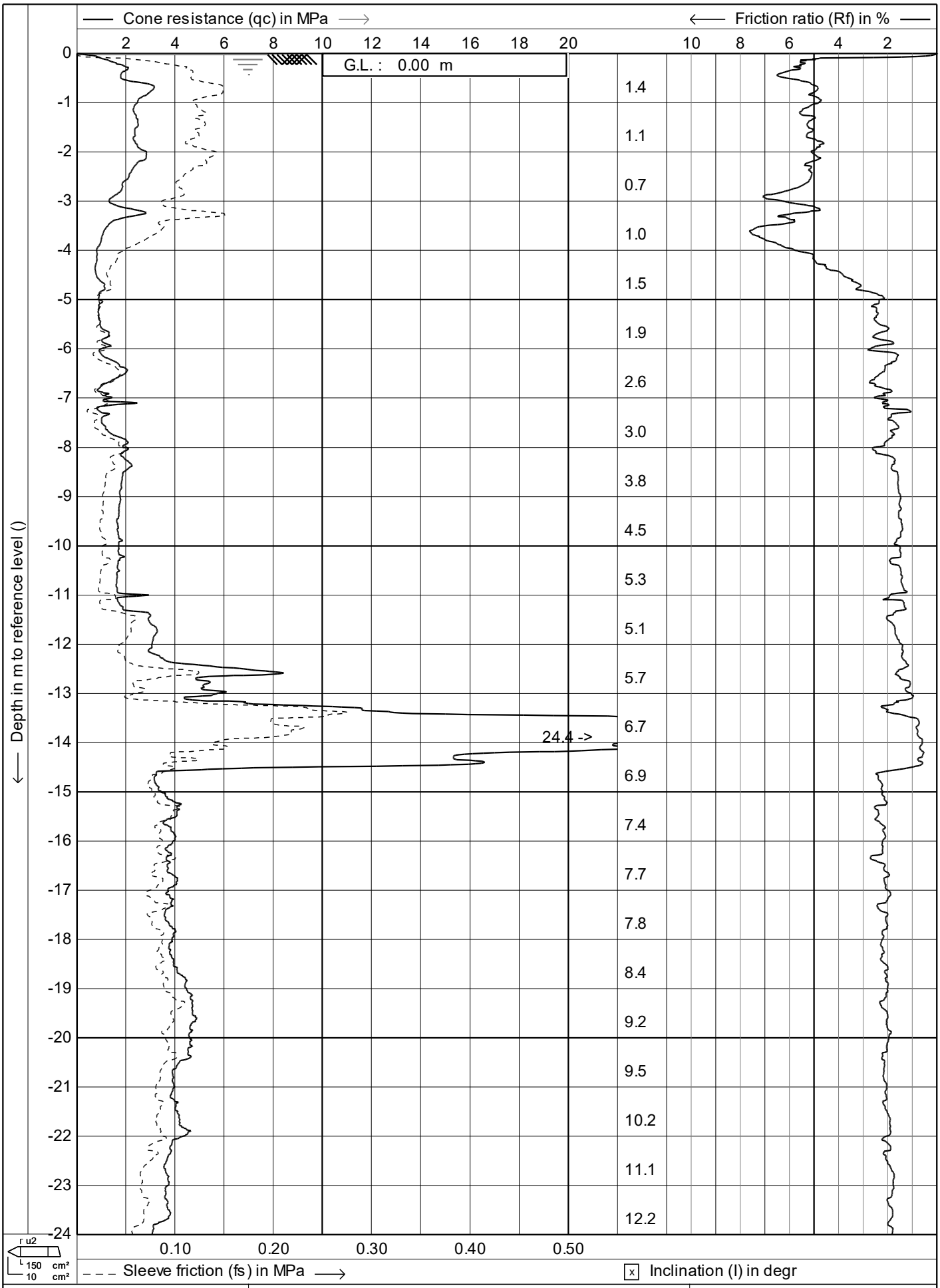
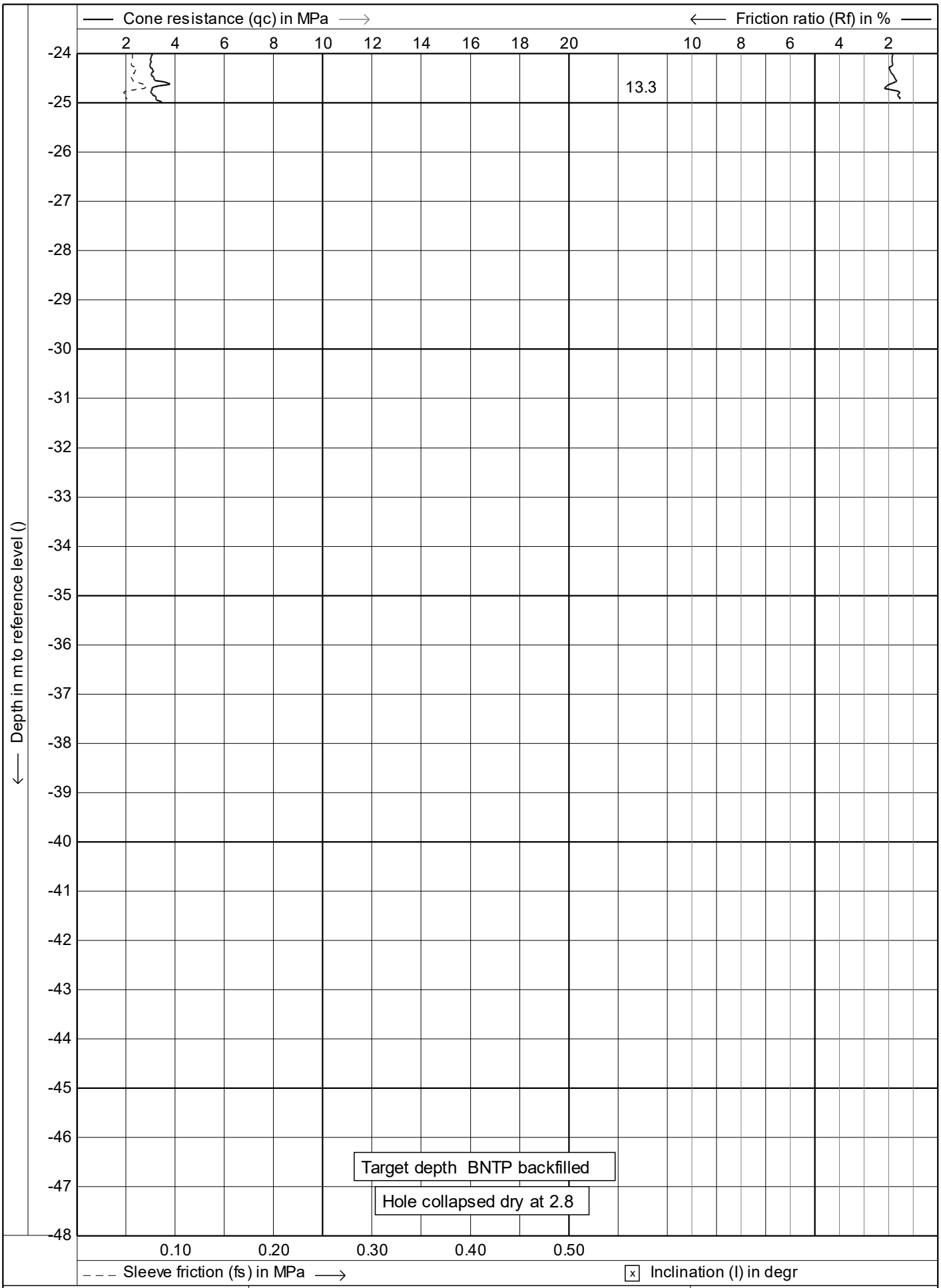
1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **052** 1/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

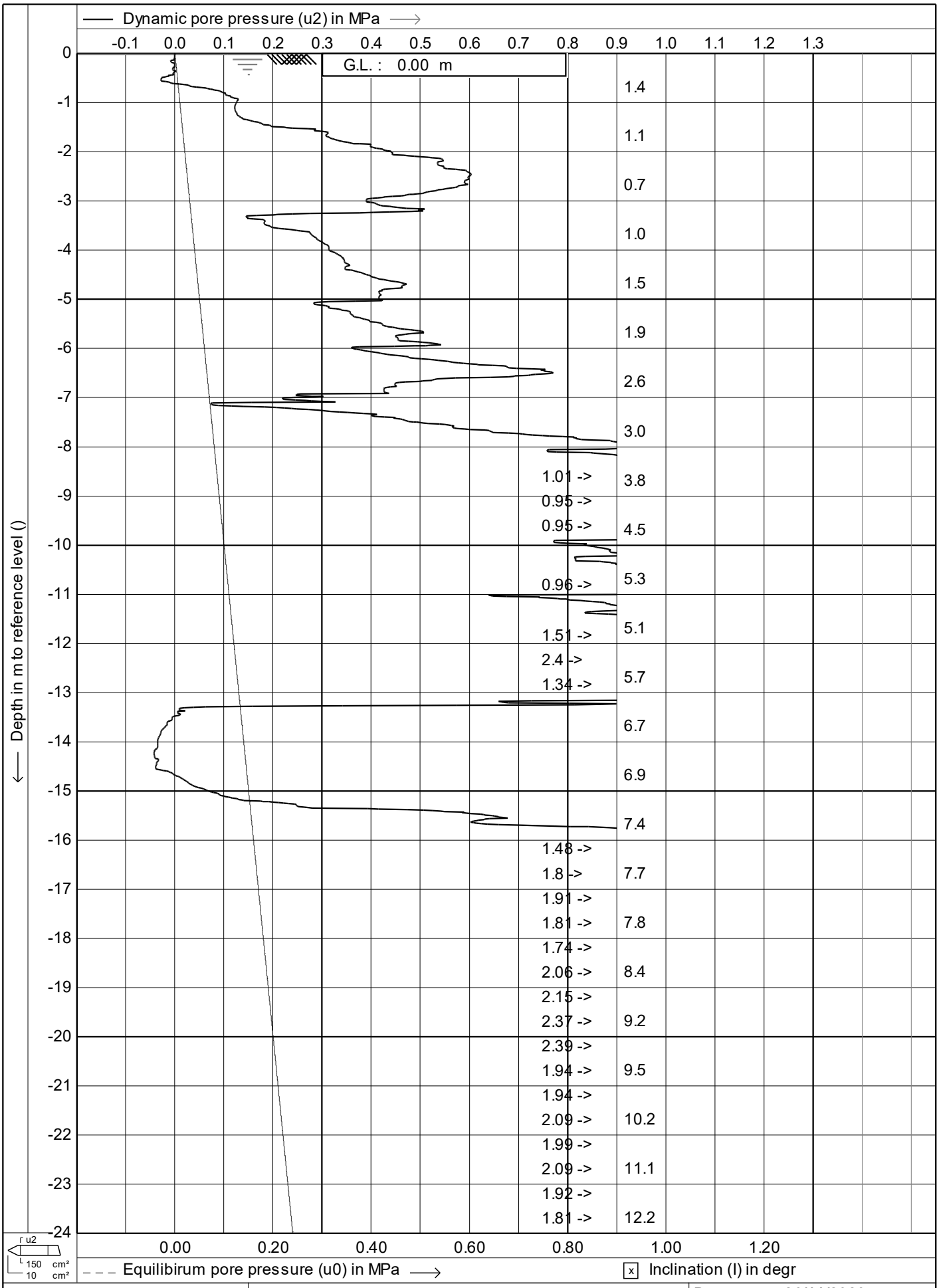
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

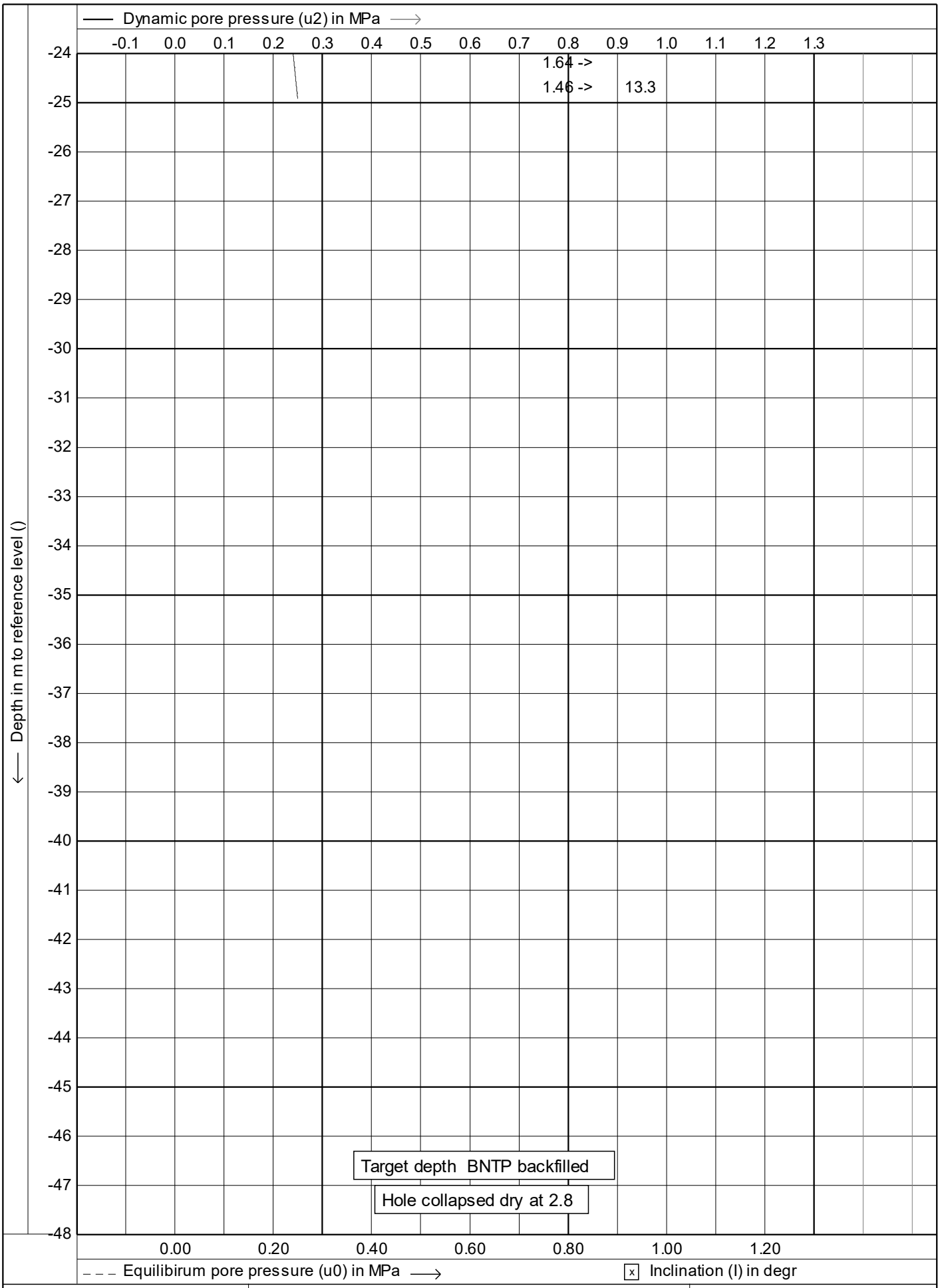


1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **052** 3/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

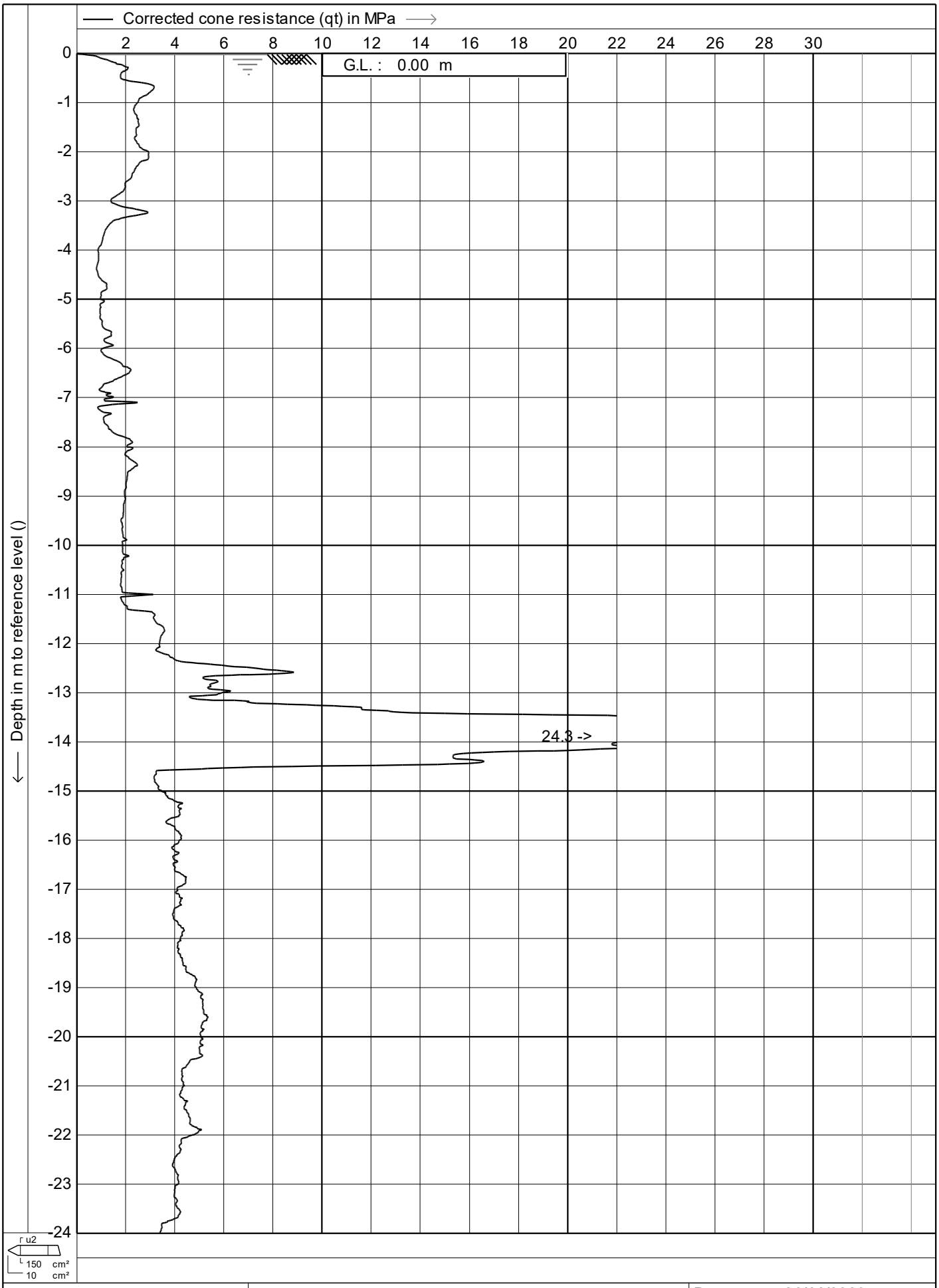
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**4/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

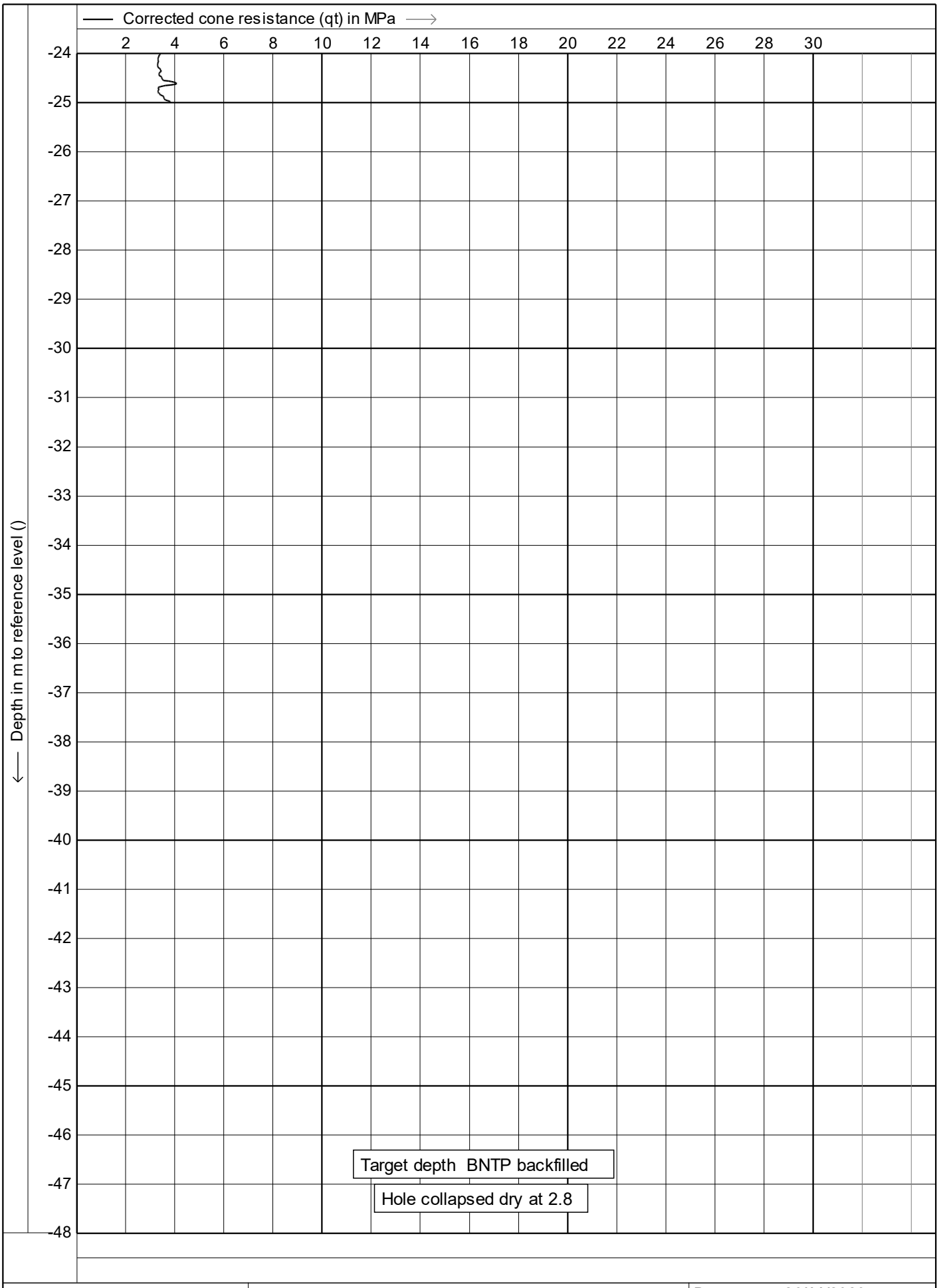
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**5/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

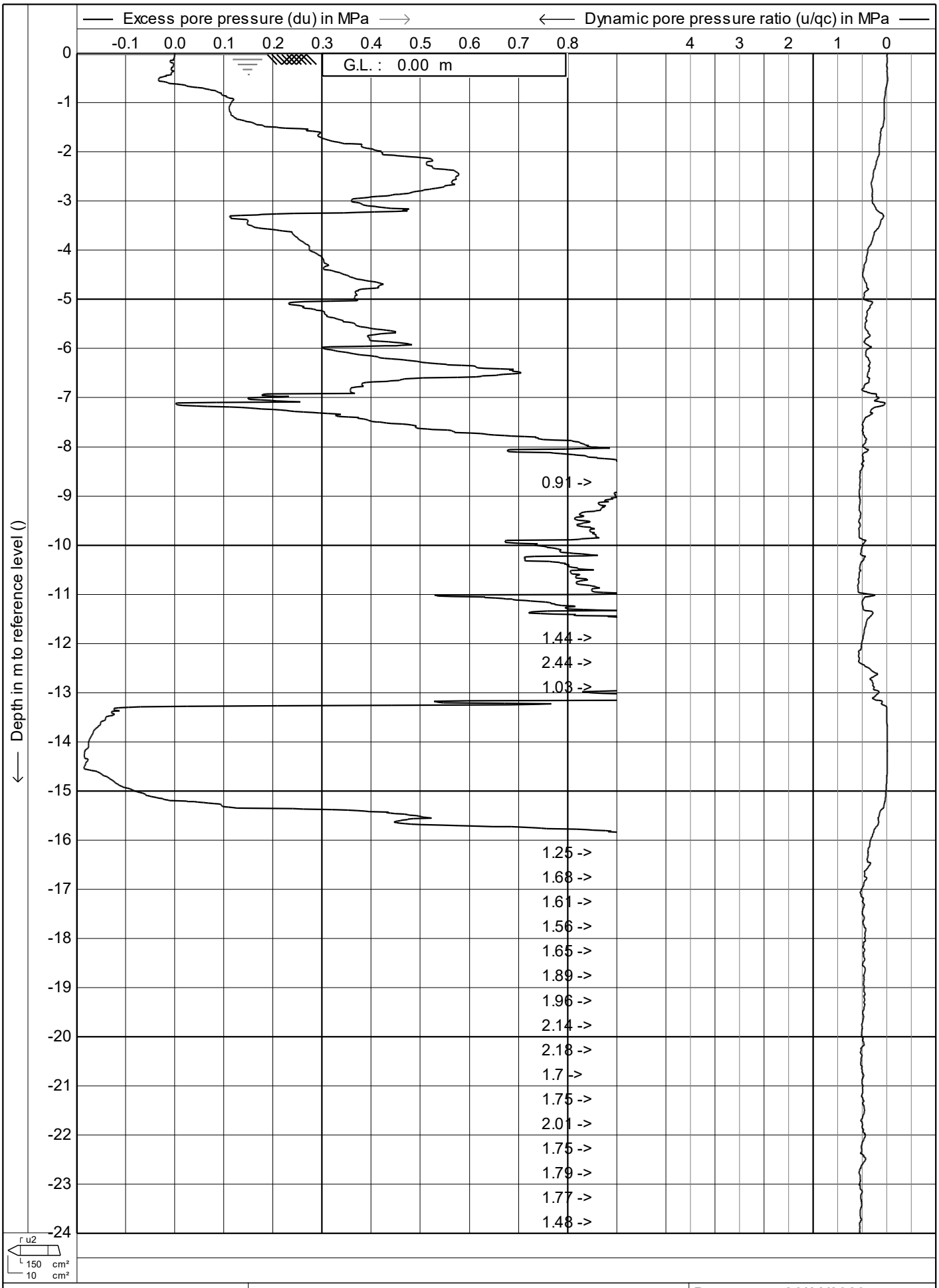
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**6/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

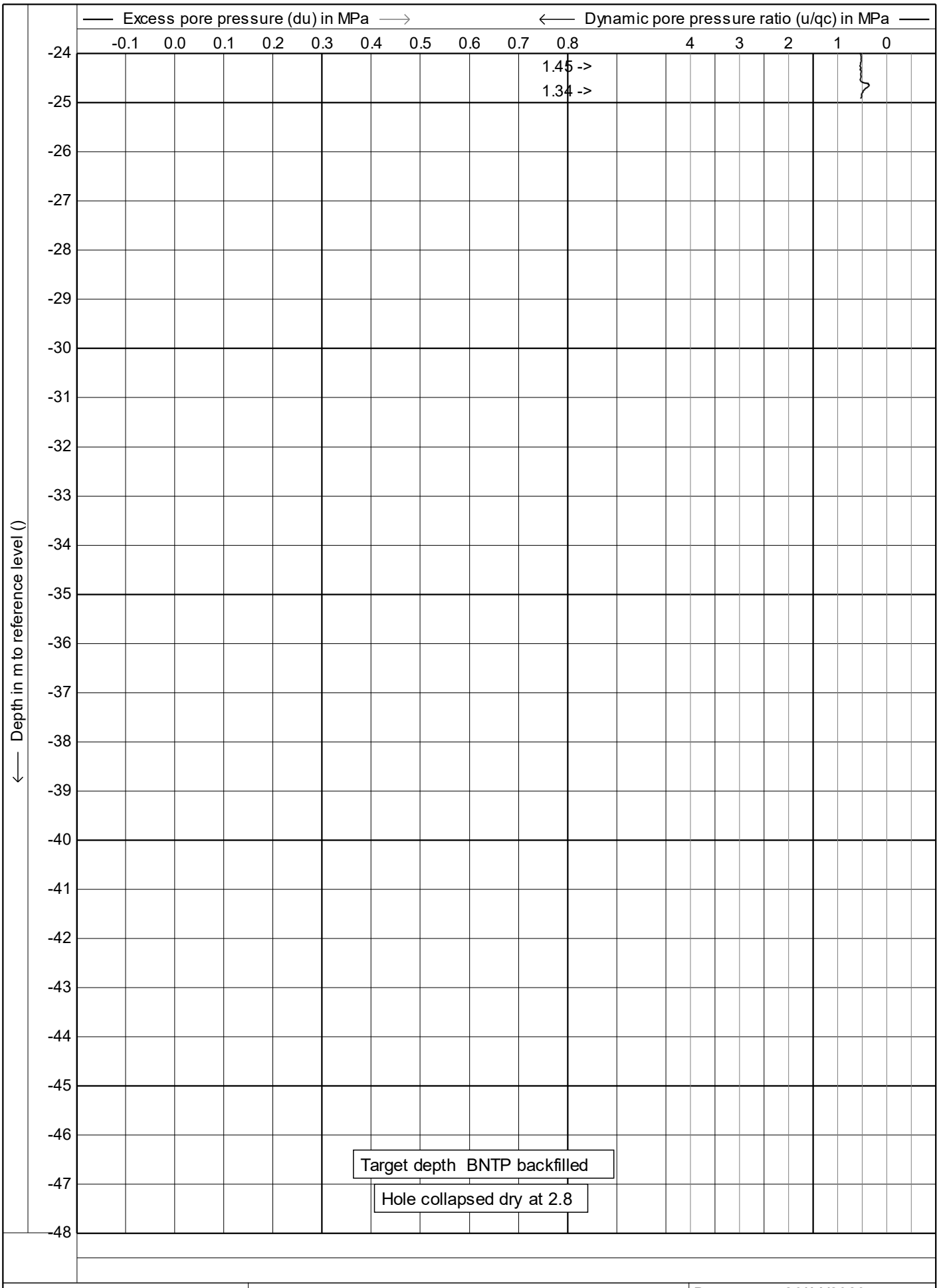
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

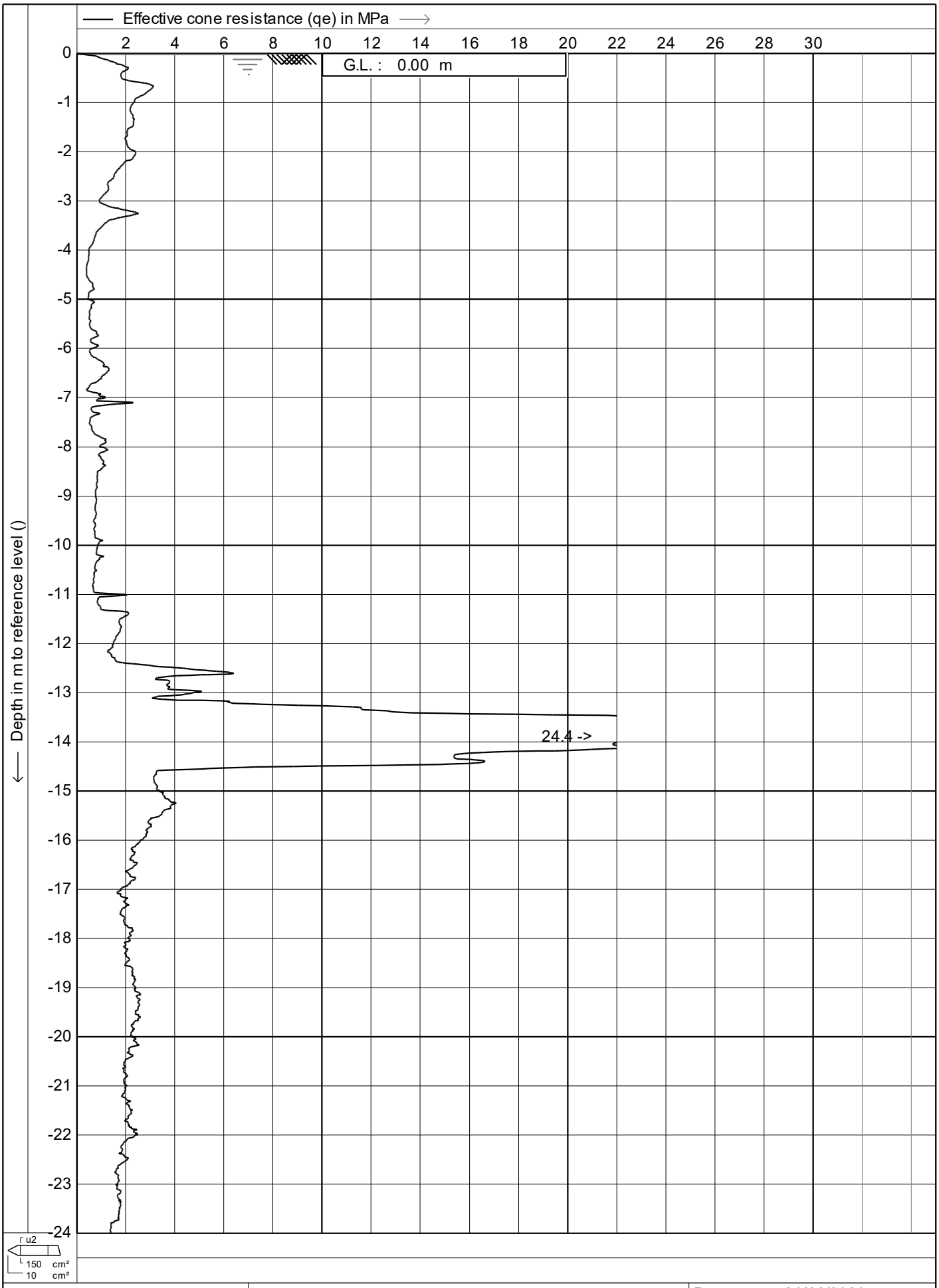
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

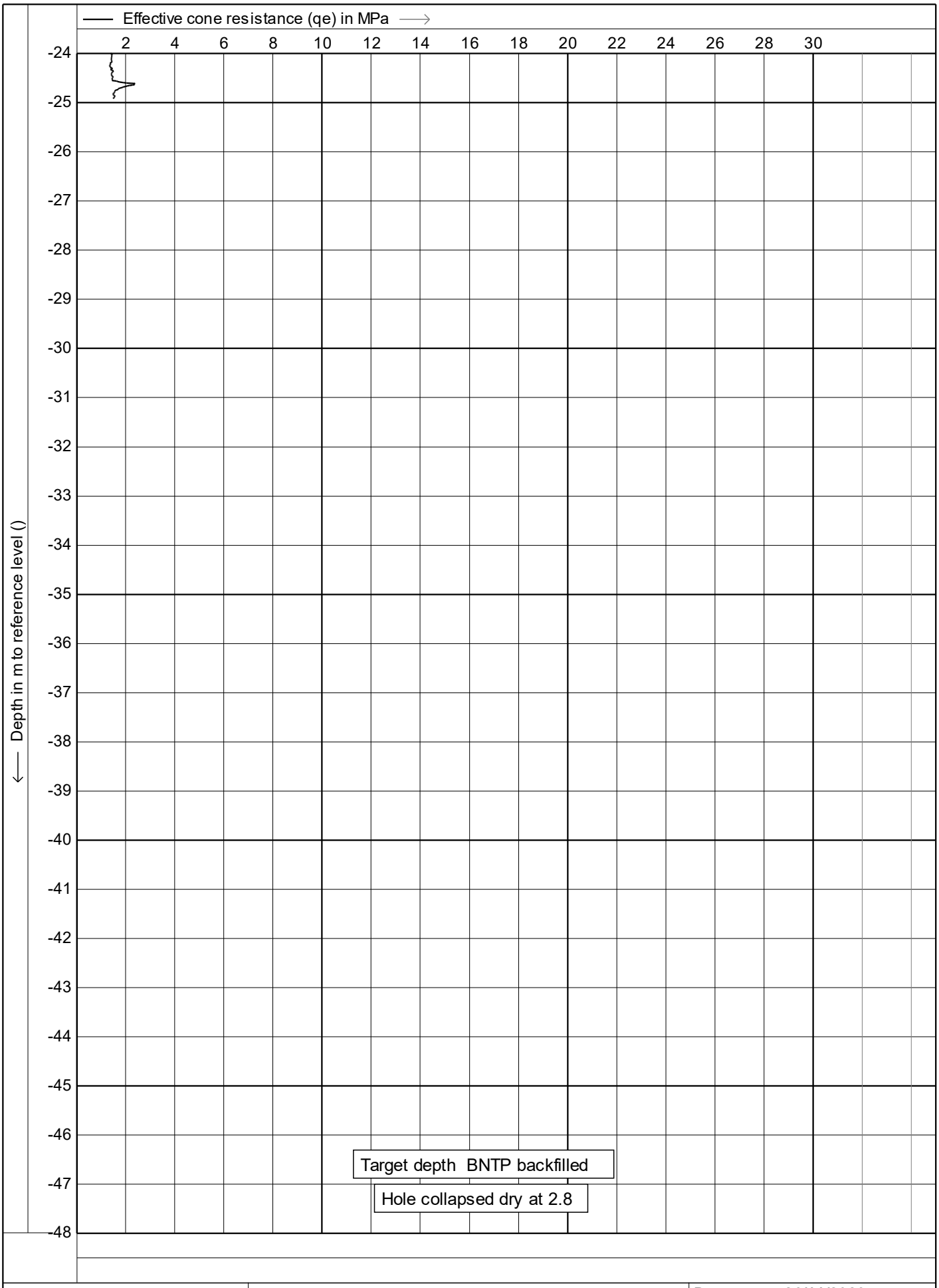
**8/28**

1.48




| | | | |
|---|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** | |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** | |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** | |
| | Position: **0, 0** | CPT no. : **052** | **9/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

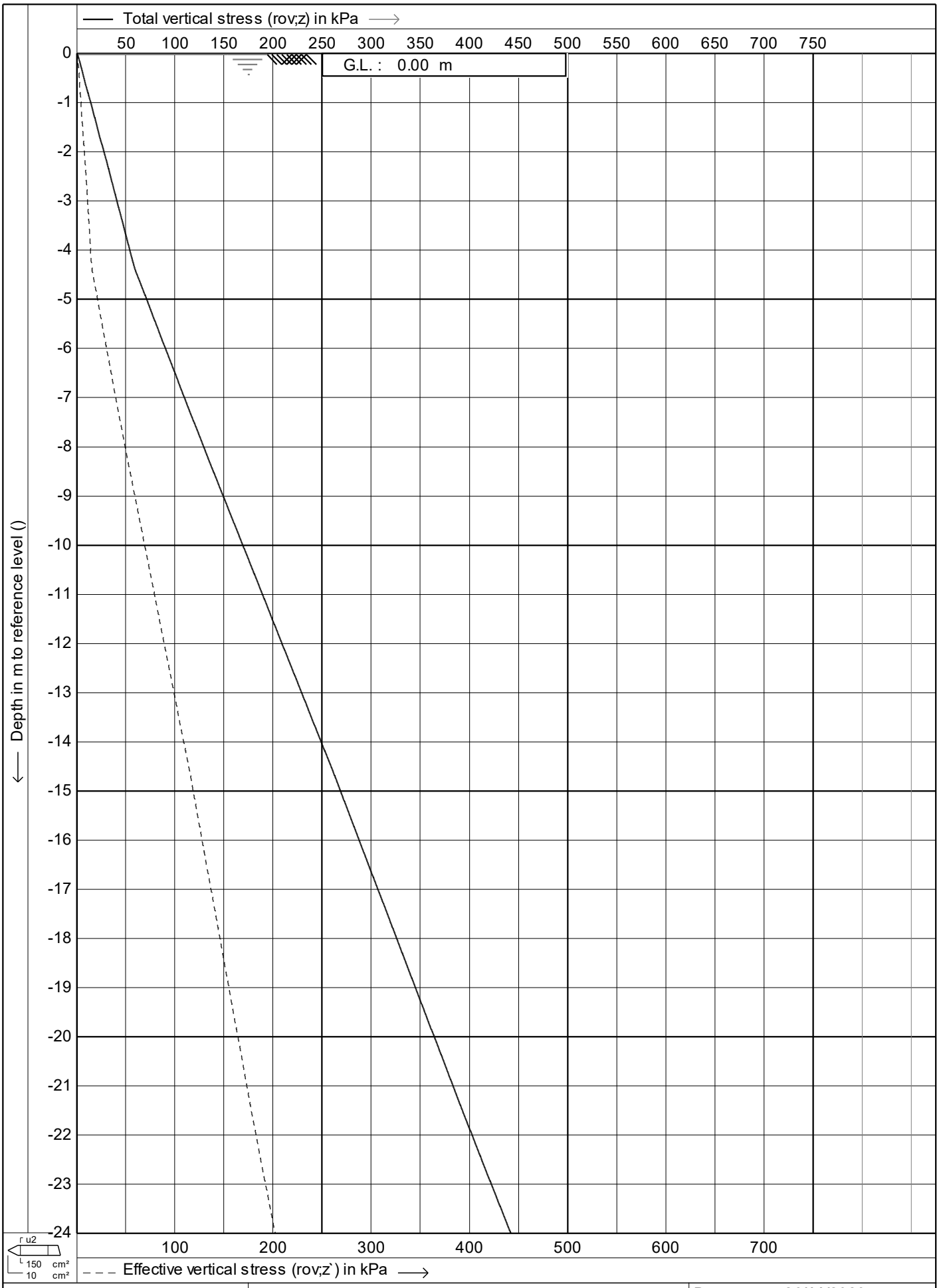
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**10/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

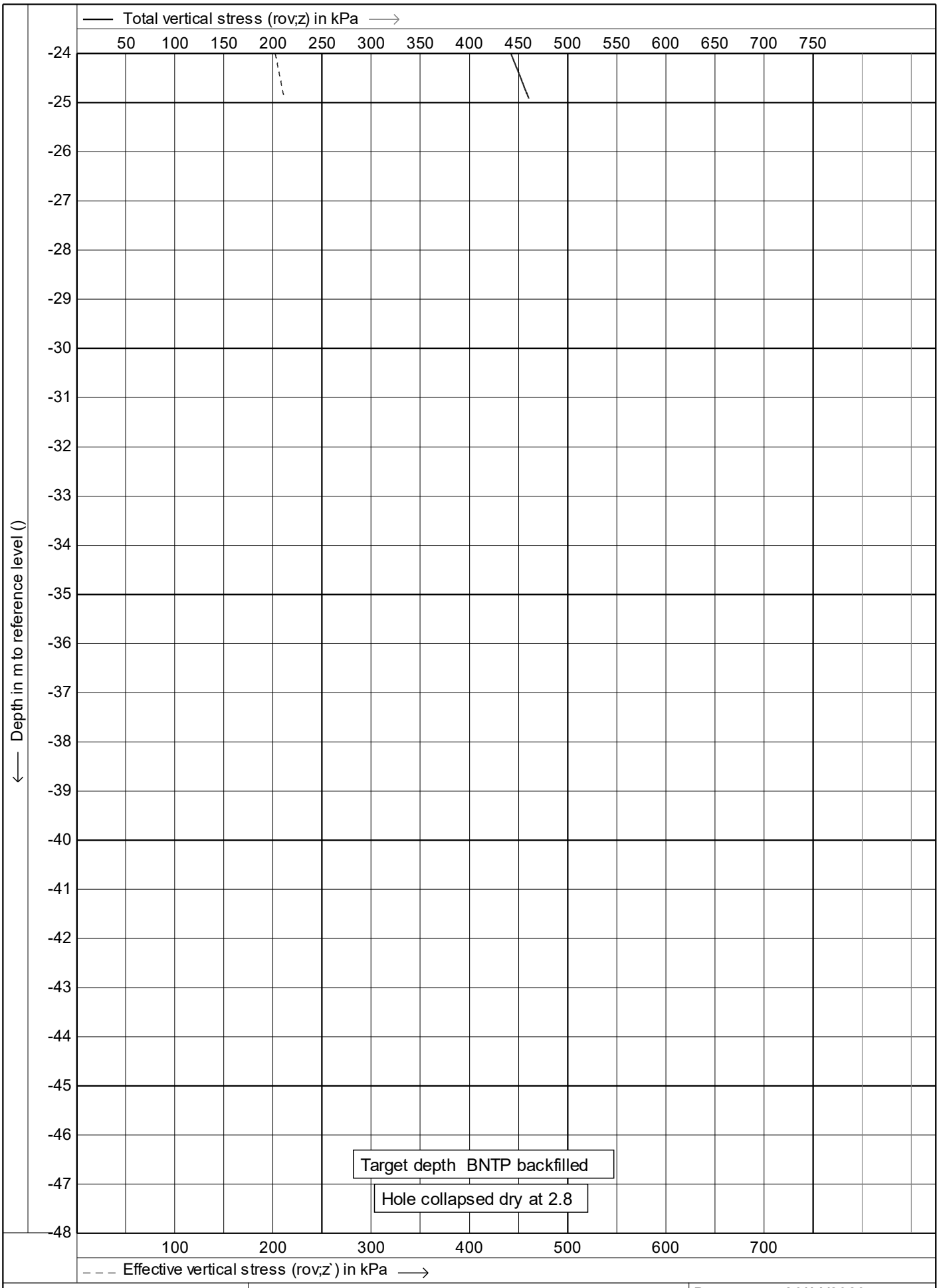
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**11/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

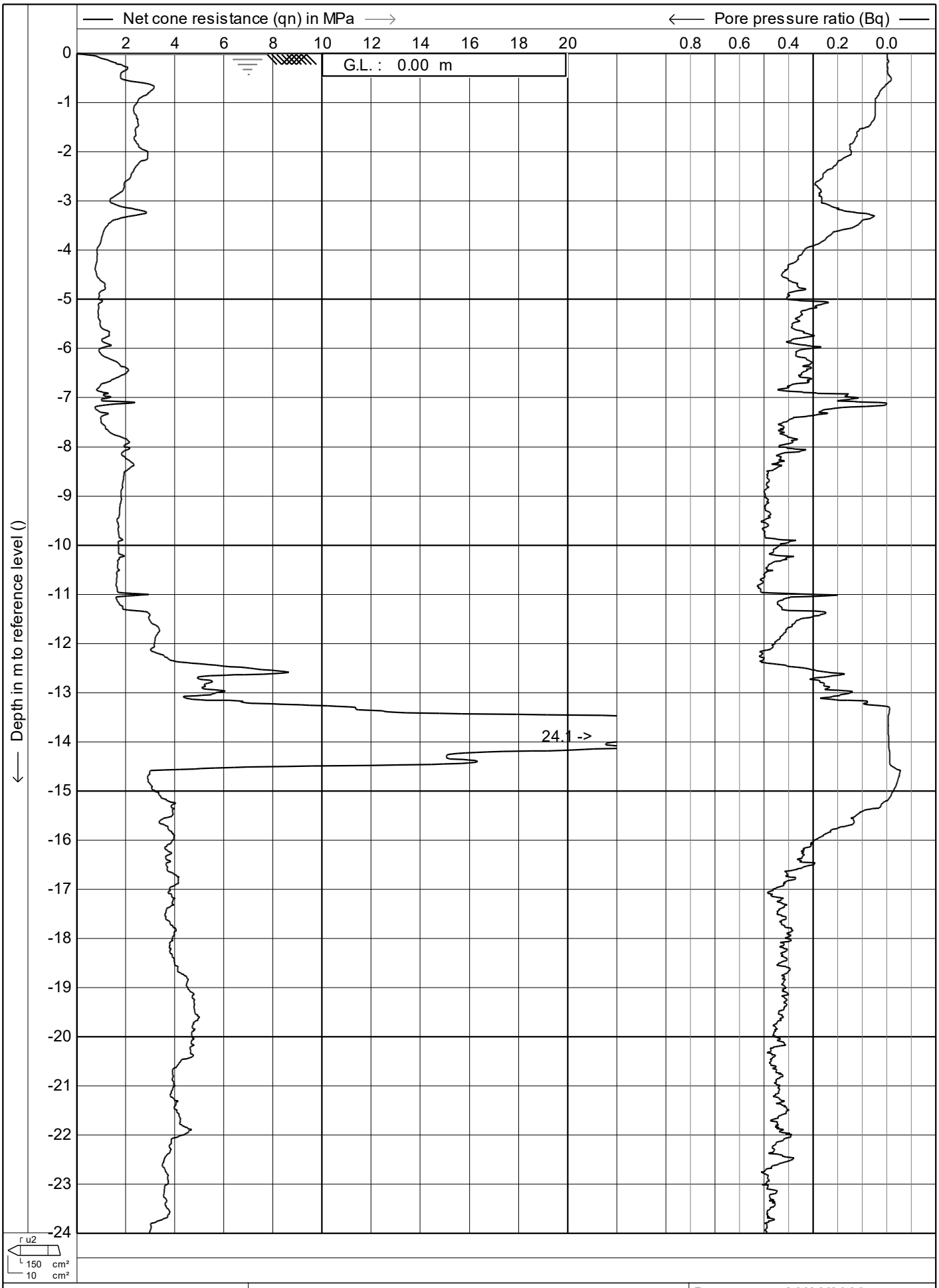
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

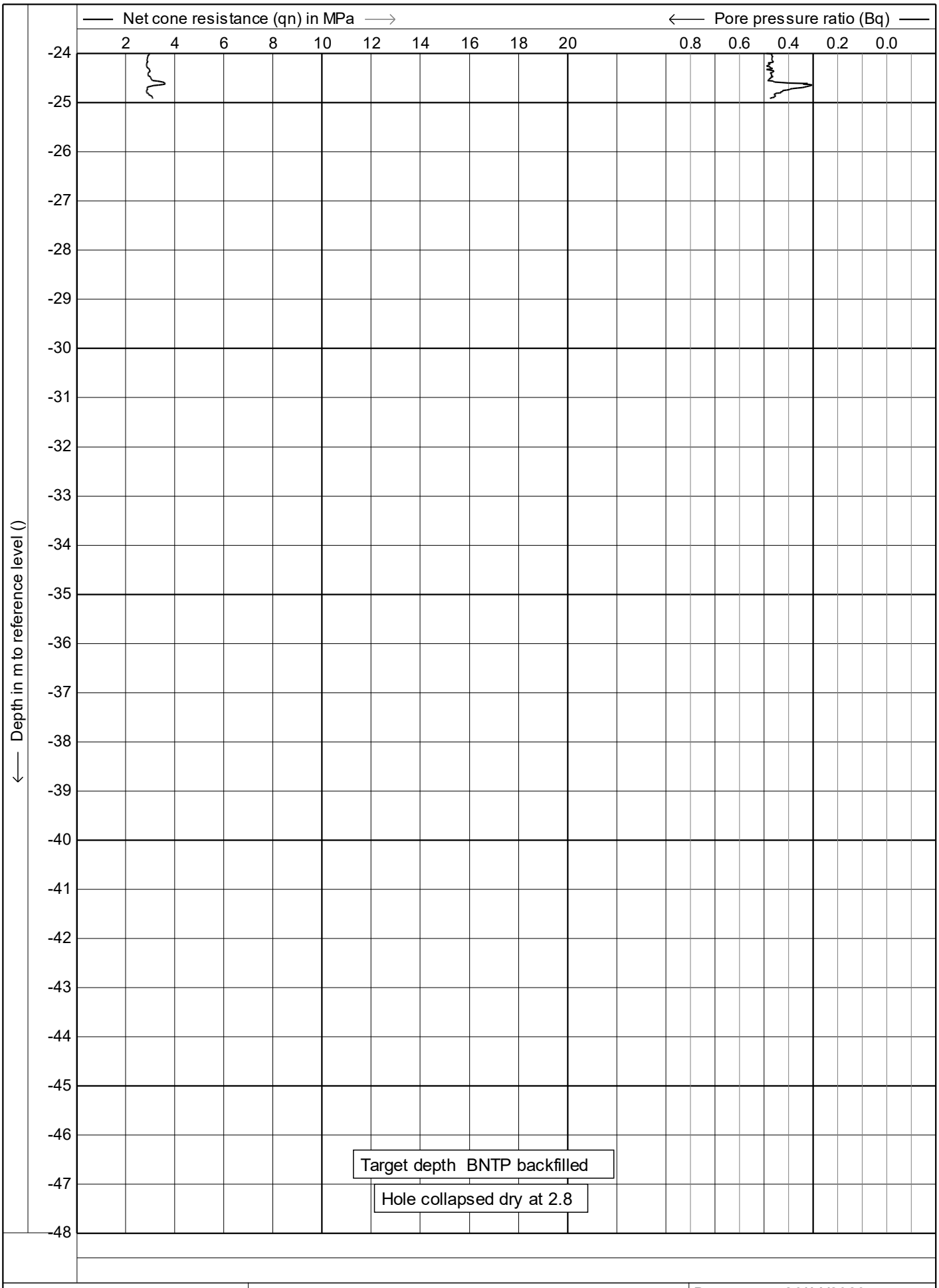
**12/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **052** — **13/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

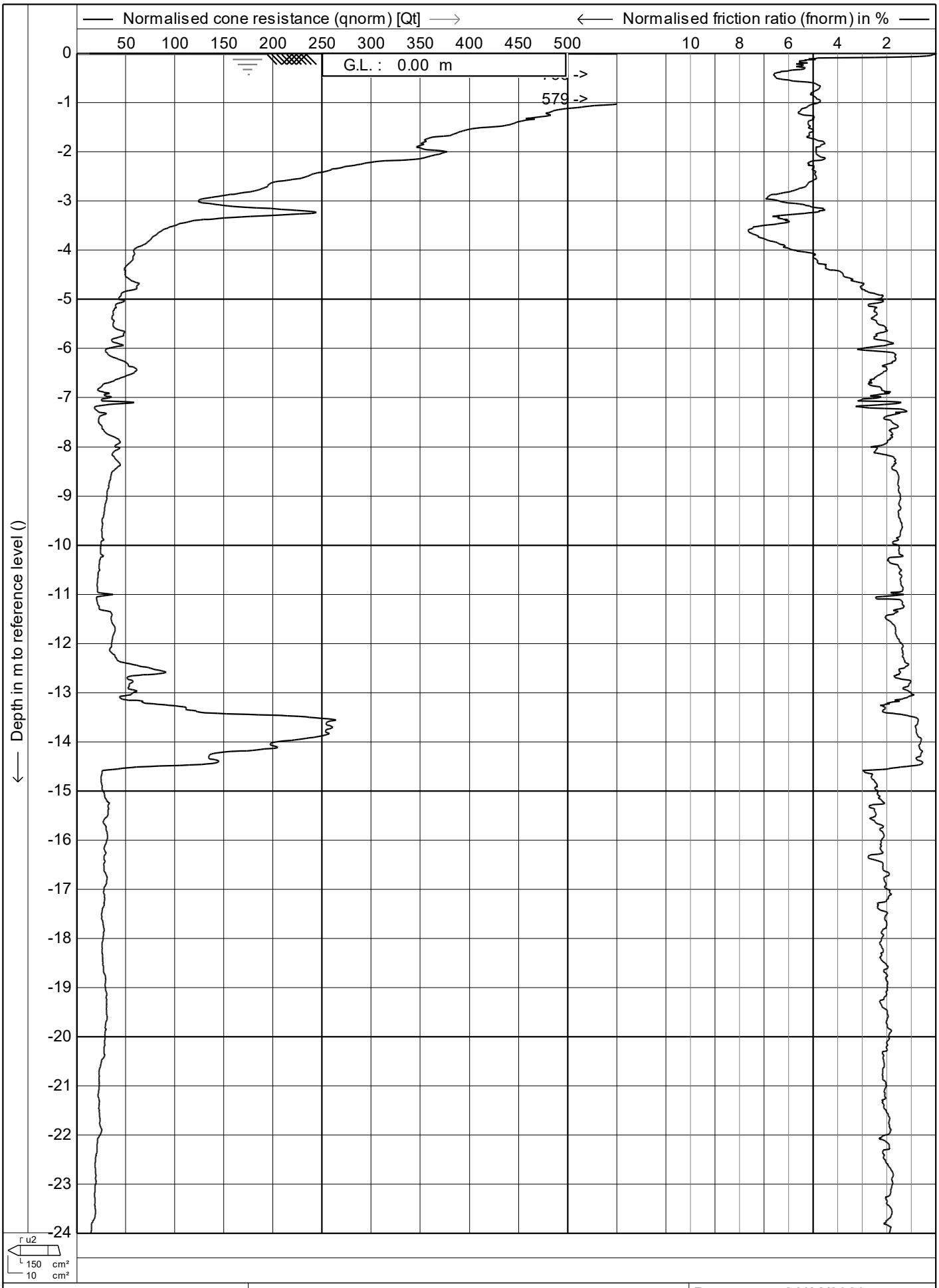
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**14/28**

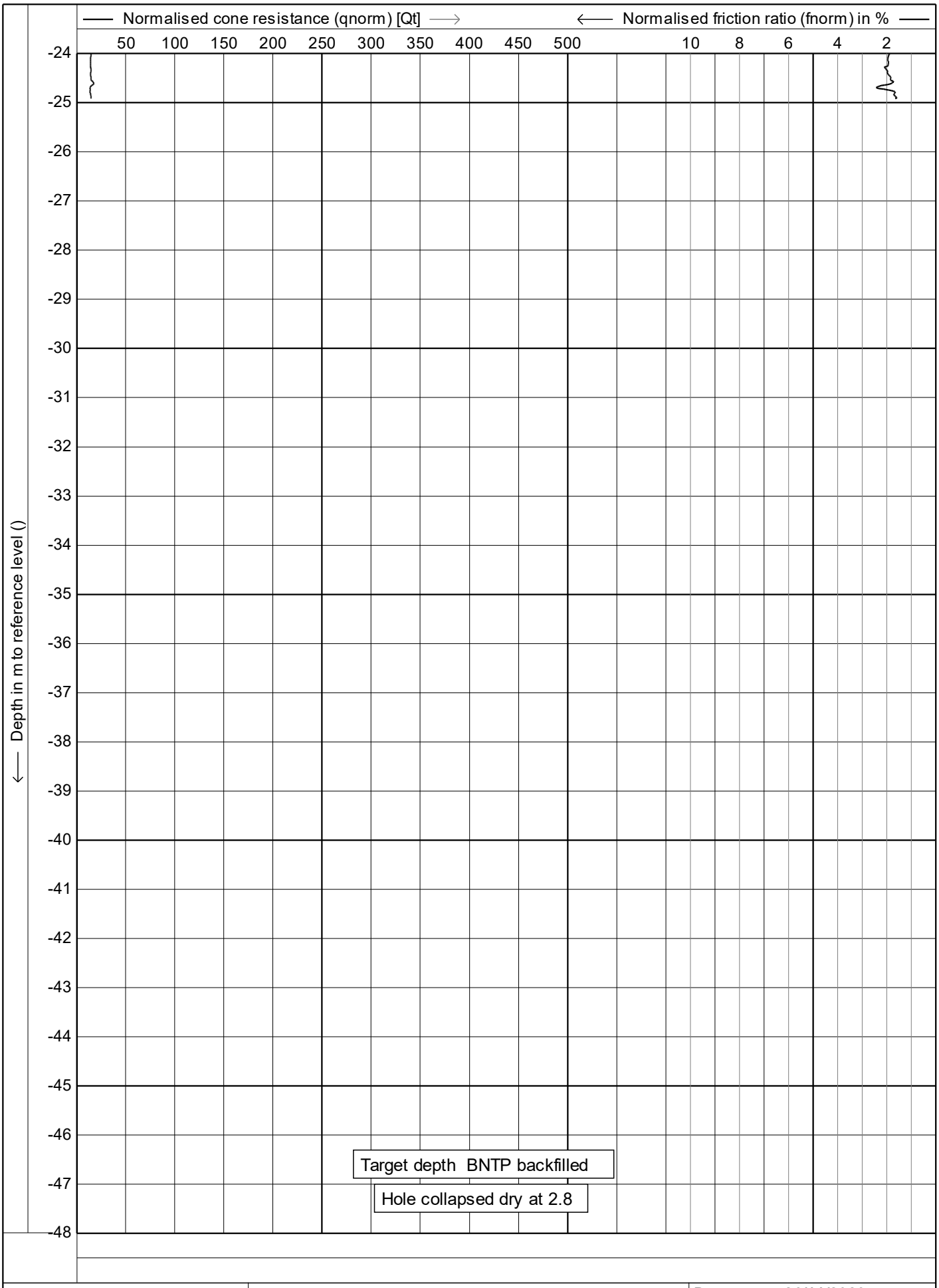
1.48




| | | | |
|---|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date | : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. | : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. | : **05AU7** |
| | Position: **0, 0** | CPT no. | : **052** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

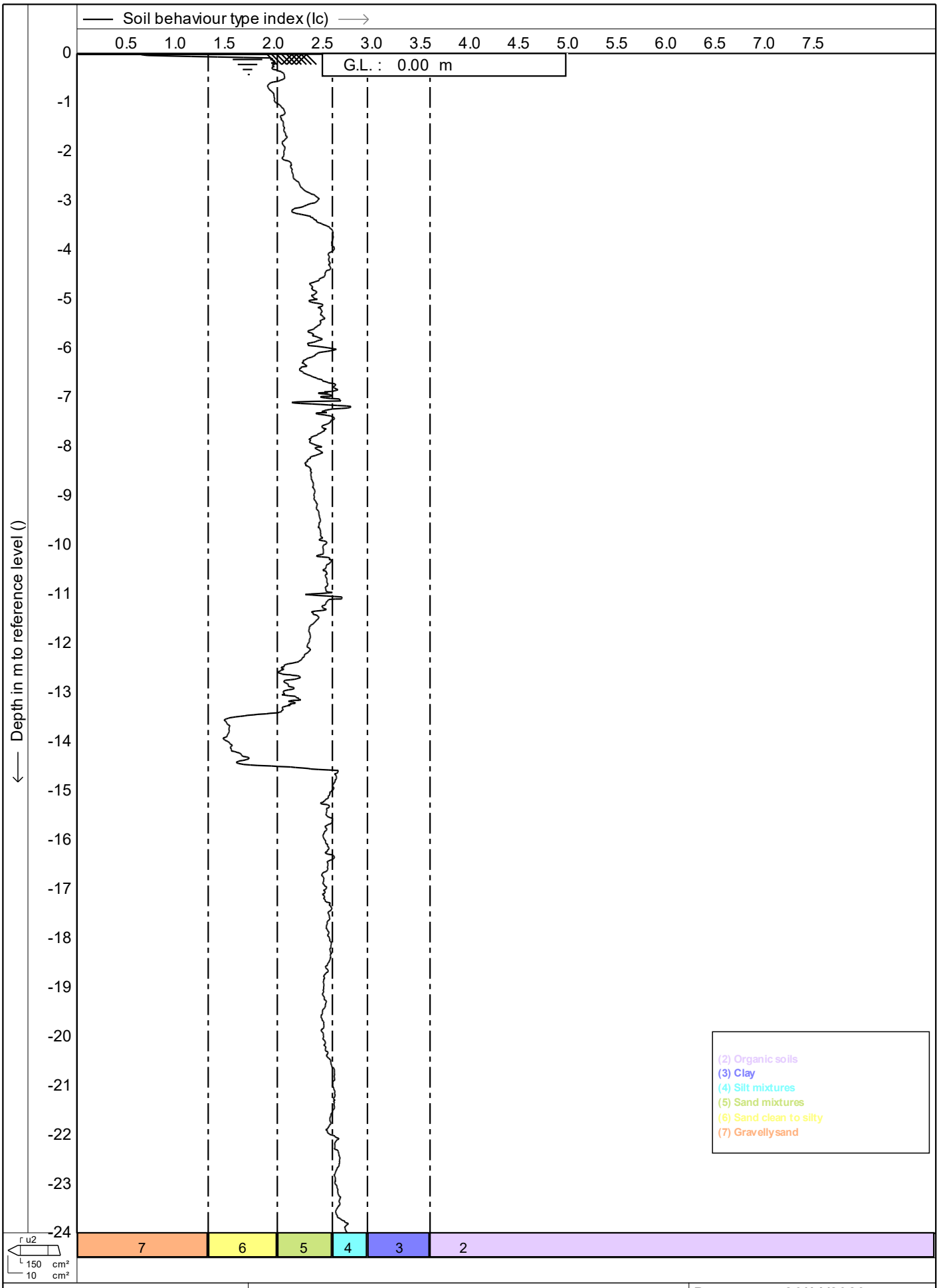
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**16/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

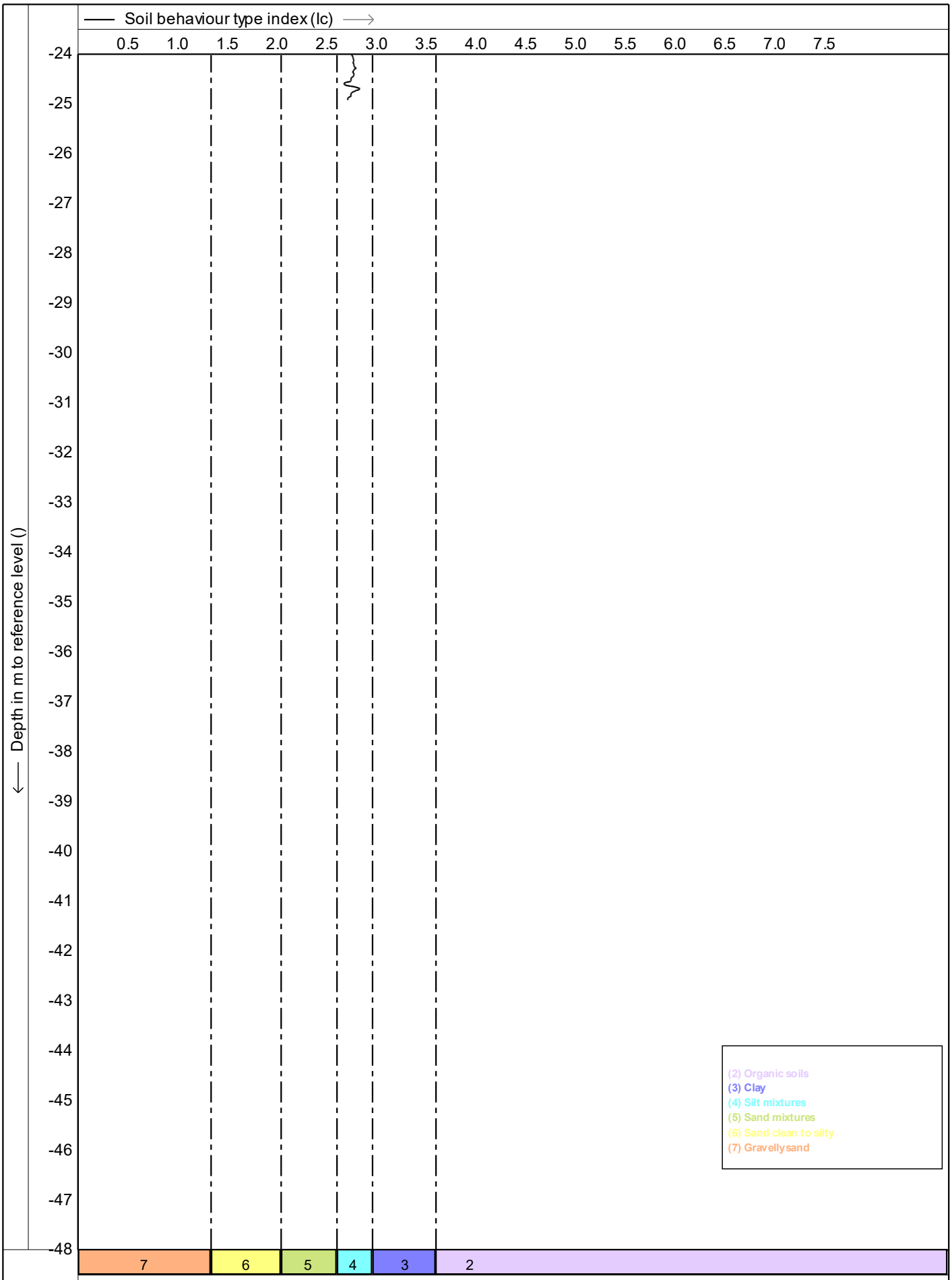
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**17/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

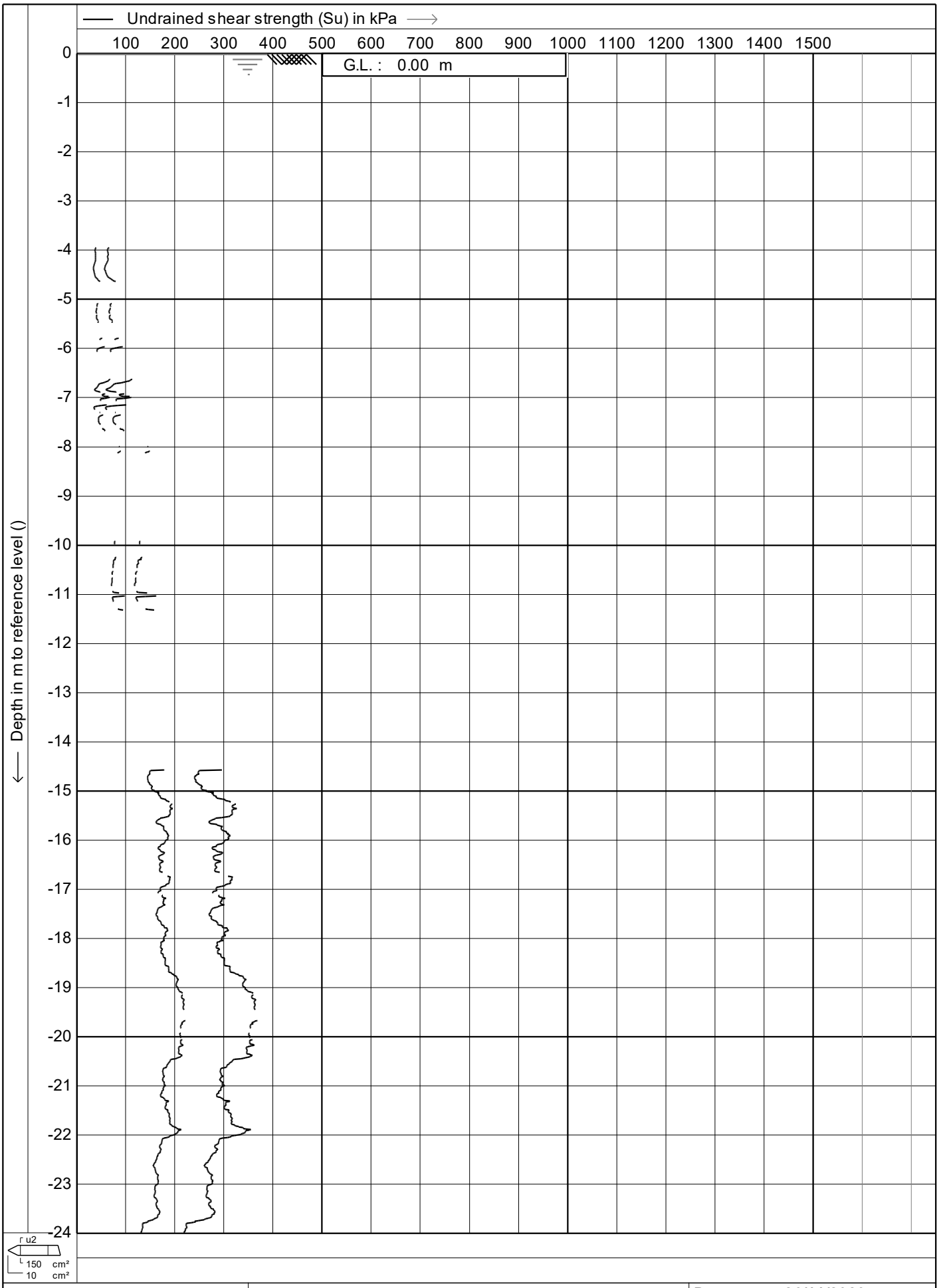
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

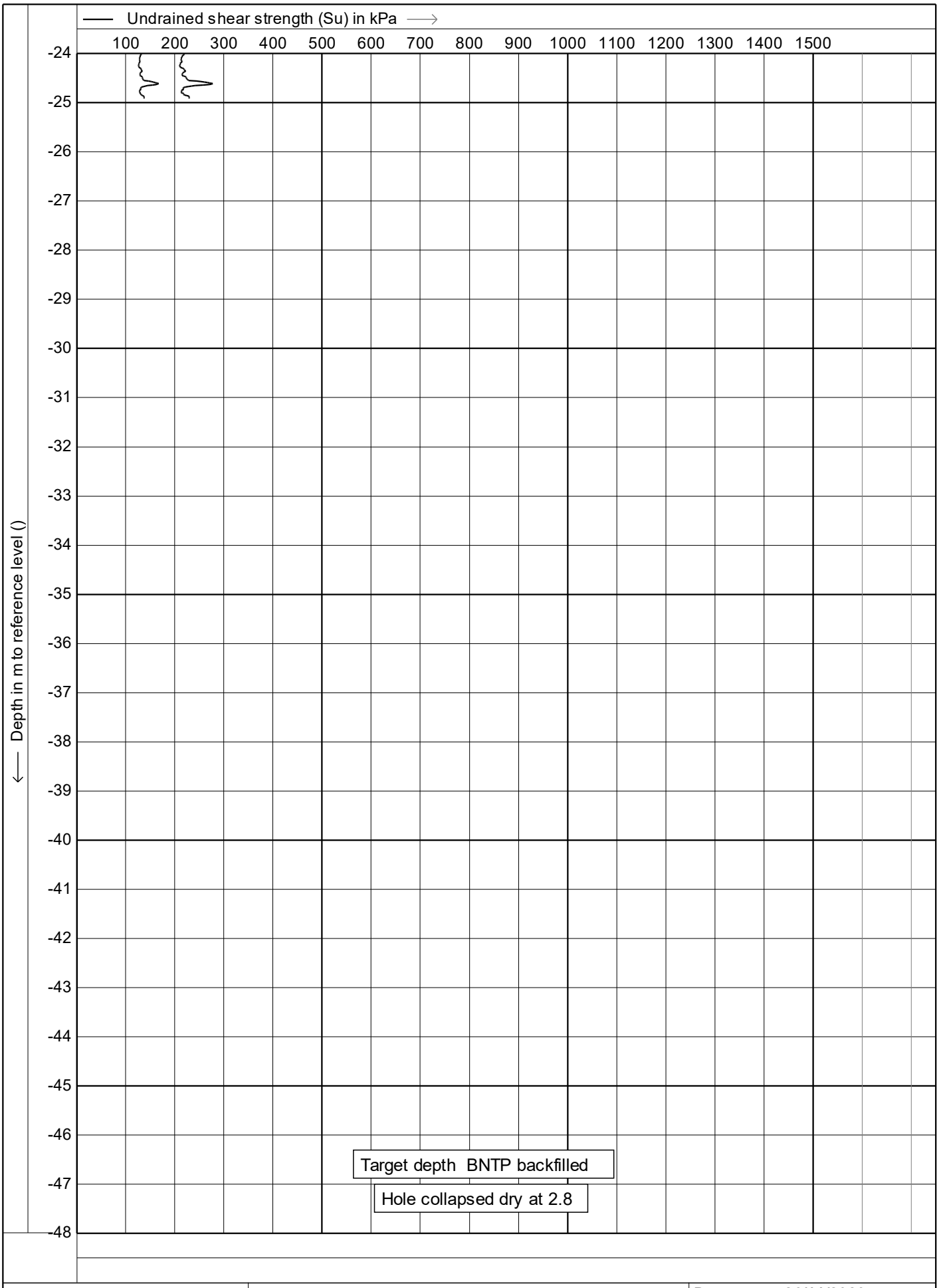
**18/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **052** — **19/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

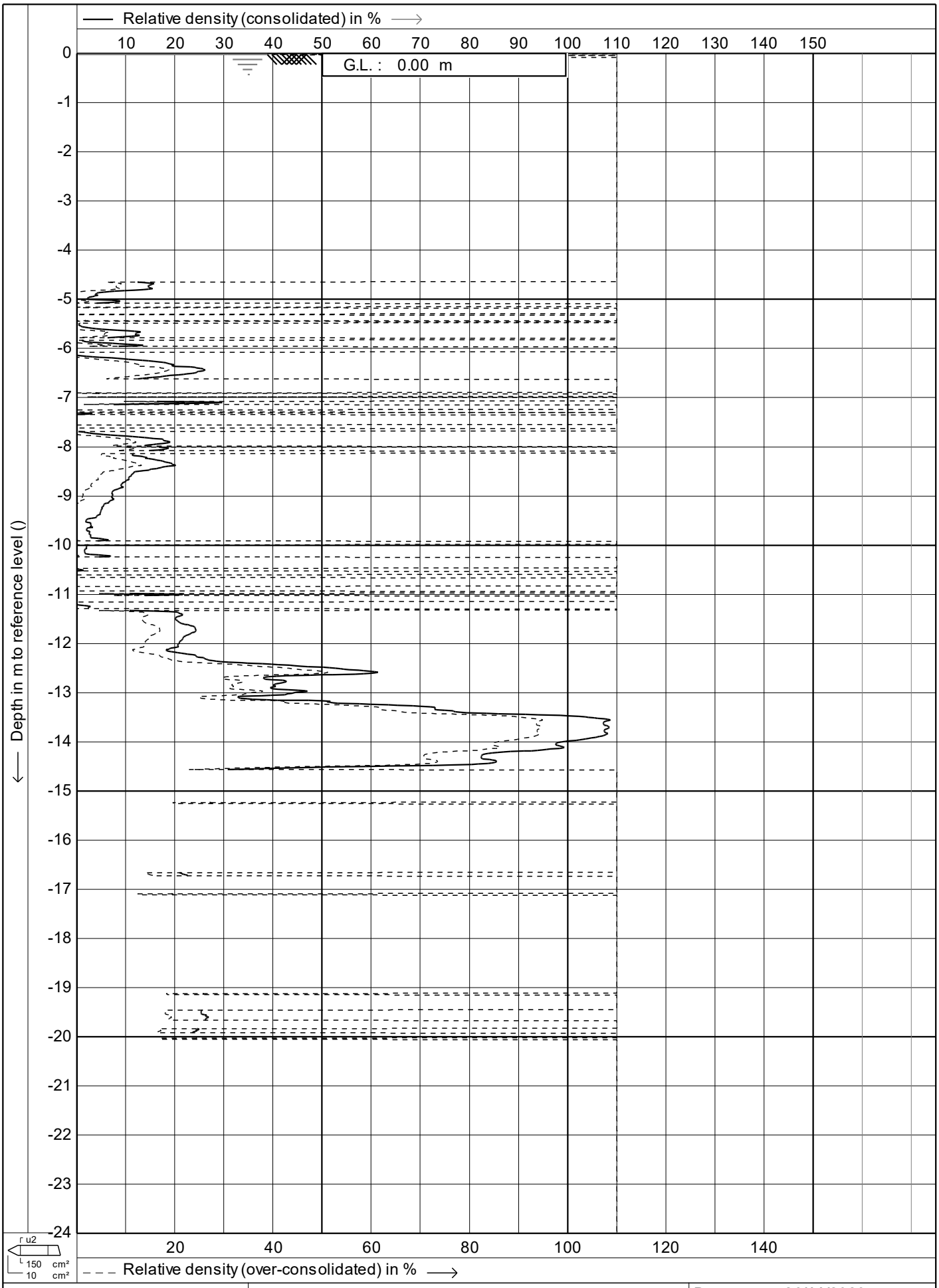
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

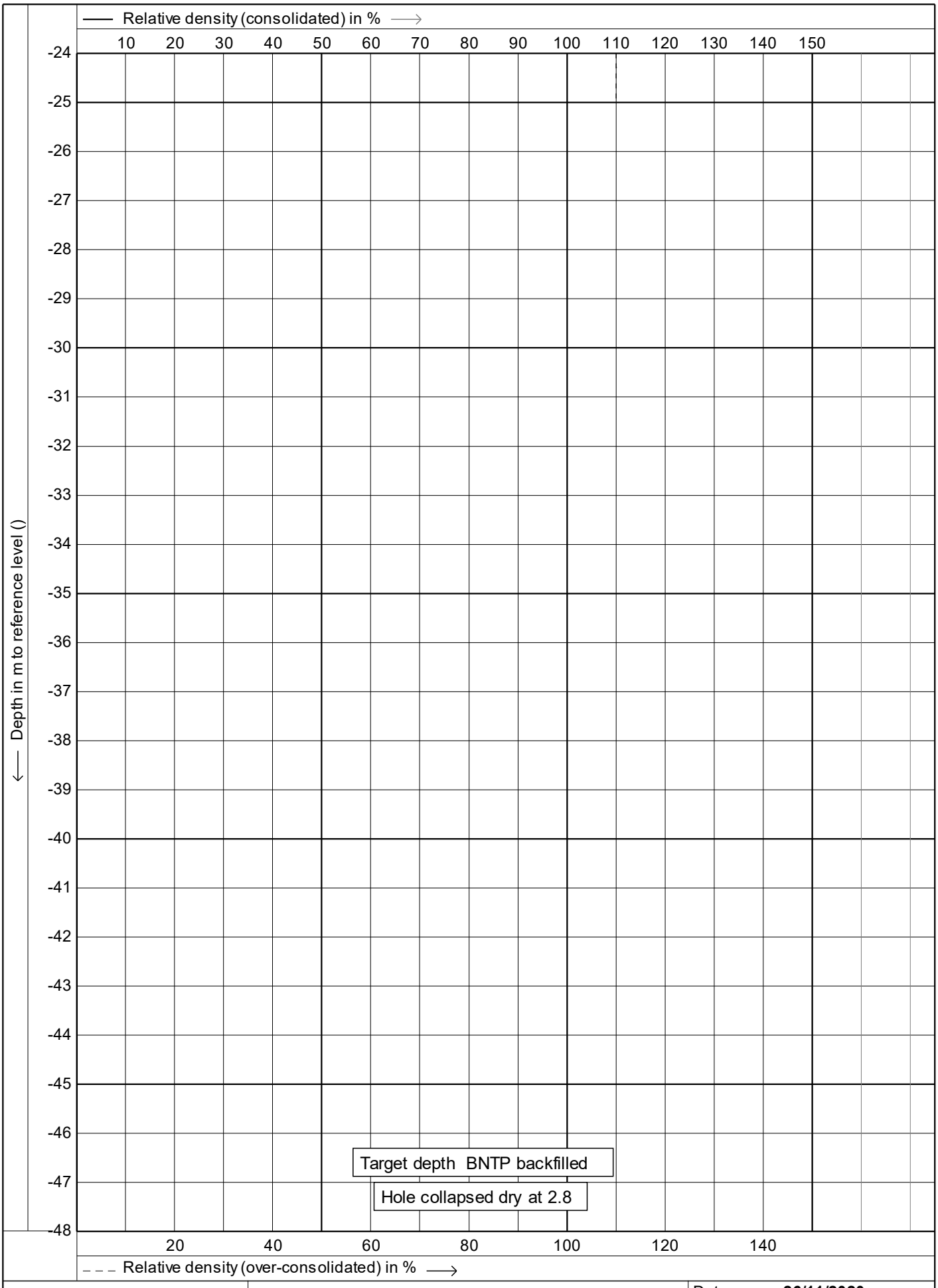
**20/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **052** — **21/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

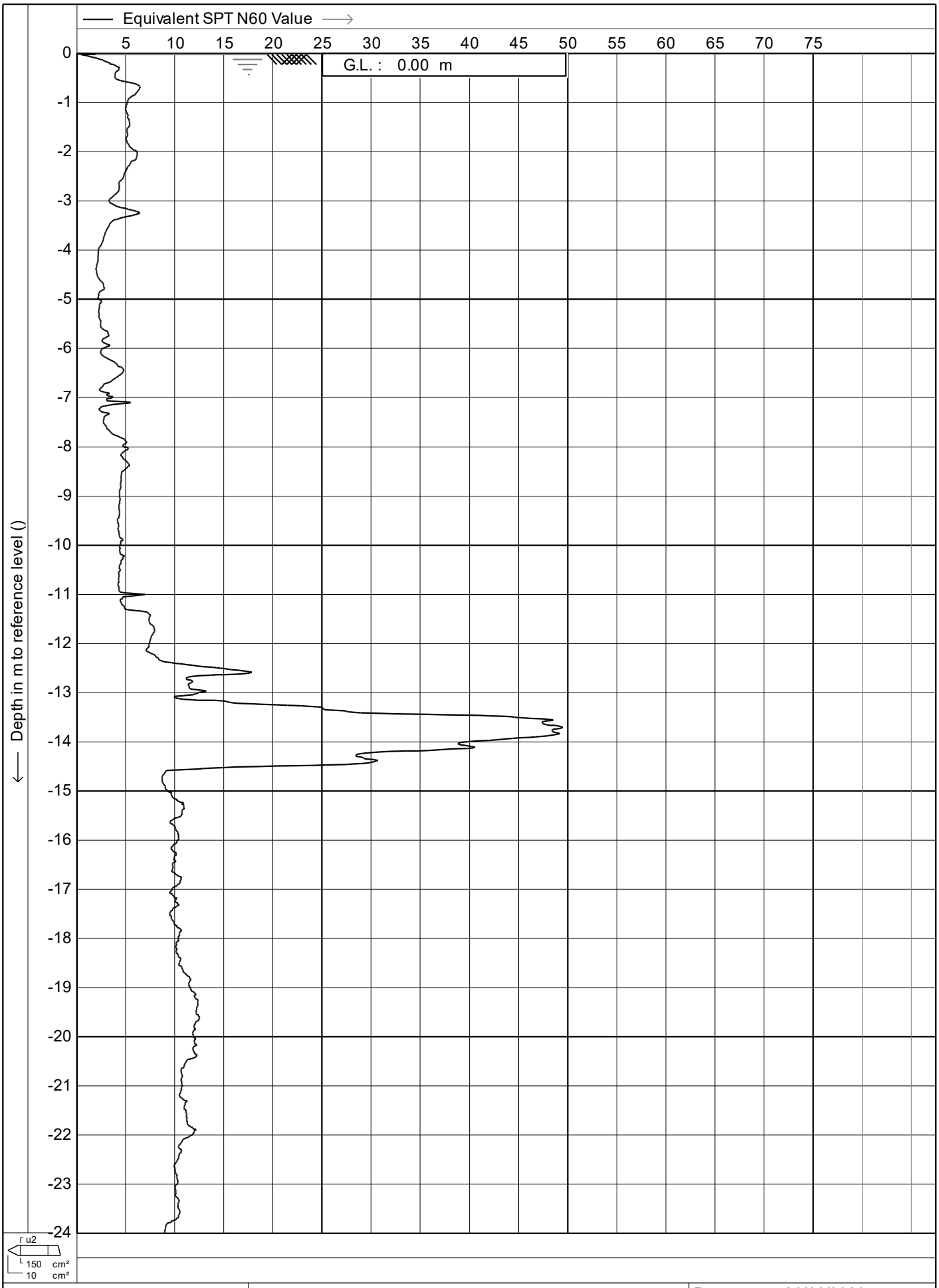
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**22/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

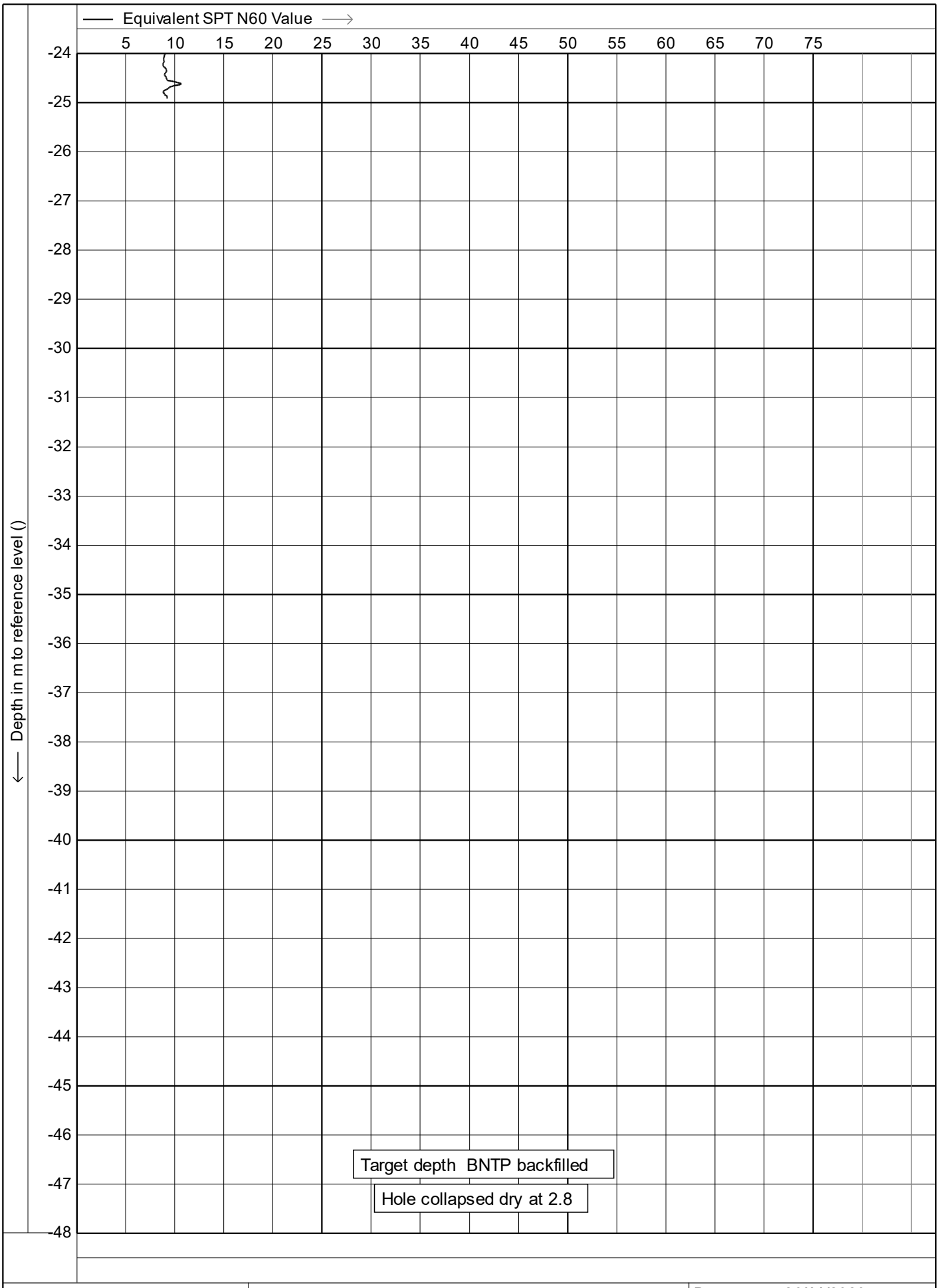
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**23/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

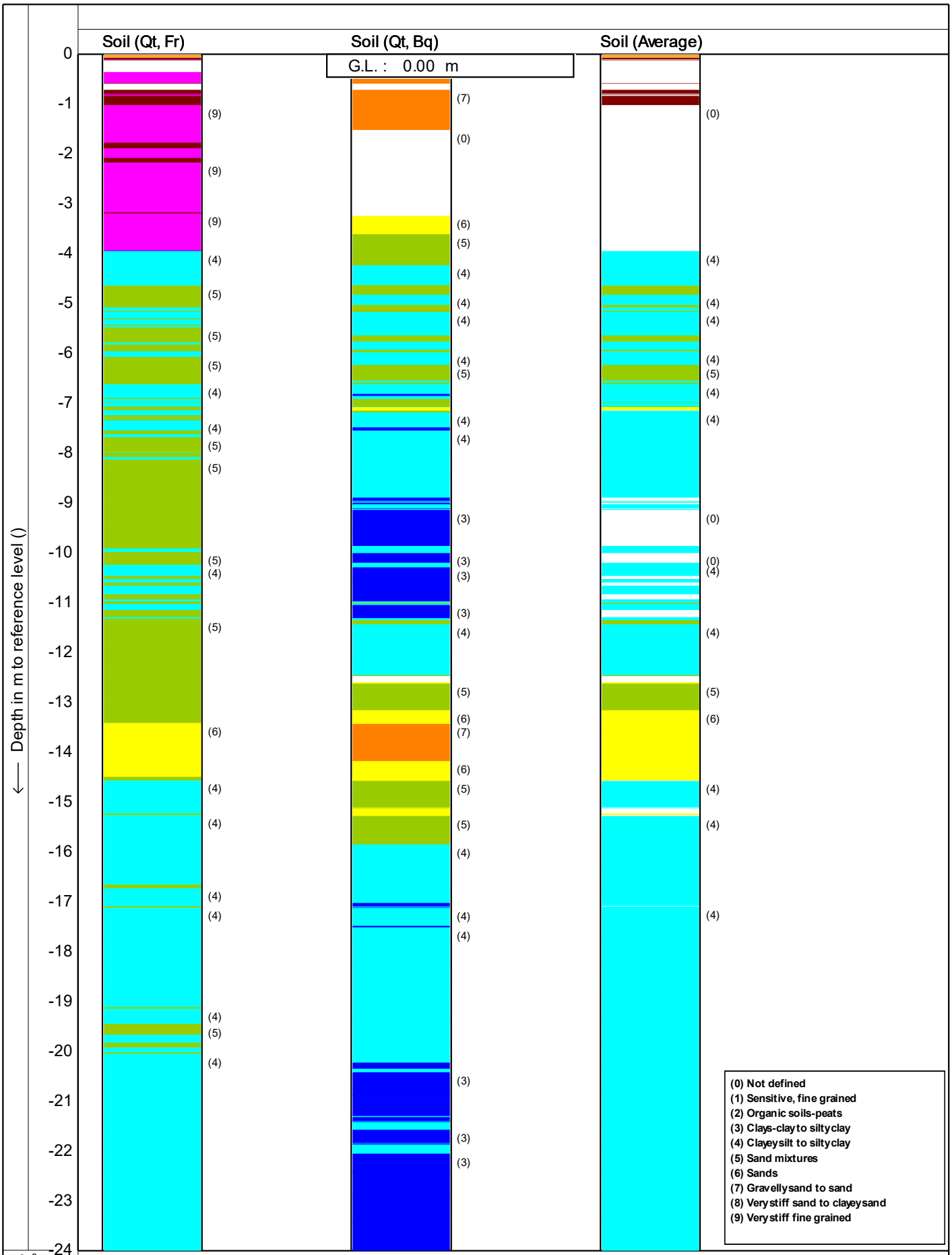
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

**24/28**

1.48




Soil behaviour type classification after Robertson 1990

r u2
150 cm²
10 cm²

PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **26/11/2020**

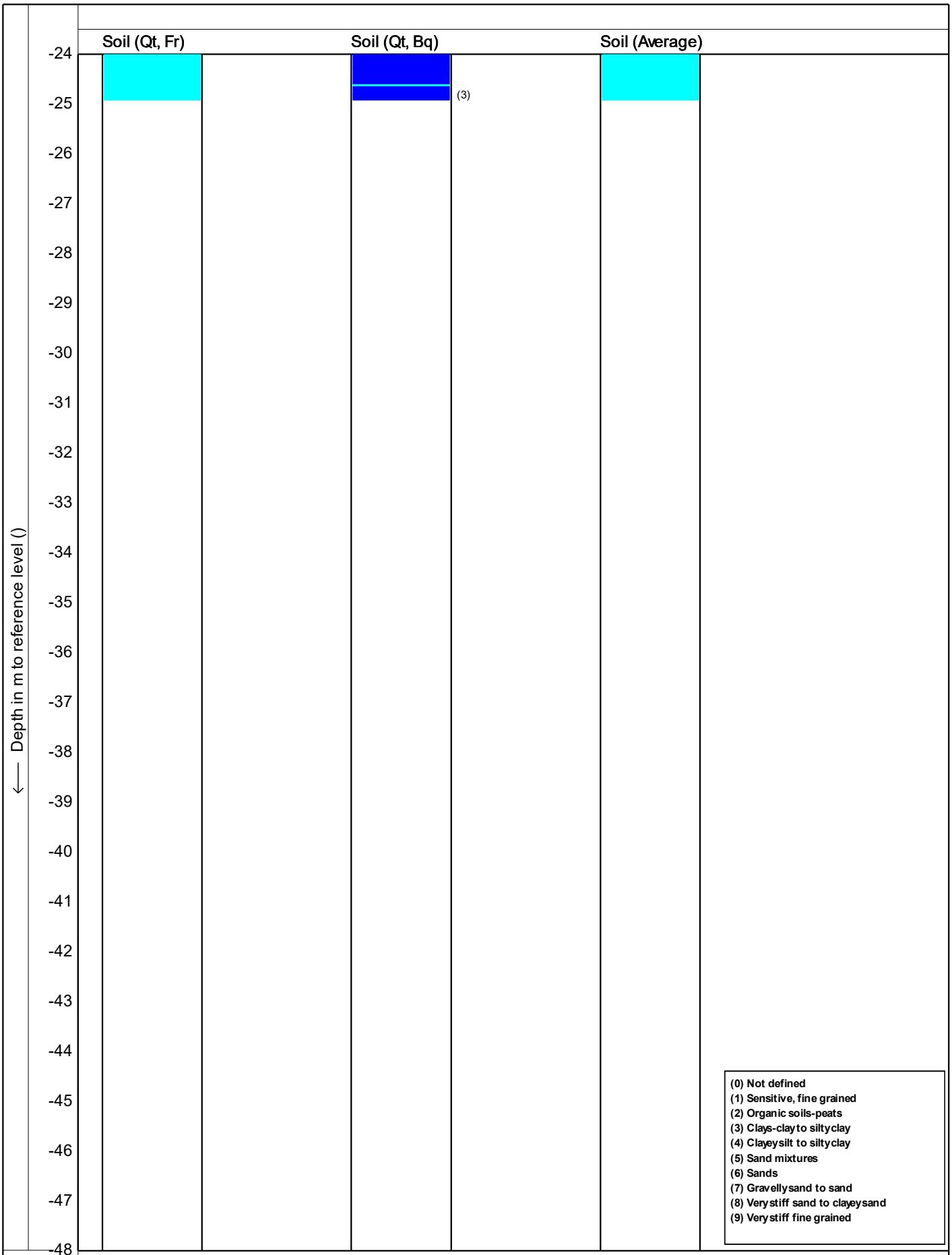
Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **052**



1.48




Soil behaviour type classification after Robertson 1990

PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

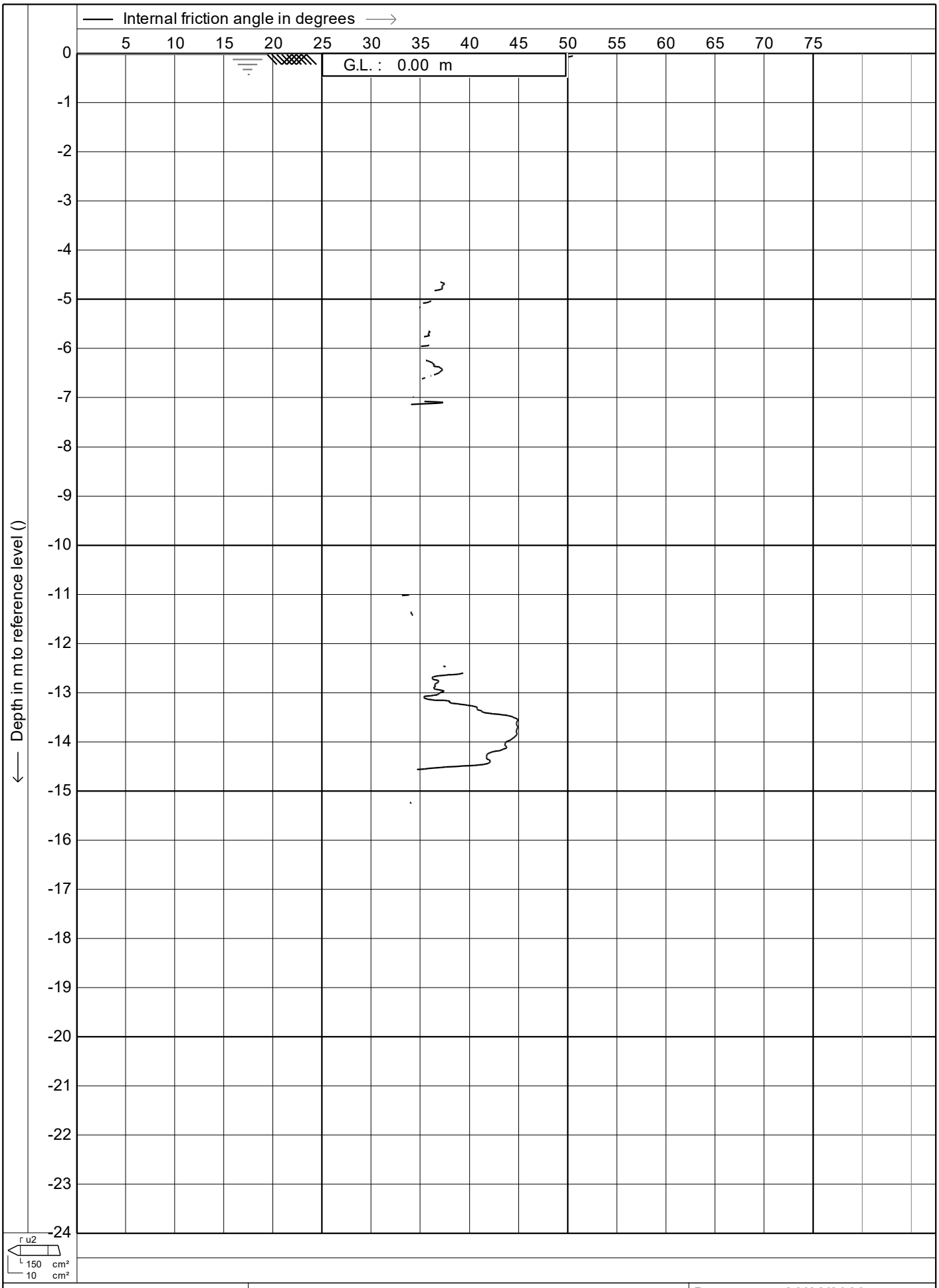
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

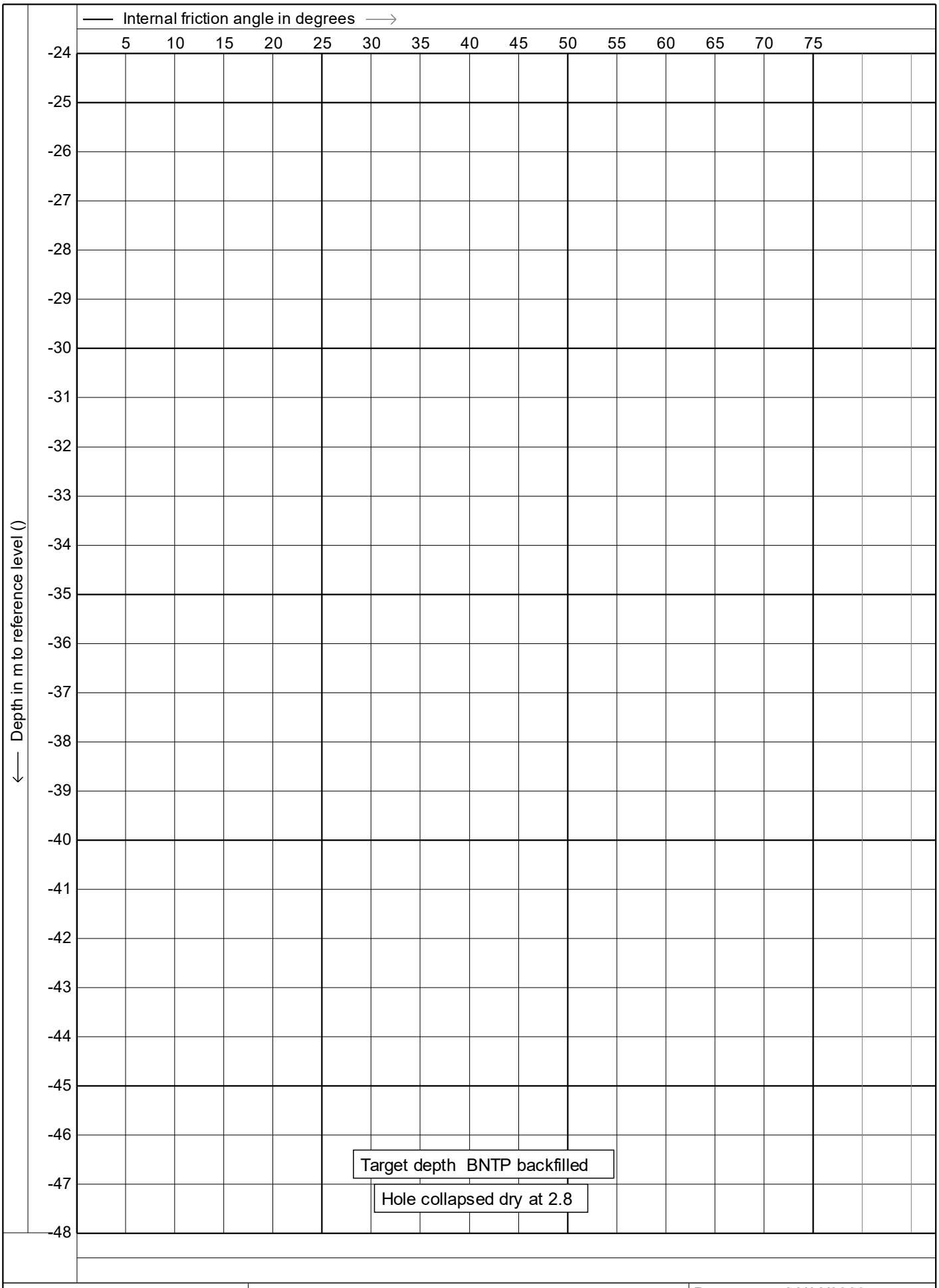


1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **052** — **27/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

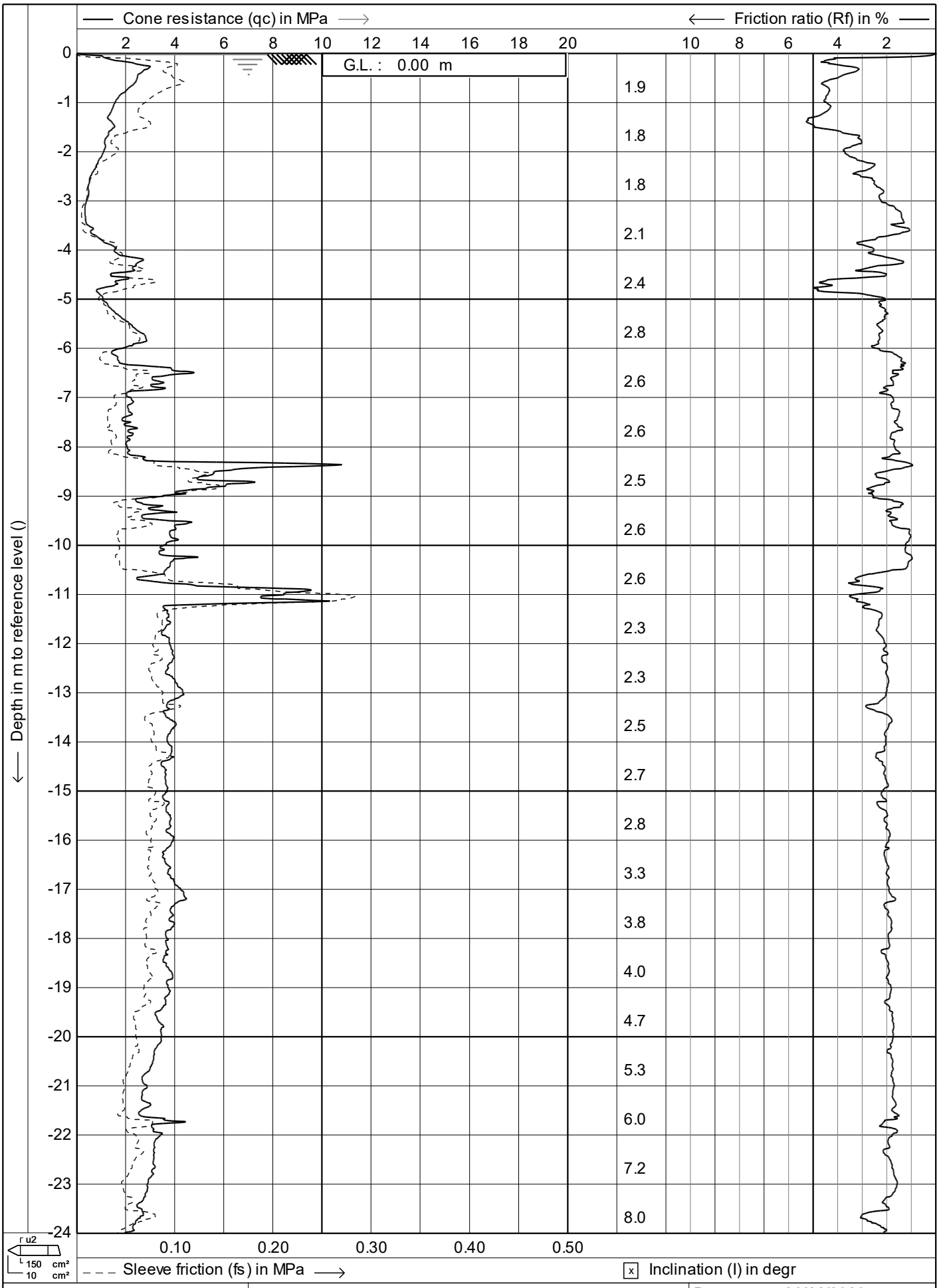
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **052** |

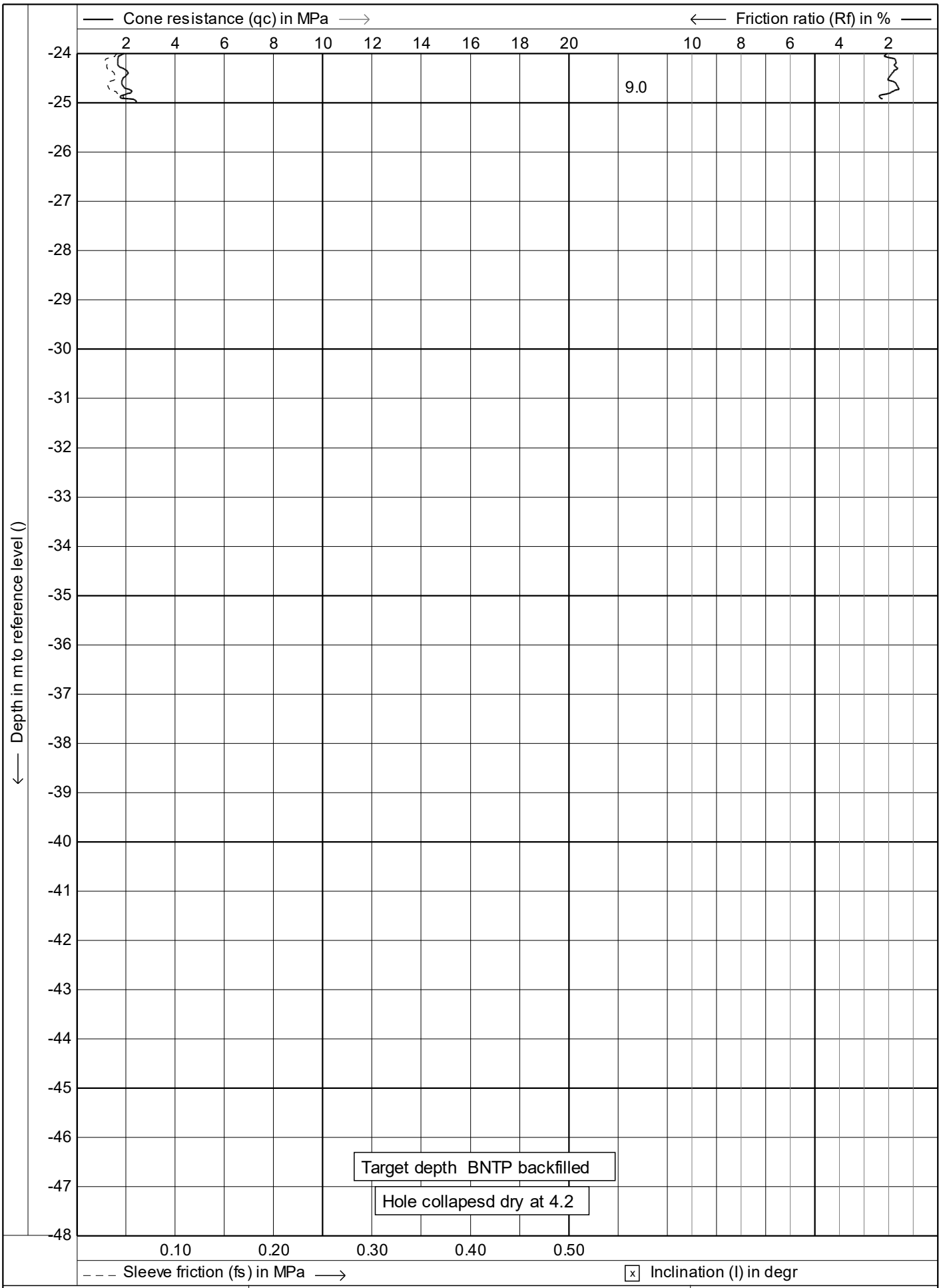
**28/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **053** 1/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

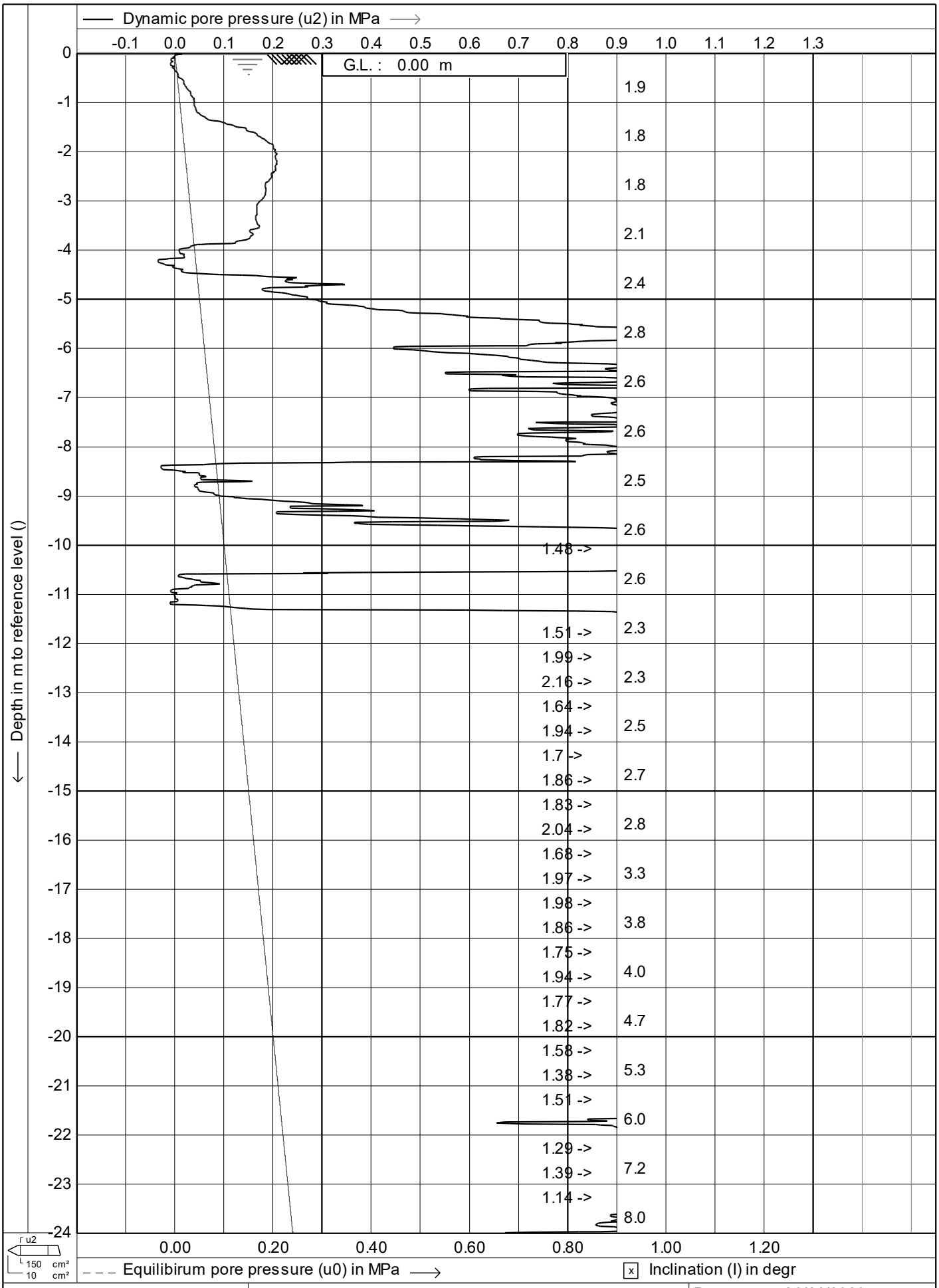
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

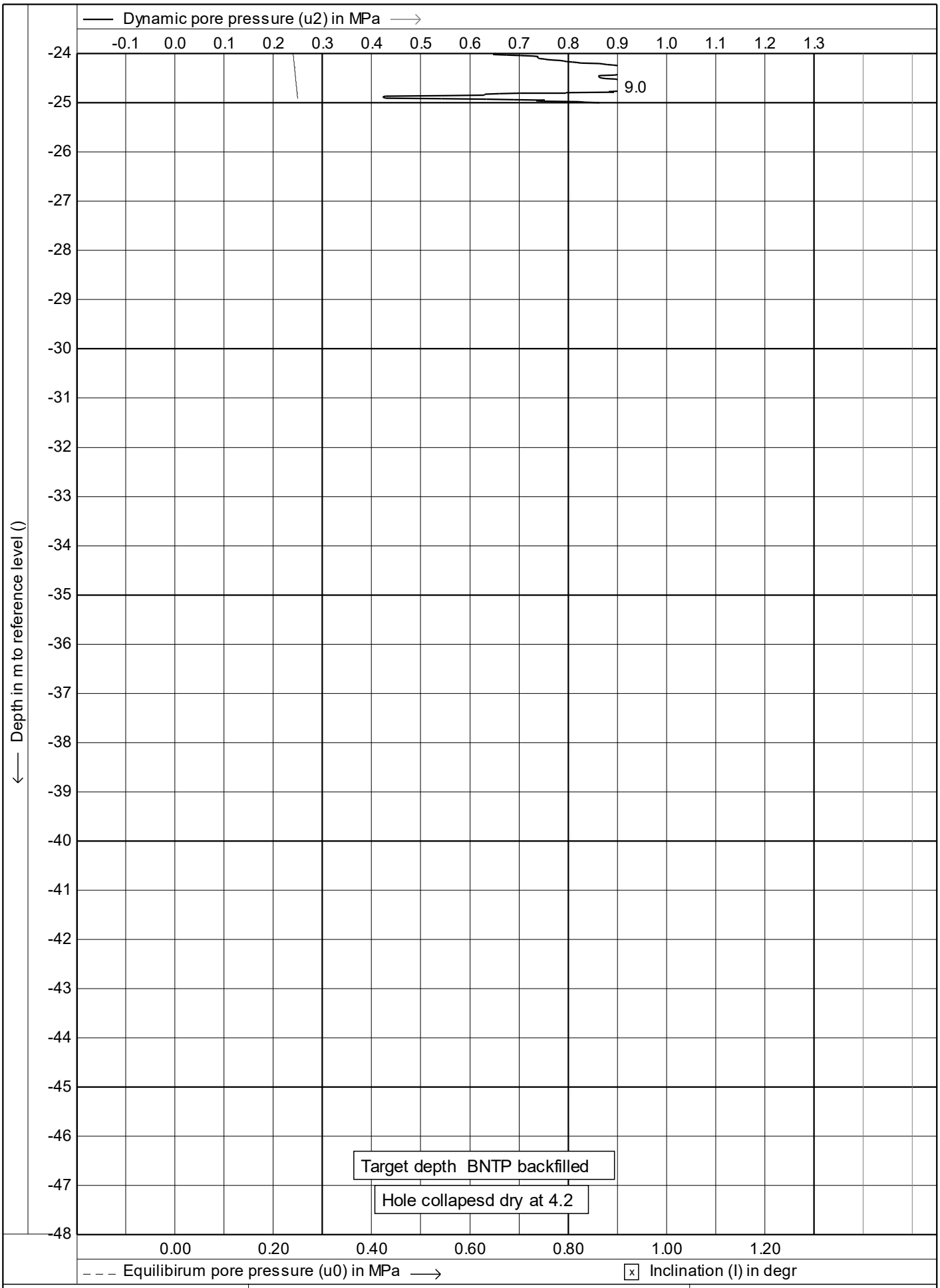


1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **053** 3/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

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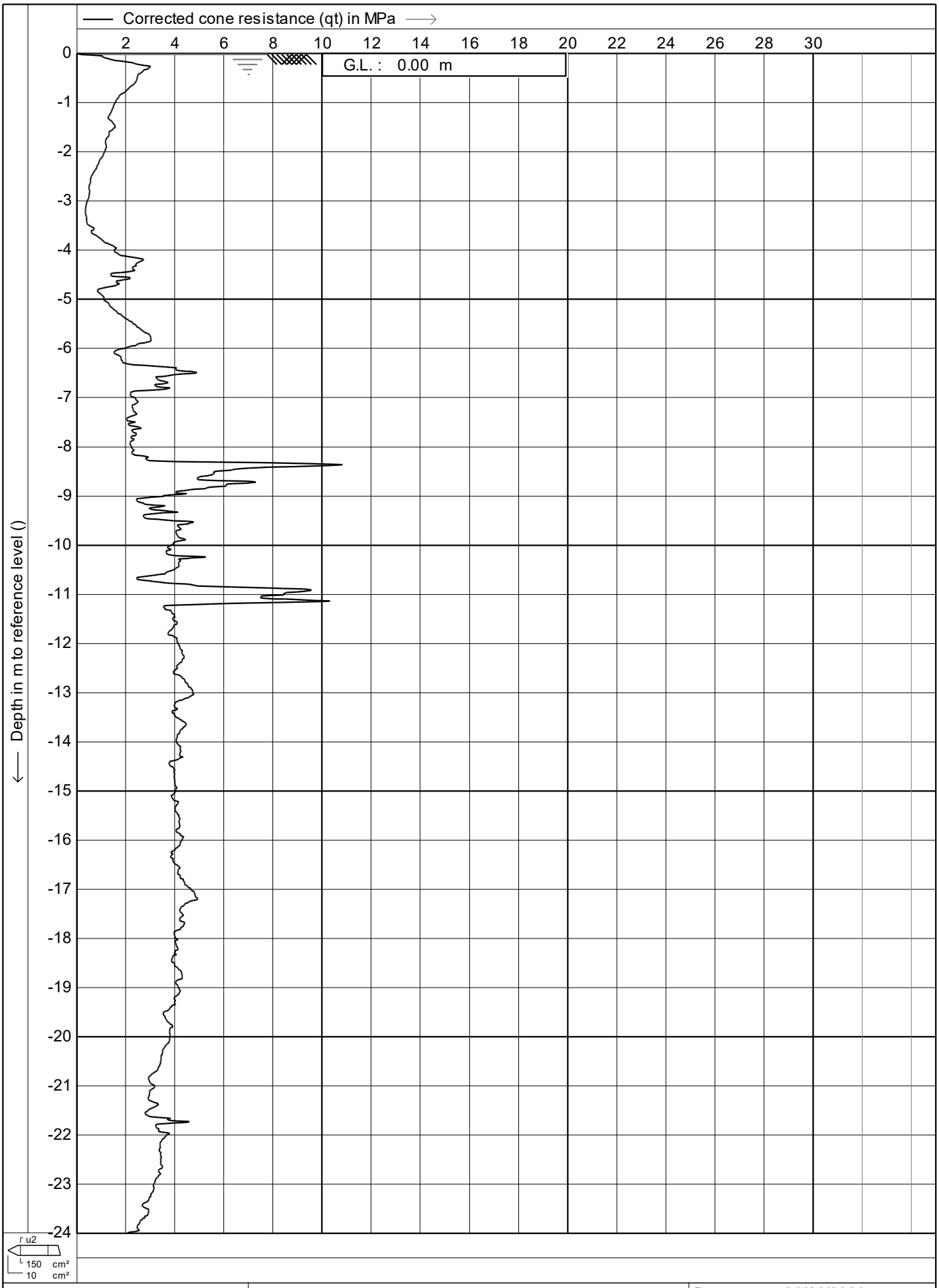
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

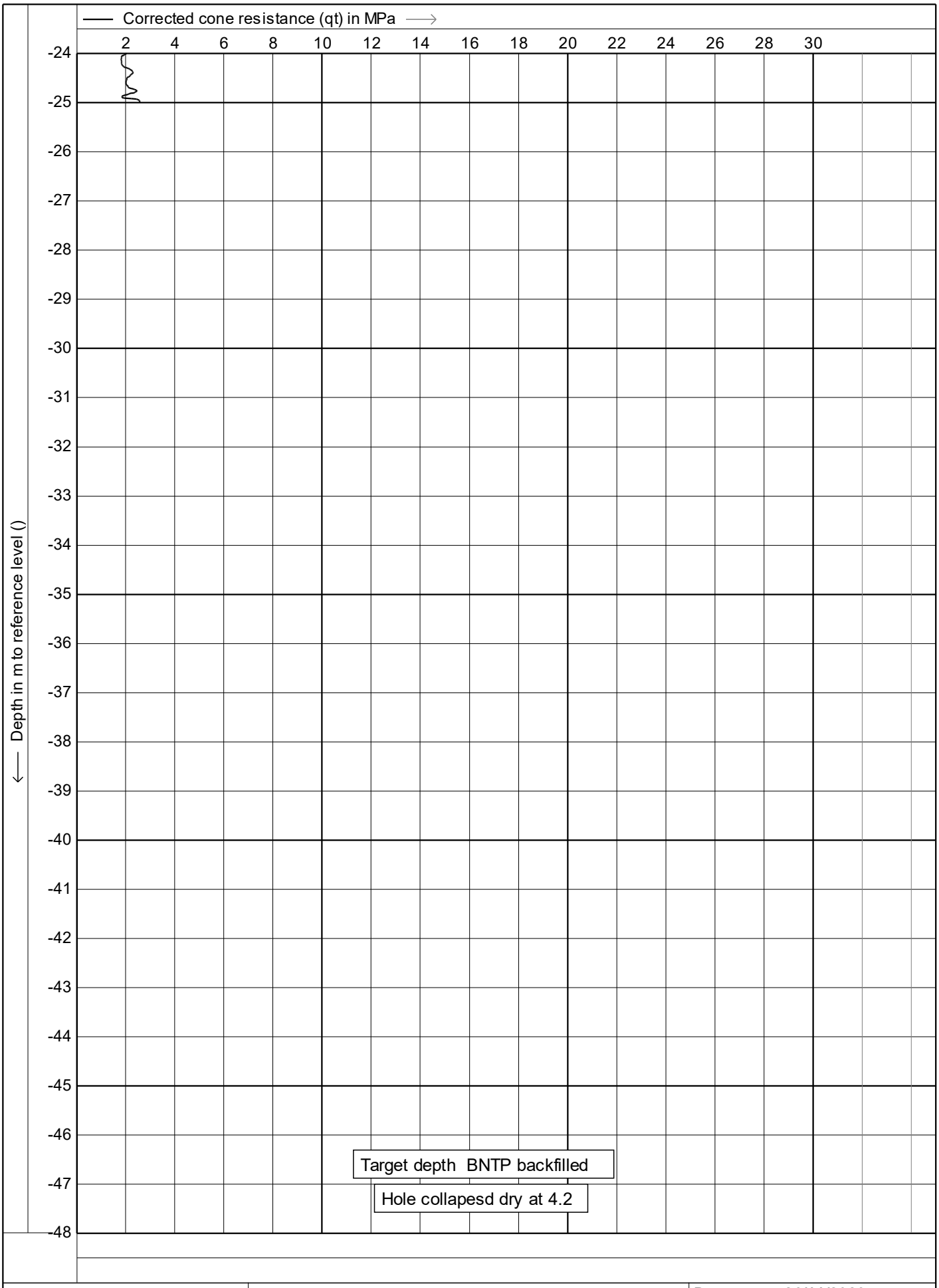
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**5/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

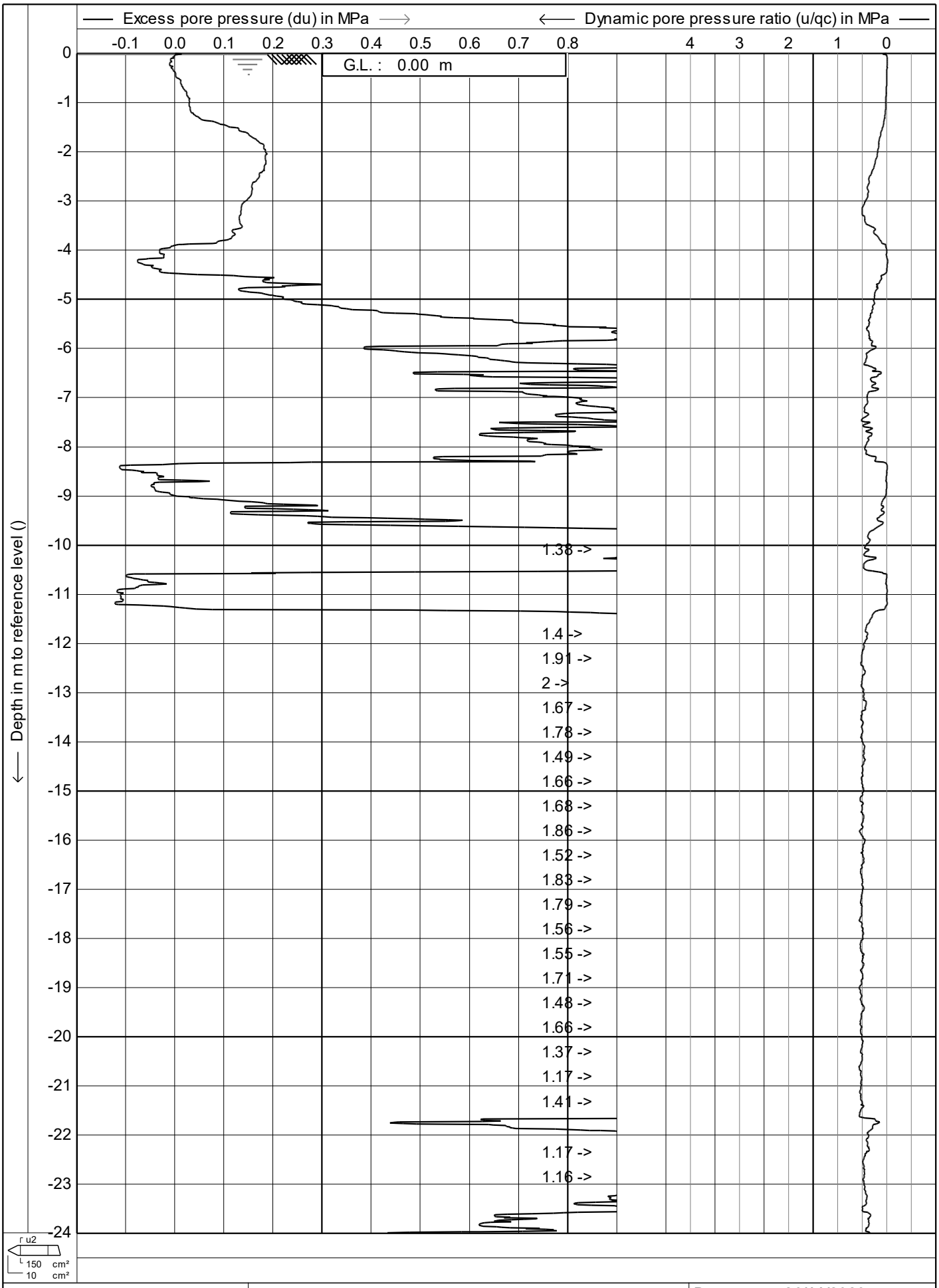
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**6/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

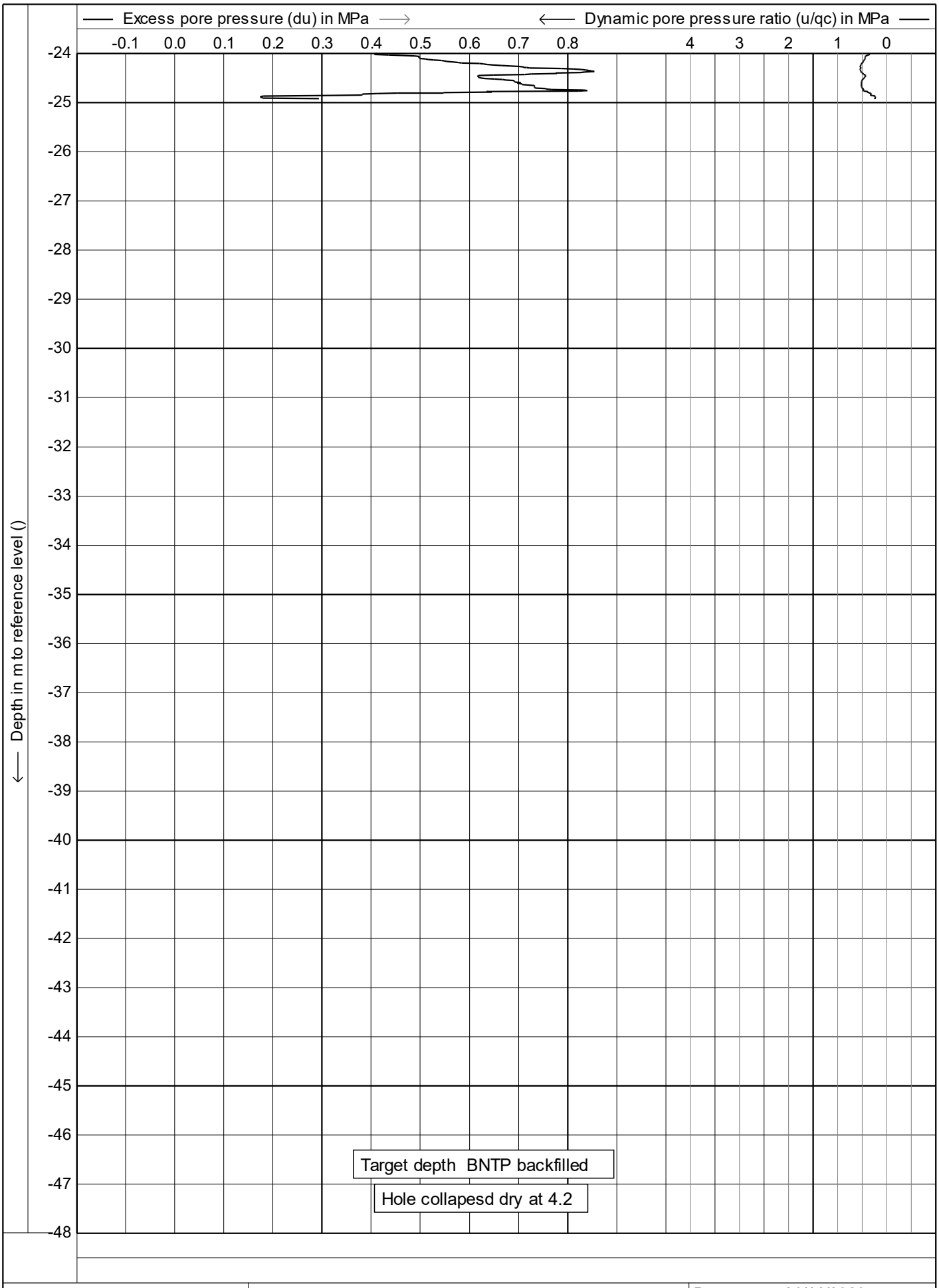
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

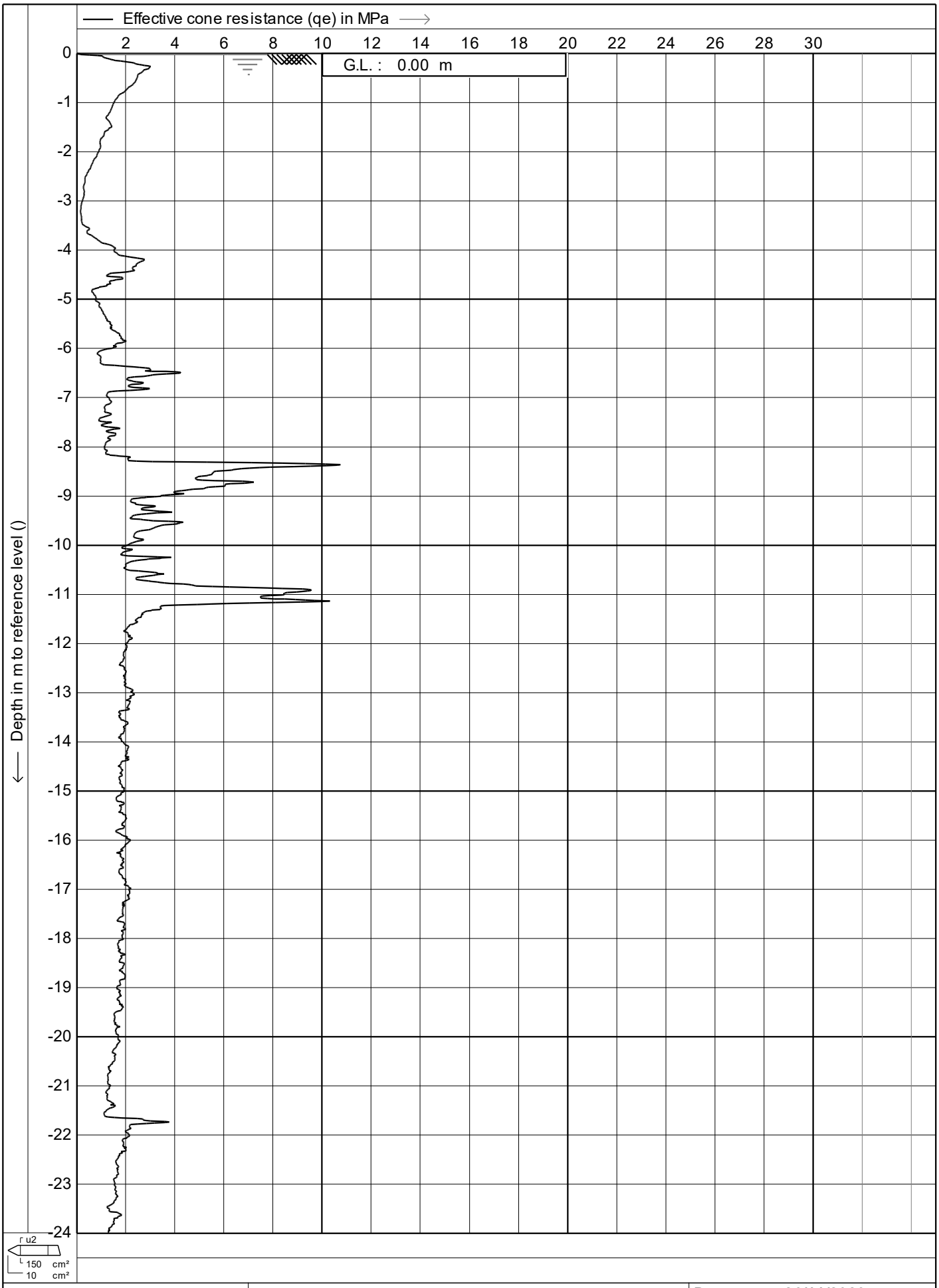
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

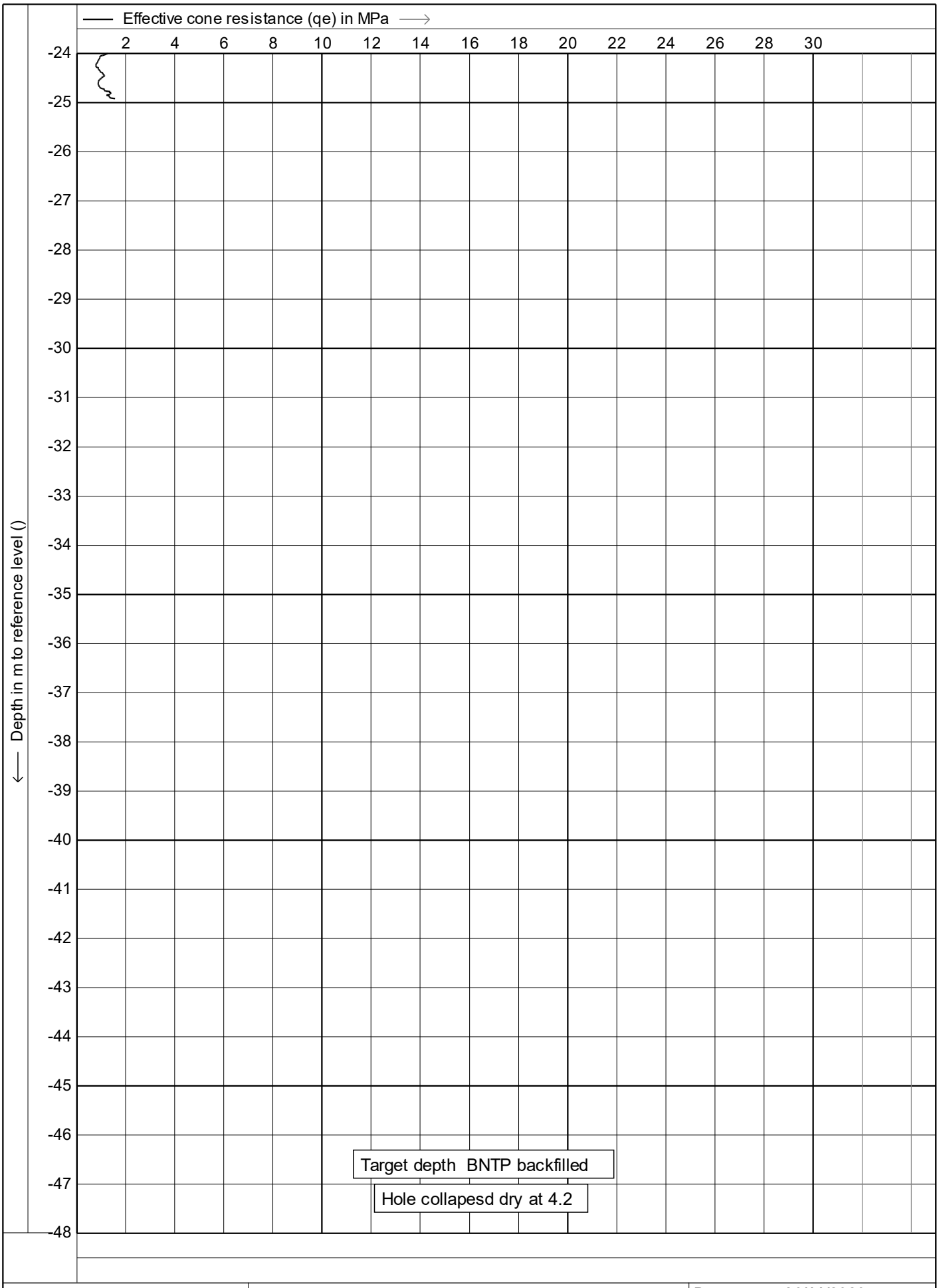
**8/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **053** — **9/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

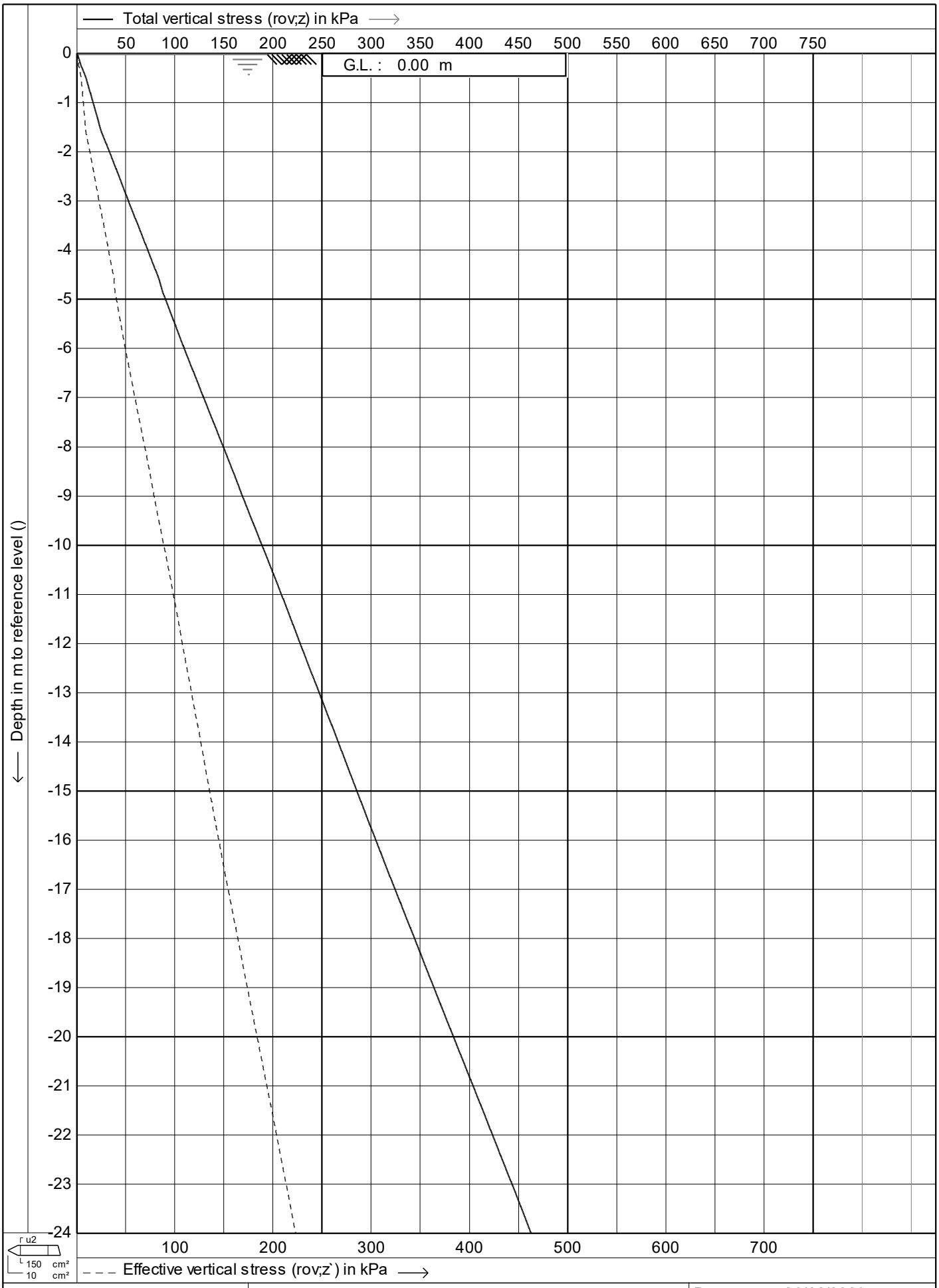
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**10/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

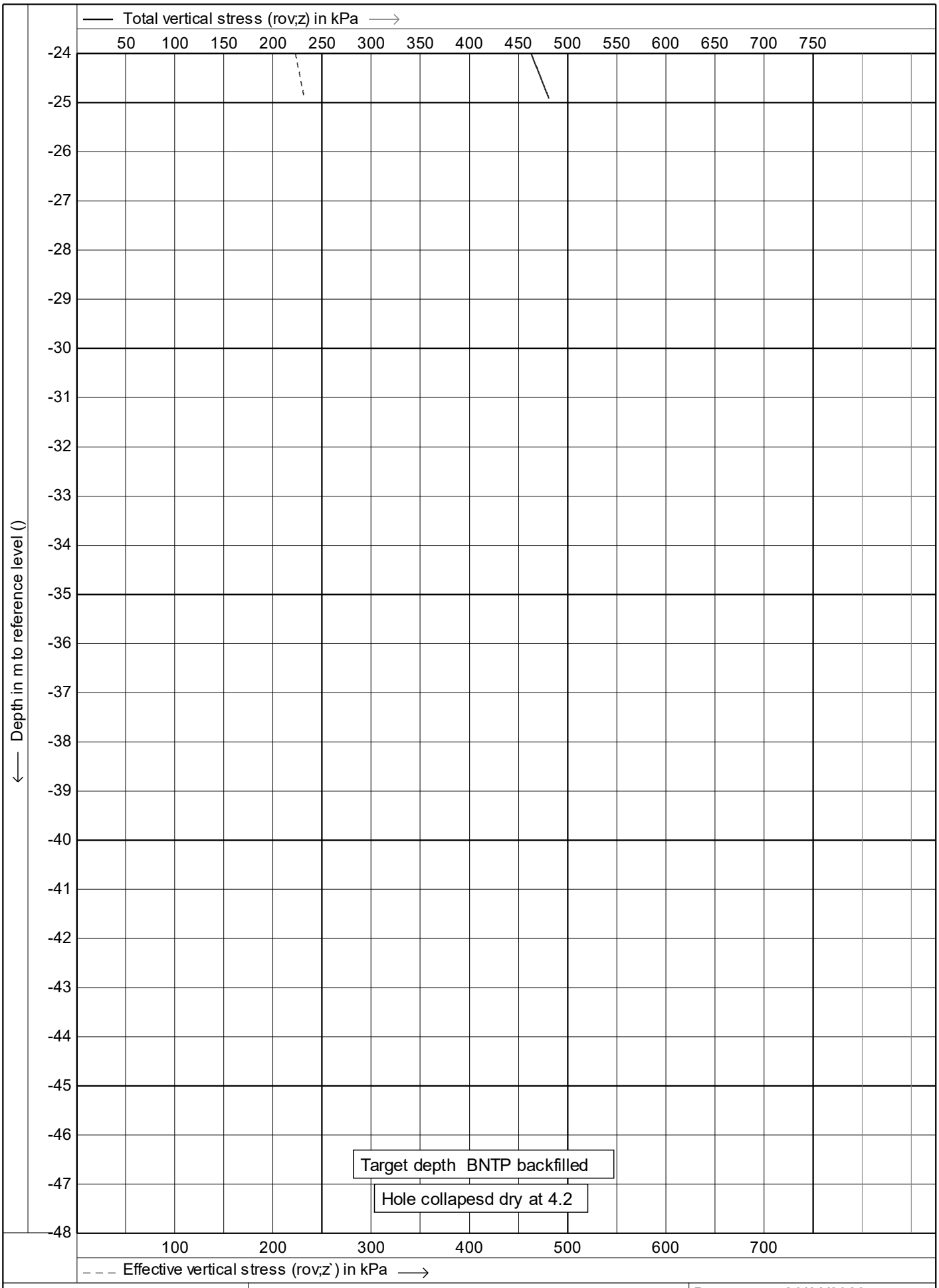
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**11/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

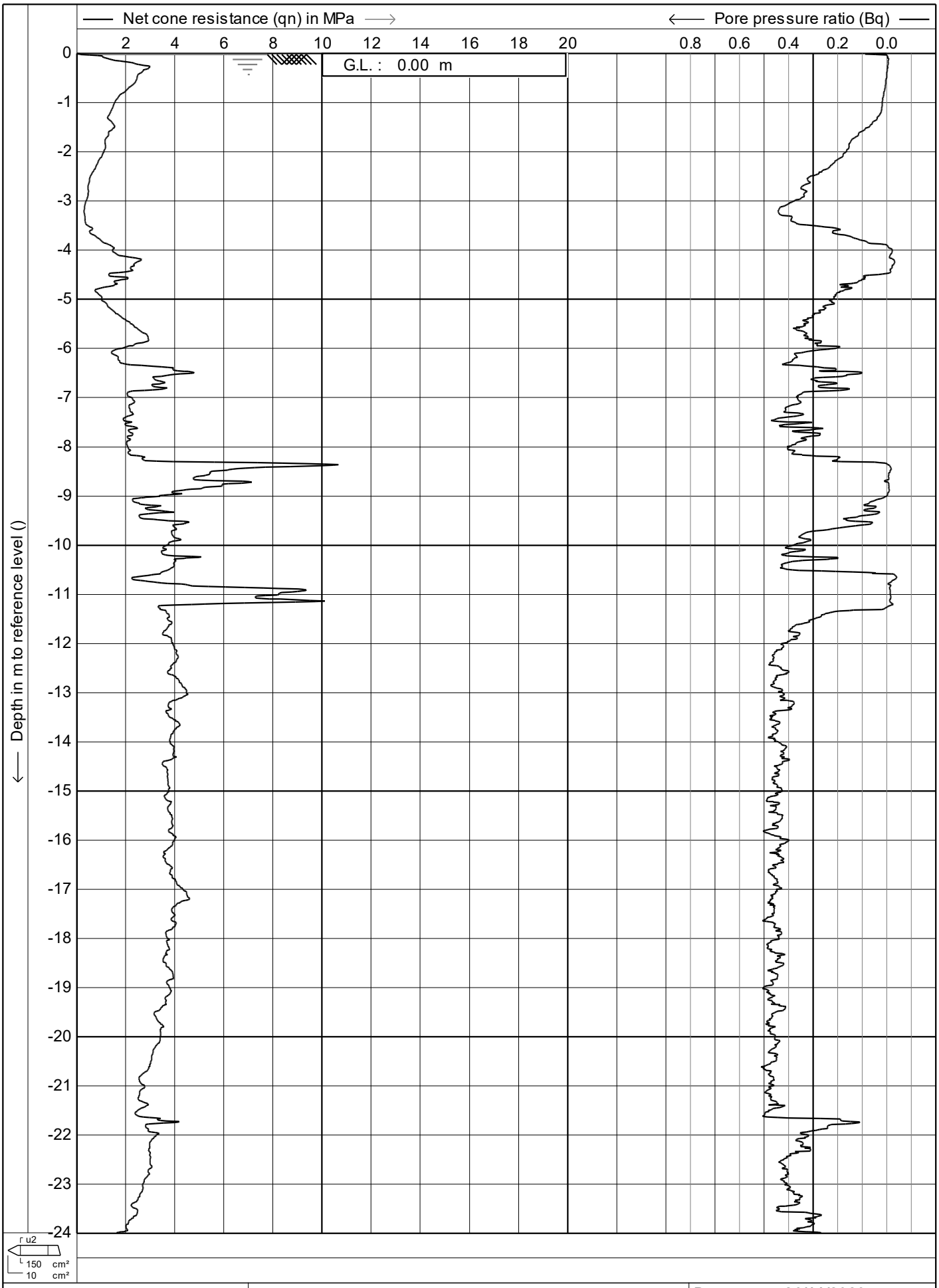
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**12/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

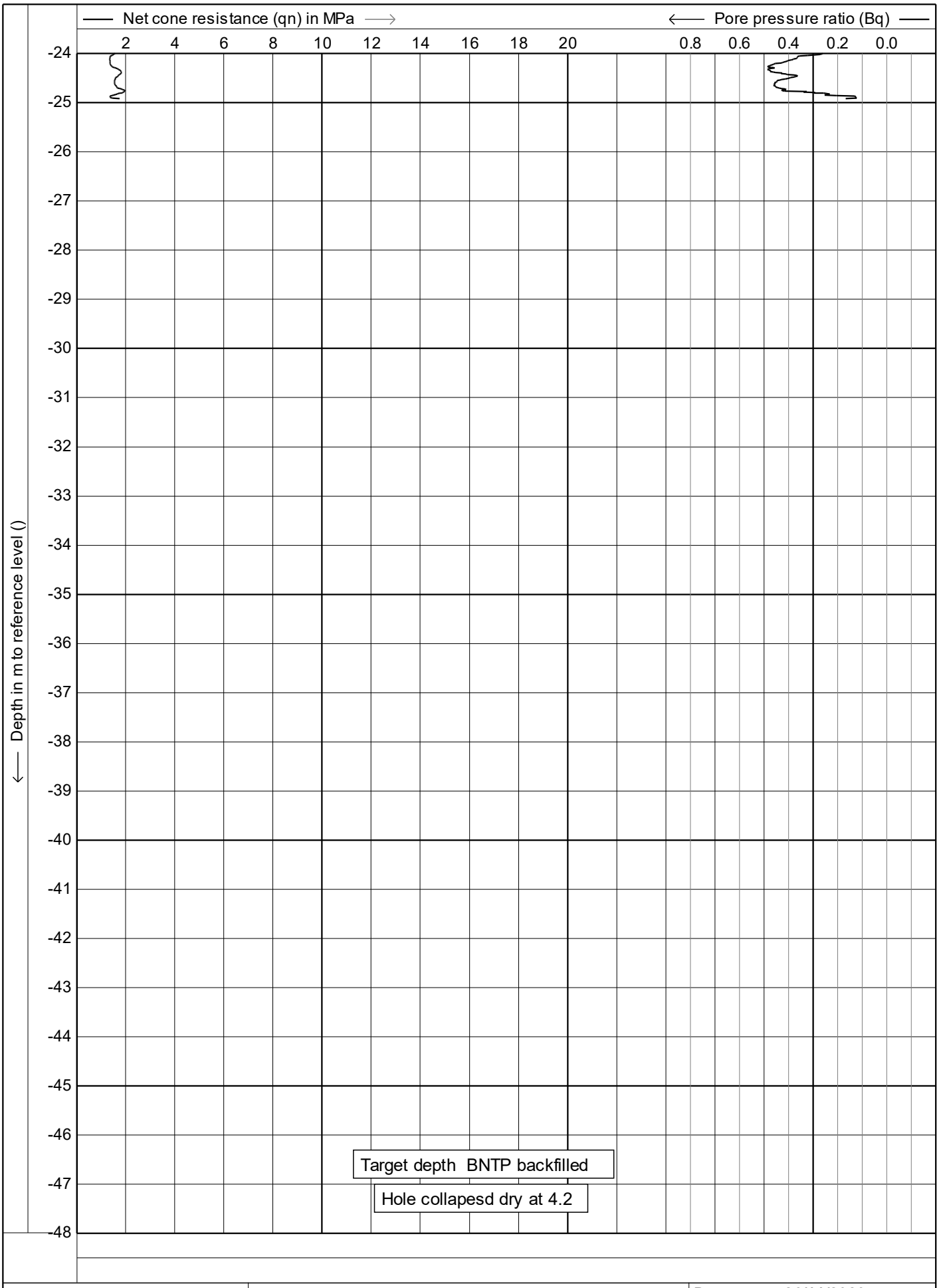
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

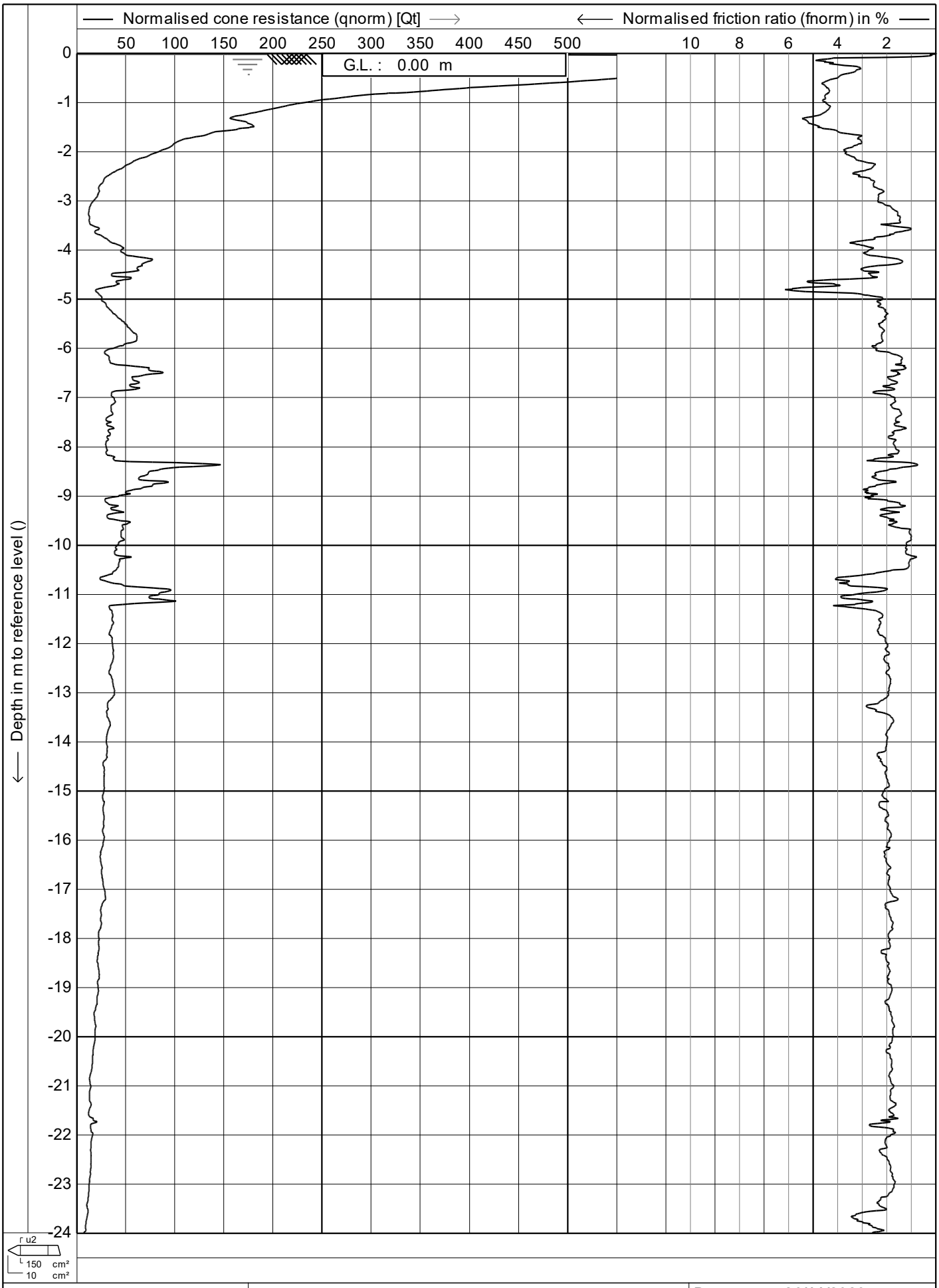
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

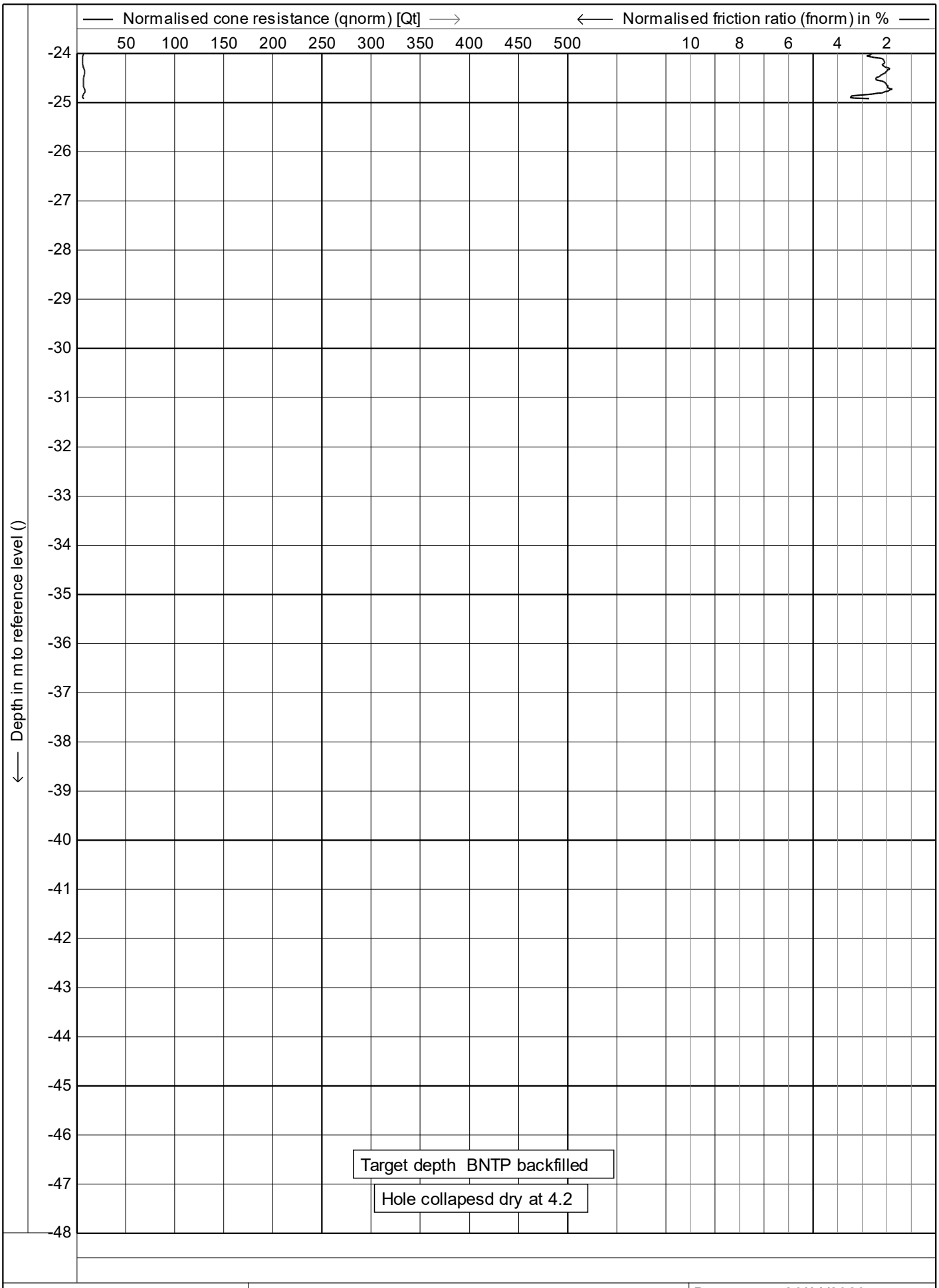
**14/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **053** — **15/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

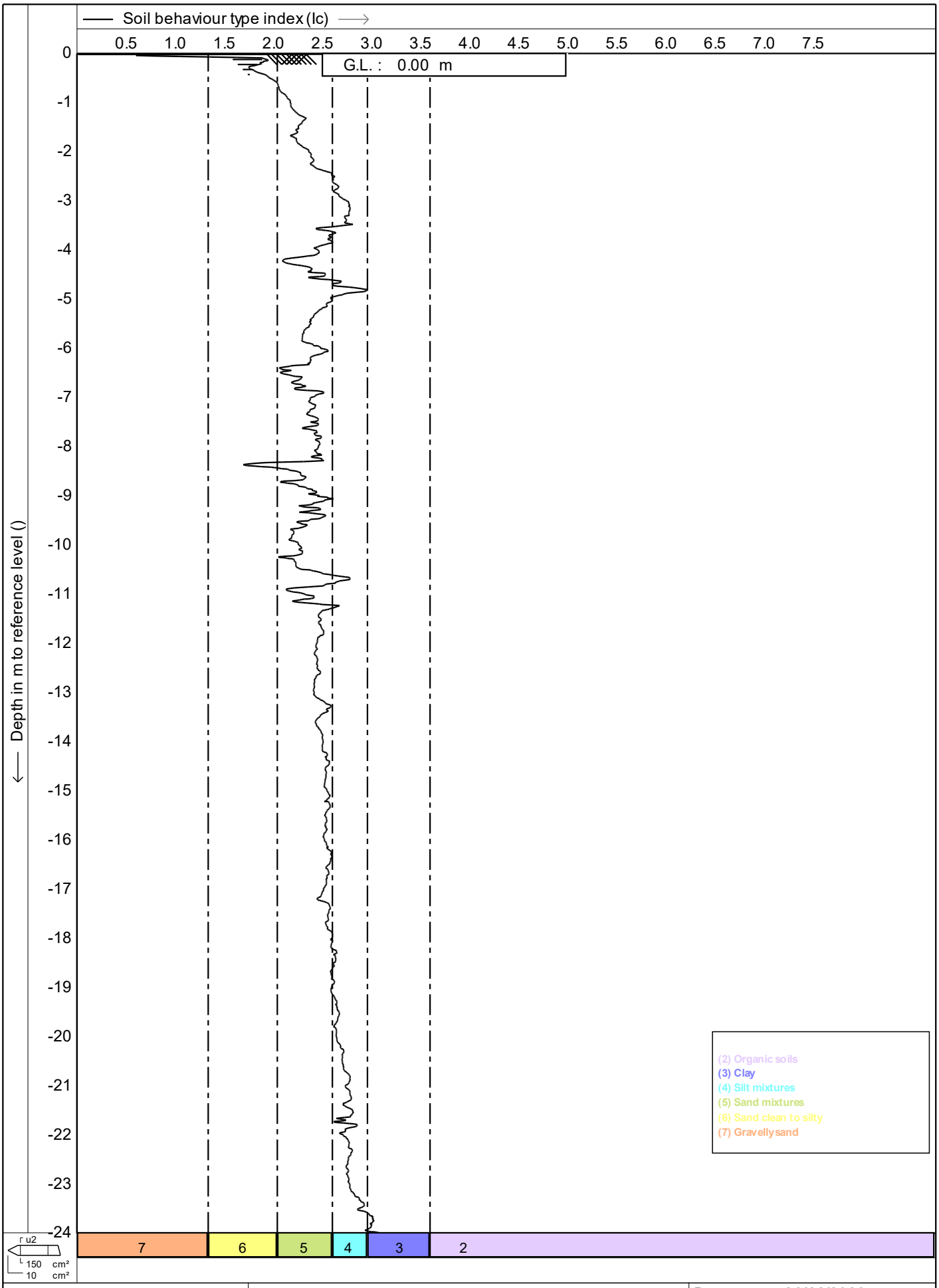
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**16/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

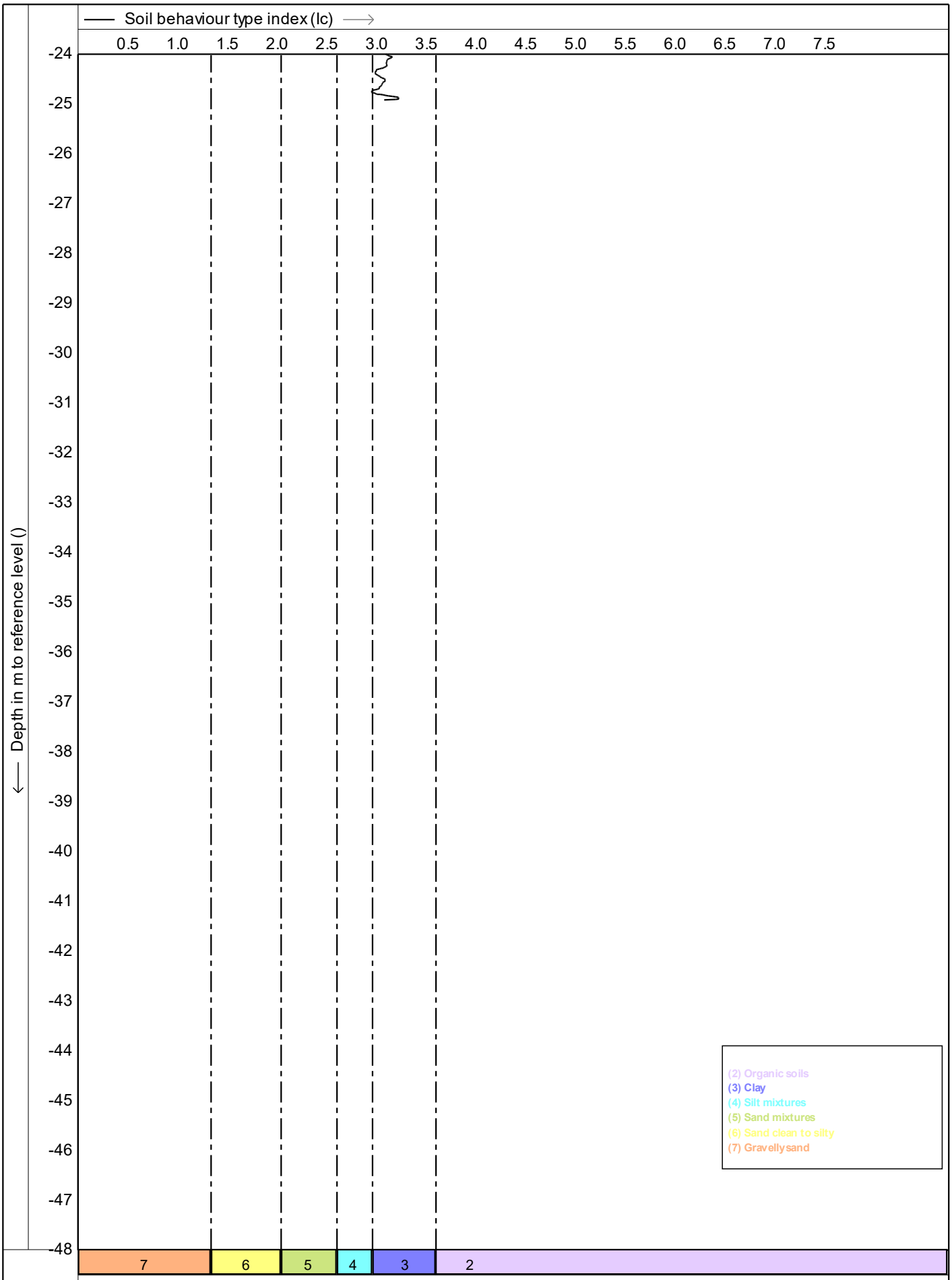
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**17/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

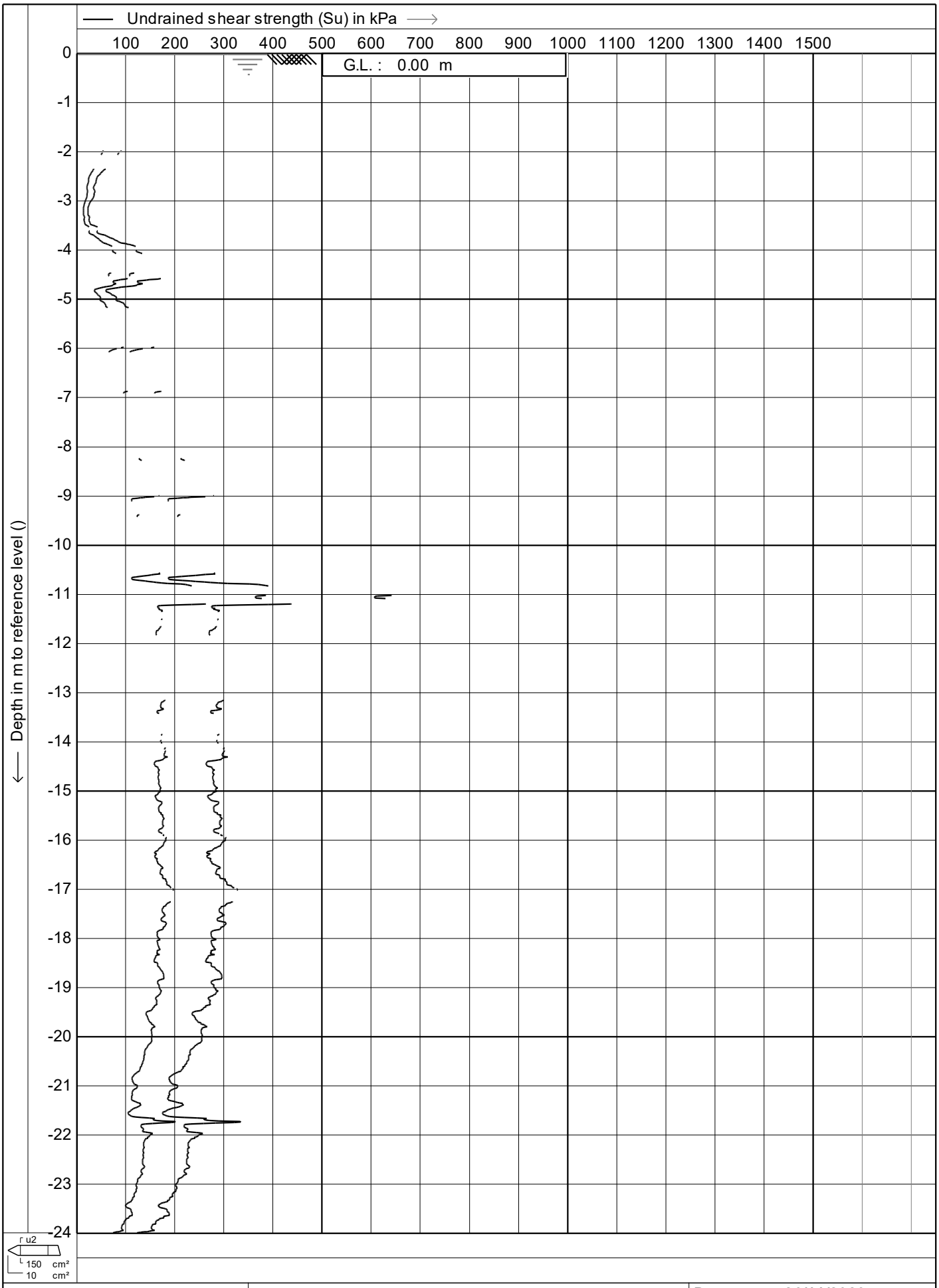
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**18/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

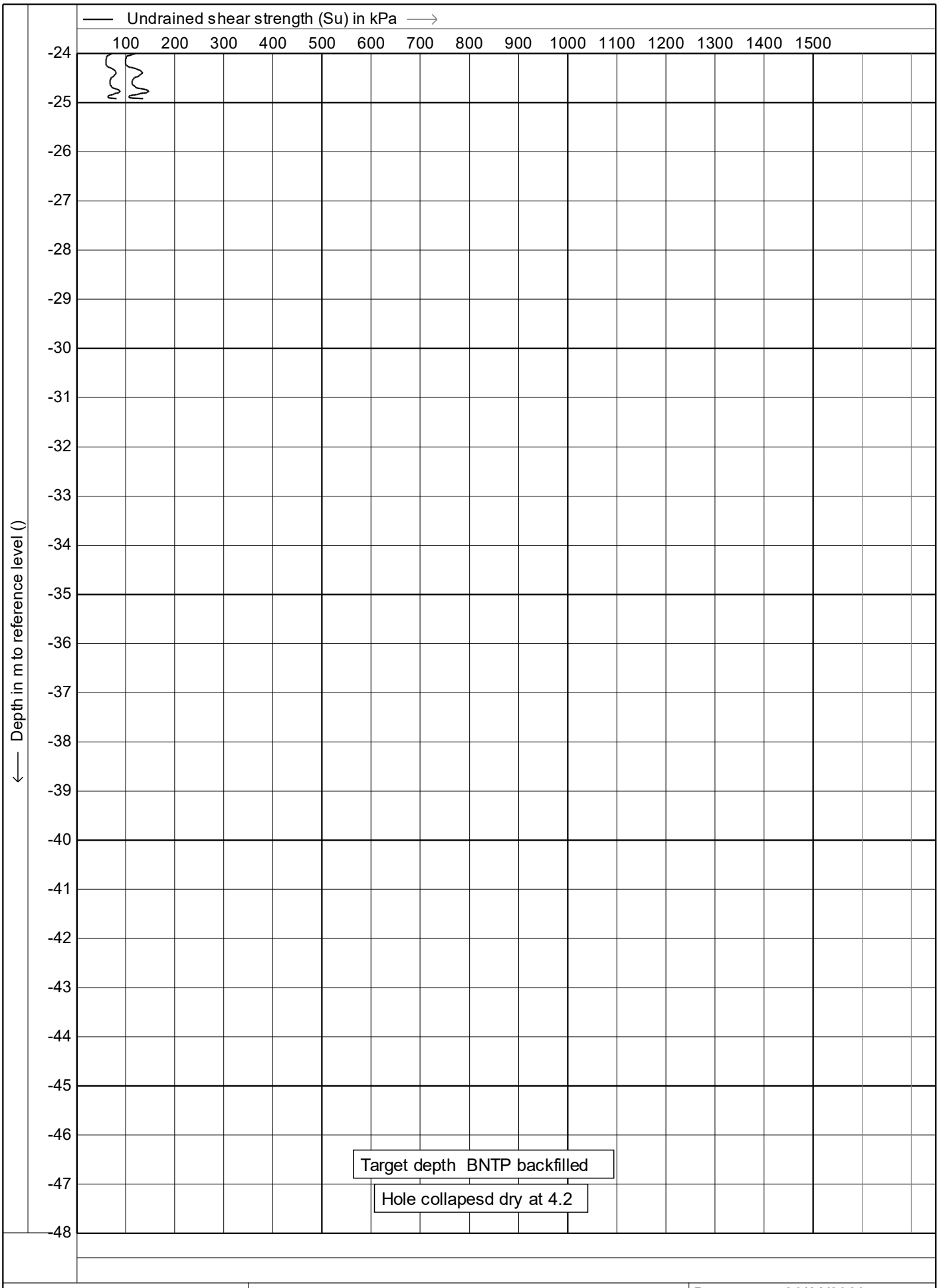
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

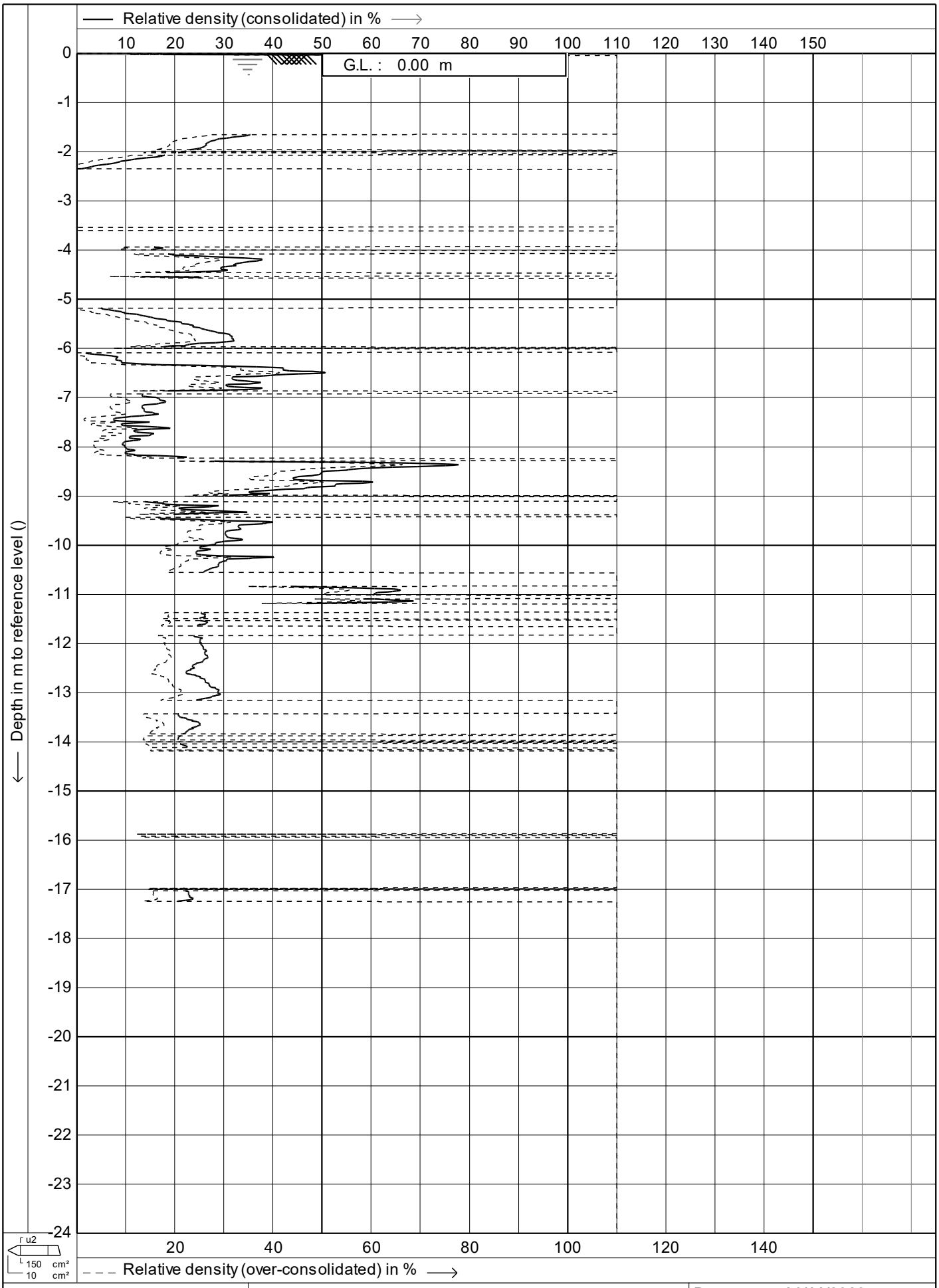
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

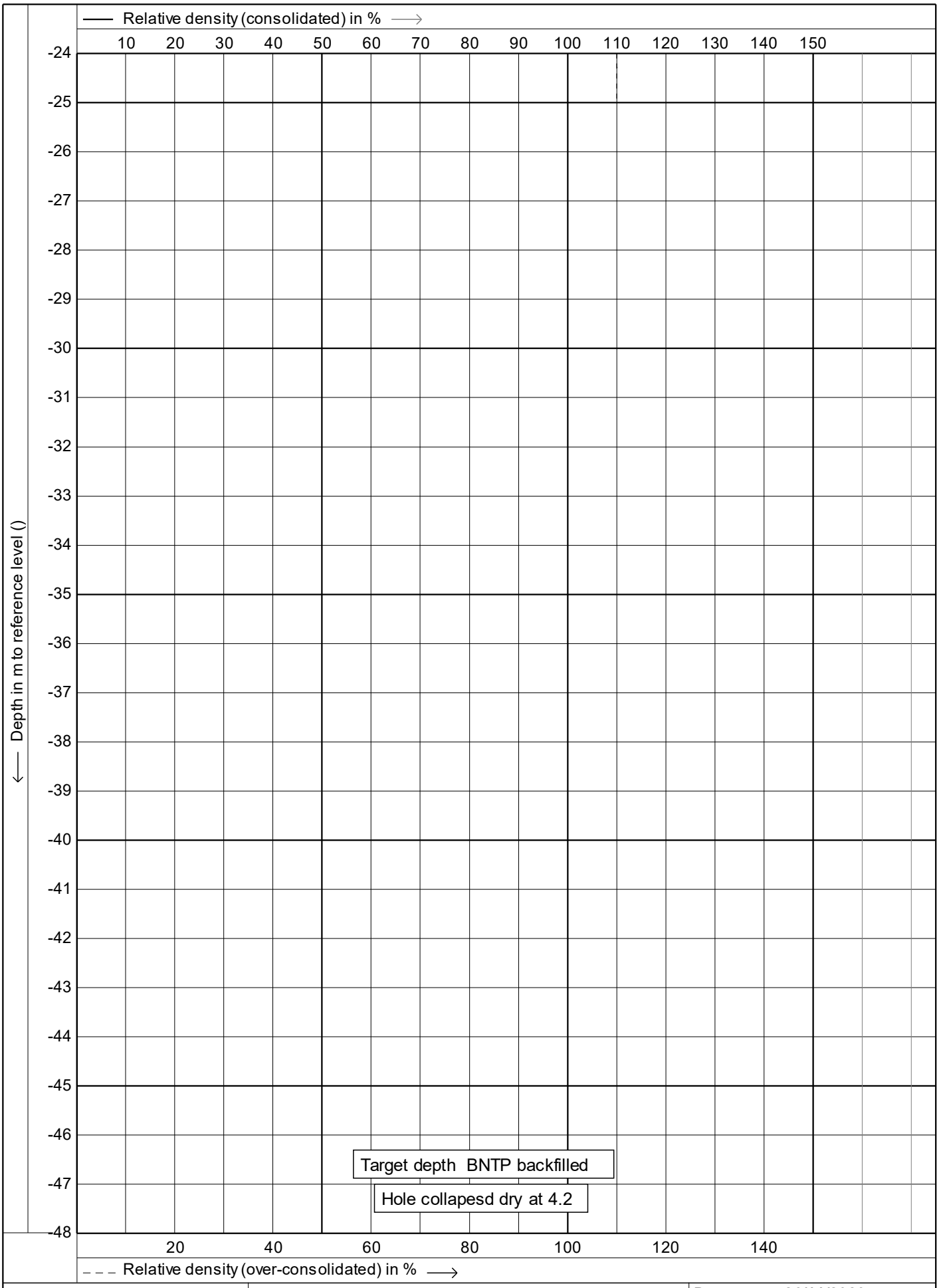
**20/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **053** — **21/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

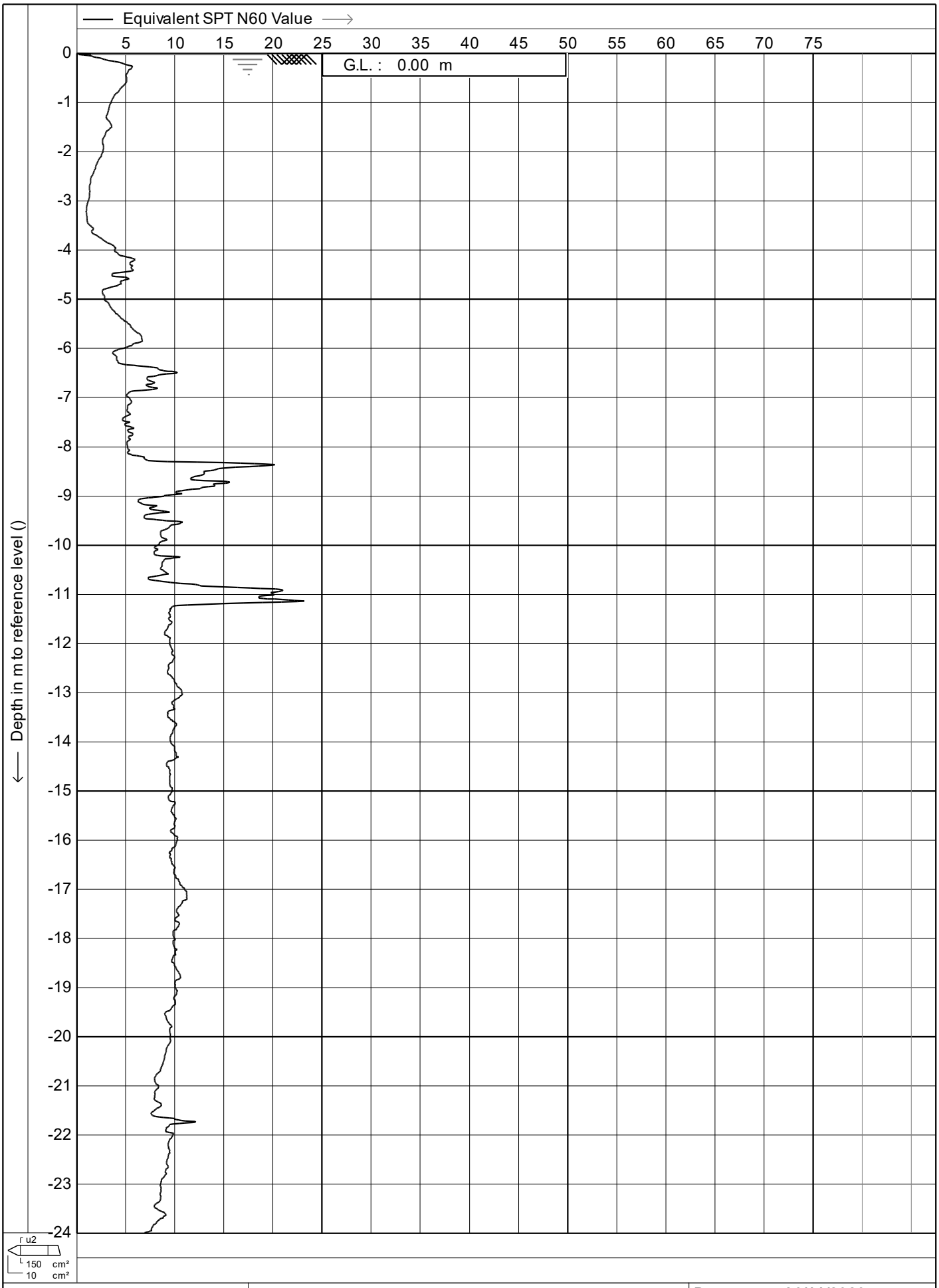
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**22/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

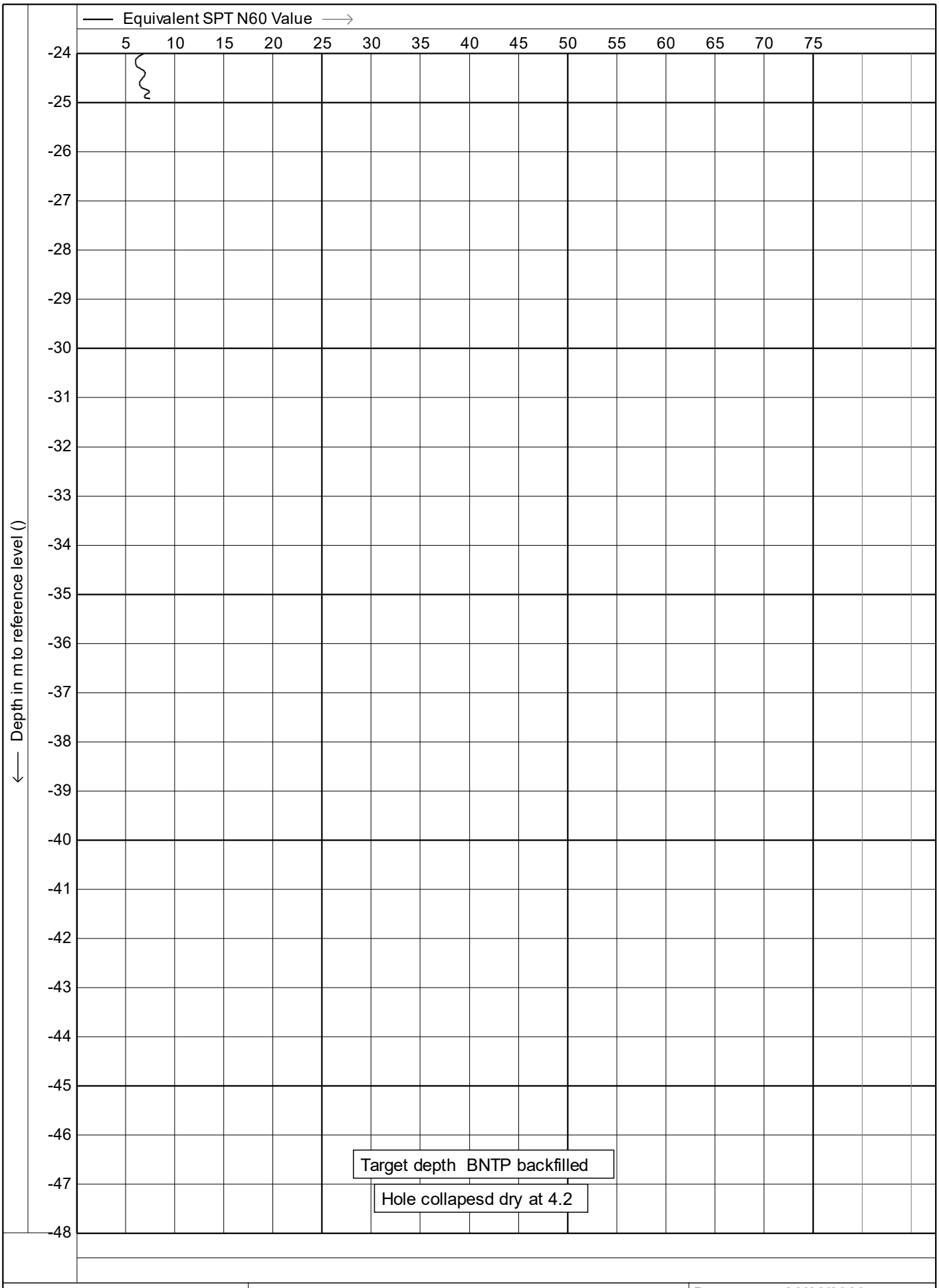
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

**23/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

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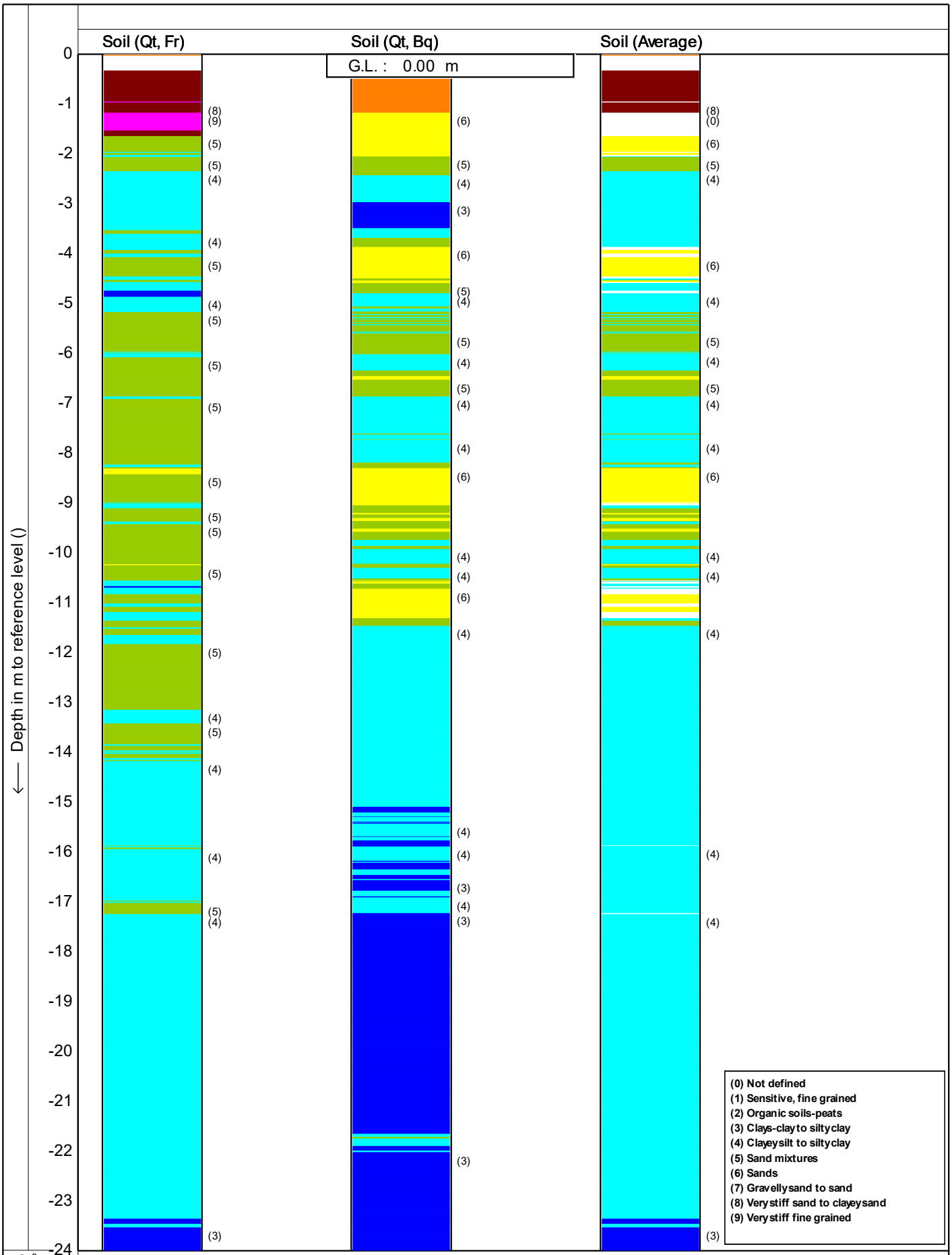
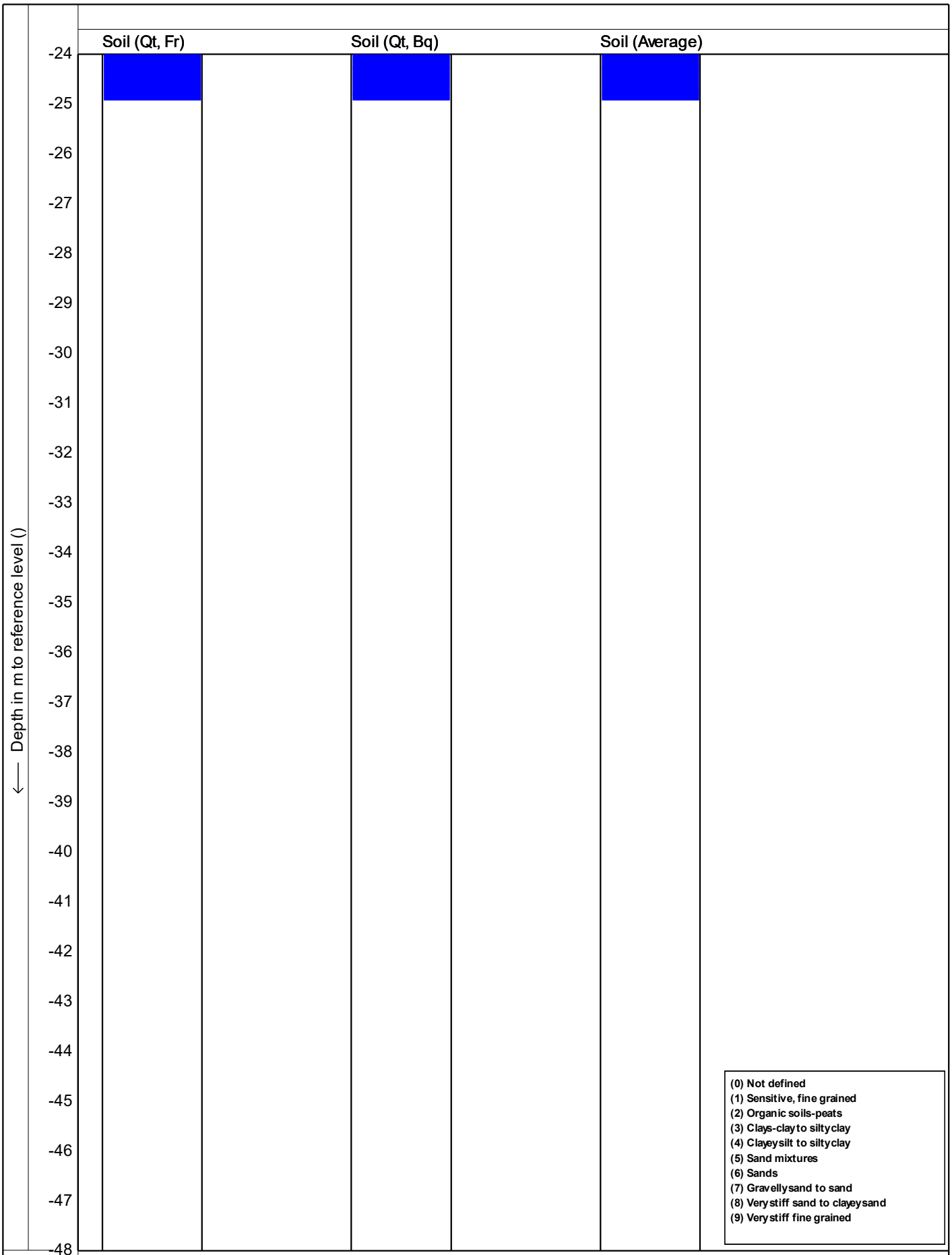
1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **26/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **053** — **25/28** |

1.48




Soil behaviour type classification after Robertson 1990

PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

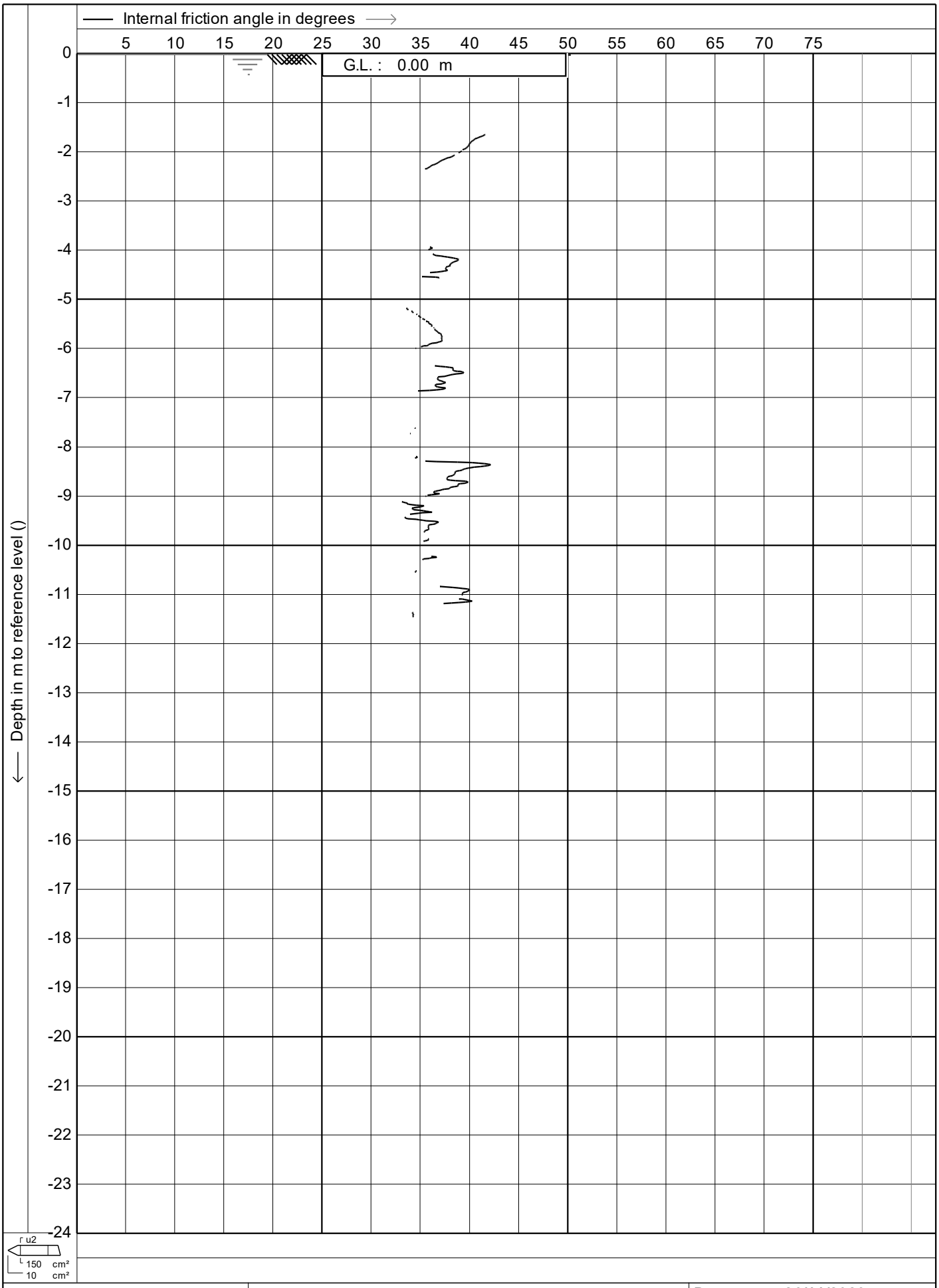
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

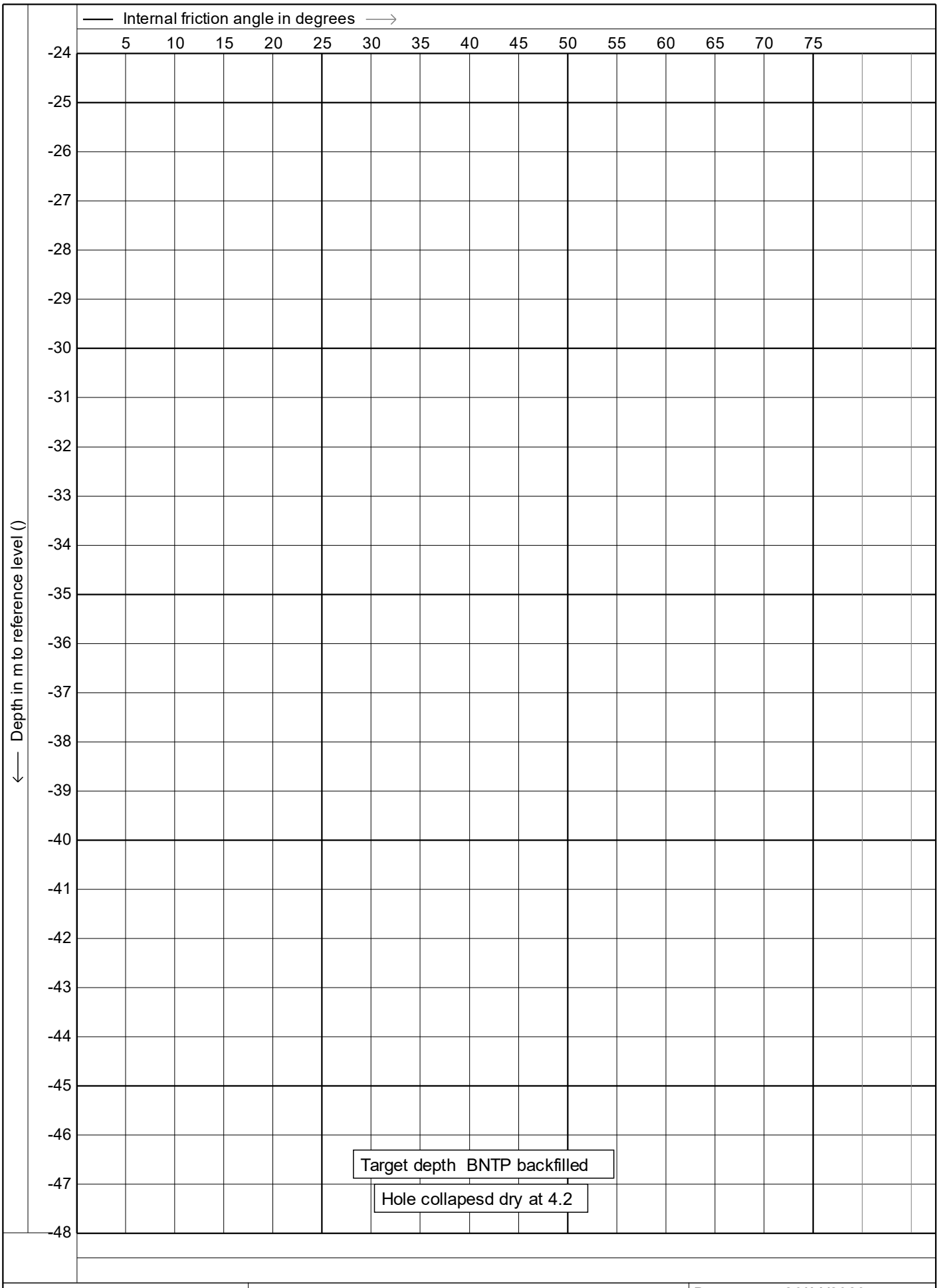
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **26/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **053** |

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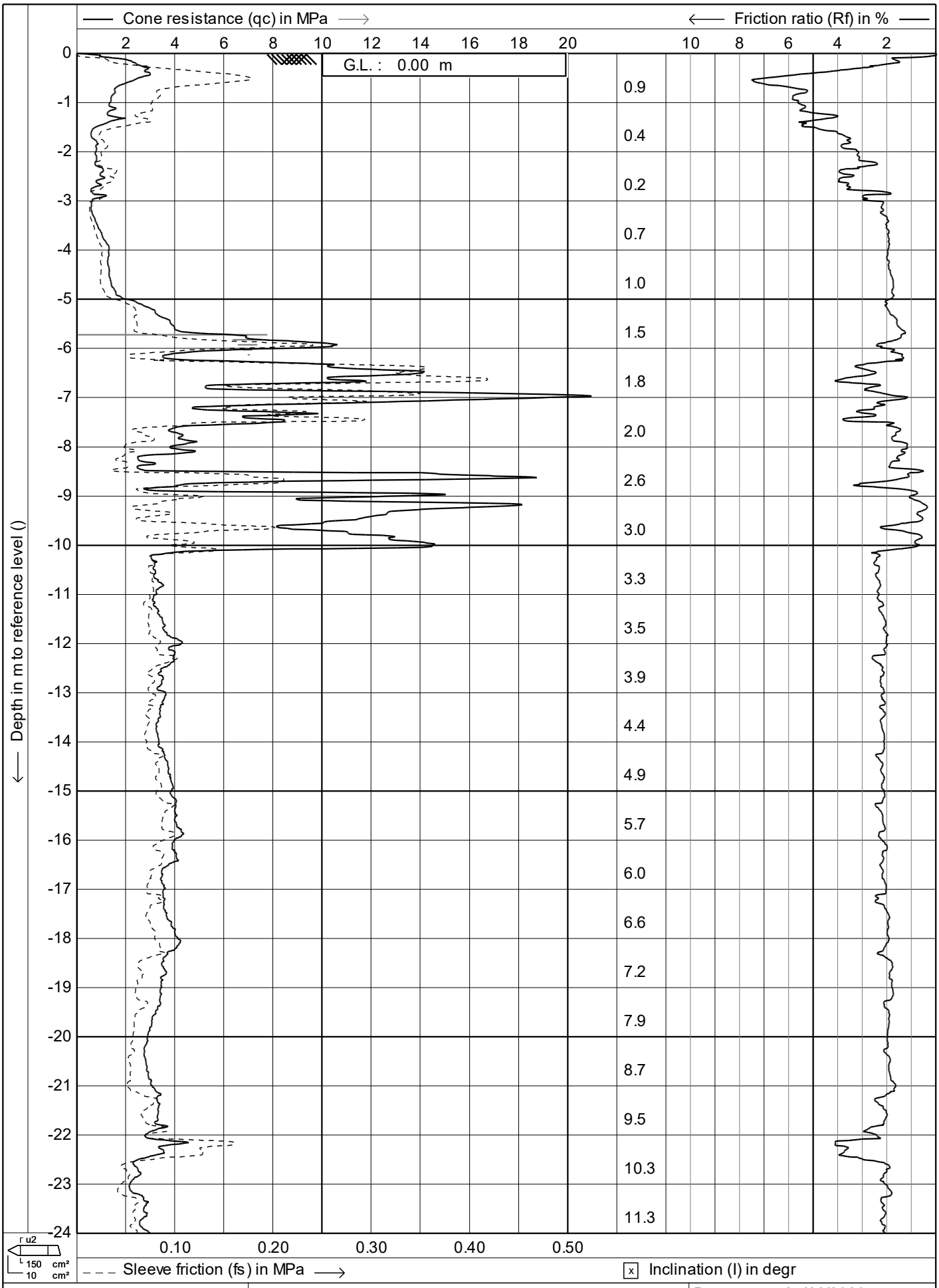
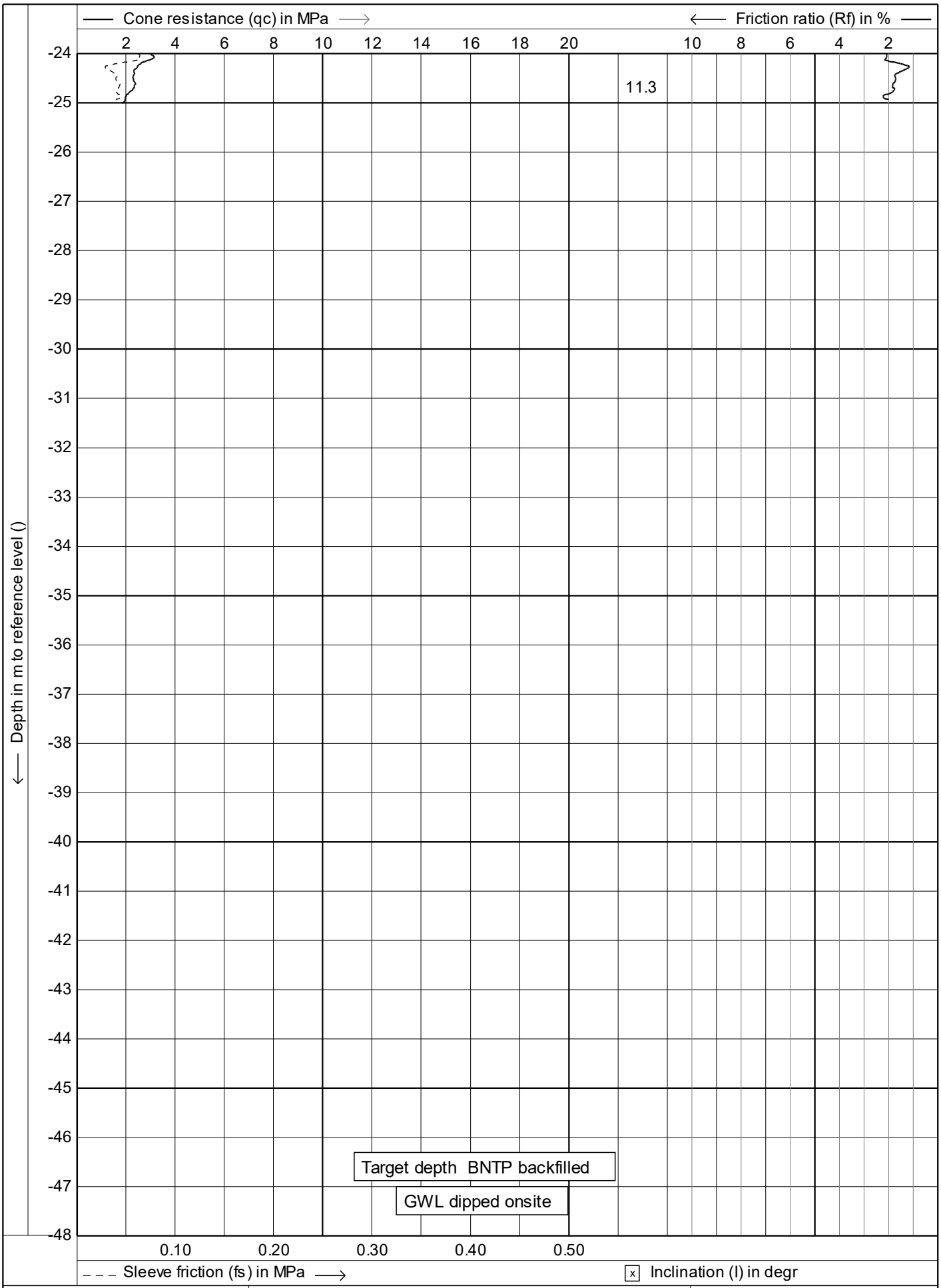
1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **25/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **054** 1/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

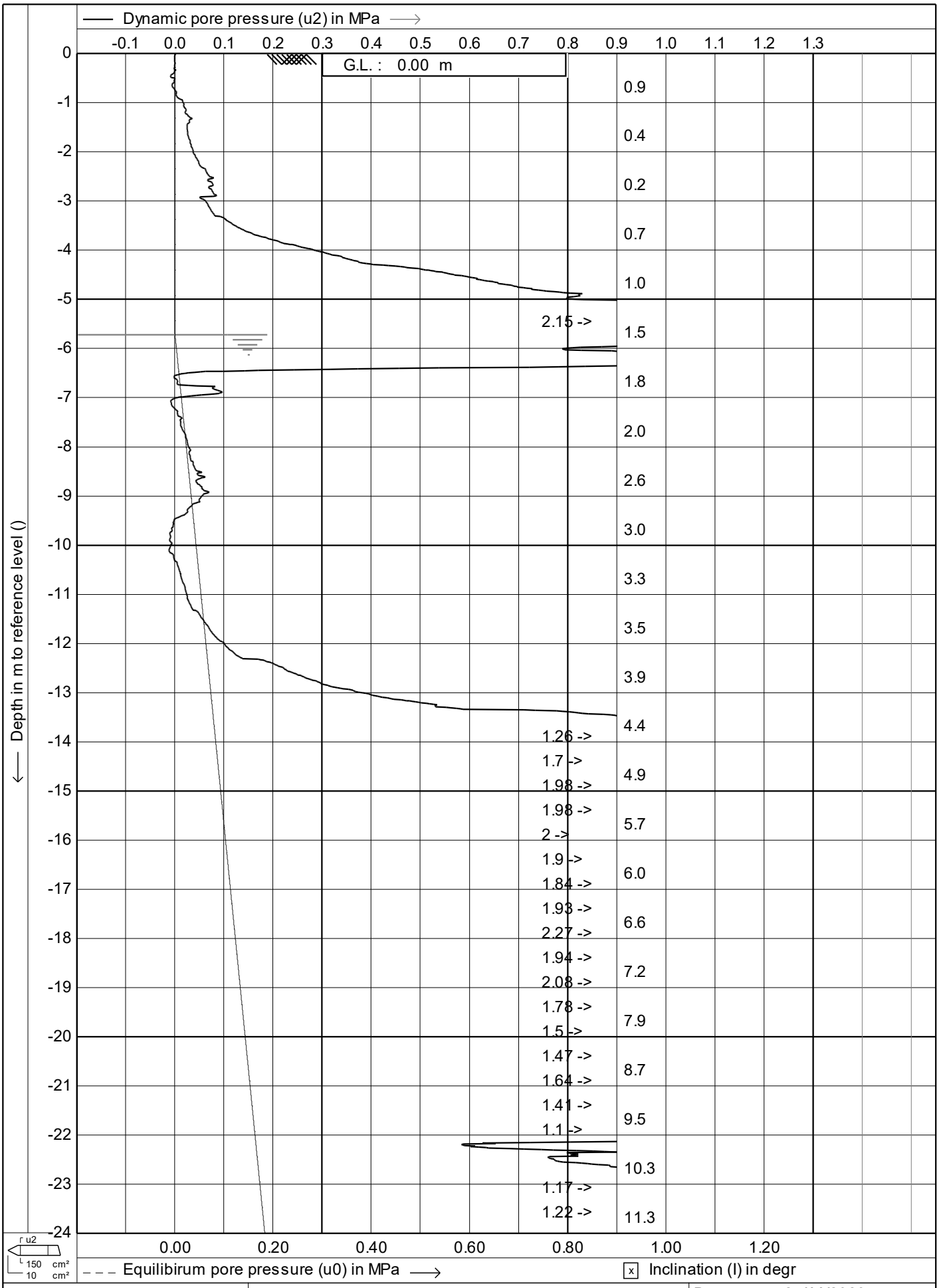
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

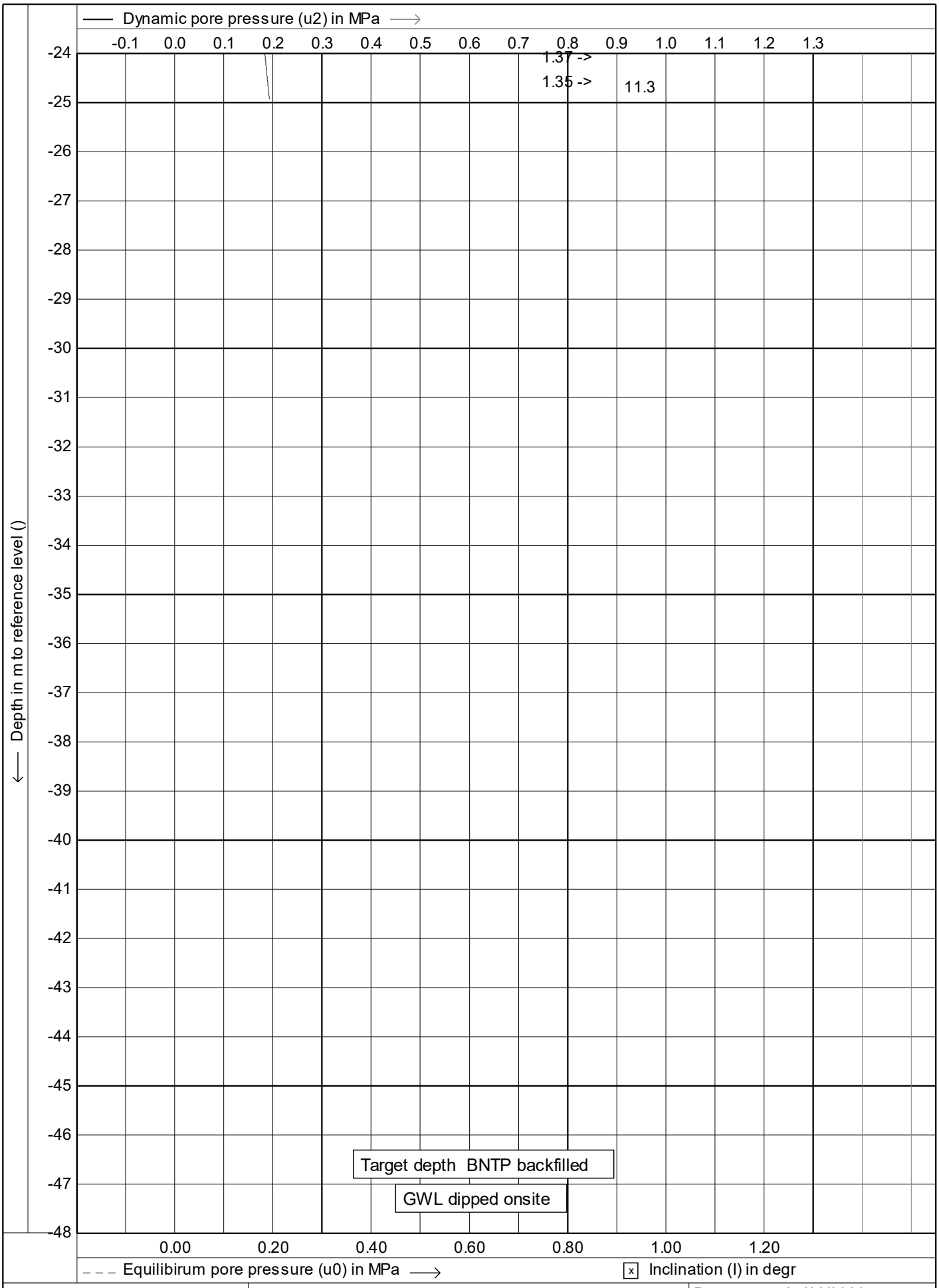


1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **25/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **054** 3/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

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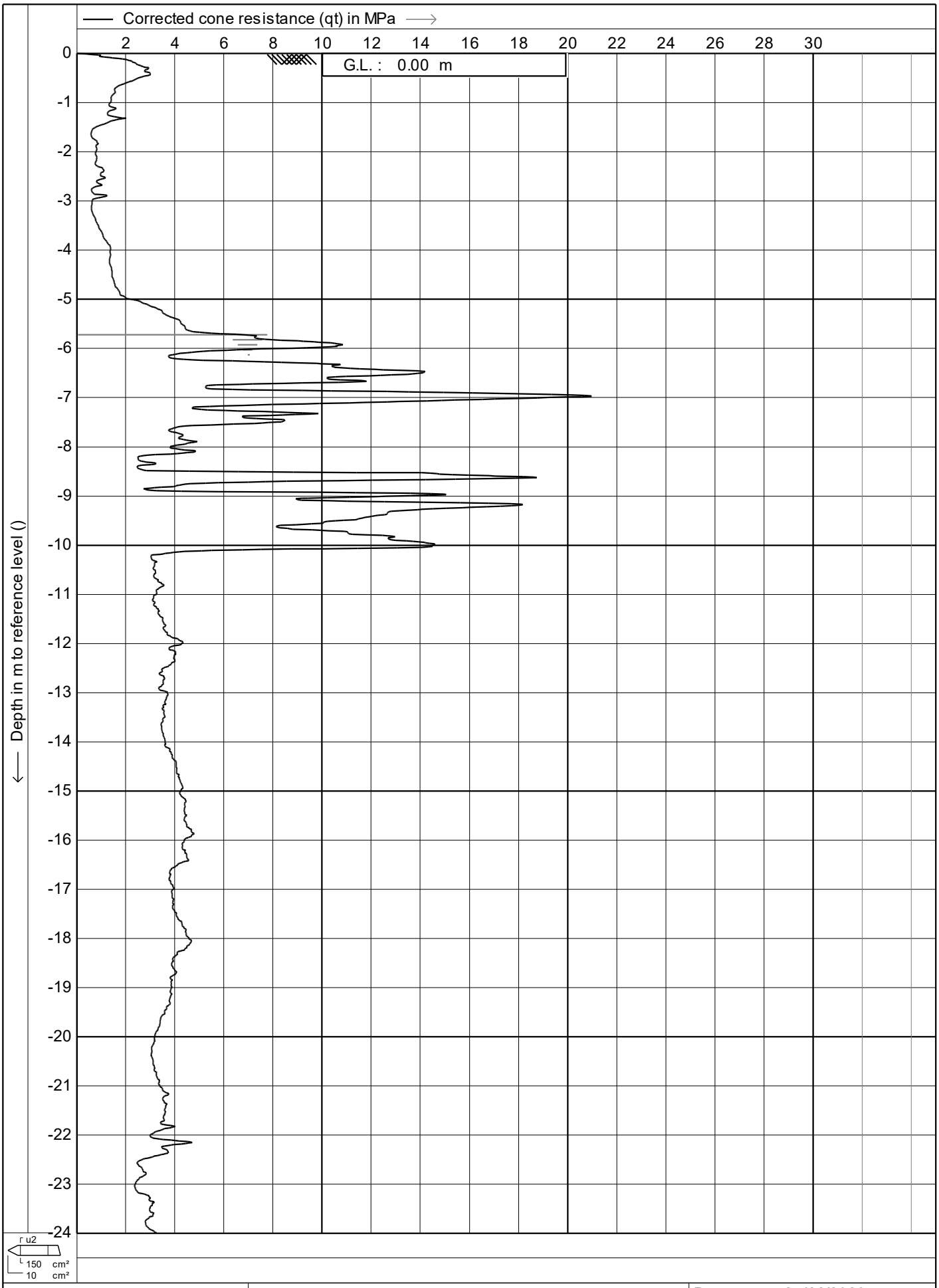
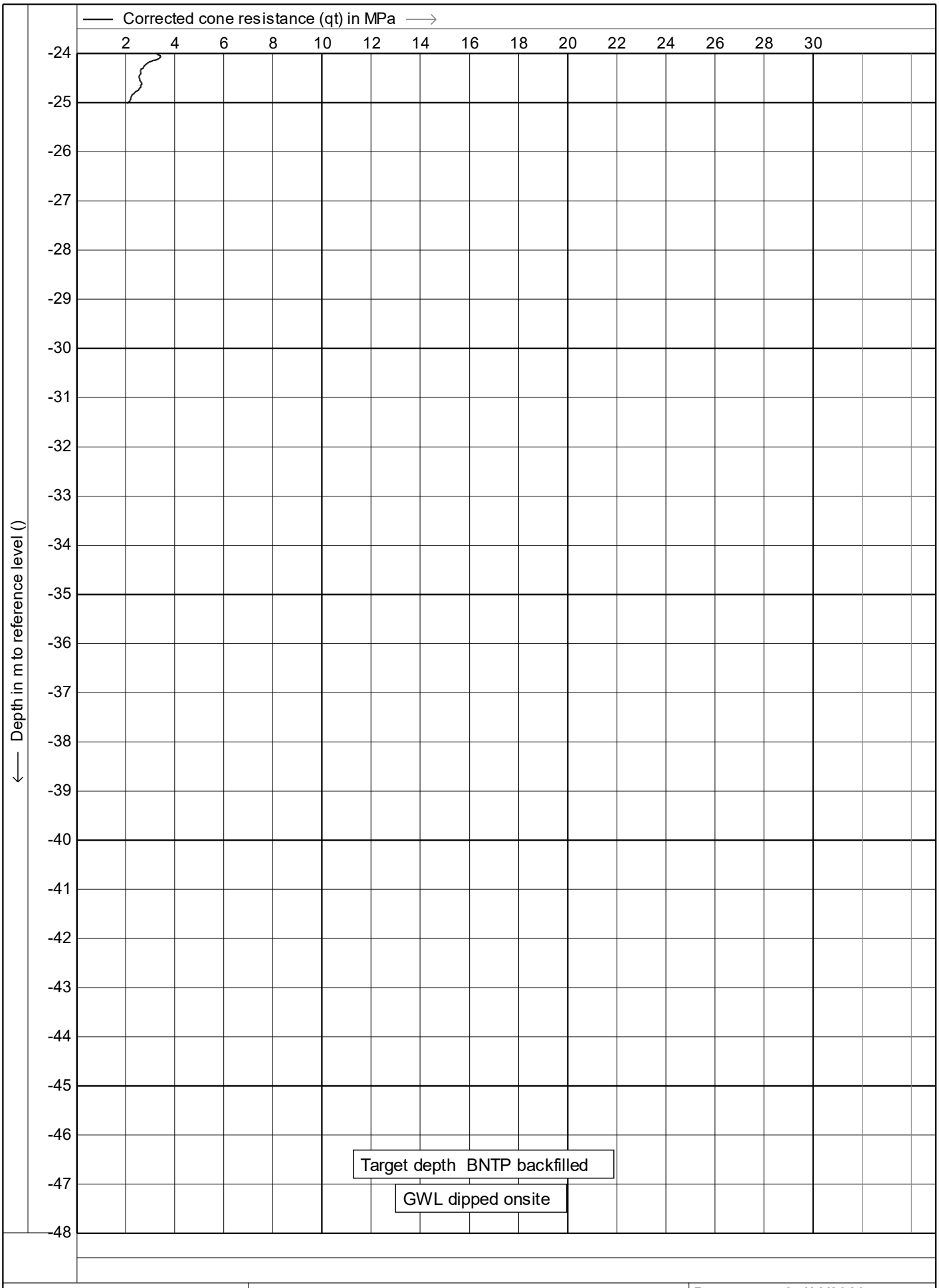
1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **25/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **054** — **5/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

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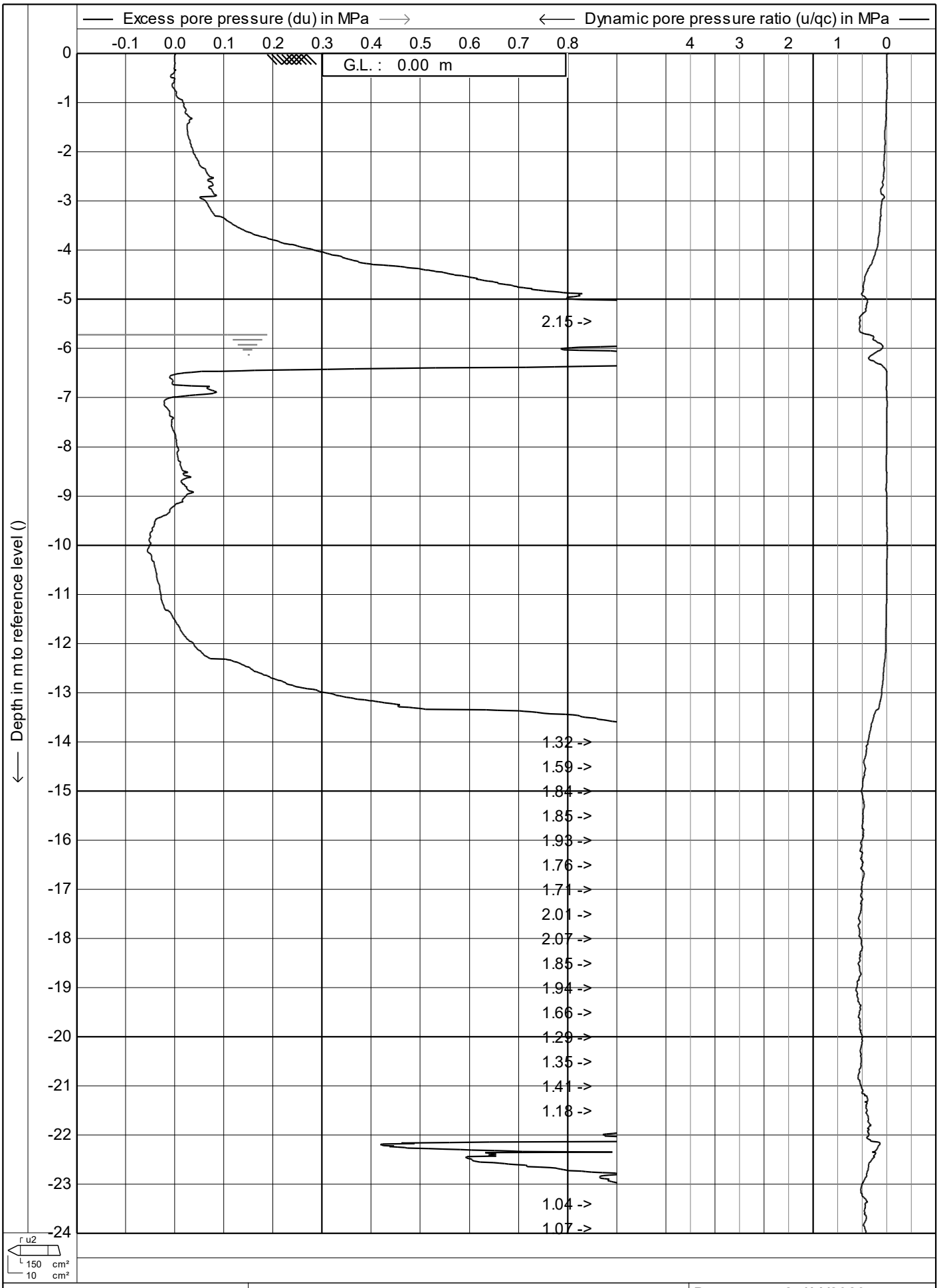
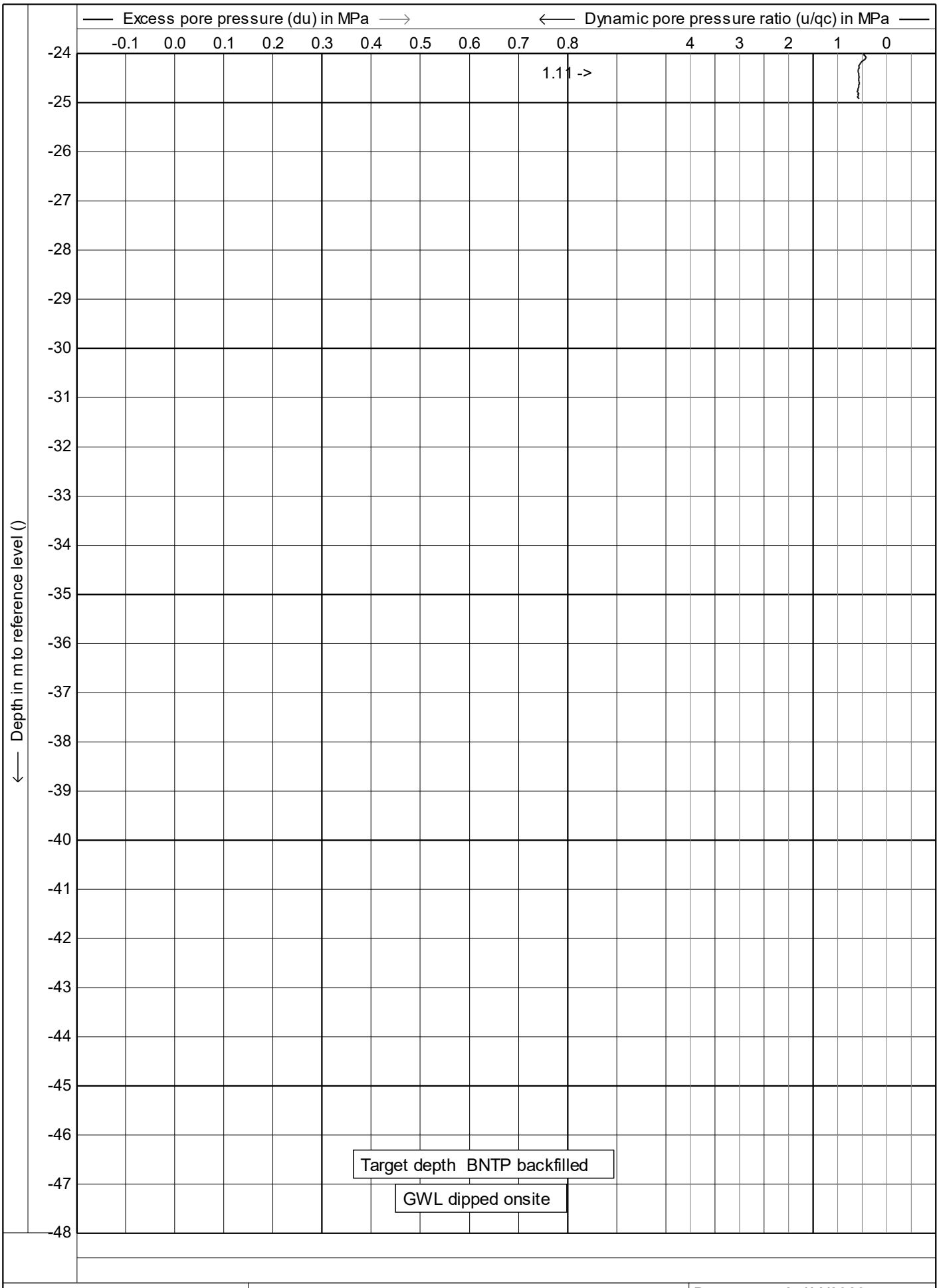
1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **25/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **054** 7/28 |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

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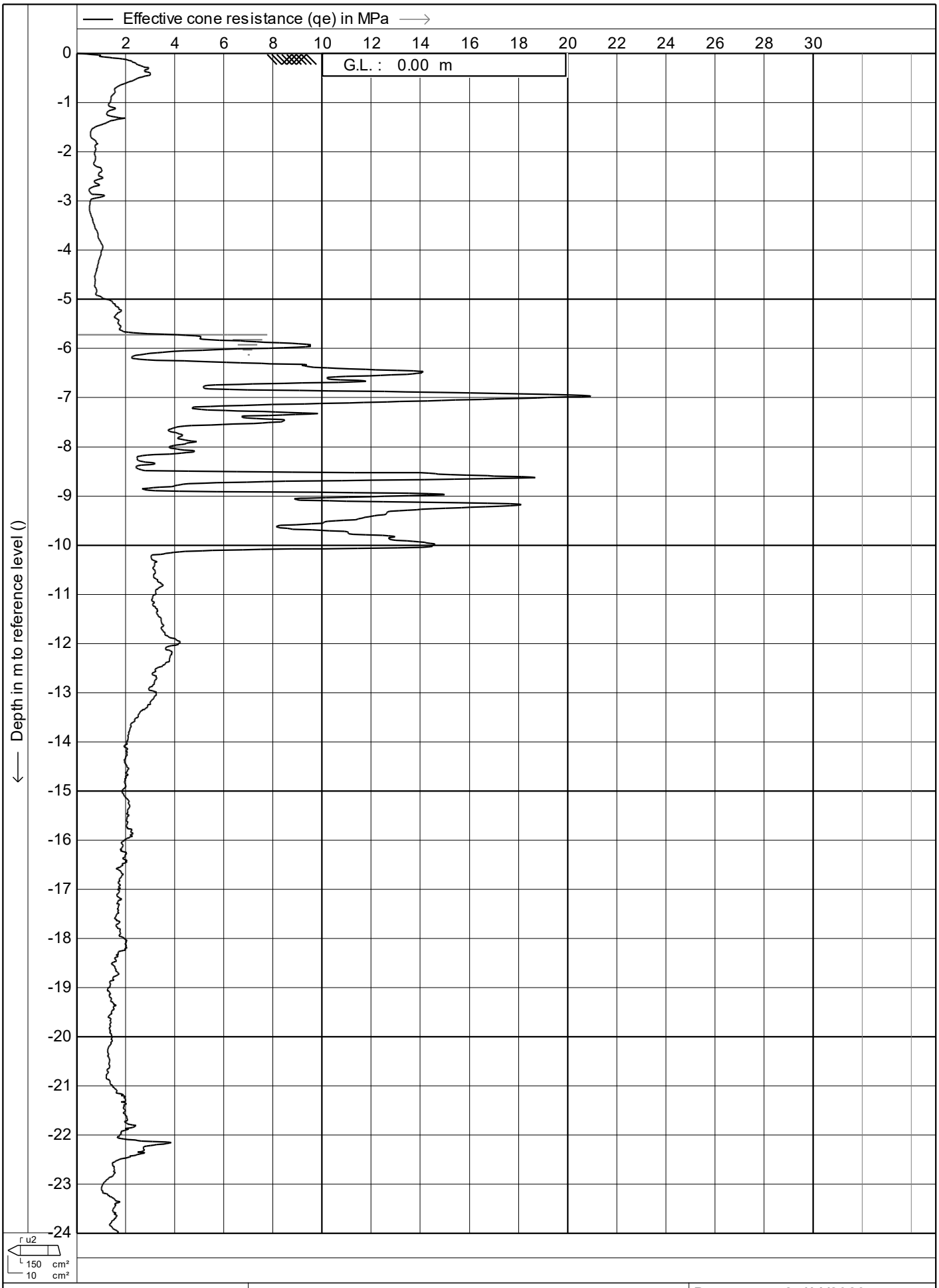
1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

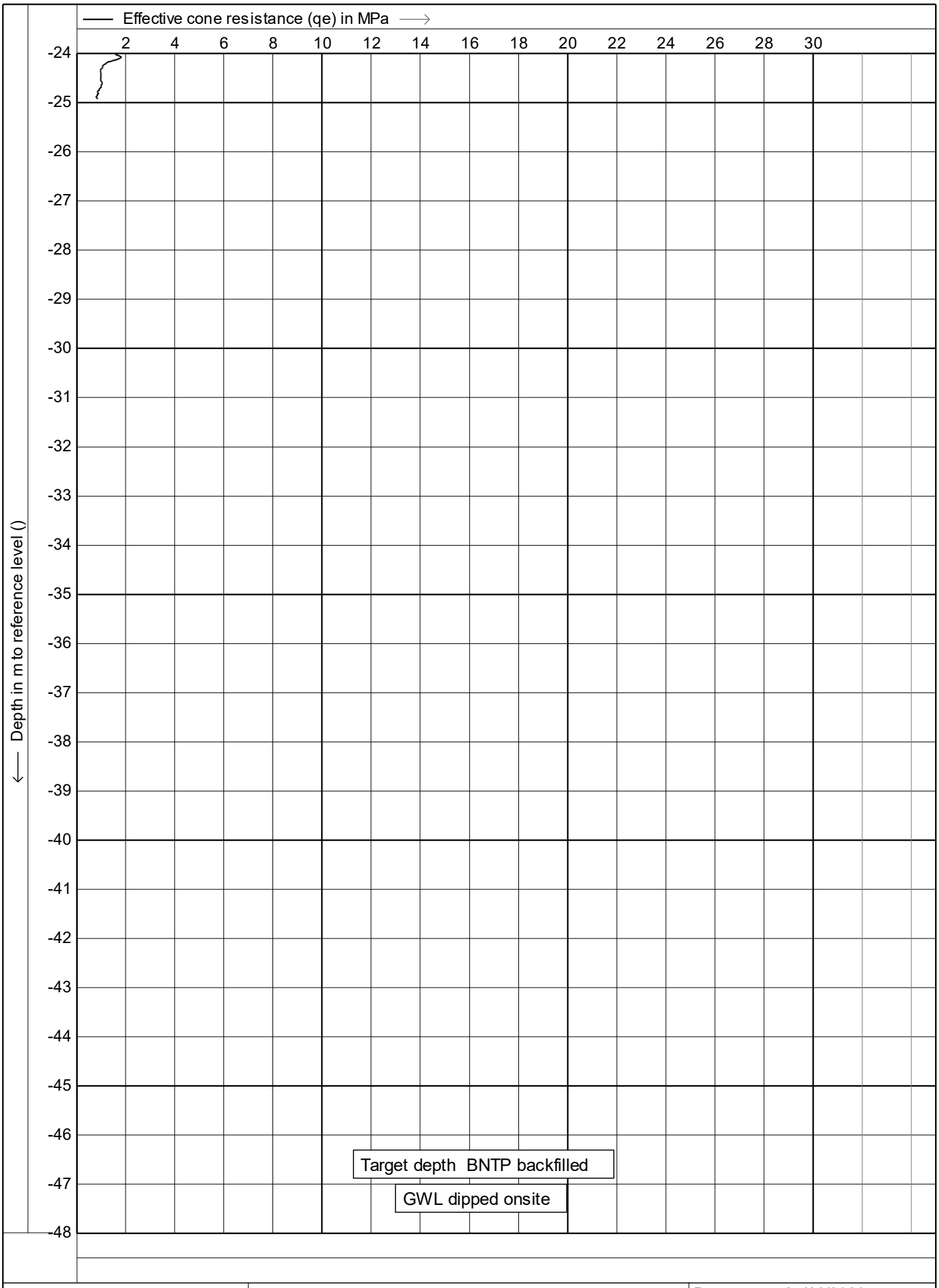
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**9/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

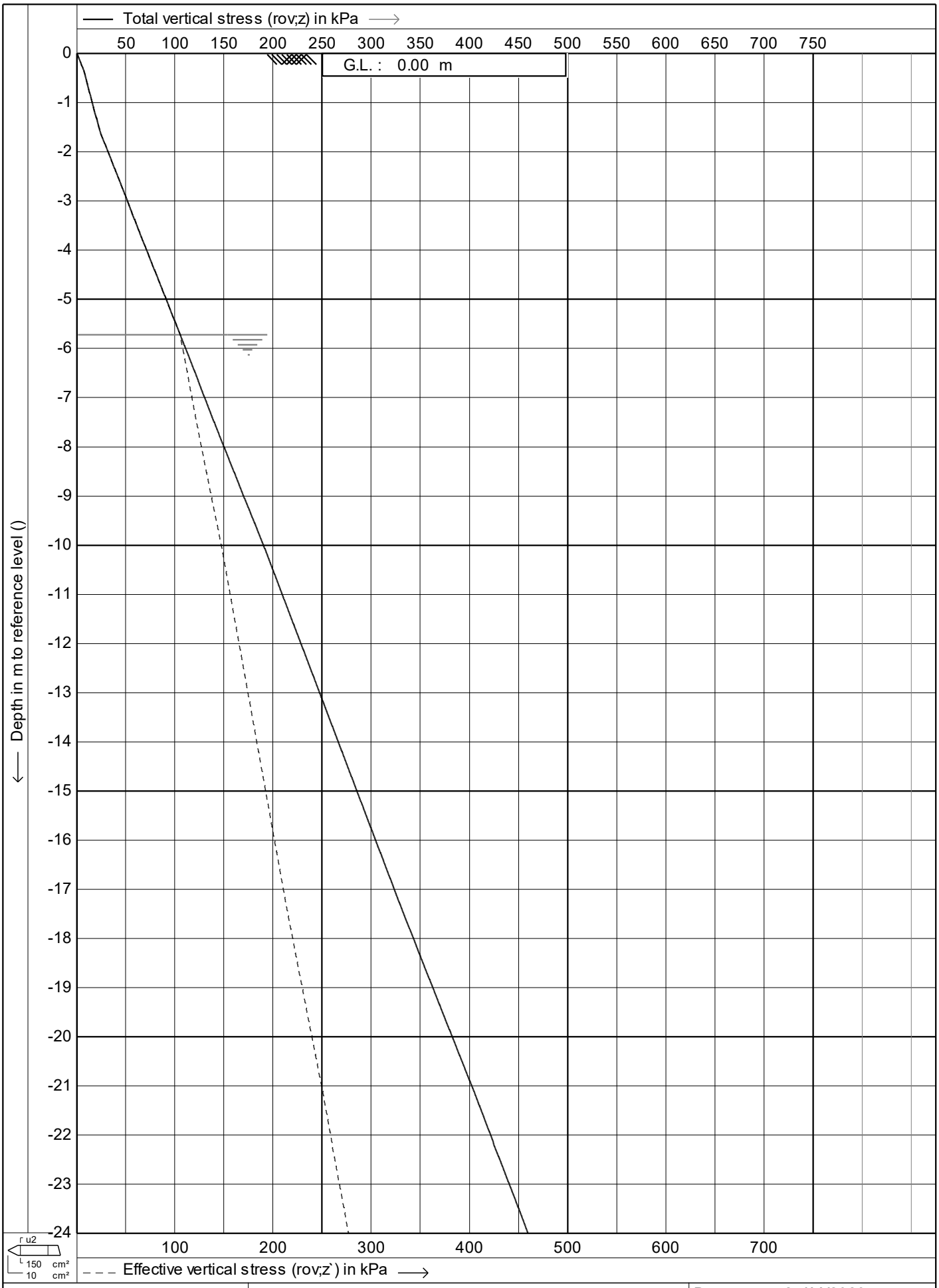
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**10/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

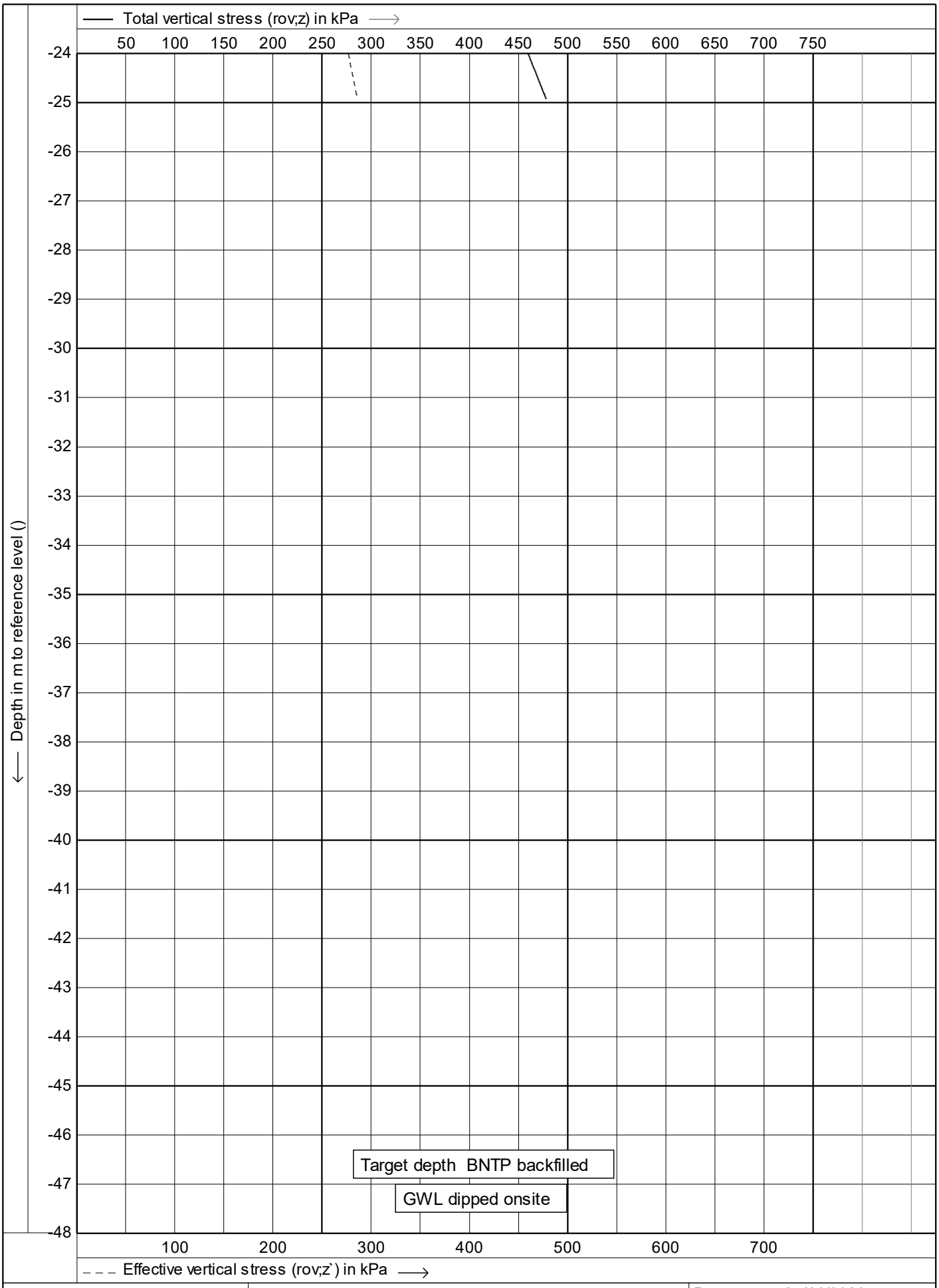
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

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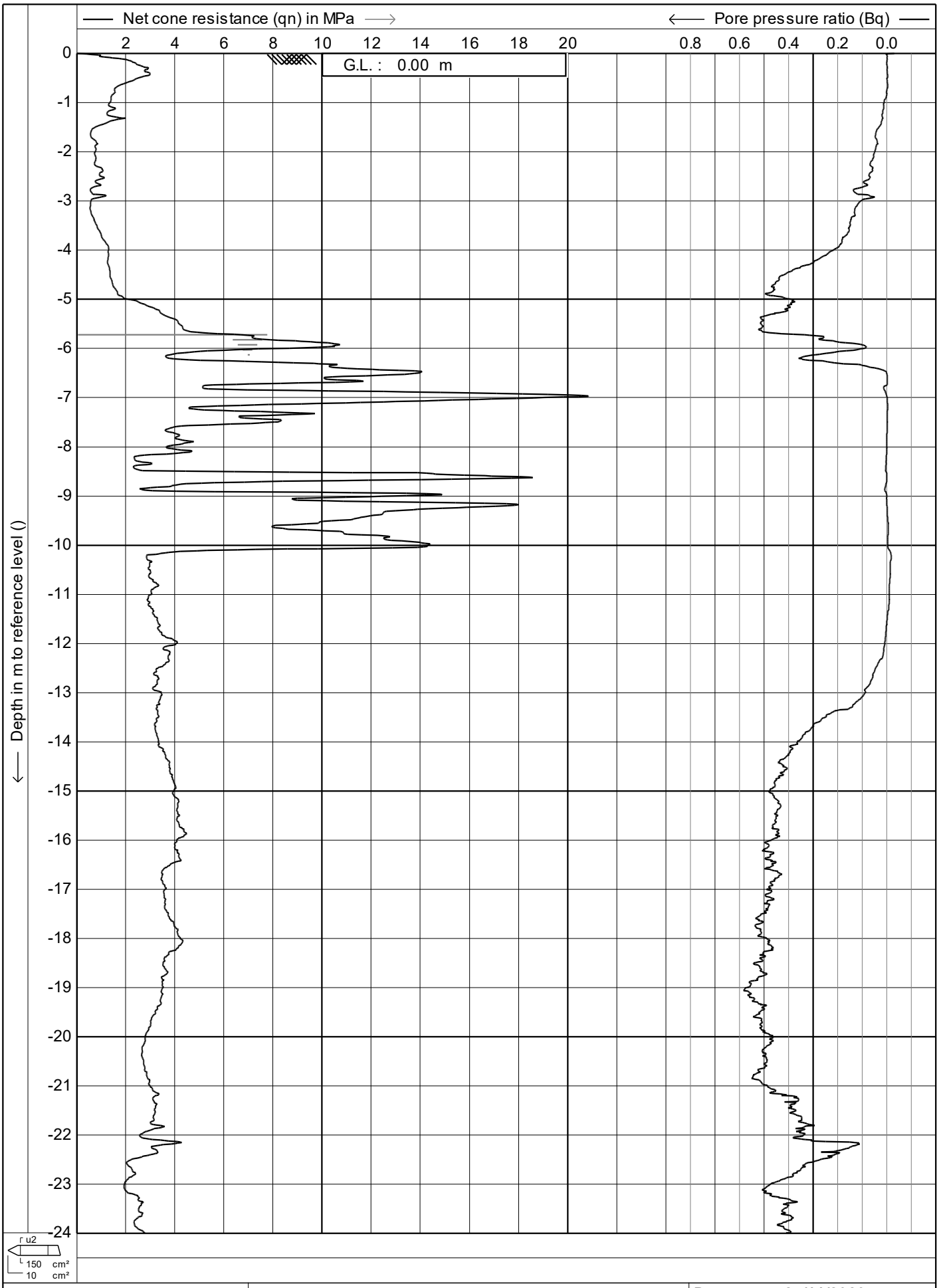
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**12/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

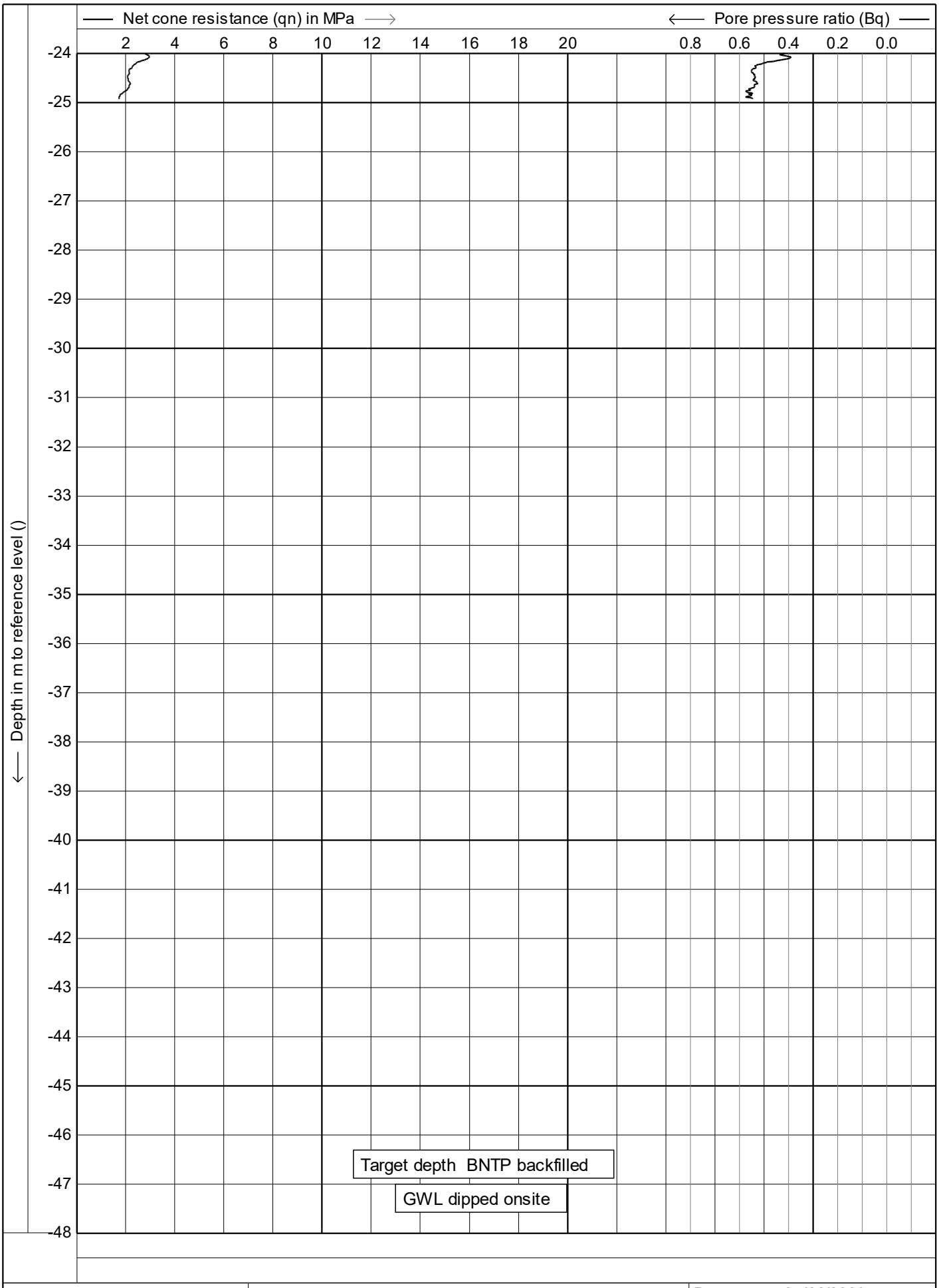
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**13/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

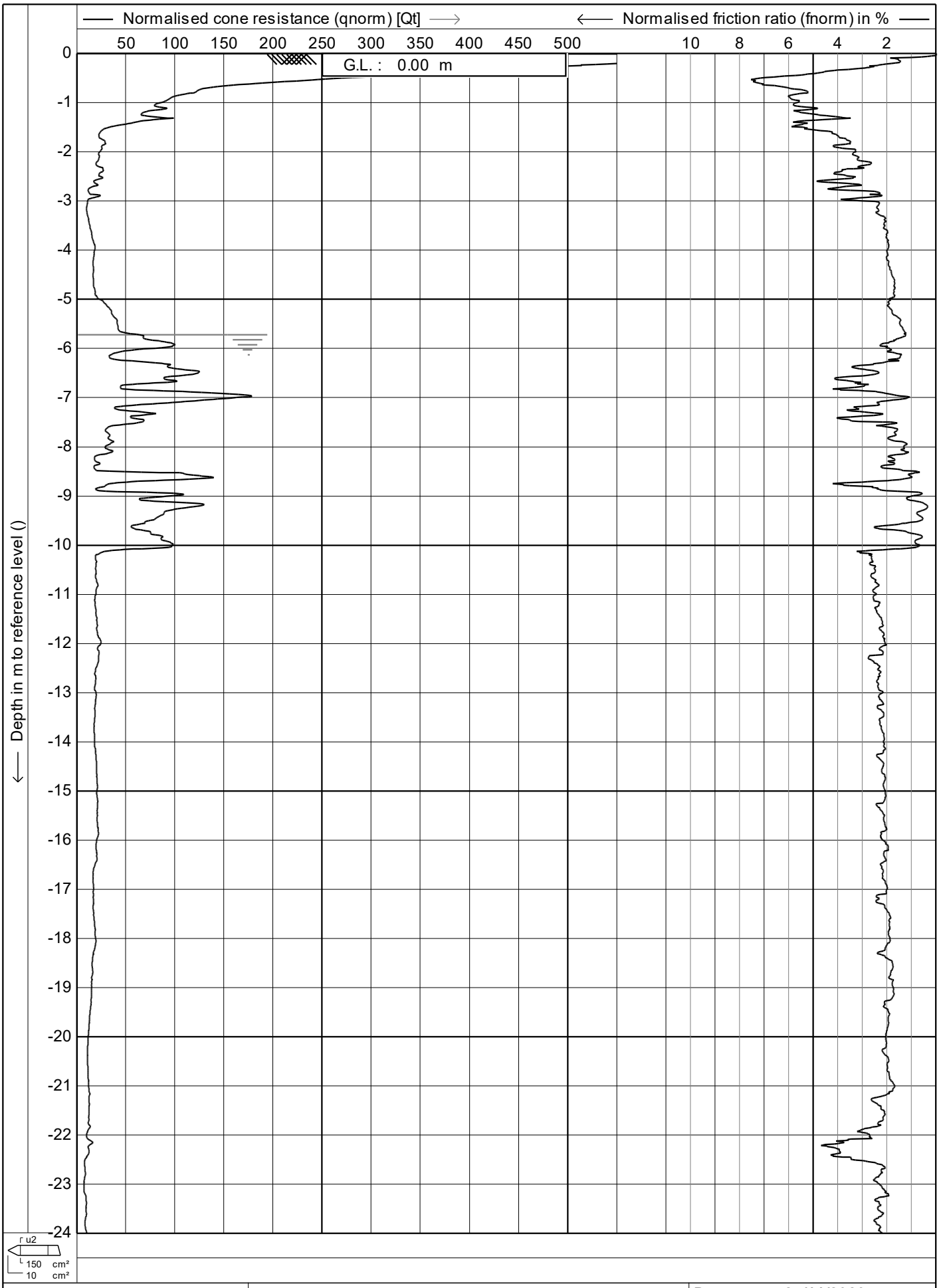
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**14/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

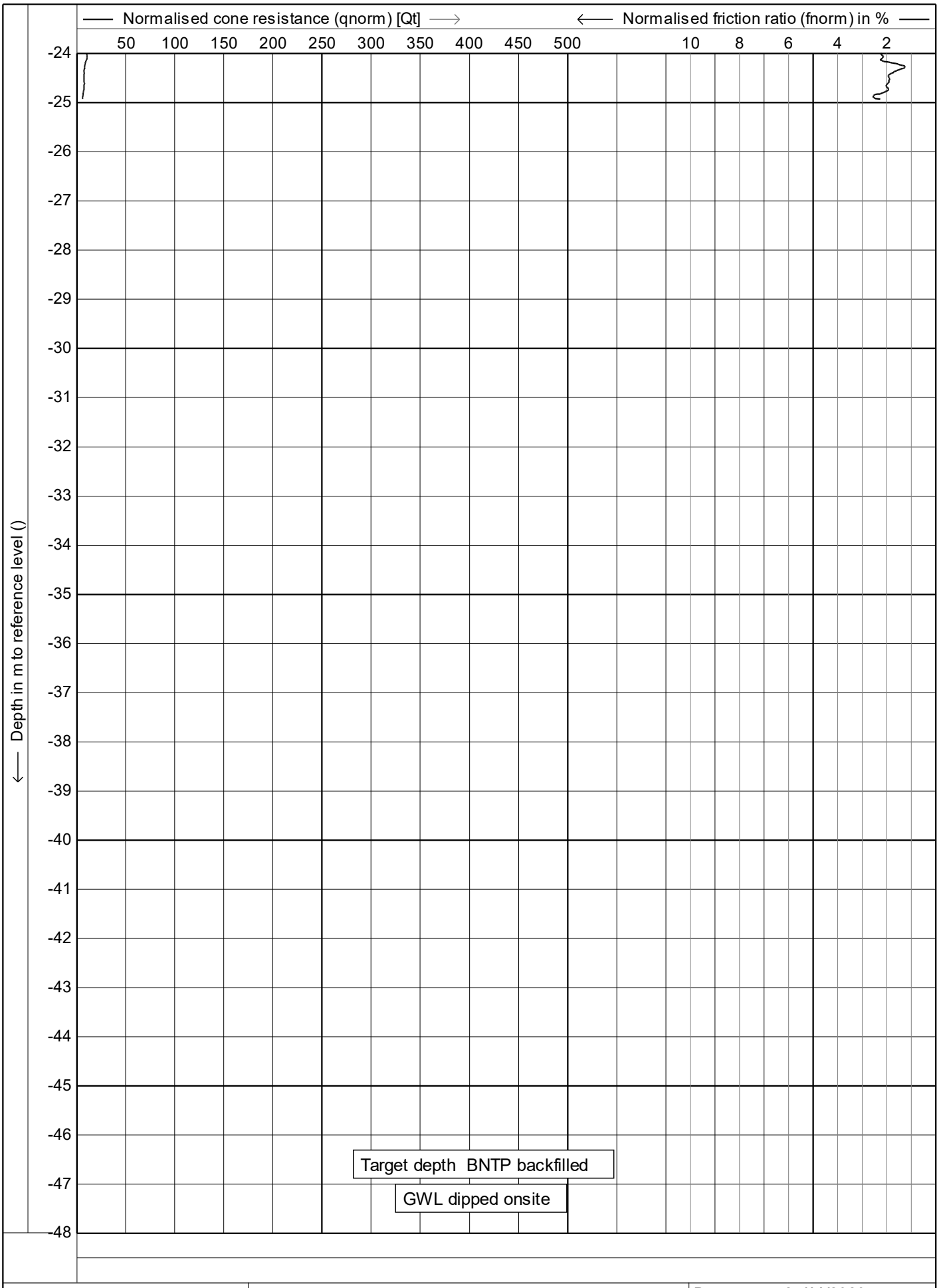
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**15/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

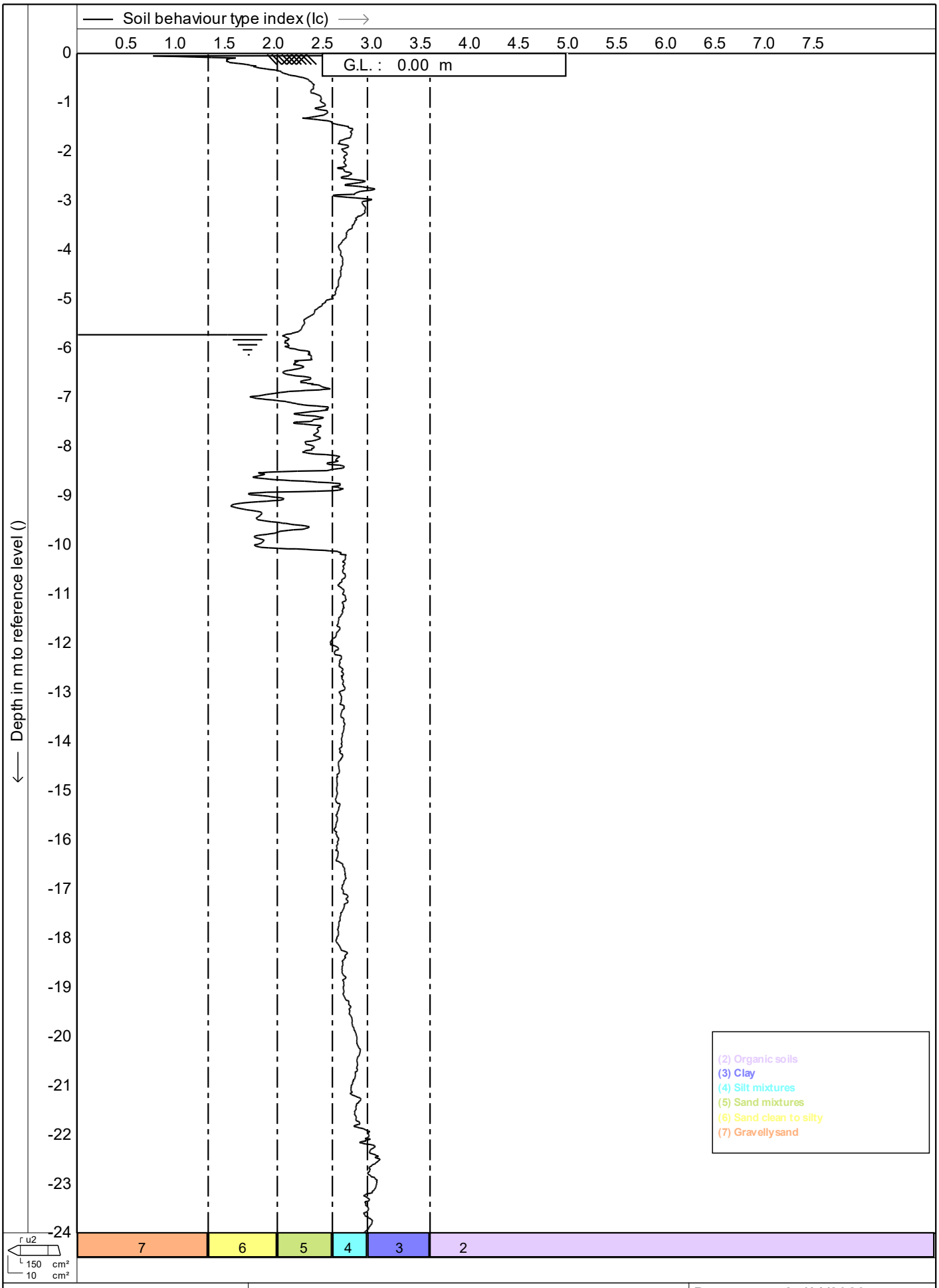
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**16/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

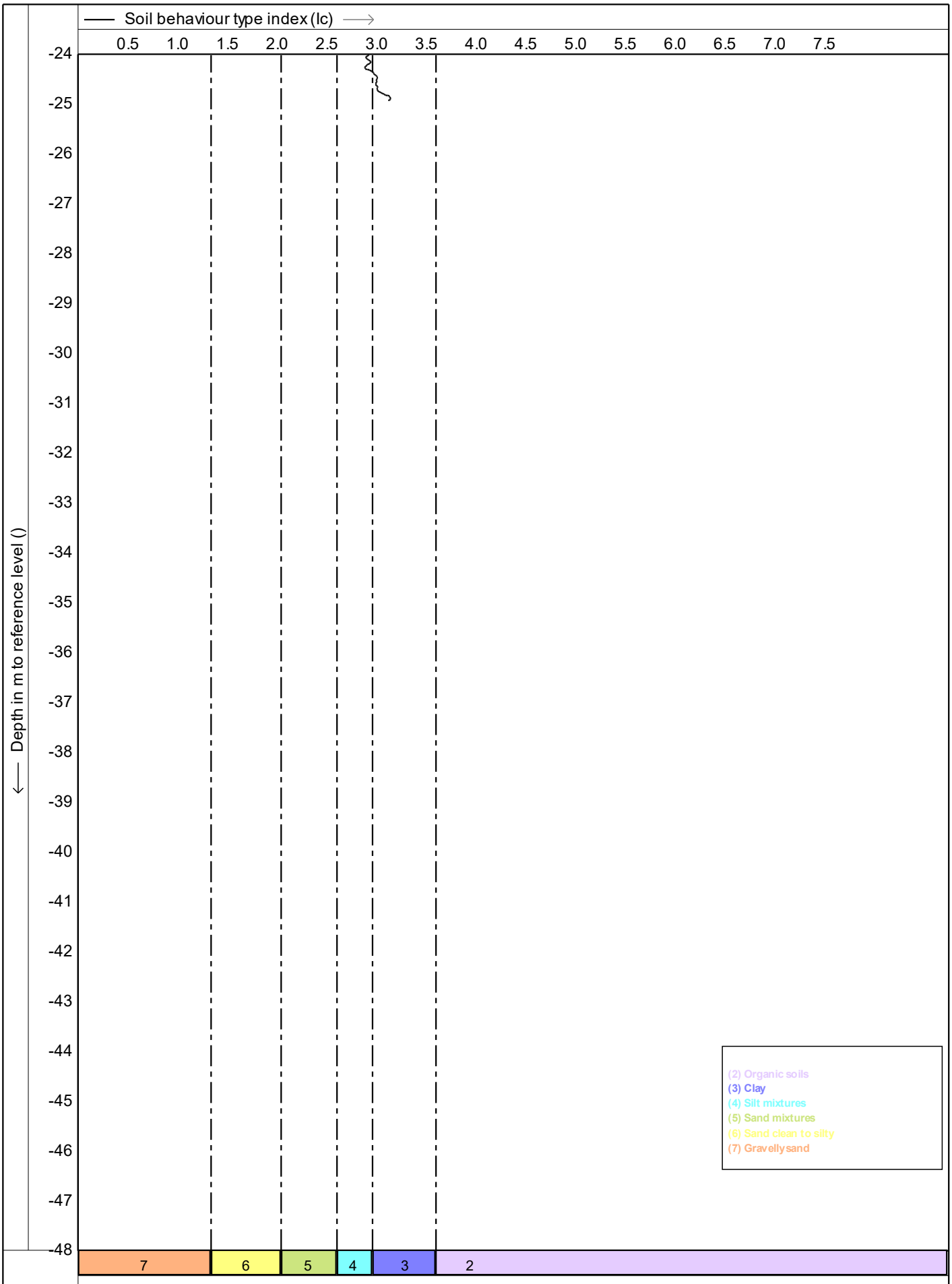
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**17/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

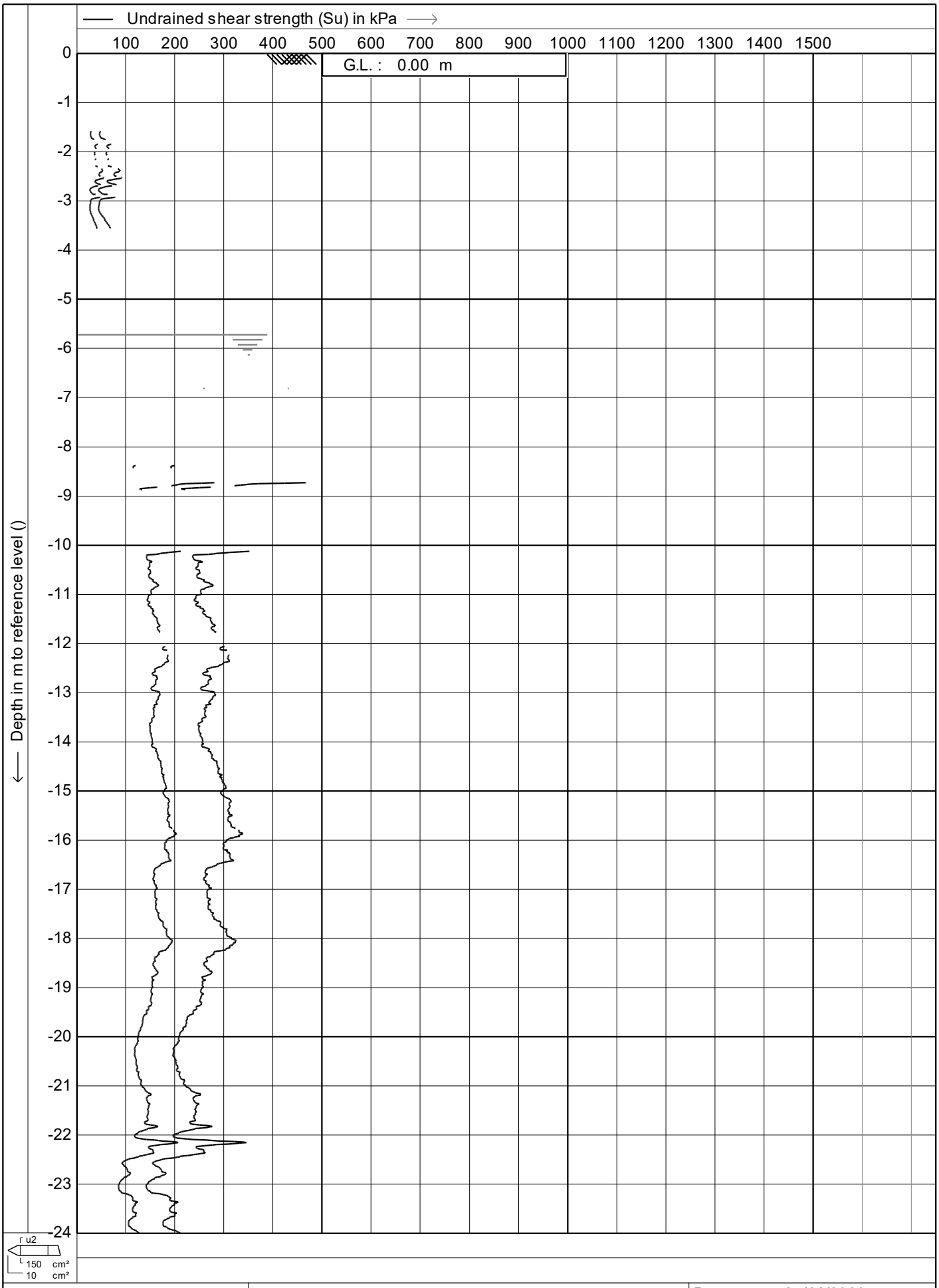
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

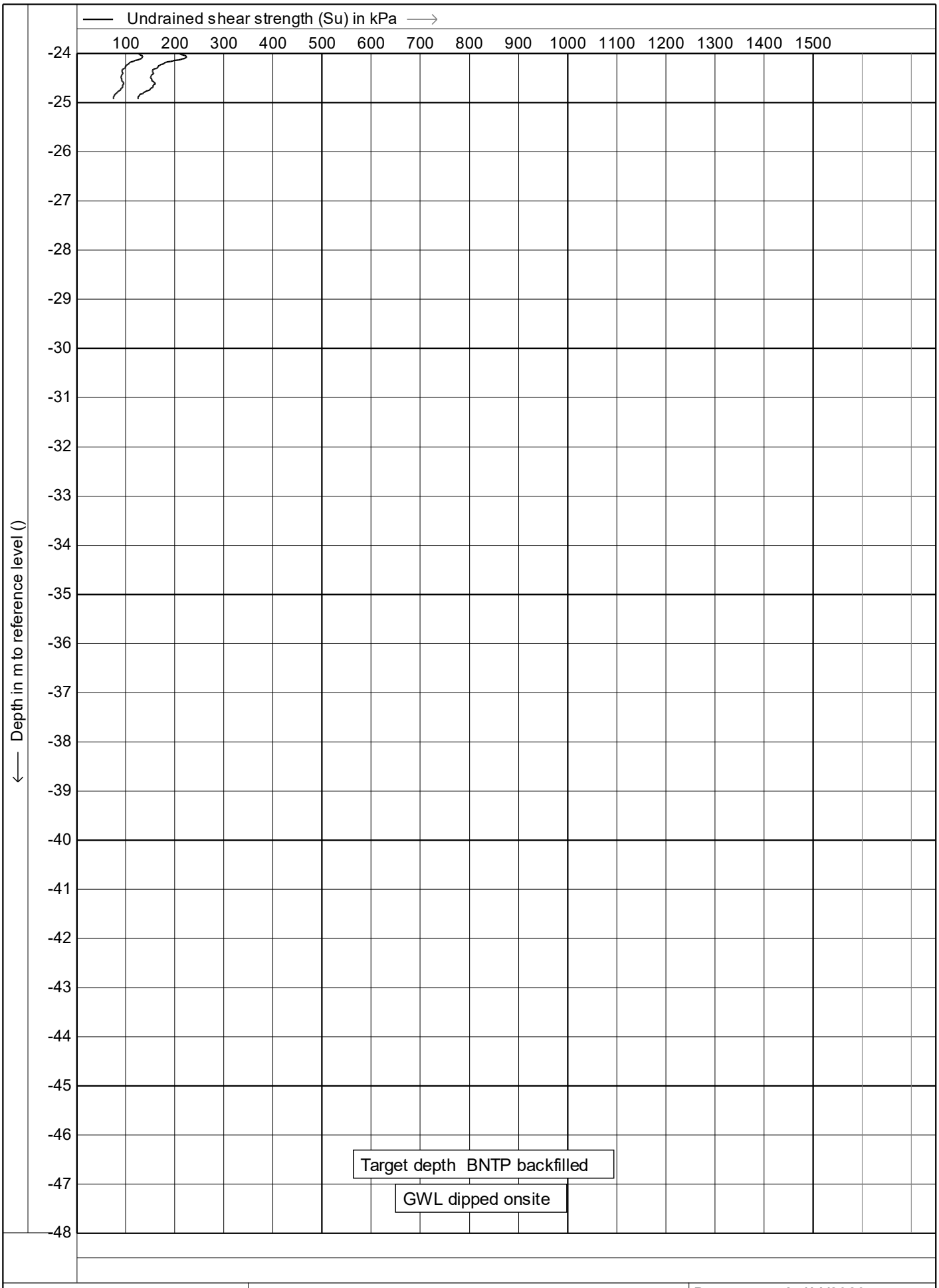
**18/28**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **25/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **054** — **19/28** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

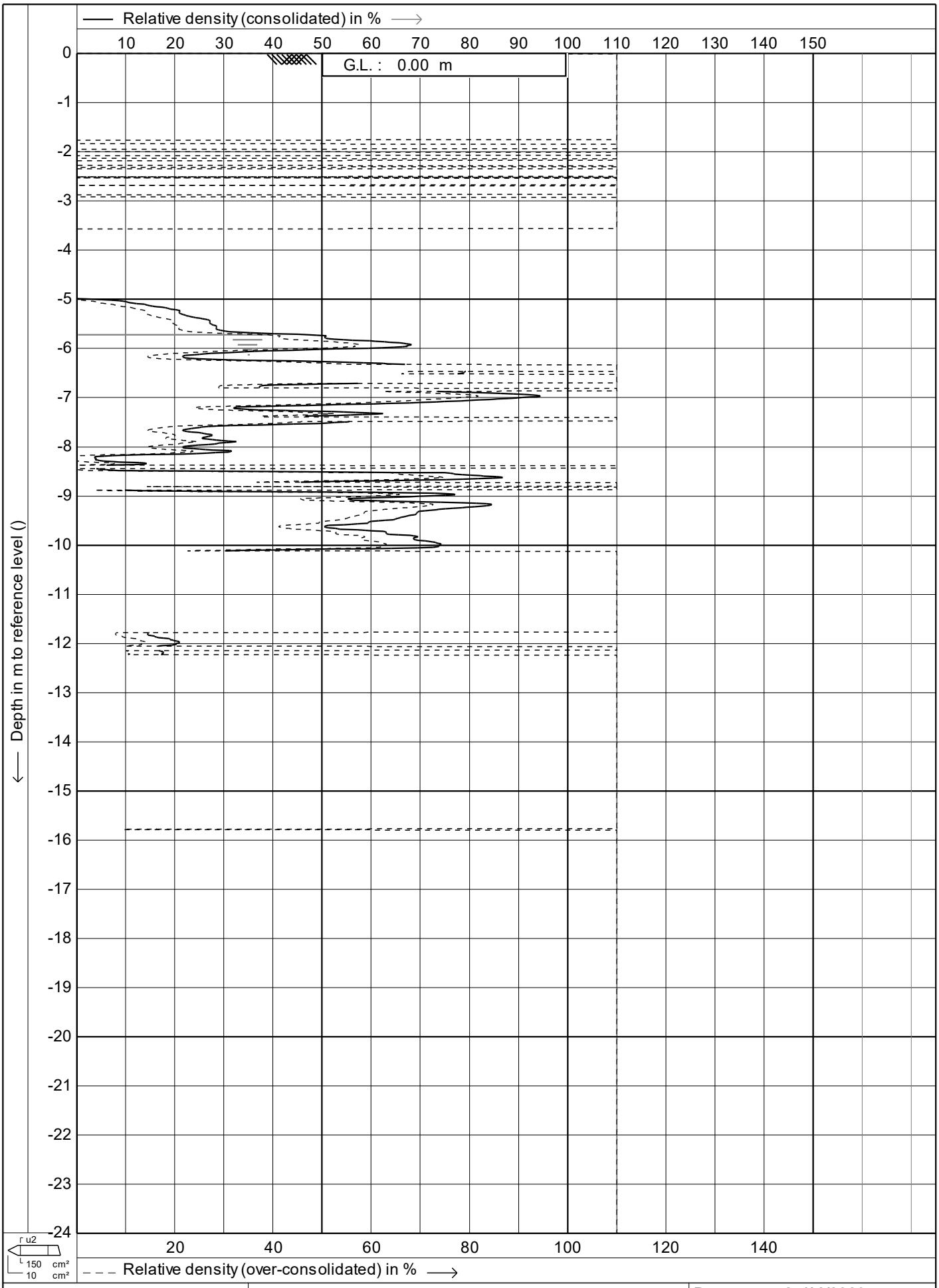
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |



1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

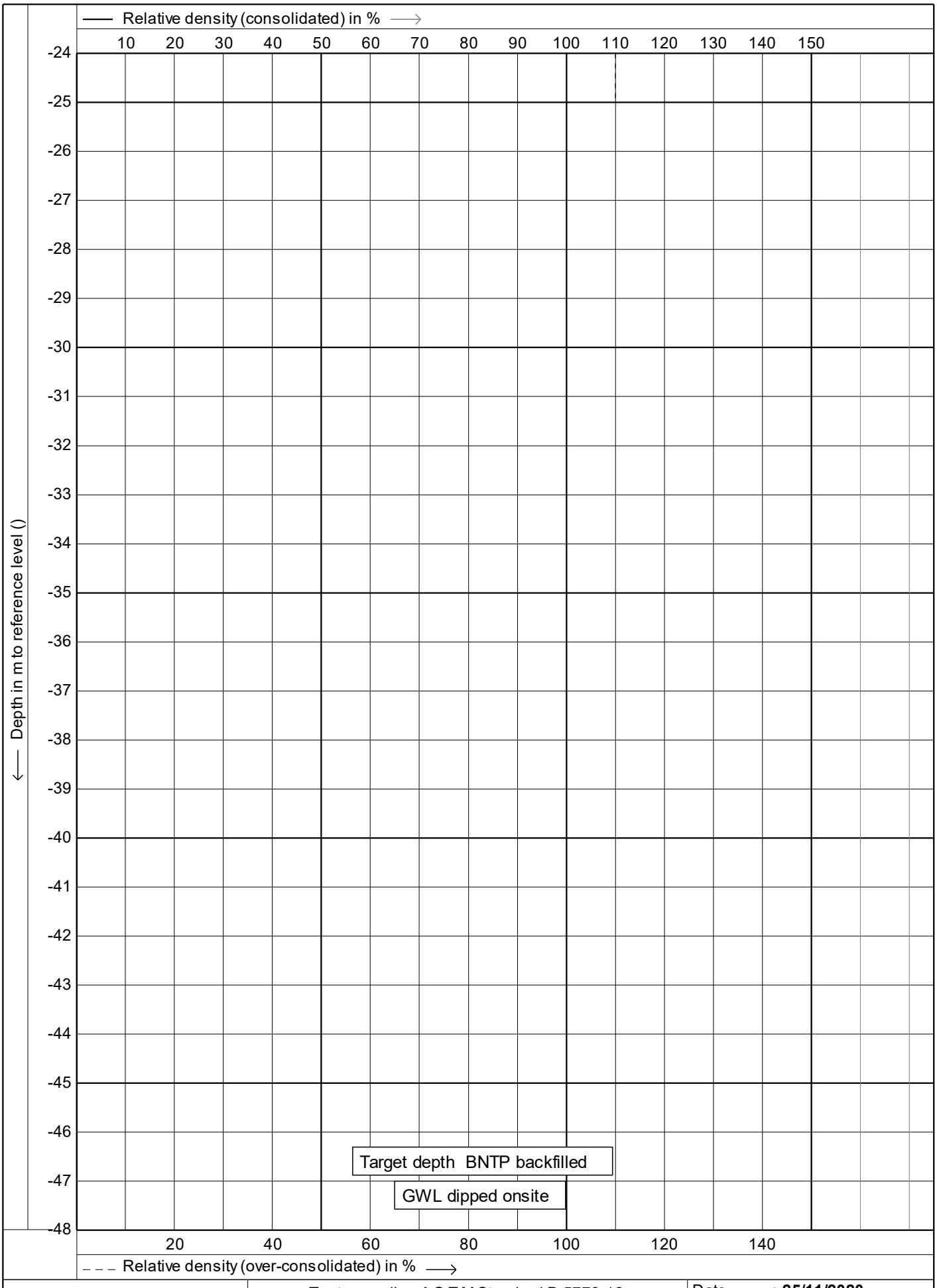
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**21/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

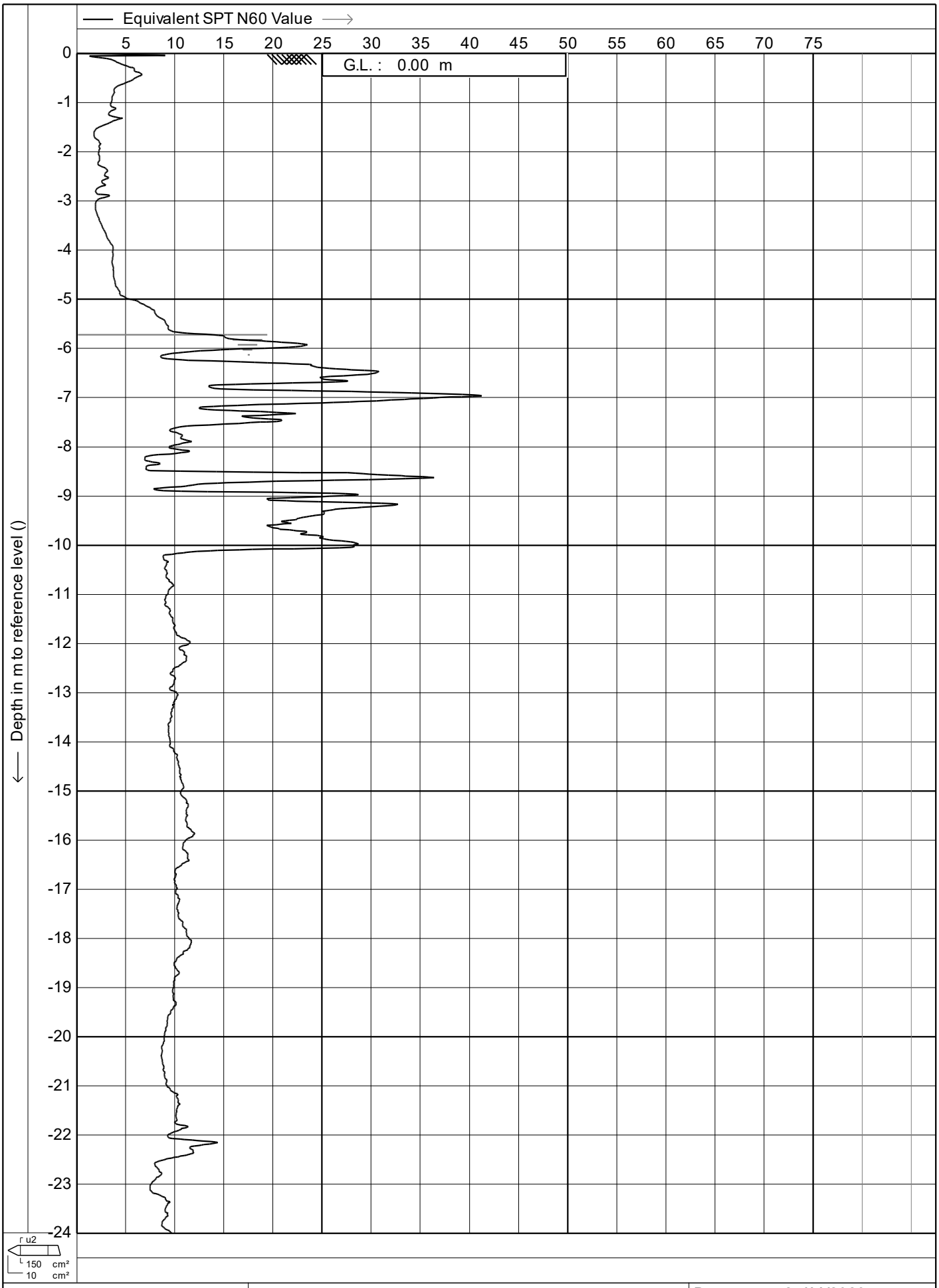
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**22/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

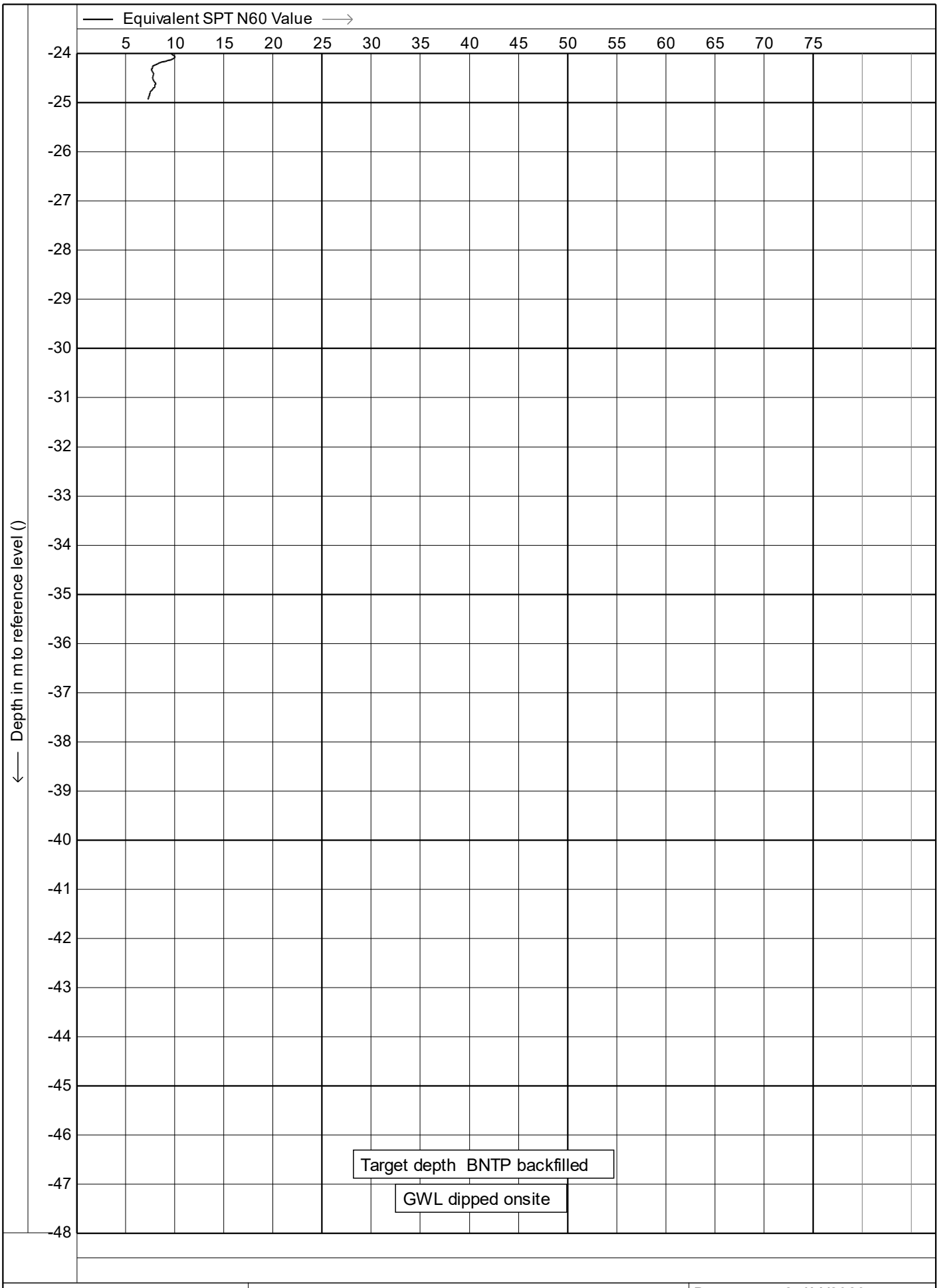
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**23/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

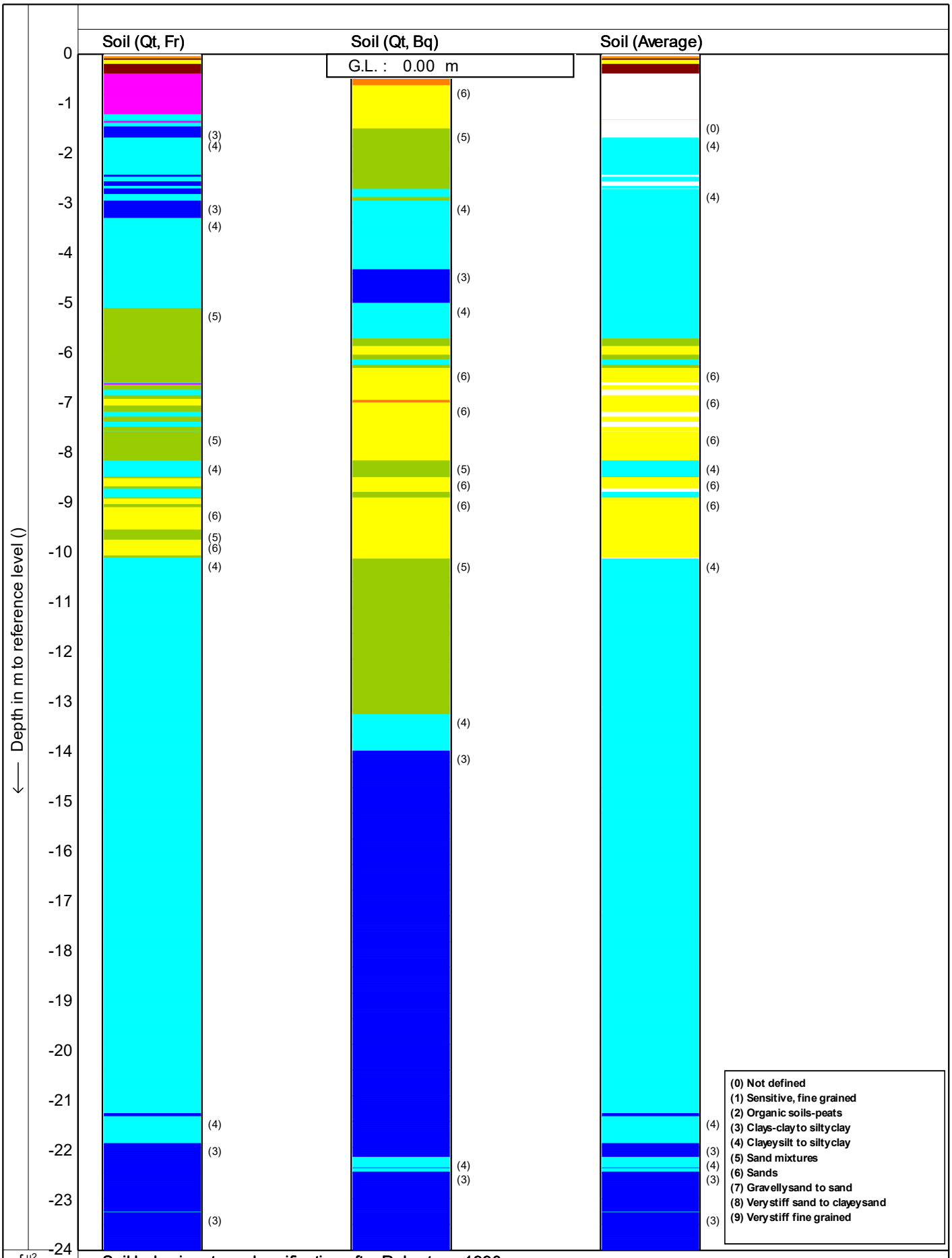
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**24/28**

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

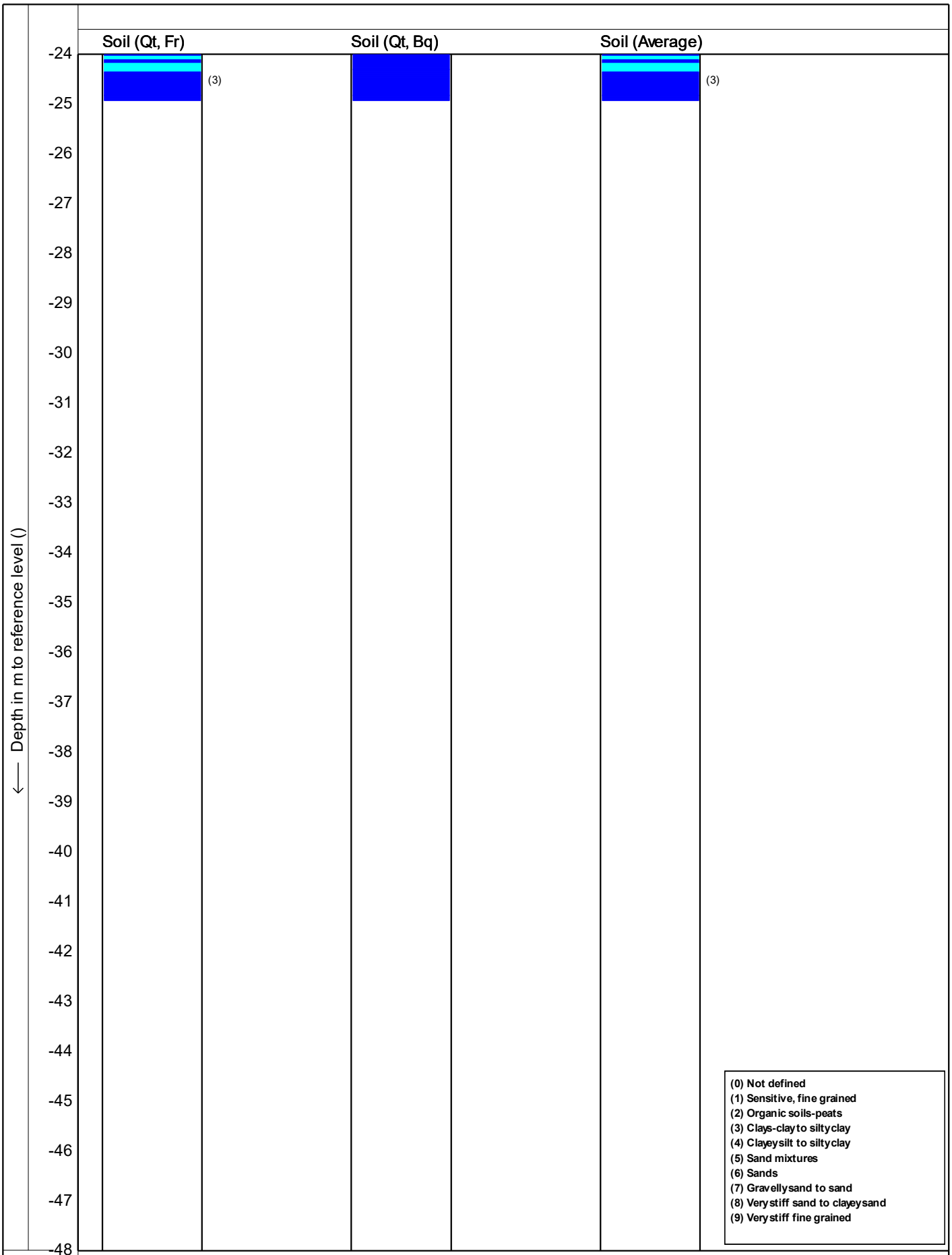
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |



1.48




Soil behaviour type classification after Robertson 1990

PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **25/11/2020**

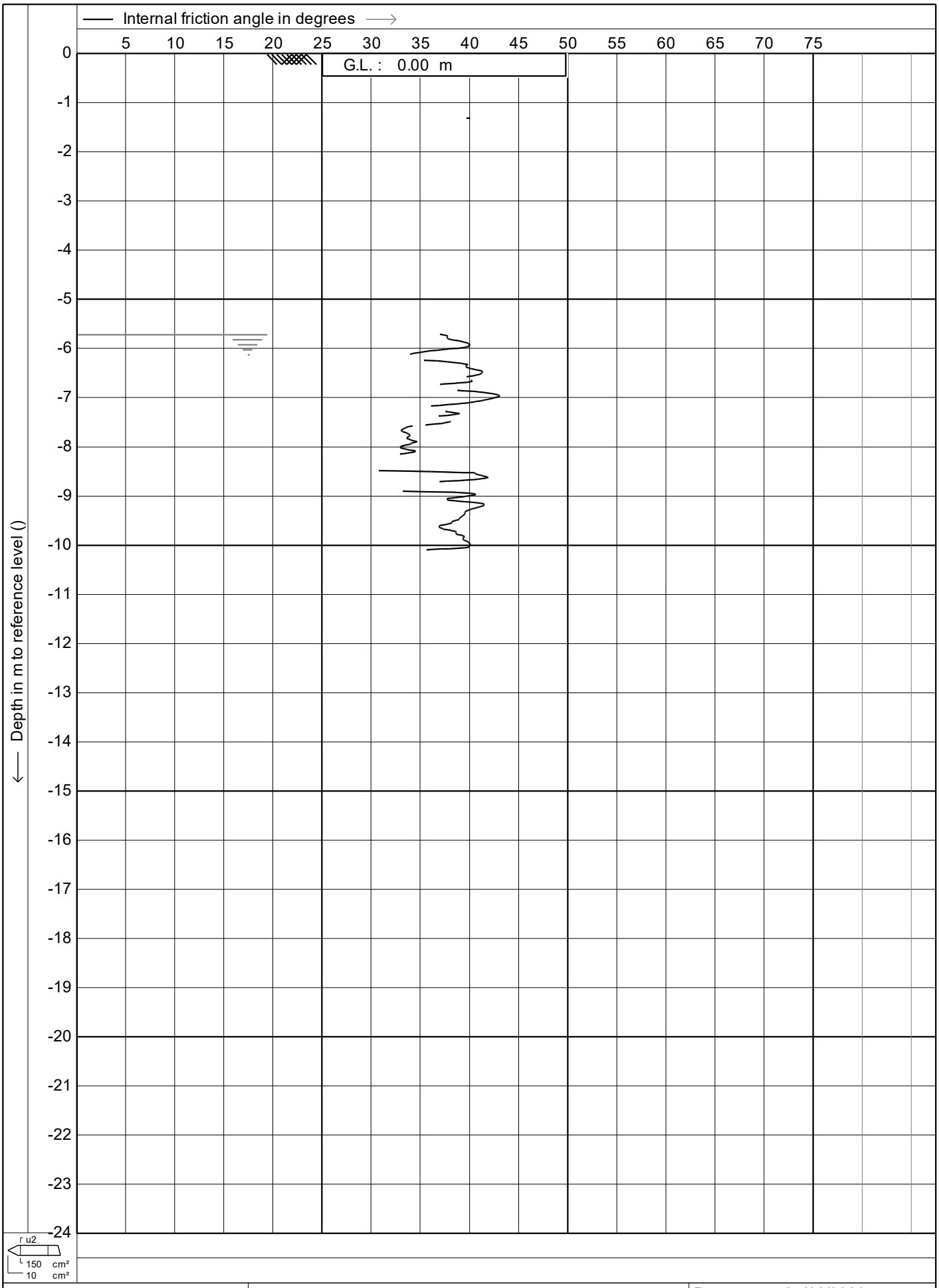
Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **054**



1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

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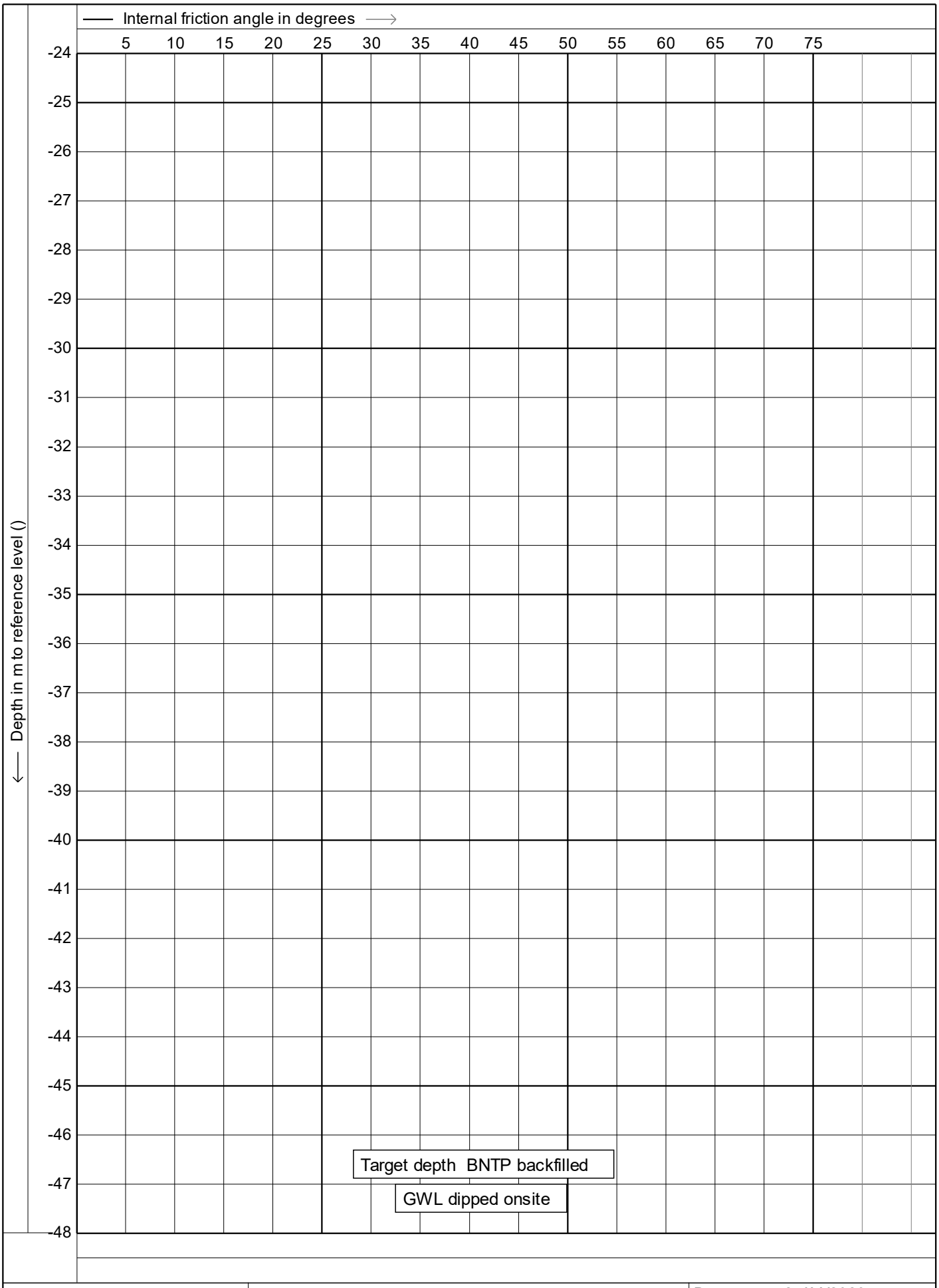
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

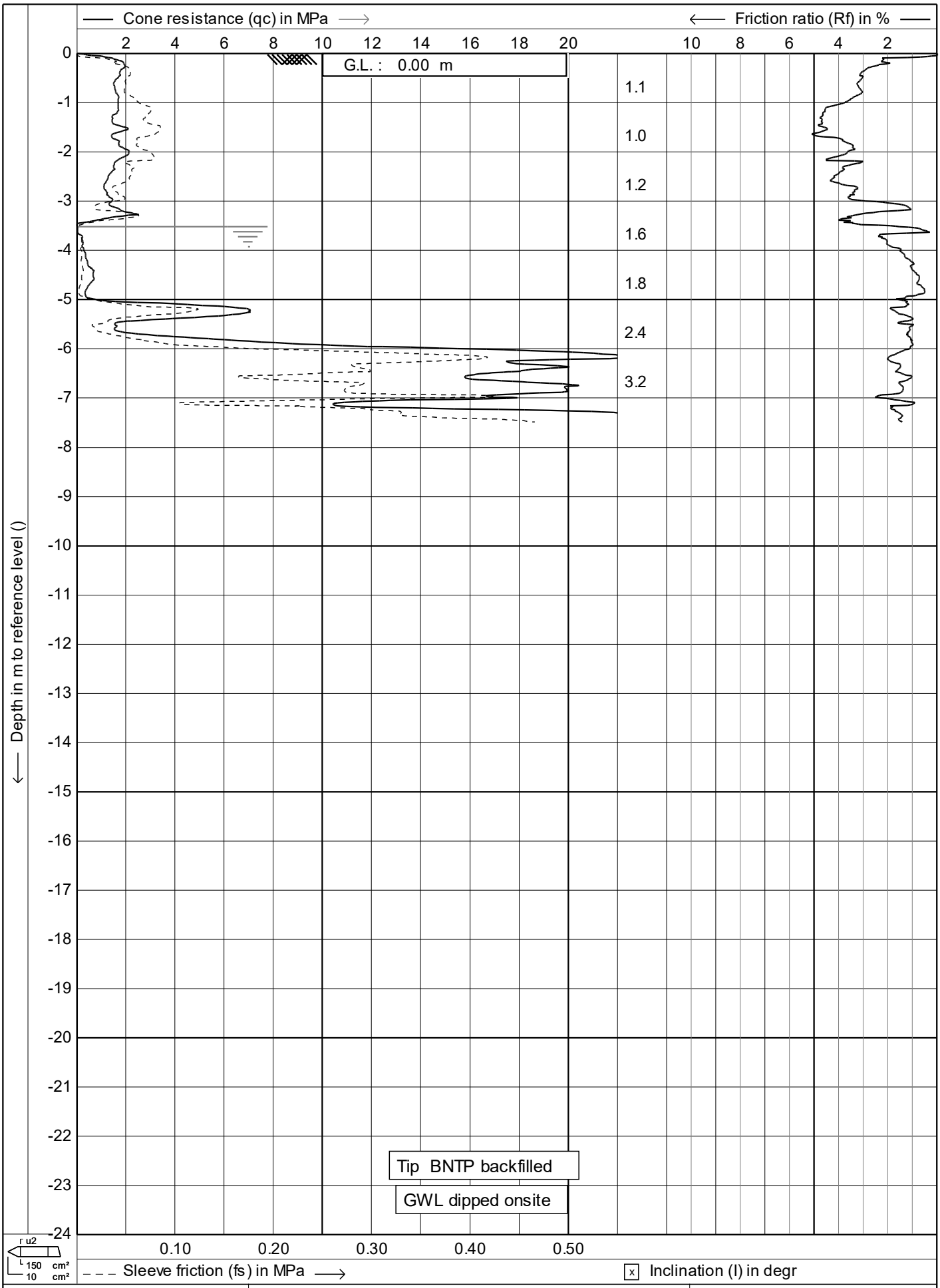
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **054** |

**28/28**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

Date : **25/11/2020**

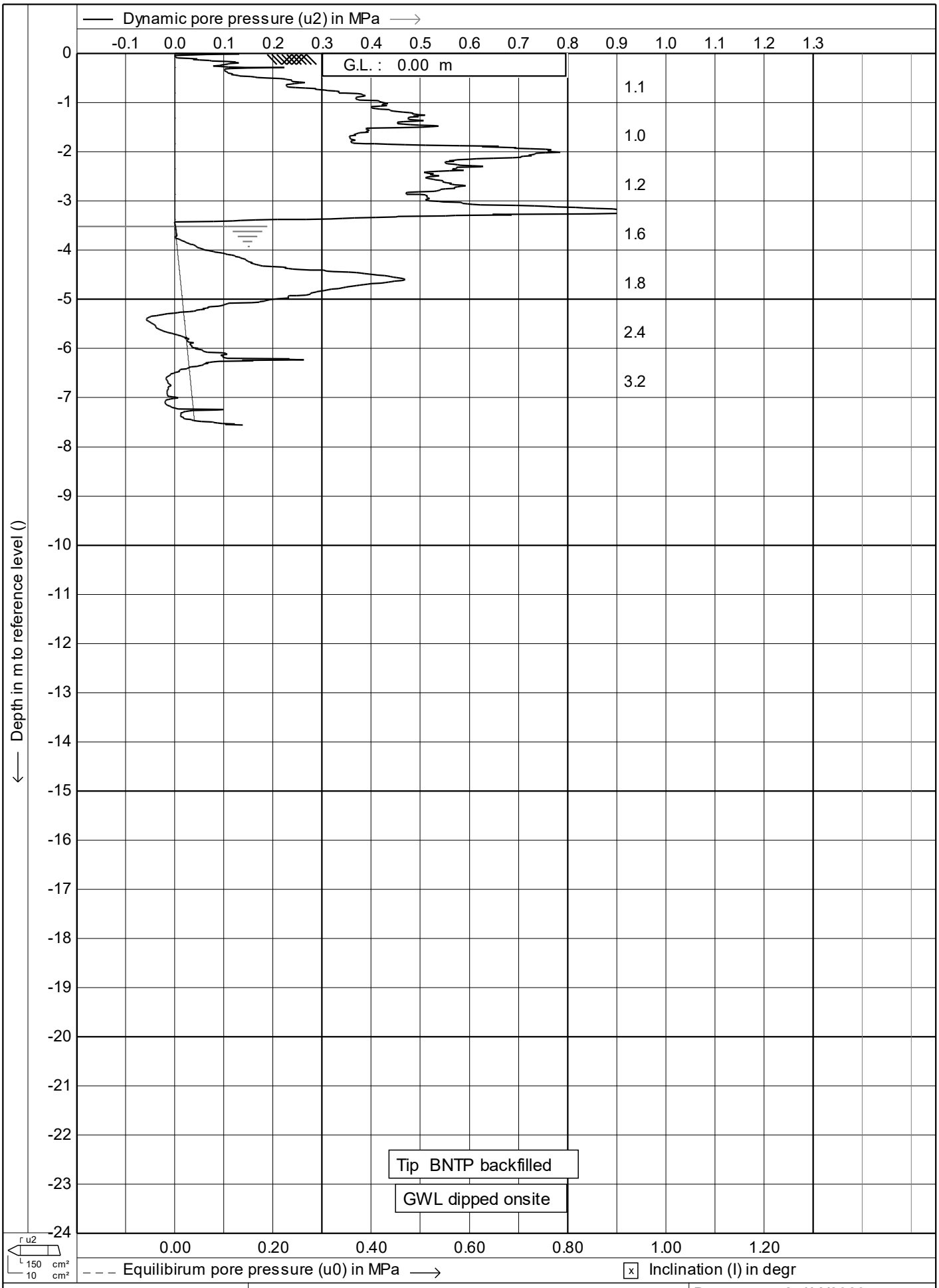
Cone no. : **C10CFIIP.C14426**

Project no. : **05AU7**

CPT no. : **055**

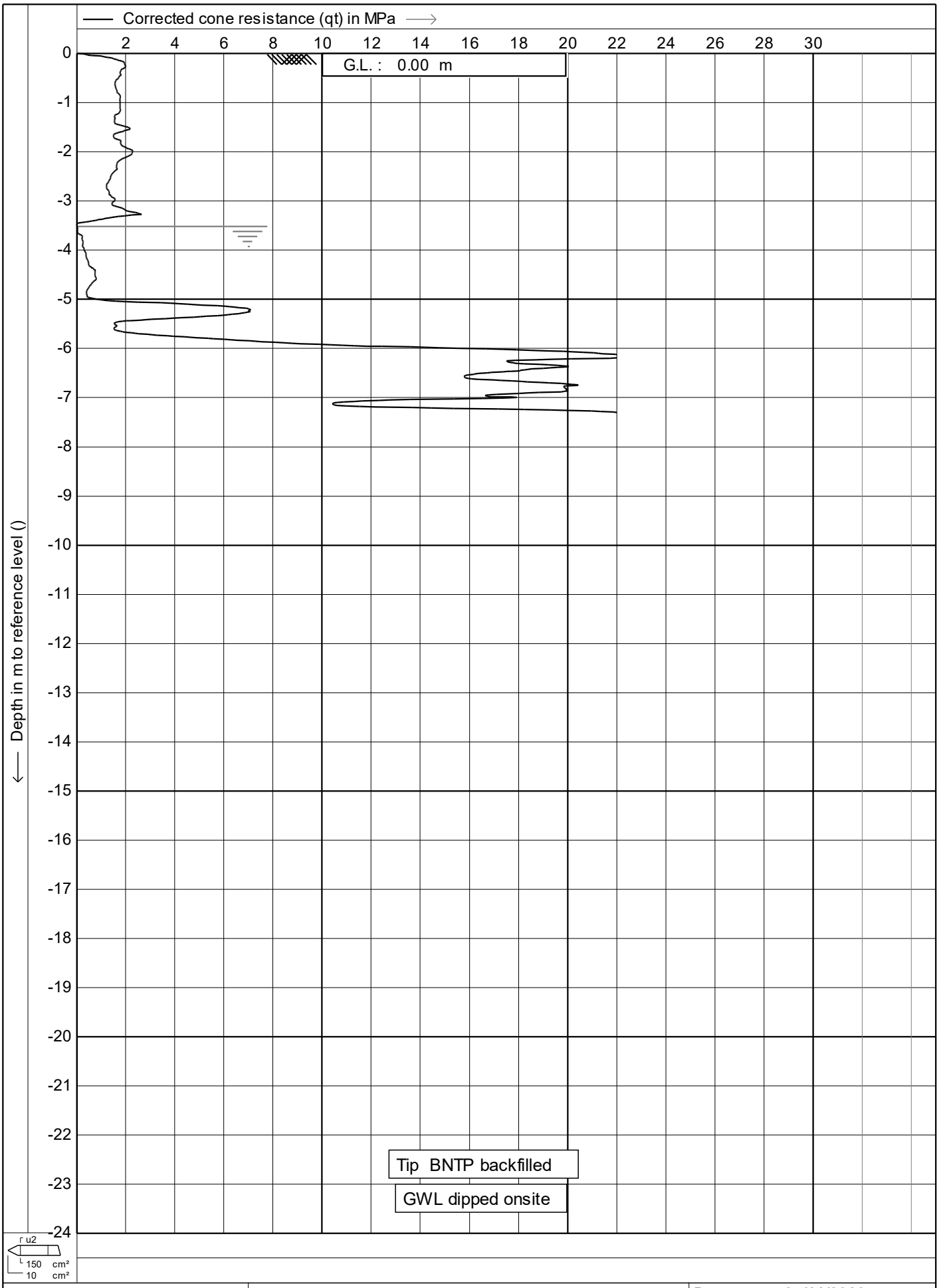
**1/14**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **25/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **055** 2/14 |

1.48




Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

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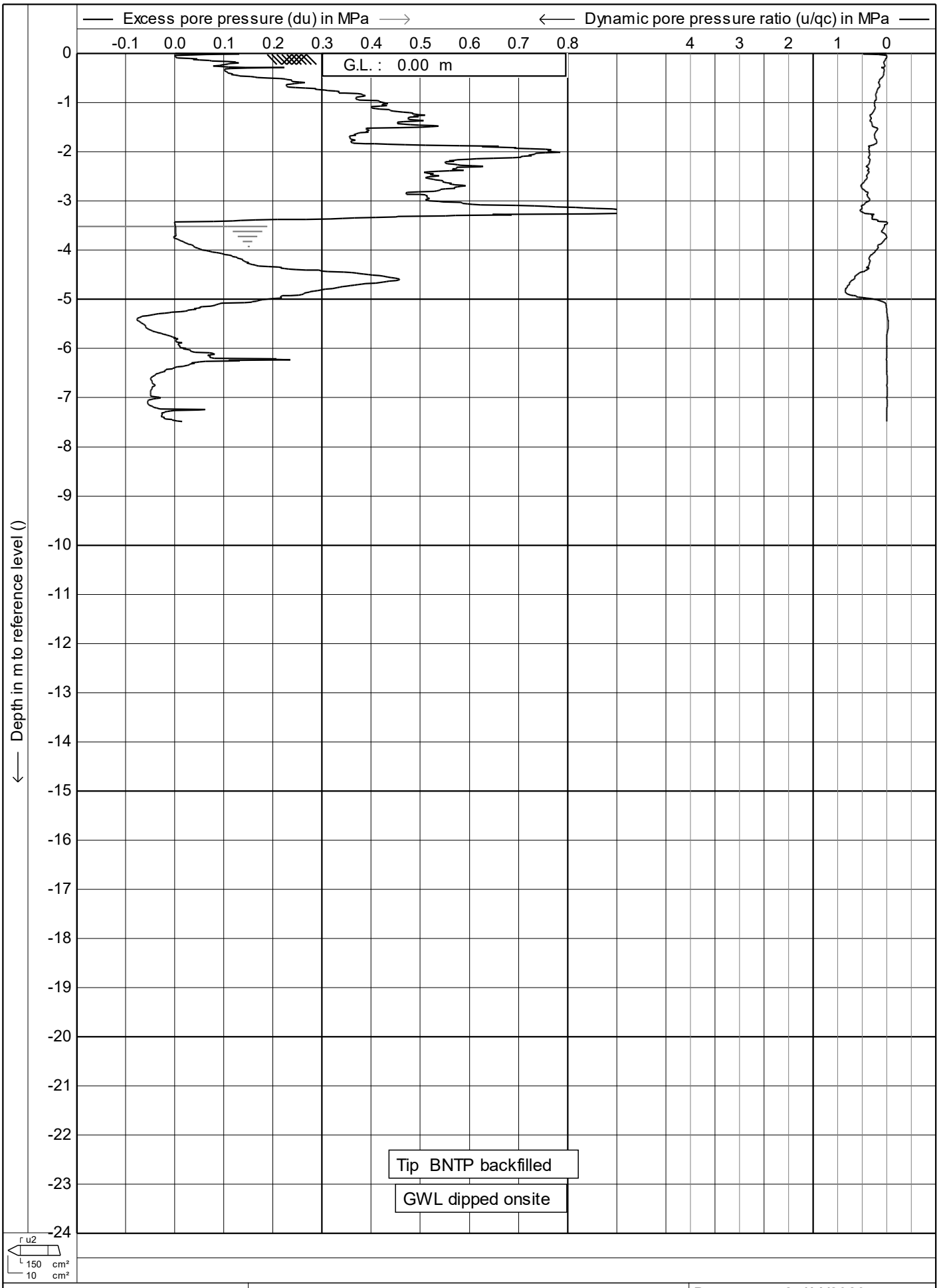
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

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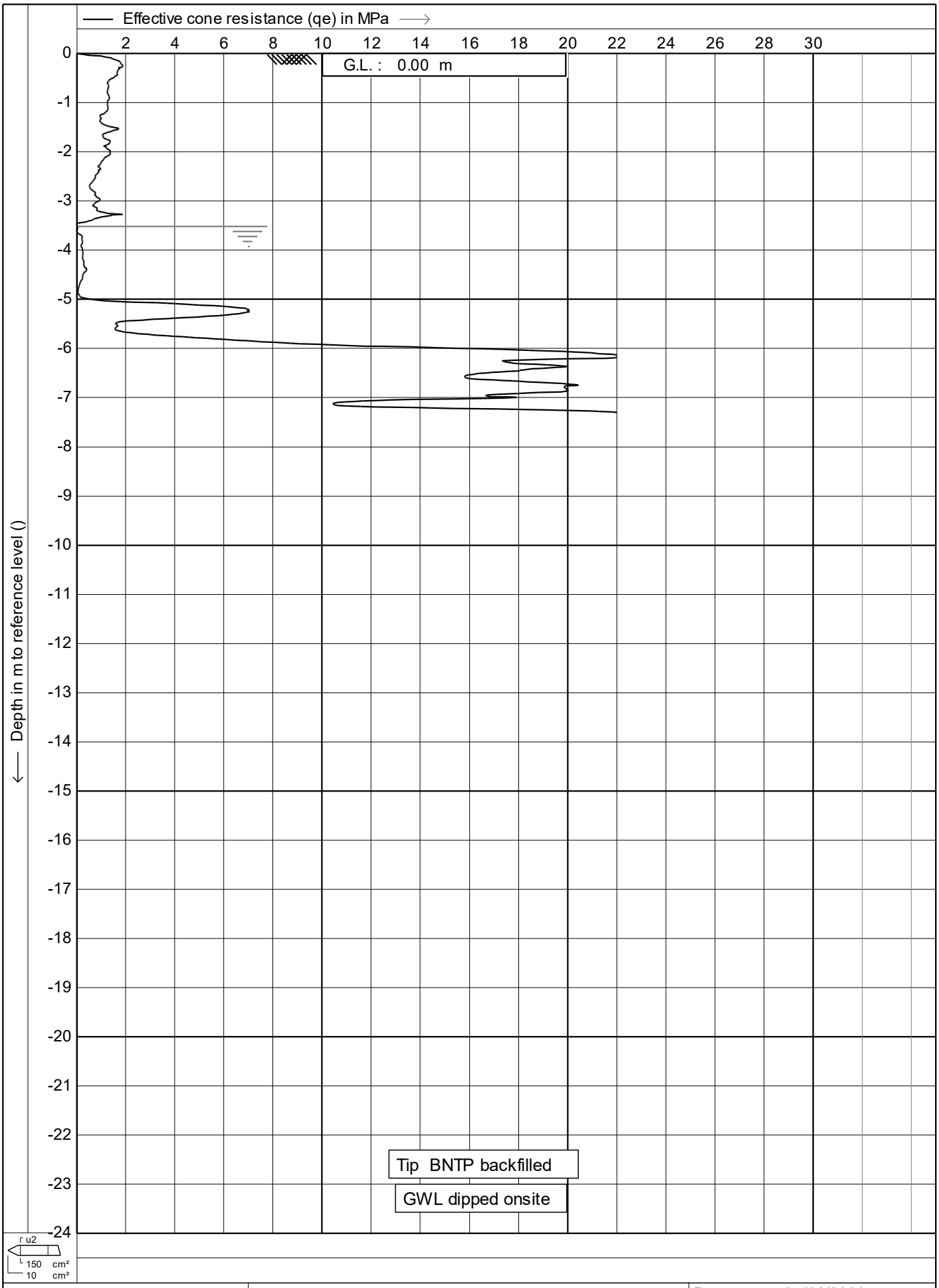
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

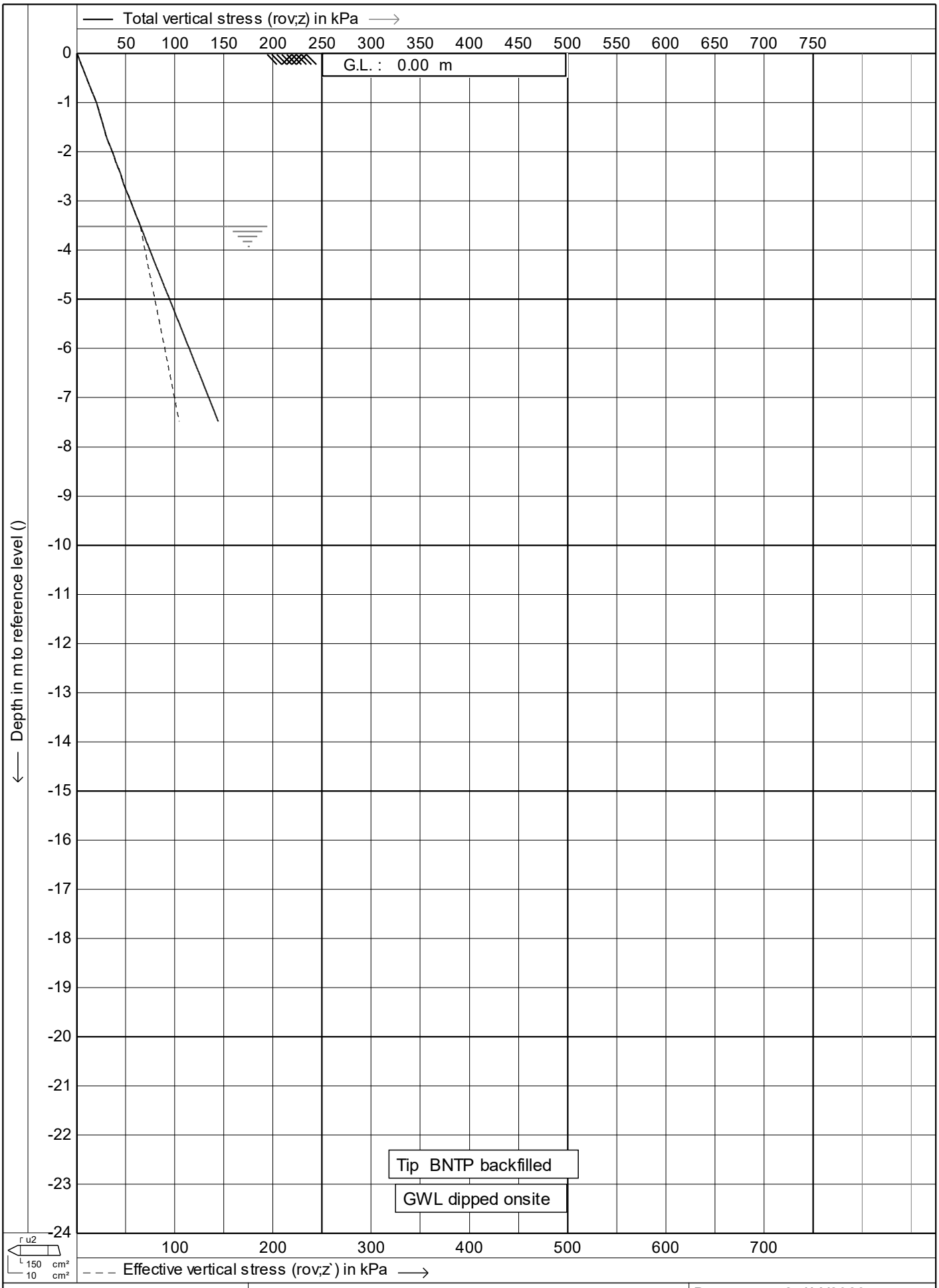
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

**5/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

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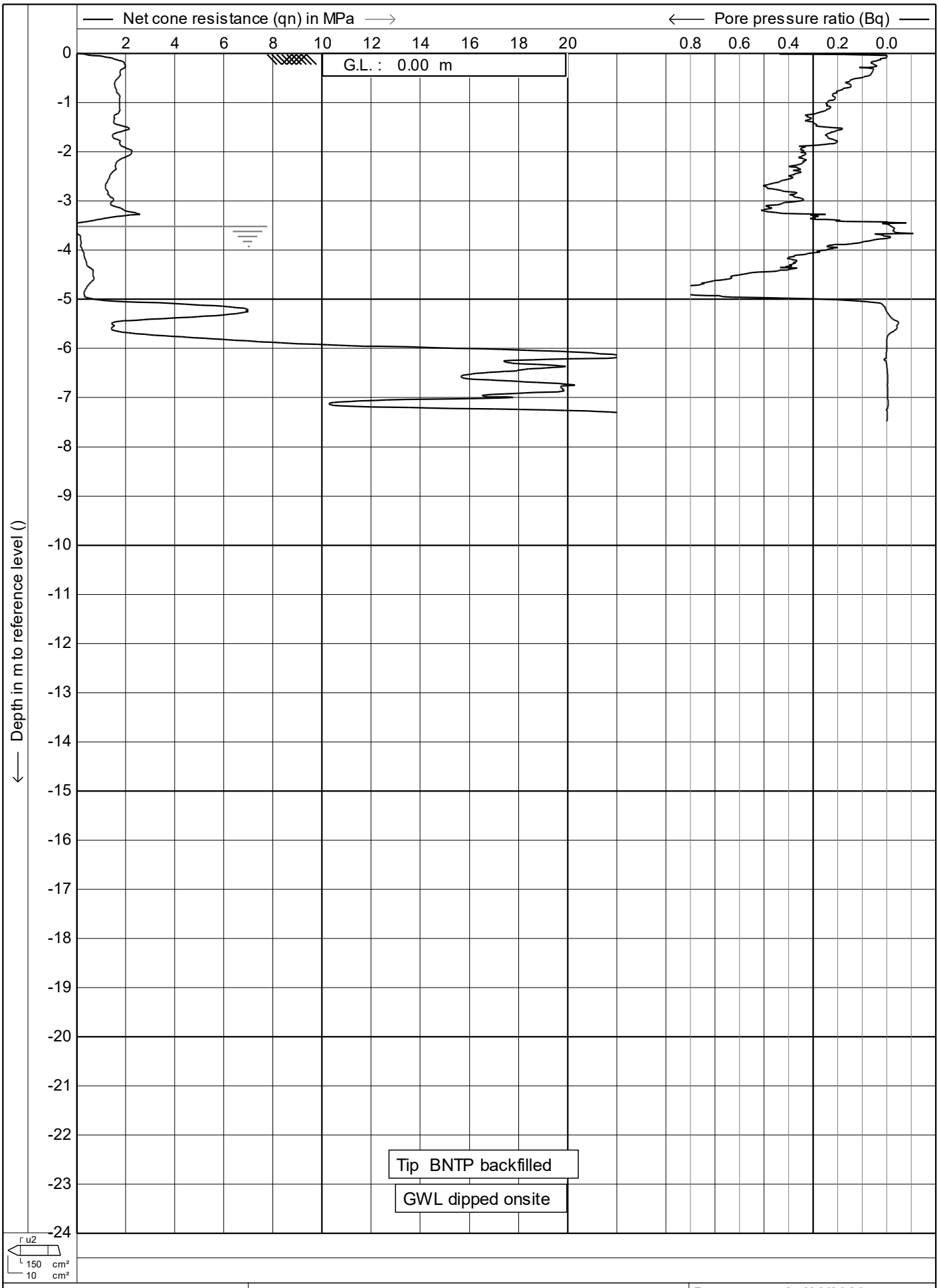
1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

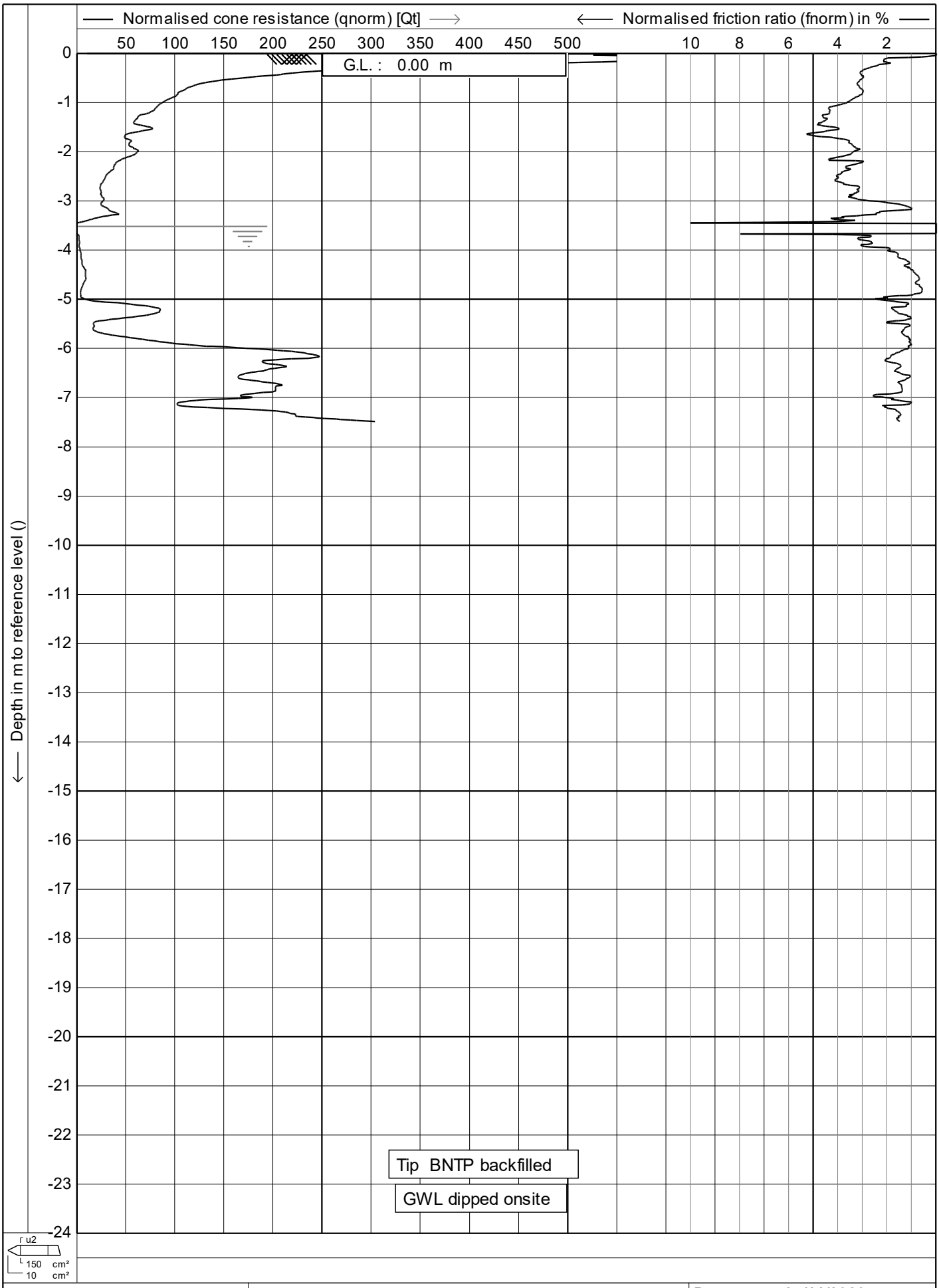
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

**7/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

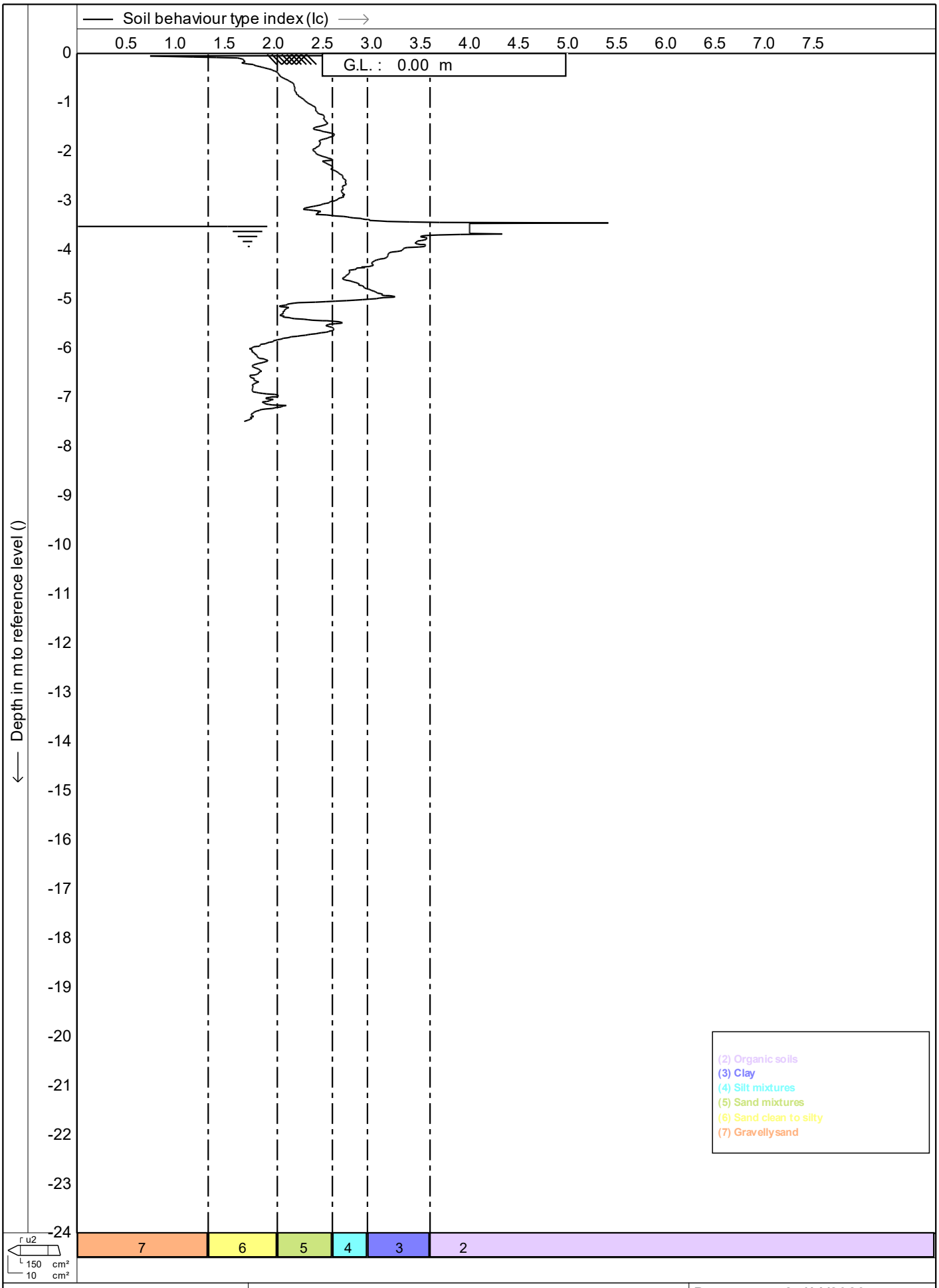
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

**8/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

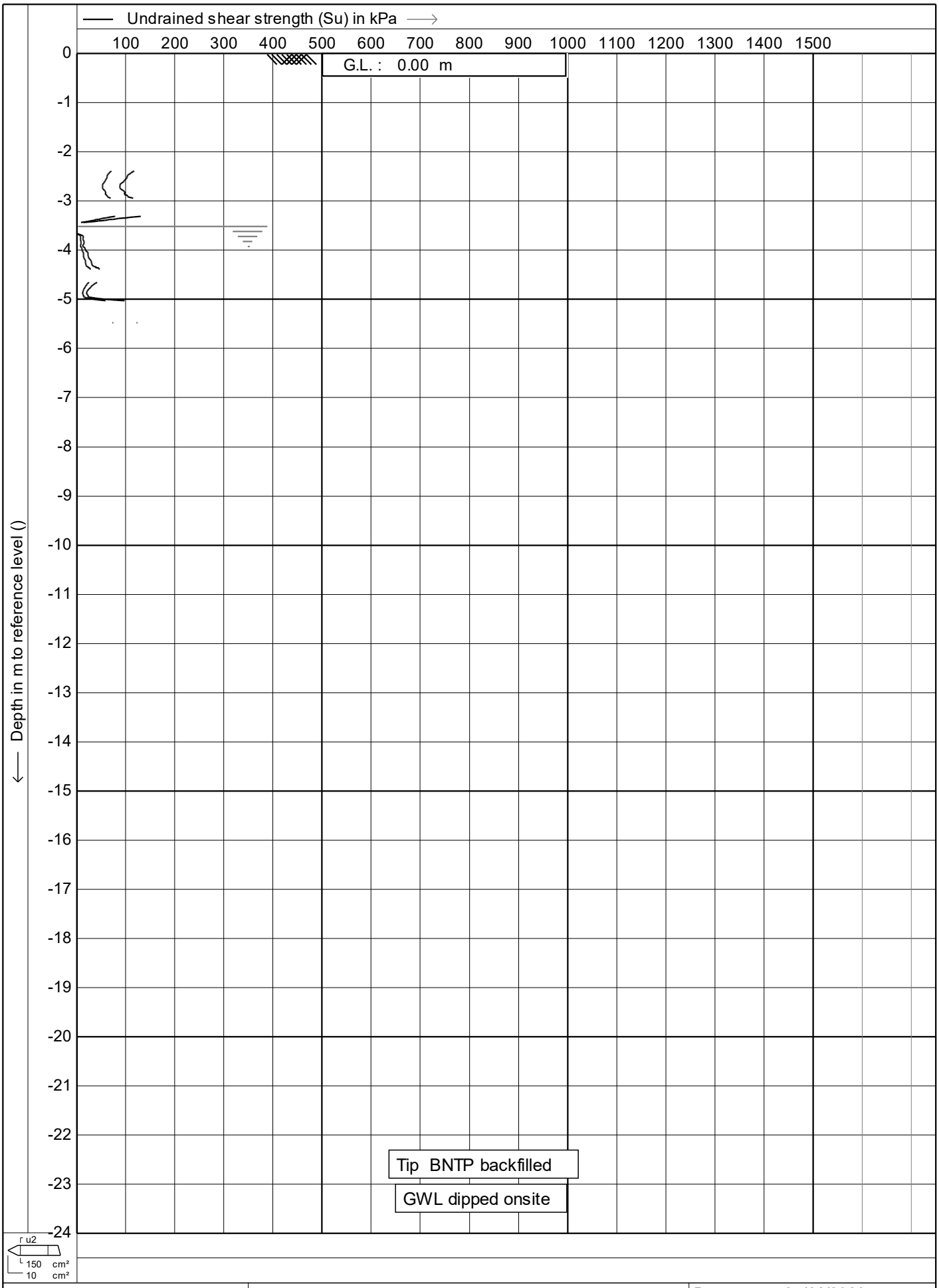
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

**9/14**

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

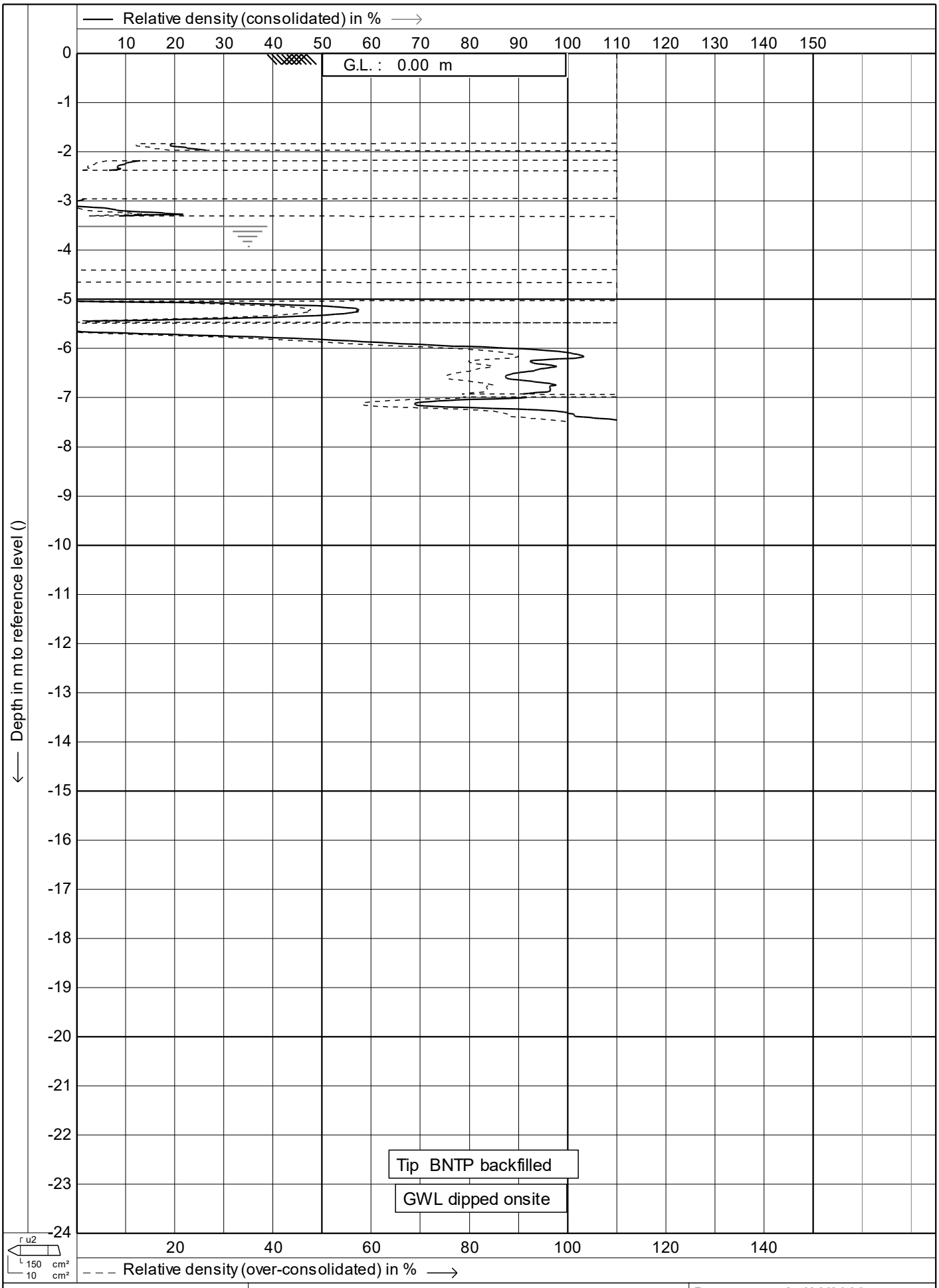
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

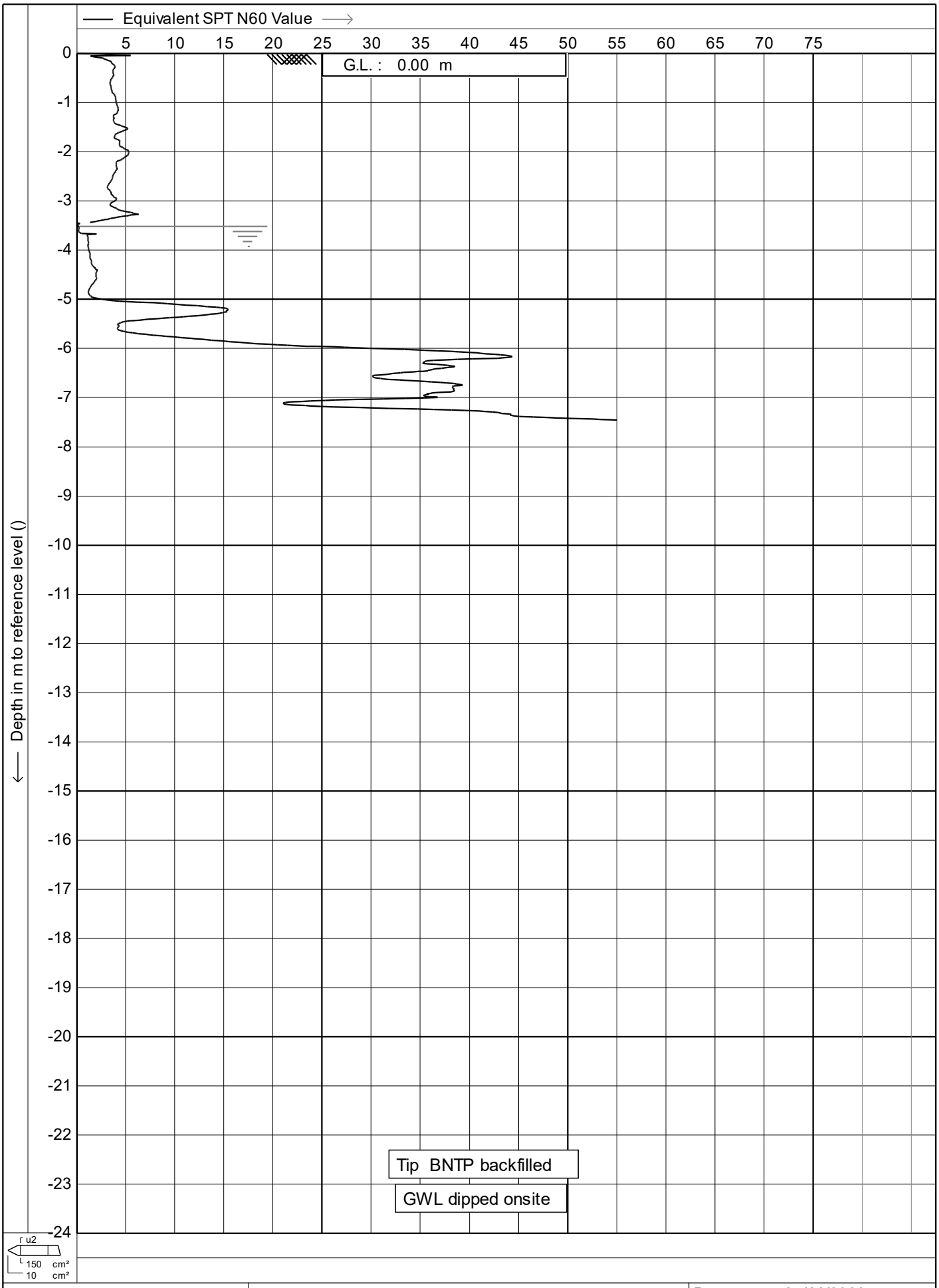
**10/14**

1.48




| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **25/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **055** — **11/14** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

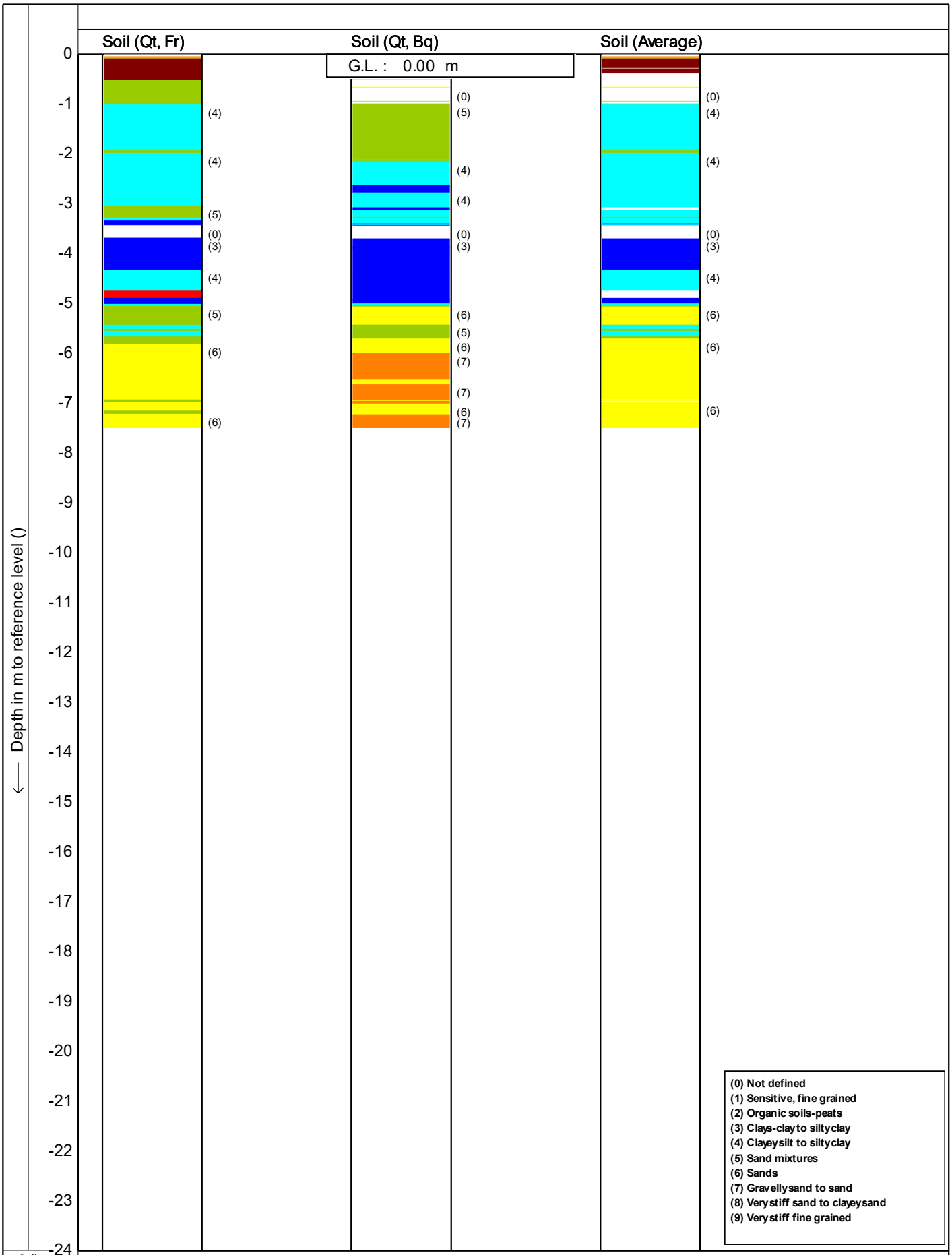
Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

**12/14**

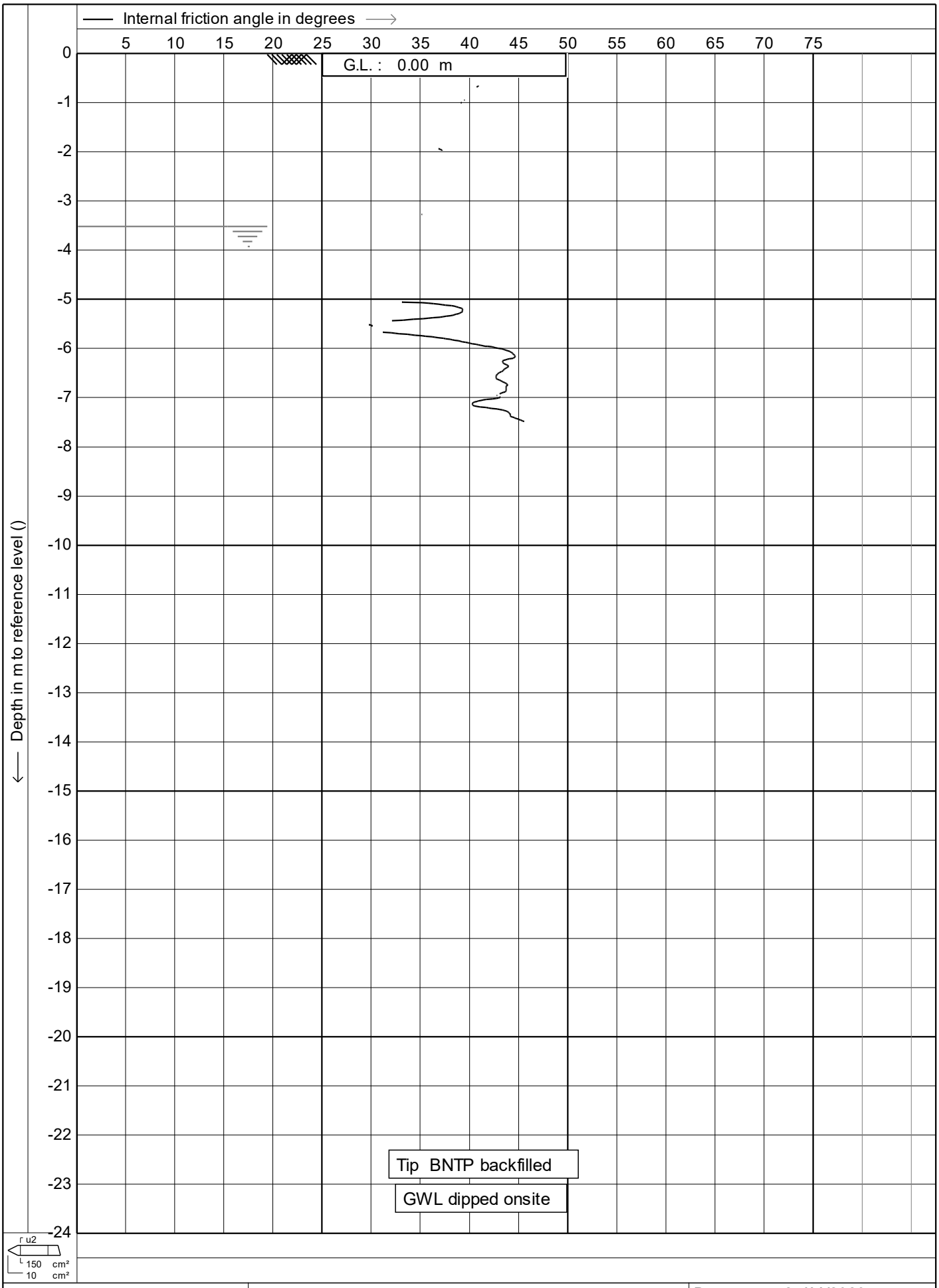
1.48




Soil behaviour type classification after Robertson 1990

| | | |
|---|---|---|
| PERRY GEOTECH | Test according A.S.T.M Standard D 5778-12 | Date : **25/11/2020** |
| | Project : **Site Investigations** | Cone no. : **C10CFIIP.C14426** |
| | Location: **Fitzgerald Rd - Drury** | Project no. : **05AU7** |
| | Position: **0, 0** | CPT no. : **055** — **13/14** |

1.48




PERRY GEOTECH

Test according A.S.T.M Standard D 5778-12

Project : **Site Investigations**

Location: **Fitzgerald Rd - Drury**

Position: **0, 0**

| | |
|---|---|
| Date | : **25/11/2020** |
| Cone no. | : **C10CFIIP.C14426** |
| Project no. | : **05AU7** |
| CPT no. | : **055** |

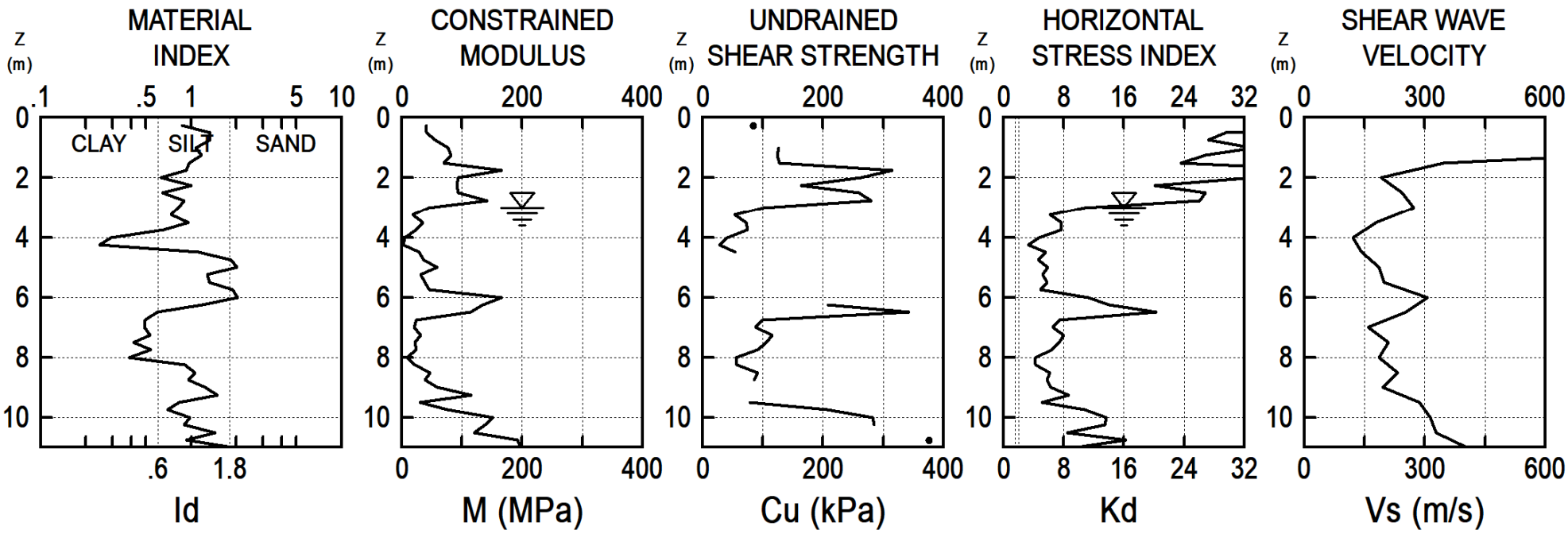
**14/14**

1.48

# Appendix G – sDMT Data

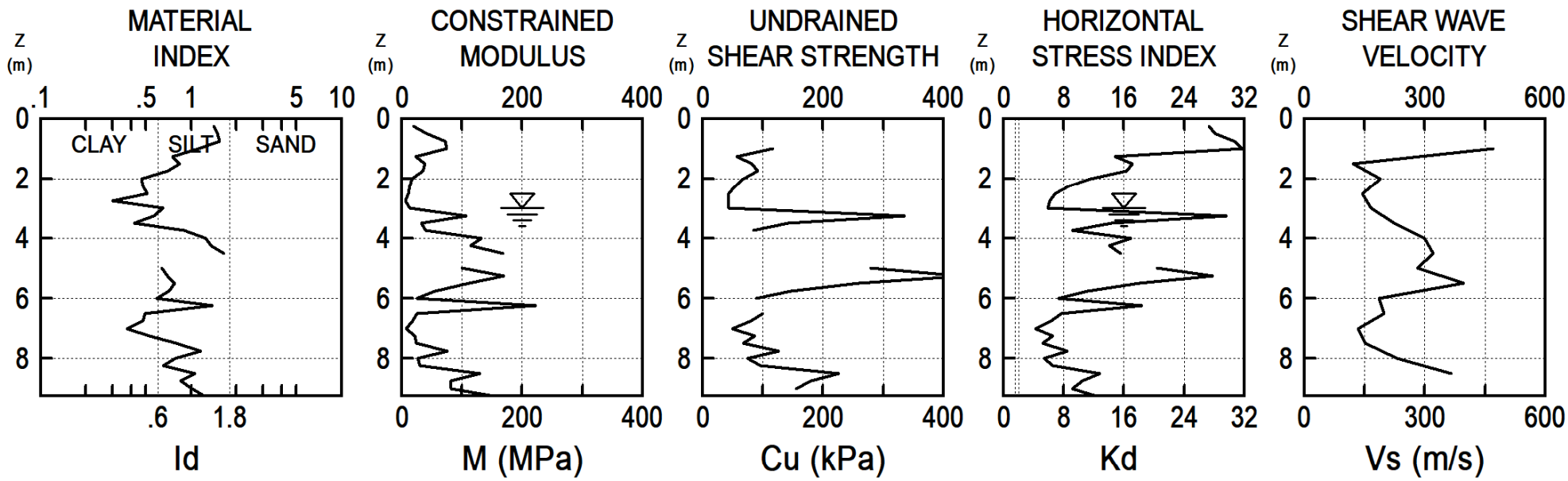
SEISMIC DILATOMETER TEST ( S D M T )

| | | |
|---|---|---|
| Perry Geotech<br>Site Investigations | Aurecon<br>Fitzgerald Rd - Drury | TEST<br>**sDMT001**<br>24 NOV 2020 |



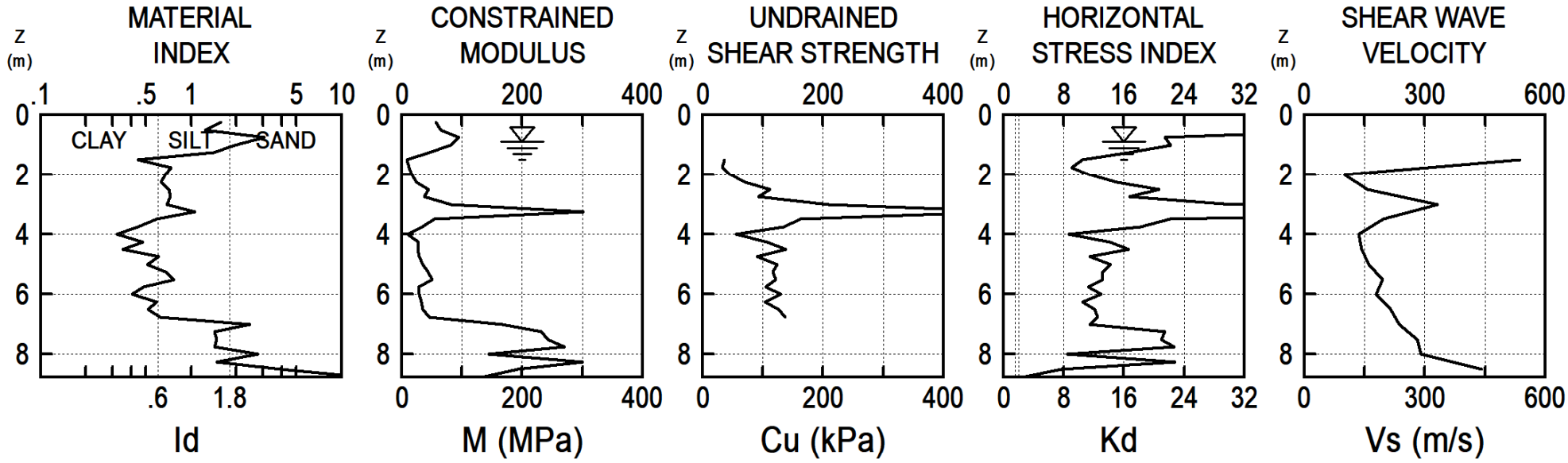
SEISMIC DILATOMETER TEST ( S D M T )

| | | |
|---|---|---|
| Perry Geotech<br>Site Investigations | Aurecon<br>Fitzgerald Rd - Drury | TEST<br>**sDMT002**<br>24 NOV 2020 |



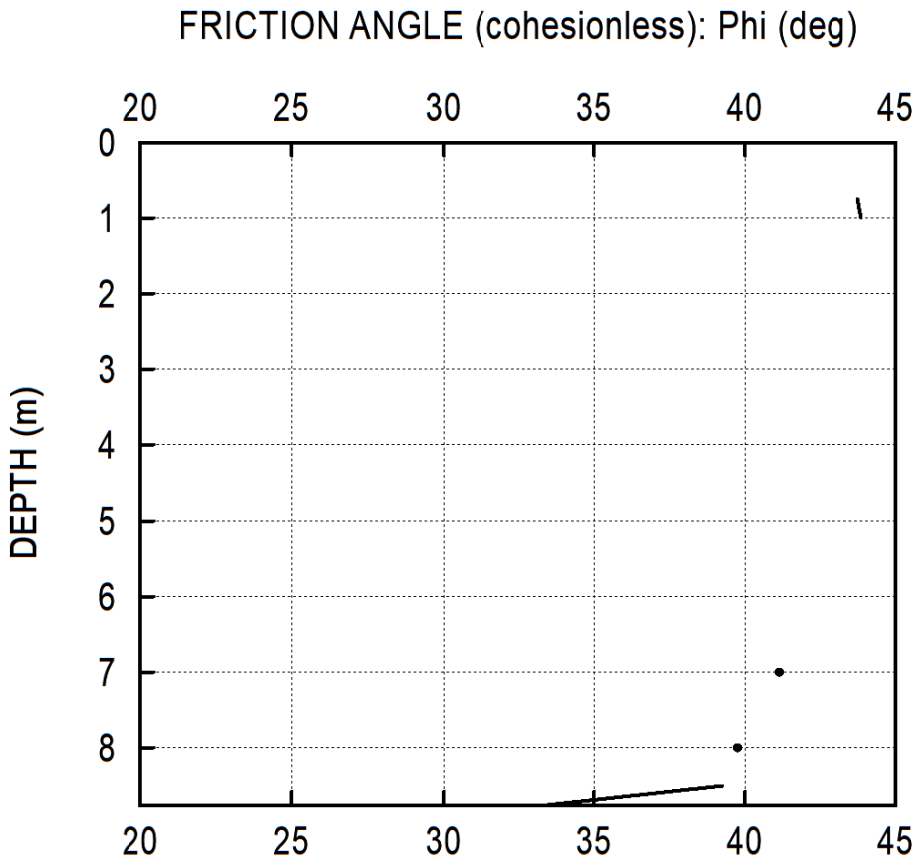
SEISMIC DILATOMETER TEST ( S D M T )

| | | |
|---|---|---|
| Perry Geotech<br>Site Investigations | Aurecon<br>Fitzgerald Rd - Drury | TEST<br>**sDMT003**<br>23 NOV 2020 |



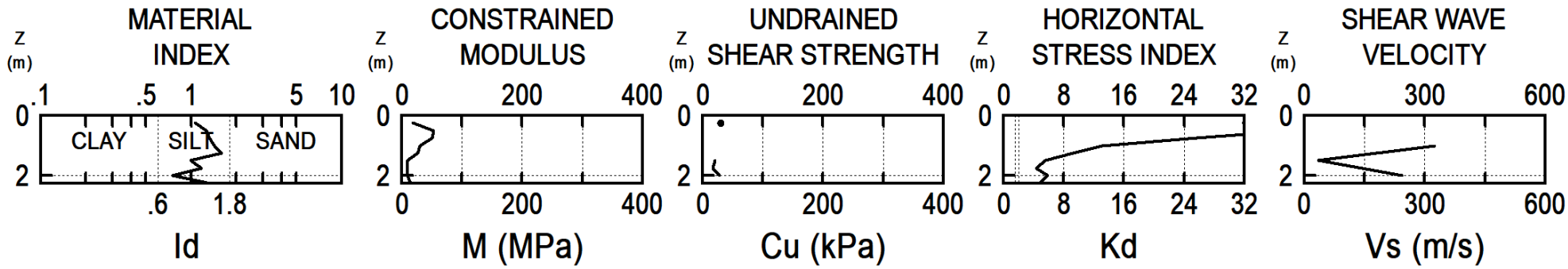
DILATOMETER TEST ( D M T )

| | | |
|---|---|---|
| Perry Geotech | Aurecon | TEST |
| Site Investigations | Fitzgerald Rd - Drury | sDMT003 |
| INTERPRETED GEOTECHNICAL PARAMETERS | | 23 NOV 2020 |

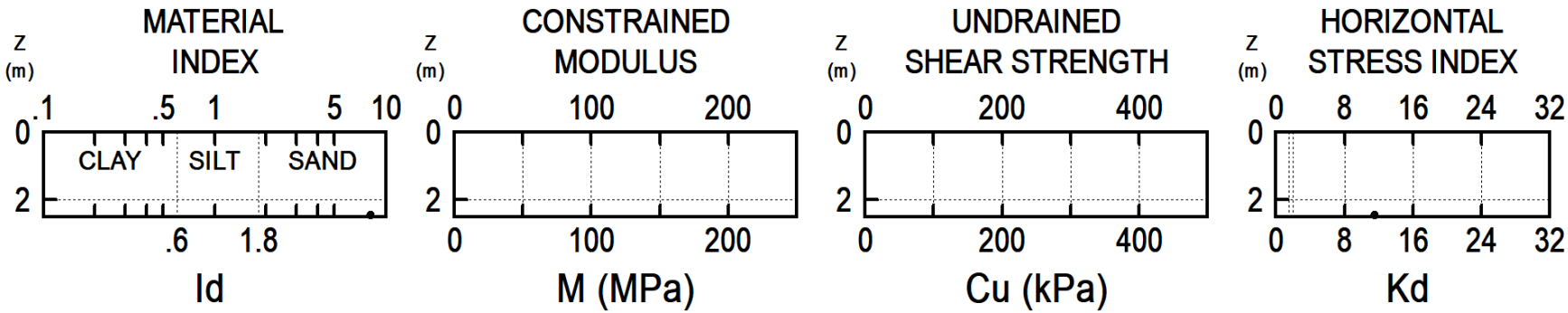


SEISMIC DILATOMETER TEST ( S D M T )

| Perry Geotech<br>Site Investigations | Aurecon<br>Fitzgerald Rd - Drury | TEST<br>**sDMT004**<br>23 NOV 2020 |
|---|---|---|



DILATOMETER TEST ( D M T )




Perry Geotech

Site Investigations

INTERPRETED GEOTECHNICAL PARAMETERS

Aurecon

Fitzgerald Rd - Drury

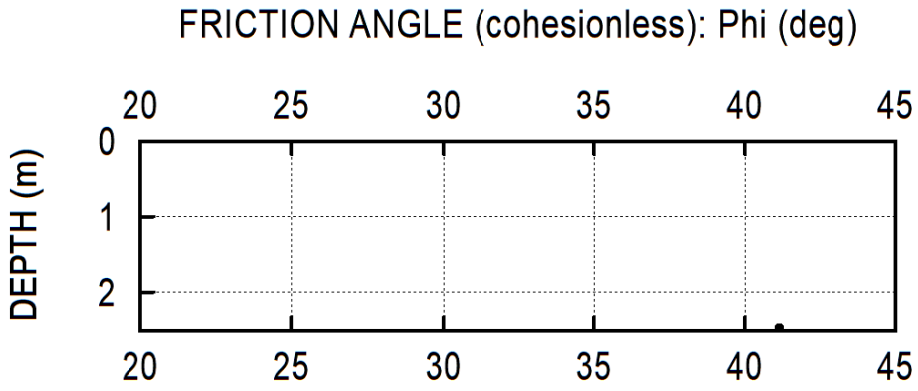
TEST

**sDMT004a**

23 NOV 2020

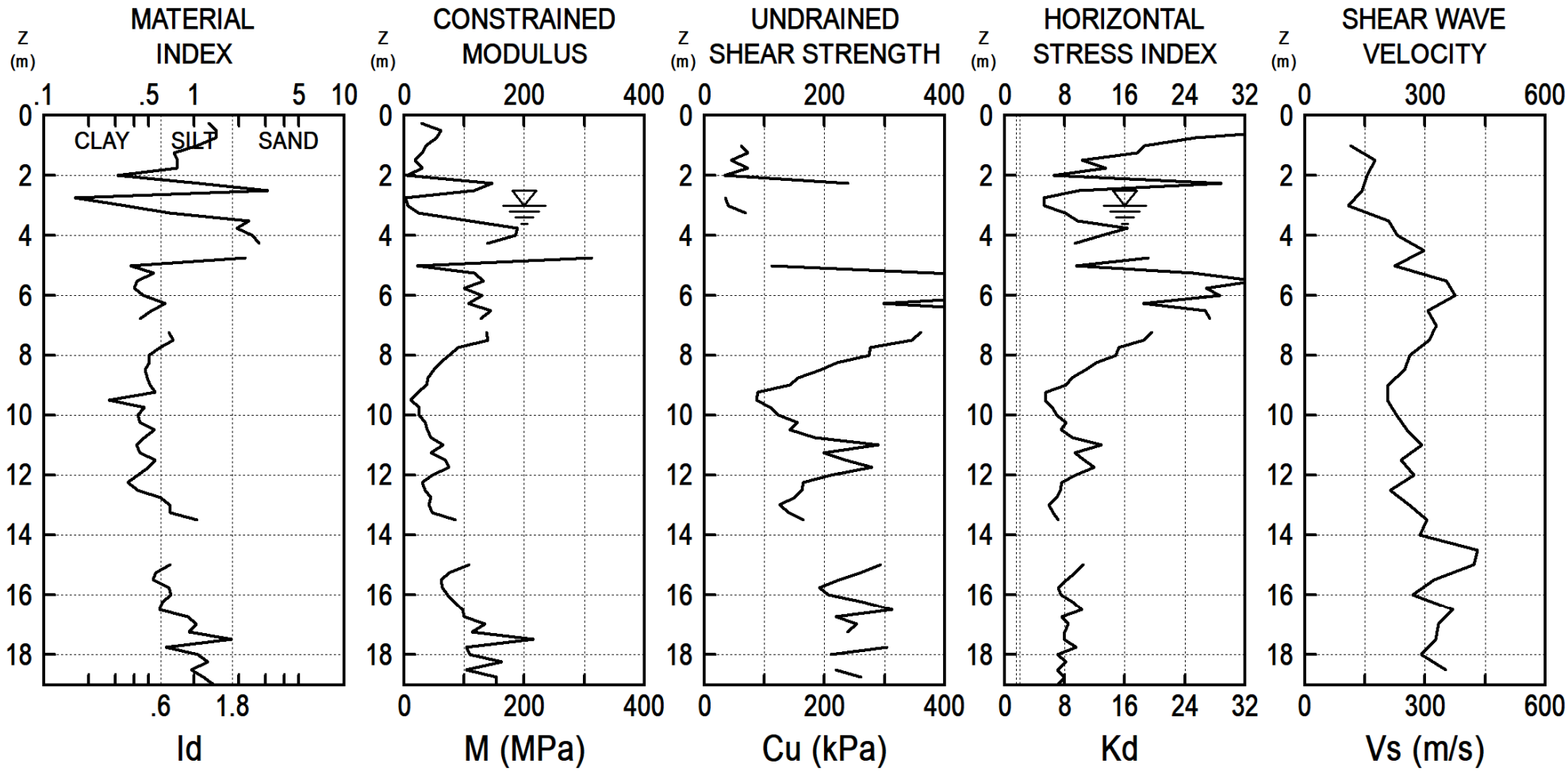
DILATOMETER TEST ( D M T )

| | | |
|---|---|---|
| Perry Geotech | Aurecon | TEST |
| Site Investigations | Fitzgerald Rd - Drury | sDMT004a |
| INTERPRETED GEOTECHNICAL PARAMETERS | | 23 NOV 2020 |



SEISMIC DILATOMETER TEST ( S D M T )

| | | |
|---|---|---|
| Perry Geotech<br>Site Investigations | Aurecon<br>Fitzgerald Rd - Drury | TEST<br>**sDMT005**<br>25 NOV 2020 |

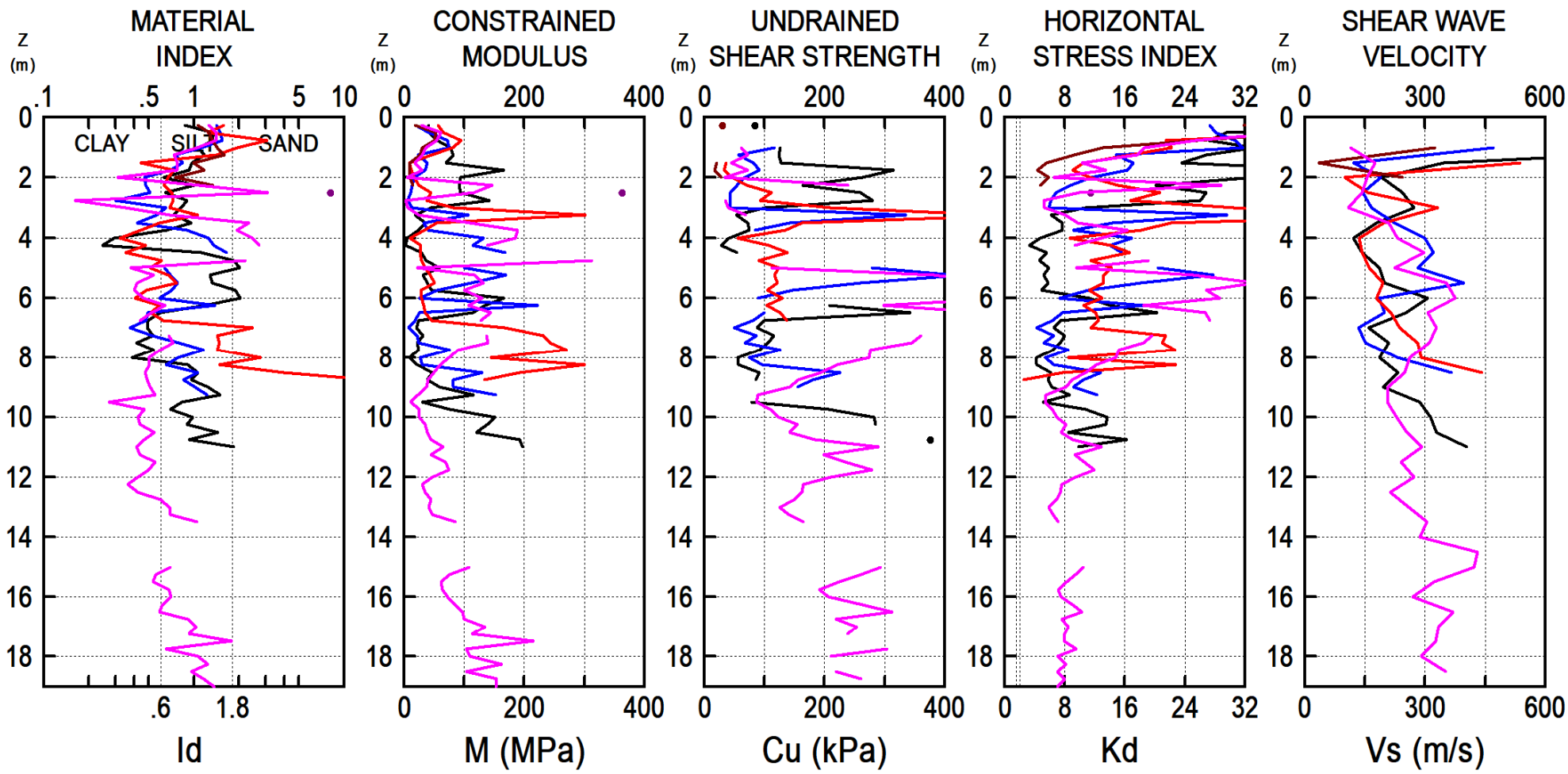


Perry Geotech

Site Investigations

Aurecon

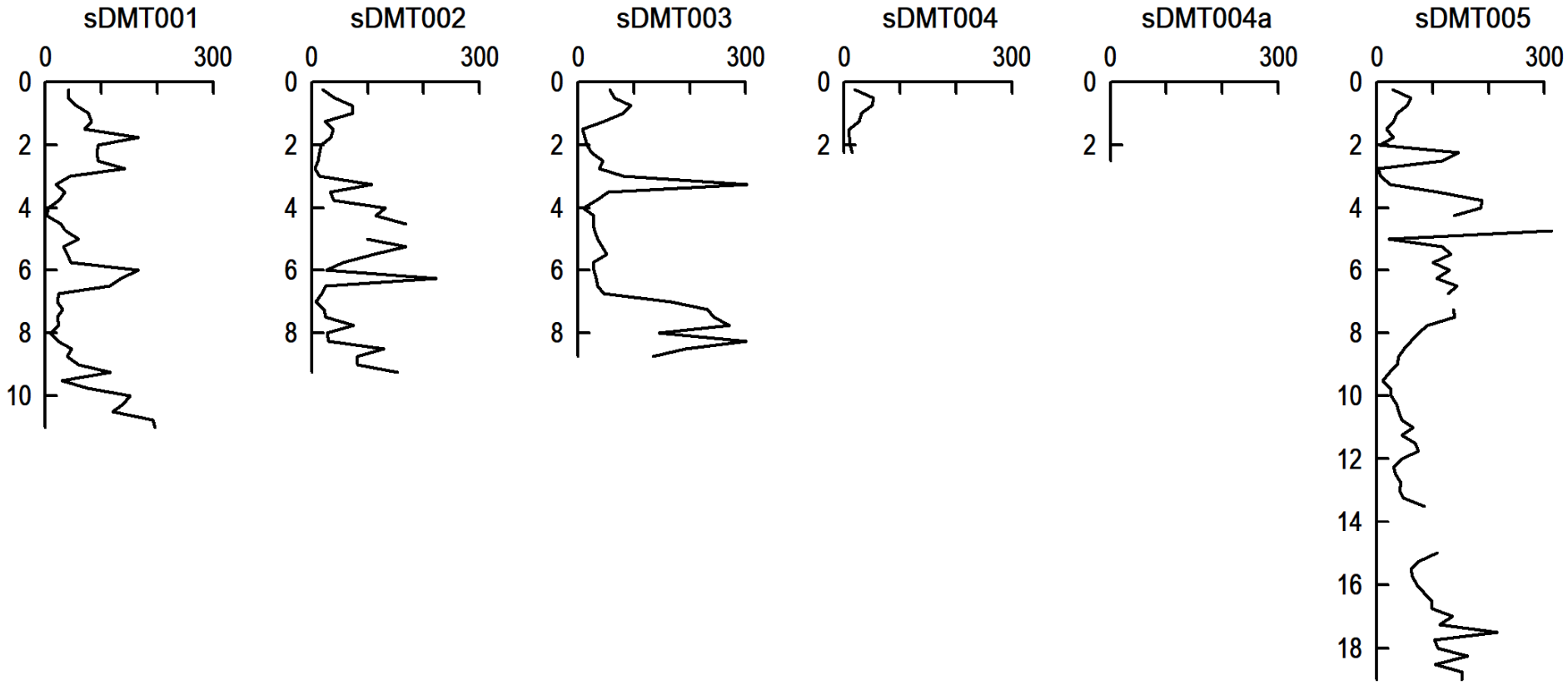
Fitzgerald Rd - Drury



Perry Geotech
Site Investigations

Aurecon
Fitzgerald Rd - Drury

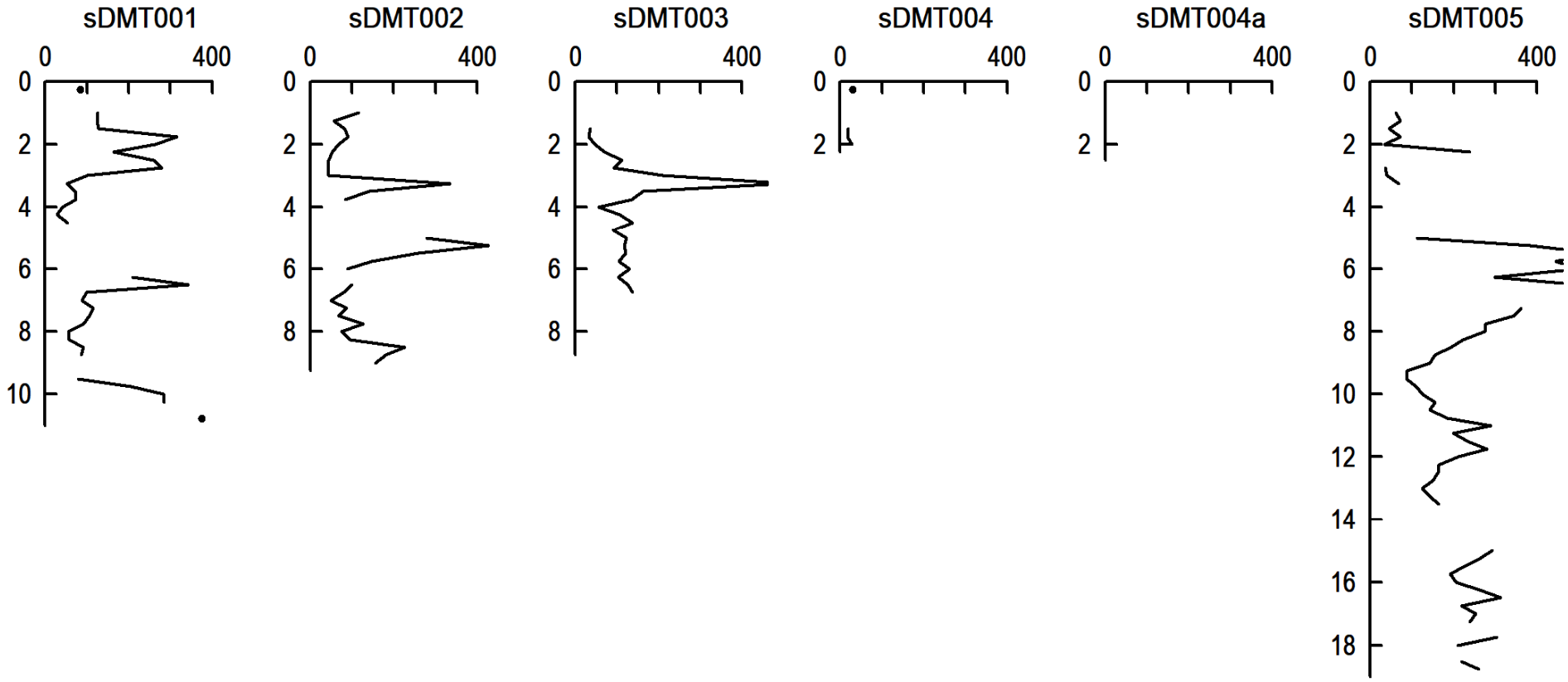
## CROSS SECTION OF CONSTRAINED MODULUS M (MPa)



Perry Geotech
Site Investigations

Aurecon
Fitzgerald Rd - Drury

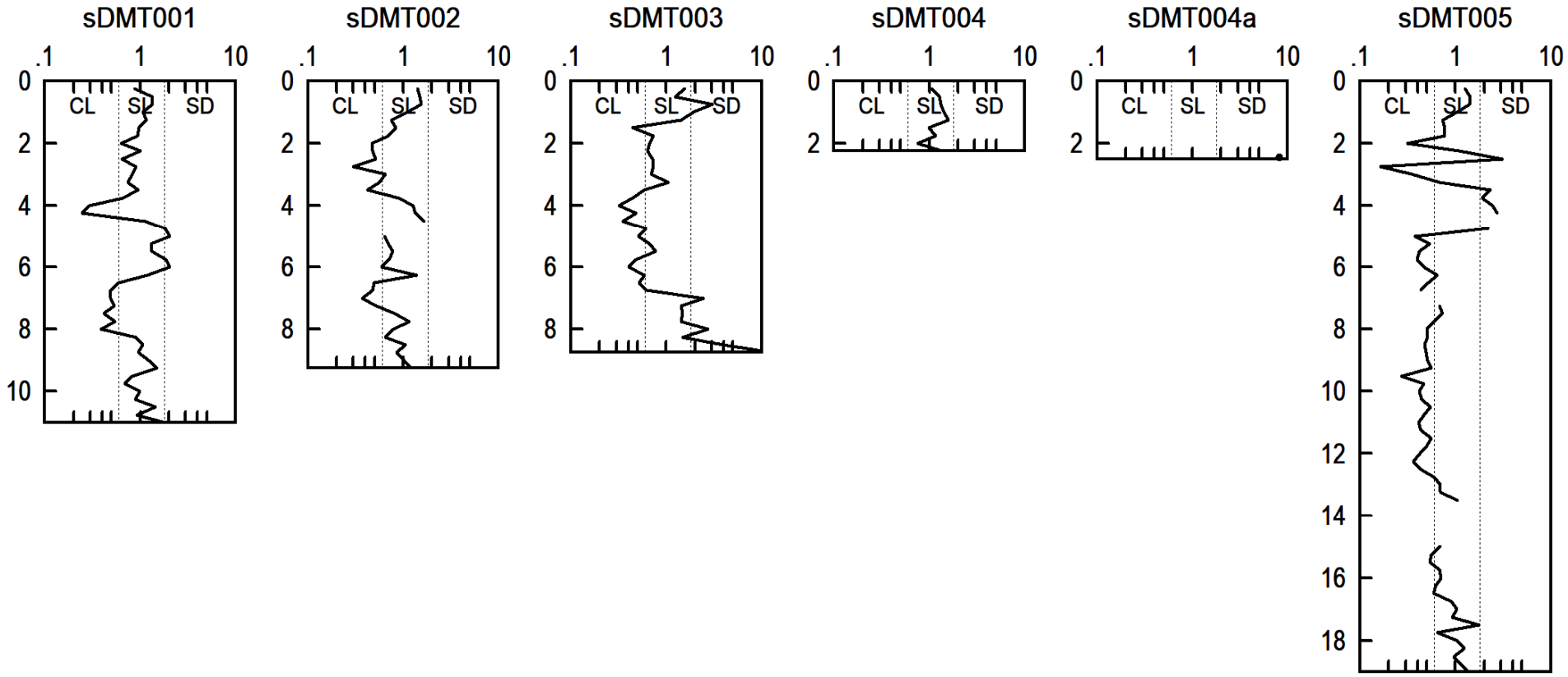
## CROSS SECTION OF UNDRAINED SHEAR STRENGTH Cu (kPa)



Perry Geotech
Site Investigations

Aurecon
Fitzgerald Rd - Drury

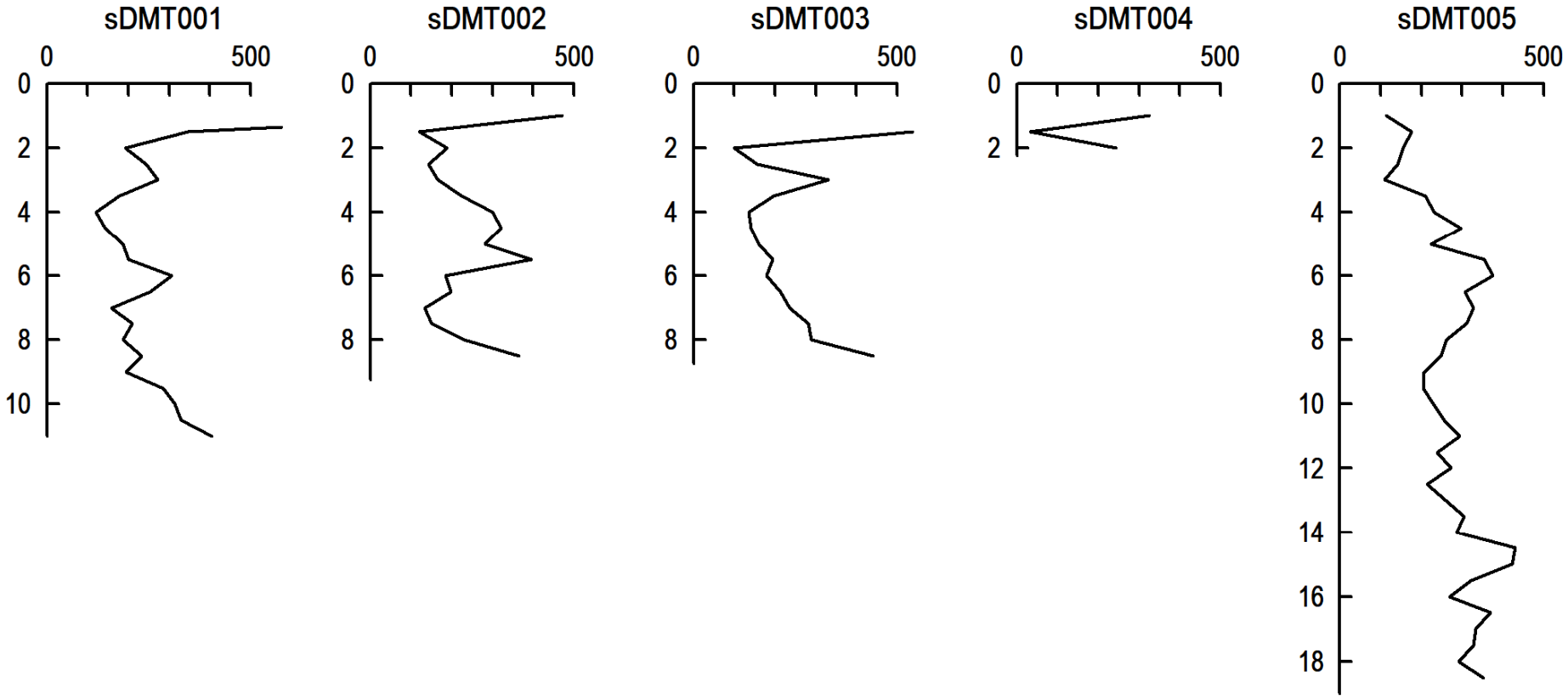
## CROSS SECTION OF MATERIAL INDEX Id



Perry Geotech
Site Investigations

Aurecon
Fitzgerald Rd - Drury

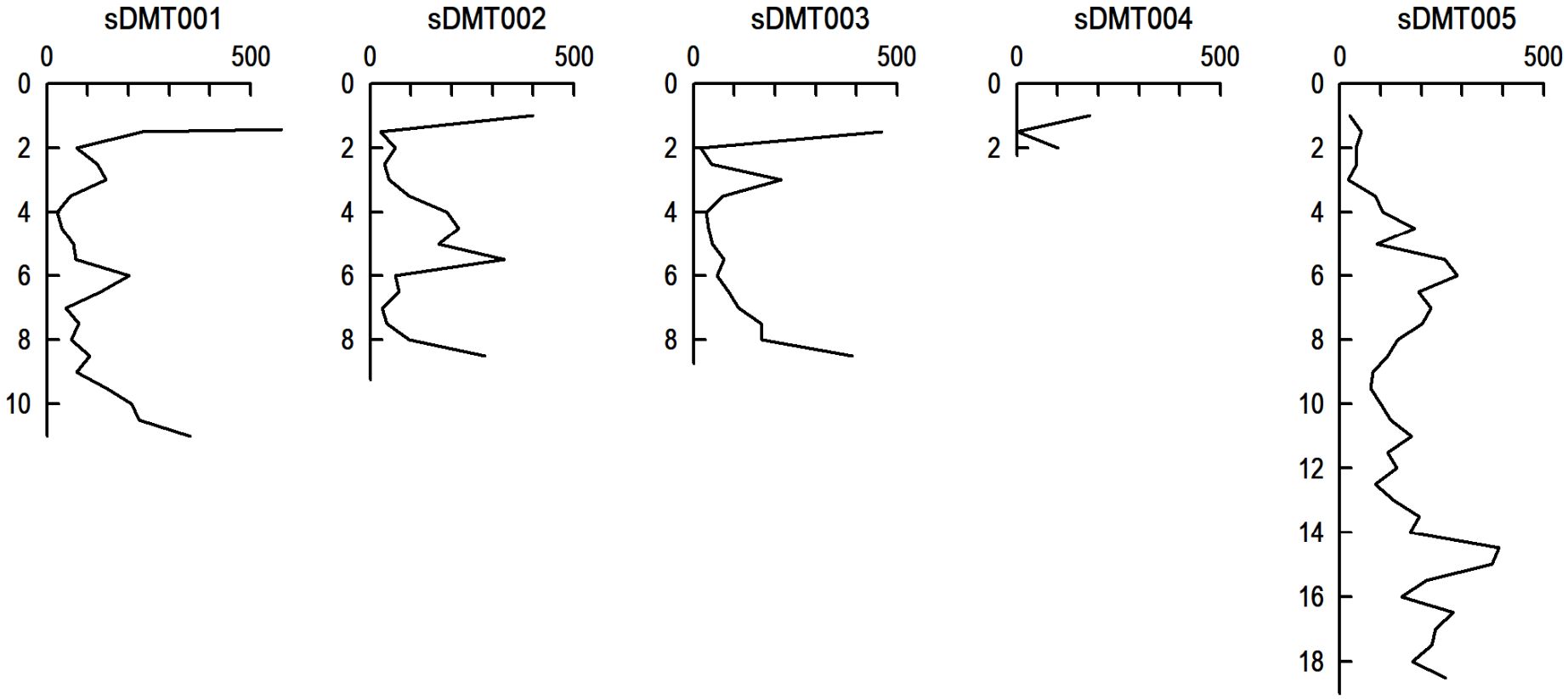
## CROSS SECTION OF SHEAR WAVE VELOCITY Vs (m/s)



Perry Geotech
Site Investigations

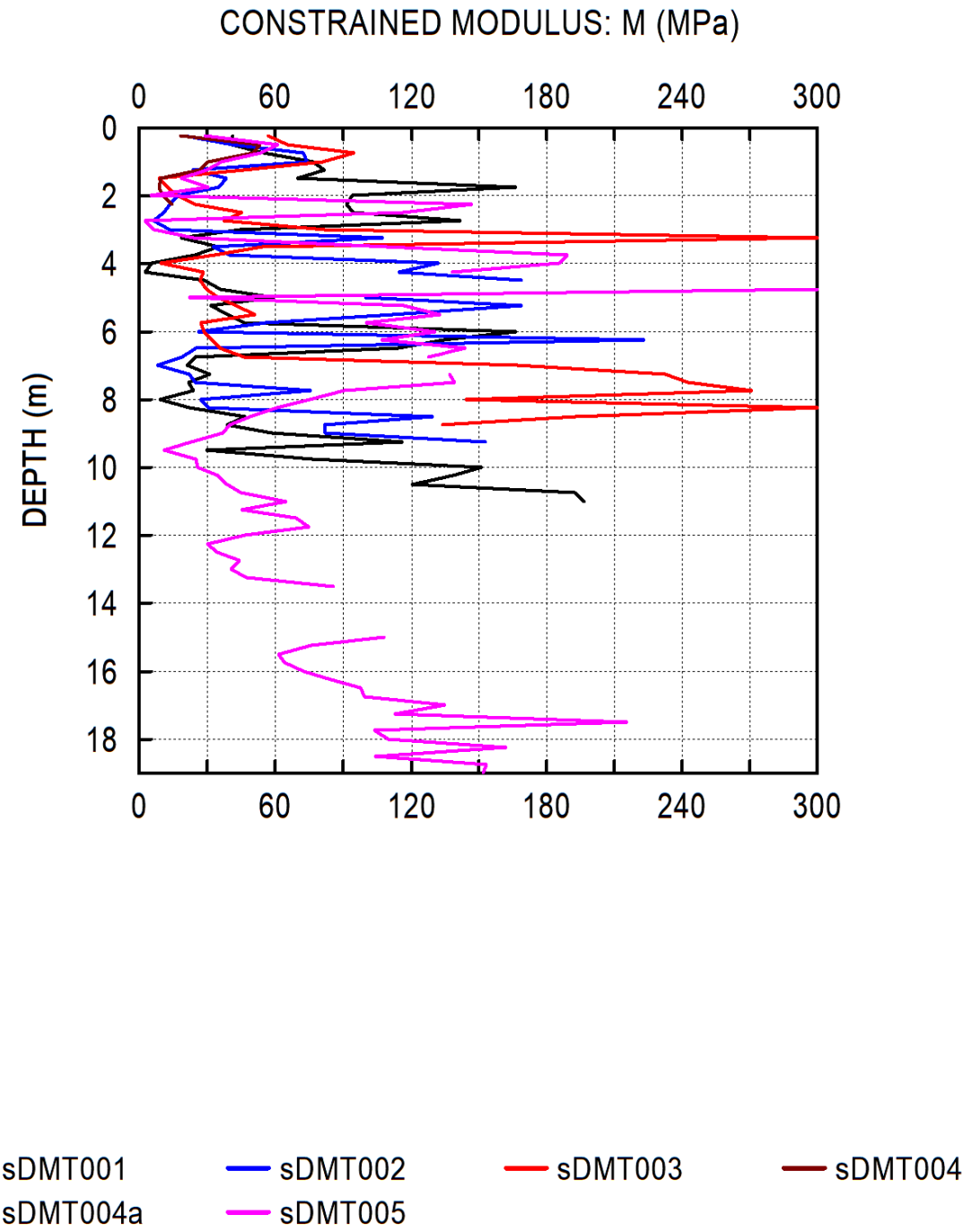
Aurecon
Fitzgerald Rd - Drury

## CROSS SECTION OF MAX SHEAR MODULUS Go (MPa)



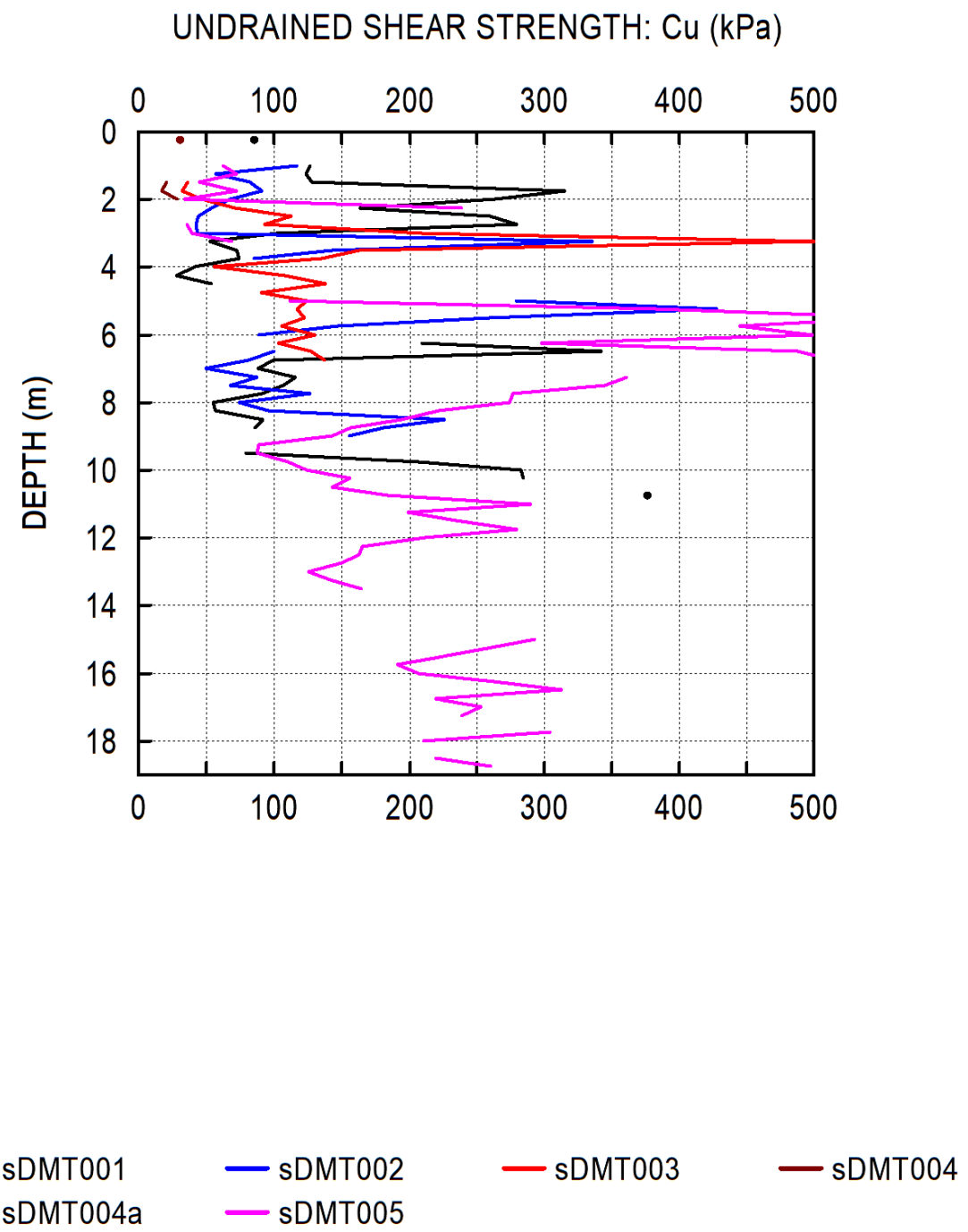
| | |
|---|---|
| Perry Geotech | Aurecon |
| Site Investigations | Fitzgerald Rd - Drury |

SUPERIMPOSED TEST RESULTS



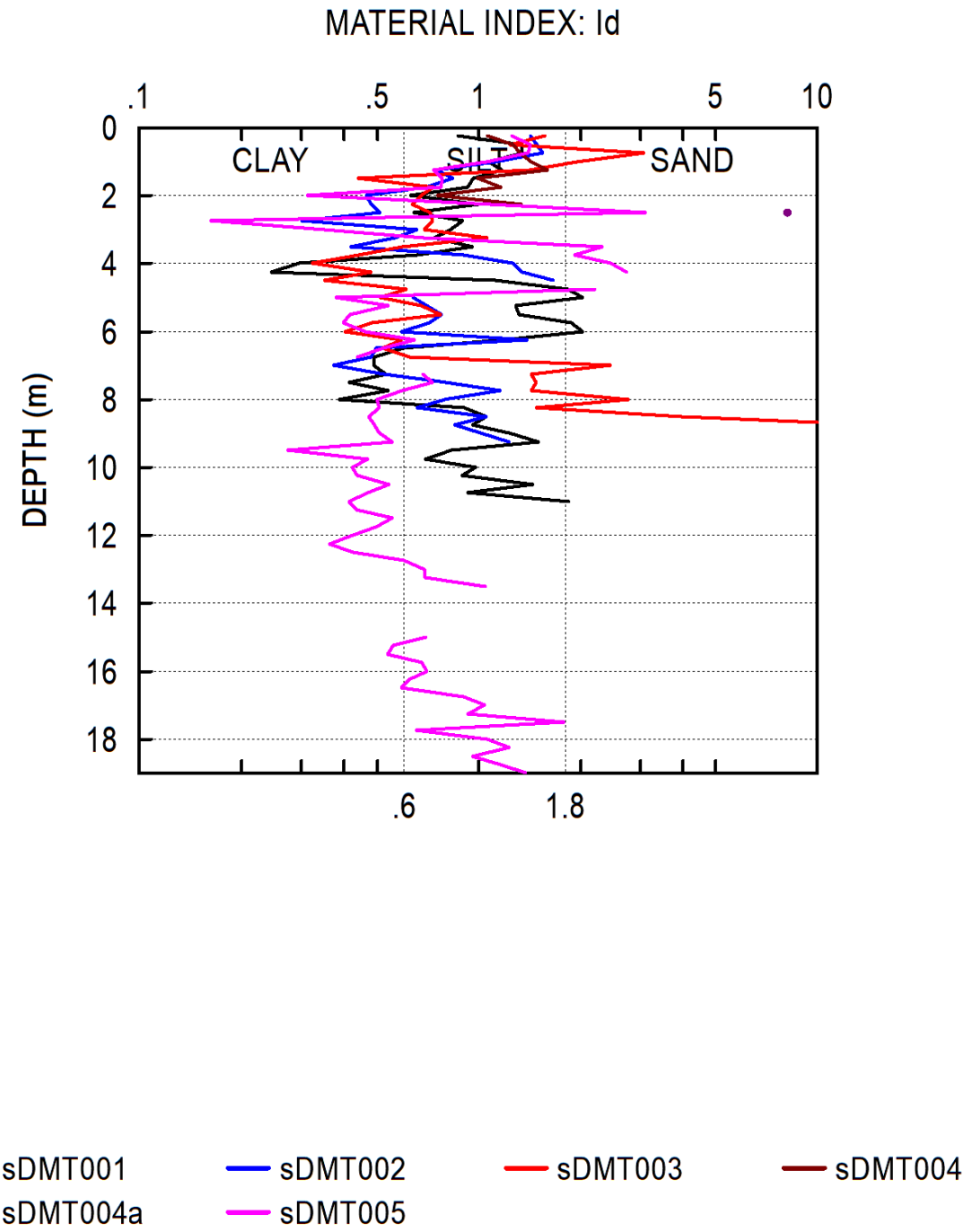
| | |
|---|---|
| Perry Geotech | Aurecon |
| Site Investigations | Fitzgerald Rd - Drury |

SUPERIMPOSED TEST RESULTS



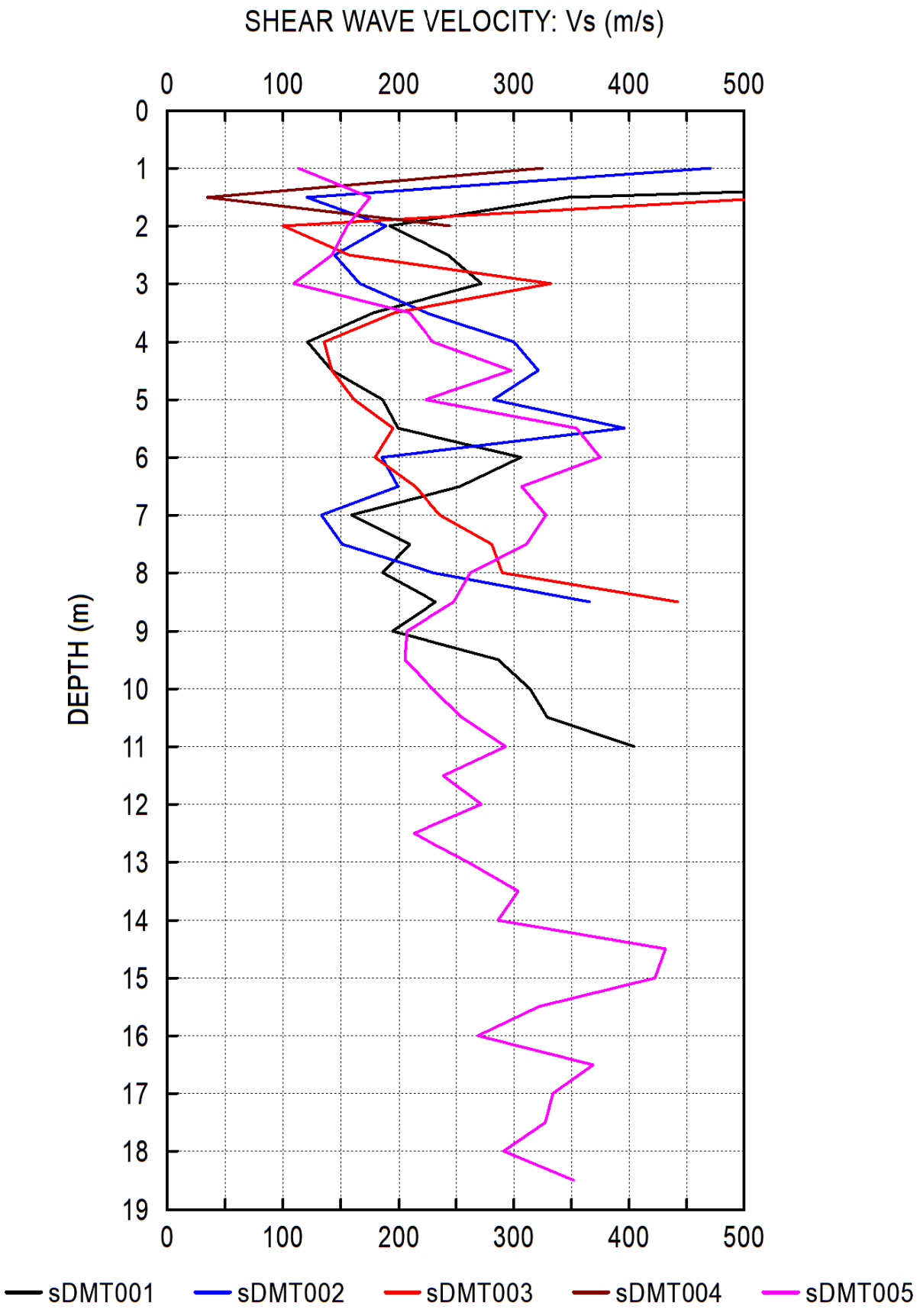
| | |
|---|---|
| Perry Geotech | Aurecon |
| Site Investigations | Fitzgerald Rd - Drury |

SUPERIMPOSED TEST RESULTS



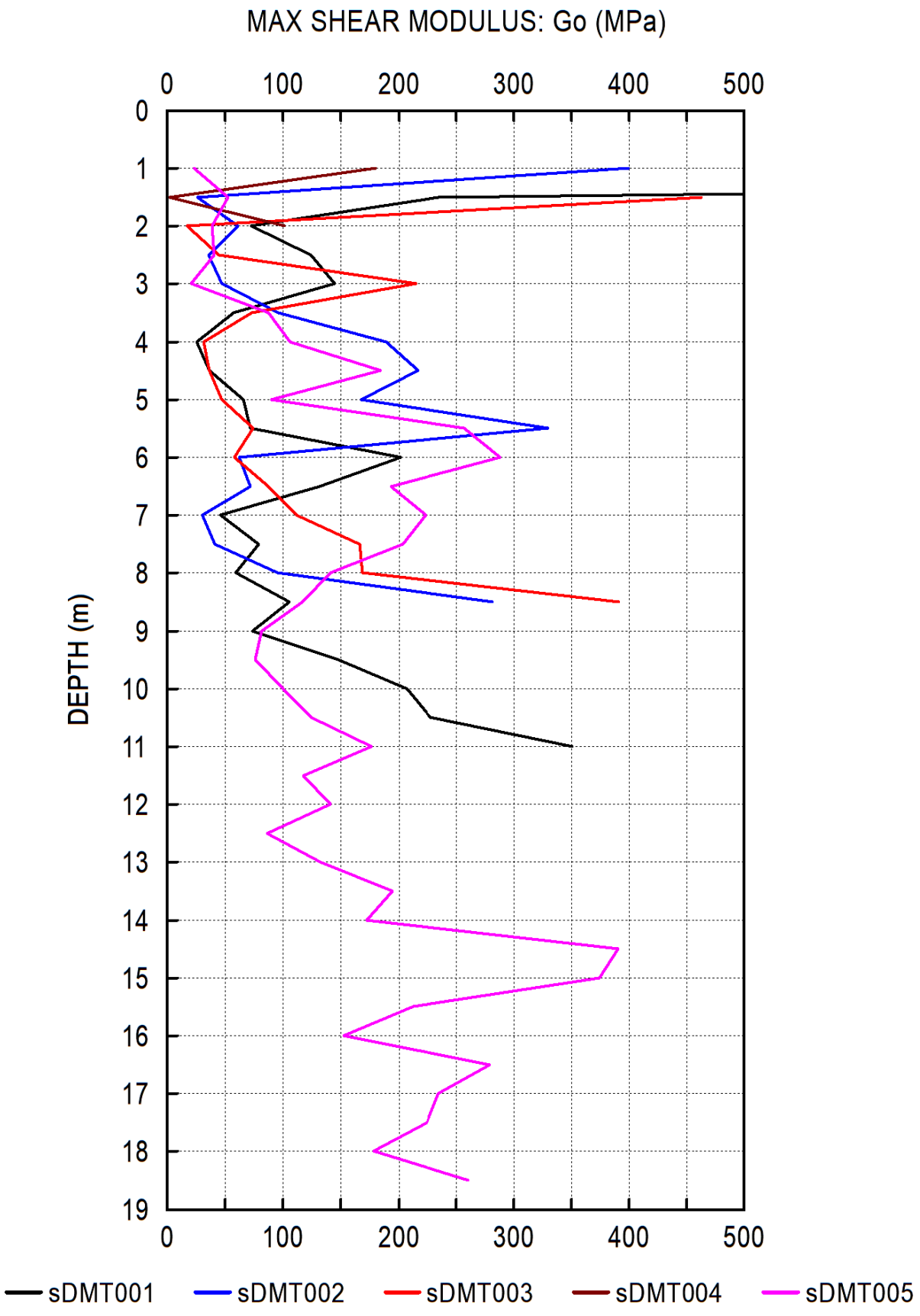
| | |
|---|---|
| Perry Geotech | Aurecon |
| Site Investigations | Fitzgerald Rd - Drury |

SUPERIMPOSED TEST RESULTS



| | |
|---|---|
| Perry Geotech | Aurecon |
| Site Investigations | Fitzgerald Rd - Drury |

SUPERIMPOSED TEST RESULTS



| sDMT001 | LEGEND | INTERPRETED PARAMETERS | GENERAL PARAMETERS |
|---|---|---|---|
| 24 NOV 2020 | Z = Depth Below Ground Level<br>Po,P1,P2 = Corrected A,B,C readings<br>Id = Material Index<br>Ed = Dilatometer Modulus<br>Ud = Pore Press. Index = (P2-Uo)/(Po-Uo)<br>Gamma = Bulk unit weight<br>Sigma' = Effective overb. stress<br>Uo = Pore pressure | Phi = Safe floor value of Friction Angle<br>Ko = In situ earth press. coeff.<br>M = Constrained modulus (at Sigma')<br>Cu = Undrained shear strength<br>Ocr = Overconsolidation ratio<br>(OCR = 'relative OCR'- generally realistic. If accurate independent OCR available, apply suitable factor) | DeltaA = 13 kPa<br>DeltaB = 32 kPa<br>GammaTop = 17.0 kN/m^3<br>FactorEd = 34.7<br>Zm = 0.0 kPa<br>Zabs = 0.0 m<br>Zw = 3.0 m |
| Perry Geotech<br>Aurecon<br>Site Investigations<br>Fitzgerald Rd - Drury<br>Rrefusal (10ton) | | | |

WaterTable at 3.00 m
Reduction formulae according to Marchetti, ASCE Geot.Jnl.Mar. 1980, Vol.109, 299-321; Phi according to TC16 ISSMGE, 2001

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m^3) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | sDMT001 DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.25 | 312 | 615 | | 312 | 583 | | 16.7 | 4 | 0 | 0.87 | 73.4 | 9.4 | | 5.6 | >99.9 | | 41.2 | 85 | SILT |
| 0.5 | 251 | 612 | | 248 | 580 | | 16.7 | 8 | 0 | 1.34 | 29.5 | 11.5 | | | | | 40.6 | | SANDY SILT |
| 0.75 | 351 | 833 | | 342 | 801 | | 17.7 | 13 | 0 | 1.34 | 27.2 | 15.9 | | | | | 54.9 | | SANDY SILT |
| 1.0 | 583 | 1205 | | 567 | 1173 | | 19.1 | 17 | 0 | 1.07 | 33.4 | 21.0 | | 3.7 | 80.8 | | 76.5 | 126 | SILT |
| 1.25 | 605 | 1301 | | 585 | 1269 | | 19.1 | 22 | 0 | 1.17 | 26.9 | 23.7 | | 3.3 | 57.7 | | 81.5 | 123 | SILT |
| 1.5 | 642 | 1263 | | 626 | 1231 | | 19.1 | 27 | 0 | 0.97 | 23.6 | 21.0 | | 3.0 | 47.0 | | 69.5 | 128 | SILT |
| 1.75 | 1379 | 2603 | | 1333 | 2571 | | 20.6 | 31 | 0 | 0.93 | 42.5 | 43.0 | | 4.2 | >99.9 | | 166.3 | 315 | SILT |
| 2.0 | 1213 | 1969 | | 1190 | 1937 | | 19.1 | 37 | 0 | 0.63 | 32.6 | 25.9 | | 3.6 | 78.1 | | 93.8 | 263 | CLAYEY SILT |
| 2.25 | 858 | 1694 | | 831 | 1662 | | 19.1 | 41 | 0 | 1.00 | 20.1 | 28.8 | | 2.8 | 36.8 | | 91.2 | 163 | SILT |
| 2.5 | 1259 | 2057 | | 1234 | 2025 | | 20.6 | 46 | 0 | 0.64 | 26.8 | 27.4 | | 3.3 | 57.4 | | 94.2 | 260 | CLAYEY SILT |
| 2.75 | 1381 | 2569 | | 1337 | 2537 | | 20.6 | 51 | 0 | 0.90 | 26.1 | 41.6 | | 3.2 | 55.1 | | 141.9 | 280 | SILT |
| 3.0 | 616 | 1136 | | 605 | 1104 | | 19.1 | 56 | 0 | 0.82 | 10.7 | 17.3 | | 1.9 | 13.8 | | 44.4 | 101 | SILT |
| 3.25 | 362 | 659 | | 362 | 627 | | 17.7 | 59 | 2 | 0.74 | 6.1 | 9.2 | | 1.3 | 5.8 | | 18.4 | 52 | CLAYEY SILT |
| 3.5 | 480 | 951 | | 472 | 919 | | 17.7 | 61 | 5 | 0.96 | 7.7 | 15.5 | | 1.6 | 8.2 | | 34.7 | 72 | SILT |
| 3.75 | 490 | 835 | | 488 | 803 | | 17.7 | 63 | 7 | 0.66 | 7.7 | 10.9 | | 1.6 | 8.2 | | 24.4 | 74 | CLAYEY SILT |
| 4.0 | 304 | 434 | | 313 | 402 | | 16.7 | 65 | 10 | 0.29 | 4.7 | 3.1 | | 1.1 | 3.8 | | 5.3 | 41 | CLAY |
| 4.25 | 221 | 317 | | 231 | 285 | | 15.7 | 66 | 12 | 0.24 | 3.3 | 1.9 | | 0.85 | 2.2 | | 2.5 | 27 | CLAY |
| 4.5 | 400 | 849 | | 393 | 817 | | 17.7 | 68 | 15 | 1.12 | 5.6 | 14.7 | | 1.3 | 5.0 | | 28.3 | 54 | SILT |
| 4.75 | 351 | 954 | | 336 | 922 | | 18.6 | 70 | 17 | 1.84 | 4.6 | 20.3 | | | | 37 | 35.8 | | SILTY SAND |
| 5.0 | 469 | 1326 | | 441 | 1294 | | 18.6 | 72 | 20 | 2.02 | 5.9 | 29.6 | | | | 38 | 59.2 | | SILTY SAND |
| 5.25 | 414 | 926 | | 404 | 894 | | 17.7 | 74 | 22 | 1.29 | 5.1 | 17.0 | | | | | 31.5 | | SANDY SILT |
| 5.5 | 475 | 1066 | | 461 | 1034 | | 17.7 | 76 | 25 | 1.31 | 5.7 | 19.9 | | | | | 38.9 | | SANDY SILT |
| 5.75 | 434 | 1167 | | 413 | 1135 | | 18.6 | 78 | 27 | 1.87 | 4.9 | 25.1 | | | | 37 | 46.0 | | SILTY SAND |
| 6.0 | 1009 | 2799 | | 935 | 2767 | | 21.1 | 80 | 29 | 2.02 | 11.3 | 63.6 | | | | 41 | 166.2 | | SILTY SAND |
| 6.25 | 1249 | 2602 | | 1197 | 2570 | | 20.6 | 83 | 32 | 1.18 | 14.0 | 47.7 | | 2.3 | 20.9 | | 134.4 | 208 | SILT |
| 6.5 | 1813 | 2846 | | 1777 | 2814 | | 20.1 | 86 | 34 | 0.60 | 20.3 | 36.0 | | 2.8 | 37.3 | | 114.1 | 342 | SILTY CLAY |
| 6.75 | 691 | 1041 | | 689 | 1009 | | 17.7 | 88 | 37 | 0.49 | 7.4 | 11.1 | | 1.5 | 7.7 | | 24.3 | 99 | SILTY CLAY |
| 7.0 | 633 | 953 | | 632 | 921 | | 17.7 | 90 | 39 | 0.49 | 6.6 | 10.0 | | 1.4 | 6.4 | | 20.7 | 88 | SILTY CLAY |
| 7.25 | 788 | 1207 | | 782 | 1175 | | 18.6 | 92 | 42 | 0.53 | 8.0 | 13.6 | | 1.6 | 8.8 | | 31.0 | 115 | SILTY CLAY |
| 7.5 | 741 | 1059 | | 740 | 1027 | | 17.7 | 95 | 44 | 0.41 | 7.4 | 9.9 | | 1.5 | 7.7 | | 21.8 | 106 | SILTY CLAY |
| 7.75 | 668 | 1031 | | 665 | 999 | | 17.7 | 96 | 47 | 0.54 | 6.4 | 11.6 | | 1.4 | 6.2 | | 23.7 | 91 | SILTY CLAY |
| 8.0 | 457 | 654 | | 462 | 622 | | 16.7 | 98 | 49 | 0.39 | 4.2 | 5.5 | | 1.0 | 3.2 | | 8.9 | 55 | SILTY CLAY |
| 8.25 | 482 | 894 | | 477 | 862 | | 17.7 | 100 | 52 | 0.91 | 4.2 | 13.4 | | 1.0 | 3.2 | | 21.9 | 56 | SILT |
| 8.5 | 700 | 1376 | | 681 | 1344 | | 19.1 | 102 | 54 | 1.06 | 6.1 | 23.0 | | 1.3 | 5.8 | | 46.3 | 91 | SILT |
| 8.75 | 669 | 1261 | | 655 | 1229 | | 19.1 | 104 | 56 | 0.96 | 5.7 | 19.9 | | 1.3 | 5.2 | | 38.7 | 86 | SILT |
| 9.0 | 756 | 1587 | | 730 | 1555 | | 19.1 | 107 | 59 | 1.23 | 6.3 | 28.6 | | | | | 58.5 | | SANDY SILT |
| 9.25 | 1060 | 2453 | | 1006 | 2421 | | 20.6 | 109 | 61 | 1.50 | 8.7 | 49.1 | | | | | 115.9 | | SANDY SILT |
| 9.5 | 639 | 1132 | | 630 | 1100 | | 17.7 | 112 | 64 | 0.83 | 5.1 | 16.3 | | 1.2 | 4.3 | | 29.6 | 79 | SILT |
| 9.75 | 1323 | 2179 | | 1295 | 2147 | | 20.6 | 114 | 66 | 0.69 | 10.8 | 29.5 | | 1.9 | 13.9 | | 76.0 | 206 | CLAYEY SILT |
| 10.0 | 1720 | 3250 | | 1659 | 3218 | | 20.6 | 116 | 69 | 0.98 | 13.7 | 54.1 | | 2.2 | 20.1 | | 151.2 | 283 | SILT |
| 10.25 | 1732 | 3144 | | 1677 | 3112 | | 20.6 | 119 | 71 | 0.89 | 13.5 | 49.8 | | 2.2 | 19.7 | | 138.6 | 285 | SILT |

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m^3) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | sDMT001 DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10.5 | 1158 | 2617 | | 1100 | 2585 | | 20.6 | 122 | 74 | 1.45 | 8.4 | 51.5 | | | | | 120.2 | | SANDY SILT |
| 10.75 | 2176 | 4005 | | 2100 | 3973 | | 20.6 | 125 | 76 | 0.93 | 16.2 | 65.0 | | 2.5 | 26.3 | | 192.4 | 376 | SILT |
| 11.0 | 1417 | 3639 | | 1321 | 3607 | | 21.1 | 127 | 78 | 1.84 | 9.8 | 79.3 | | | | 40 | 196.5 | | SILTY SAND |

| sDMT002 | LEGEND | INTERPRETED PARAMETERS | GENERAL PARAMETERS |
|---|---|---|---|
| 24 NOV 2020 | Z = Depth Below Ground Level<br>Po,P1,P2 = Corrected A,B,C readings<br>Id = Material Index<br>Ed = Dilatometer Modulus<br>Ud = Pore Press. Index = (P2-Uo)/(Po-Uo)<br>Gamma = Bulk unit weight<br>Sigma' = Effective overb. stress<br>Uo = Pore pressure | Phi = Safe floor value of Friction Angle<br>Ko = In situ earth press. coeff.<br>M = Constrained modulus (at Sigma')<br>Cu = Undrained shear strength<br>Ocr = Overconsolidation ratio<br>(OCR = 'relative OCR'- generally realistic. If accurate independent OCR available, apply suitable factor) | DeltaA = 12 kPa<br>DeltaB = 33 kPa<br>GammaTop = 17.0 kN/m^3<br>FactorEd = 34.7<br>Zm = 0.0 kPa<br>Zabs = 0.0 m<br>Zw = 3.0 m |
| Perry Geotech<br>Aurecon<br>Site Investigations<br>Fitzgerald Rd - Drury<br>Refusal (10ton) | | | |

WaterTable at 3.00 m
Reduction formulae according to Marchetti, ASCE Geot.Jnl.Mar. 1980, Vol.109, 299-321; Phi according to TC16 ISSMGE, 2001

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m^3) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | sDMT002 DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.25 | 112 | 314 | | 116 | 281 | | 15.7 | 4 | 0 | 1.42 | 27.3 | 5.7 | | | | | 19.7 | | SANDY SILT |
| 0.5 | 234 | 604 | | 230 | 571 | | 16.7 | 8 | 0 | 1.49 | 28.1 | 11.8 | | | | | 41.2 | | SANDY SILT |
| 0.75 | 394 | 994 | | 378 | 961 | | 17.7 | 12 | 0 | 1.54 | 30.6 | 20.2 | | | | | 72.0 | | SANDY SILT |
| 1.0 | 548 | 1159 | | 532 | 1126 | | 17.7 | 17 | 0 | 1.12 | 31.7 | 20.6 | | 3.6 | 74.8 | | 74.1 | 117 | SILT |
| 1.25 | 312 | 580 | | 313 | 547 | | 16.7 | 21 | 0 | 0.75 | 14.8 | 8.1 | | 2.3 | 22.7 | | 23.3 | 57 | CLAYEY SILT |
| 1.5 | 440 | 833 | | 435 | 800 | | 17.7 | 25 | 0 | 0.84 | 17.1 | 12.7 | | 2.5 | 28.6 | | 38.2 | 82 | SILT |
| 1.75 | 492 | 860 | | 488 | 827 | | 17.7 | 30 | 0 | 0.70 | 16.4 | 11.8 | | 2.5 | 26.7 | | 34.9 | 91 | CLAYEY SILT |
| 2.0 | 392 | 612 | | 395 | 579 | | 16.7 | 34 | 0 | 0.46 | 11.6 | 6.4 | | 2.0 | 15.5 | | 16.8 | 67 | SILTY CLAY |
| 2.25 | 333 | 532 | | 337 | 499 | | 16.7 | 38 | 0 | 0.48 | 8.8 | 5.6 | | 1.7 | 10.1 | | 13.3 | 54 | SILTY CLAY |
| 2.5 | 286 | 472 | | 291 | 439 | | 16.7 | 43 | 0 | 0.51 | 6.8 | 5.1 | | 1.4 | 6.8 | | 10.8 | 44 | SILTY CLAY |
| 2.75 | 280 | 407 | | 288 | 374 | | 16.7 | 47 | 0 | 0.30 | 6.2 | 3.0 | | 1.3 | 5.8 | | 6.0 | 42 | CLAY |
| 3.0 | 298 | 530 | | 301 | 497 | | 16.7 | 51 | 0 | 0.65 | 5.9 | 6.8 | | 1.3 | 5.4 | | 13.4 | 43 | CLAYEY SILT |
| 3.25 | 1587 | 2467 | | 1557 | 2434 | | 20.1 | 53 | 2 | 0.56 | 29.6 | 30.4 | | 3.5 | 67.0 | | 107.3 | 335 | SILTY CLAY |
| 3.5 | 799 | 1159 | | 795 | 1126 | | 18.6 | 55 | 5 | 0.42 | 14.3 | 11.5 | | 2.3 | 21.6 | | 32.6 | 142 | SILTY CLAY |
| 3.75 | 543 | 1039 | | 532 | 1006 | | 17.7 | 57 | 7 | 0.90 | 9.2 | 16.4 | | 1.7 | 10.8 | | 39.6 | 84 | SILT |
| 4.0 | 1064 | 2313 | | 1016 | 2280 | | 20.6 | 59 | 10 | 1.26 | 17.0 | 43.9 | | | | | 131.6 | | SANDY SILT |
| 4.25 | 925 | 2083 | | 881 | 2050 | | 19.1 | 62 | 12 | 1.34 | 14.0 | 40.6 | | | | | 114.3 | | SANDY SILT |
| 4.5 | 1086 | 2716 | | 1019 | 2683 | | 20.6 | 64 | 15 | 1.66 | 15.6 | 57.7 | | | | | 168.7 | | SANDY SILT |
| 5.0 | 1472 | 2377 | | 1441 | 2344 | | 20.6 | 70 | 20 | 0.64 | 20.4 | 31.3 | | 2.8 | 37.5 | | 99.5 | 279 | CLAYEY SILT |
| 5.25 | 2091 | 3473 | | 2036 | 3440 | | 20.6 | 72 | 22 | 0.70 | 27.8 | 48.7 | | 3.3 | 60.9 | | 169.0 | 428 | CLAYEY SILT |
| 5.5 | 1421 | 2467 | | 1383 | 2434 | | 20.6 | 75 | 25 | 0.77 | 18.1 | 36.5 | | 2.6 | 31.1 | | 111.6 | 259 | CLAYEY SILT |
| 5.75 | 913 | 1545 | | 896 | 1512 | | 19.1 | 78 | 27 | 0.71 | 11.2 | 21.4 | | 2.0 | 14.7 | | 55.7 | 147 | CLAYEY SILT |
| 6.0 | 616 | 987 | | 612 | 954 | | 17.7 | 80 | 29 | 0.59 | 7.3 | 11.9 | | 1.5 | 7.5 | | 25.8 | 88 | SILTY CLAY |
| 6.25 | 1625 | 3660 | | 1538 | 3627 | | 20.6 | 82 | 32 | 1.39 | 18.3 | 72.5 | | | | | 222.9 | | SANDY SILT |
| 6.5 | 687 | 1038 | | 684 | 1005 | | 17.7 | 85 | 34 | 0.49 | 7.7 | 11.1 | | 1.6 | 8.1 | | 24.8 | 100 | SILTY CLAY |
| 6.75 | 587 | 883 | | 586 | 850 | | 17.7 | 87 | 37 | 0.48 | 6.3 | 9.1 | | 1.4 | 6.1 | | 18.6 | 81 | SILTY CLAY |
| 7.0 | 406 | 583 | | 411 | 550 | | 16.7 | 89 | 39 | 0.37 | 4.2 | 4.8 | | 1.0 | 3.2 | | 7.7 | 49 | SILTY CLAY |
| 7.25 | 633 | 972 | | 630 | 939 | | 17.7 | 90 | 42 | 0.52 | 6.5 | 10.7 | | 1.4 | 6.3 | | 22.1 | 87 | SILTY CLAY |
| 7.5 | 532 | 943 | | 526 | 910 | | 17.7 | 92 | 44 | 0.80 | 5.2 | 13.3 | | 1.2 | 4.5 | | 24.5 | 67 | CLAYEY SILT |
| 7.75 | 880 | 1808 | | 848 | 1775 | | 19.1 | 94 | 47 | 1.16 | 8.5 | 32.2 | | 1.7 | 9.6 | | 75.2 | 127 | SILT |
| 8.0 | 581 | 1020 | | 573 | 987 | | 17.7 | 97 | 49 | 0.79 | 5.4 | 14.4 | | 1.2 | 4.7 | | 27.0 | 74 | CLAYEY SILT |
| 8.25 | 706 | 1153 | | 698 | 1120 | | 17.7 | 99 | 52 | 0.65 | 6.6 | 14.6 | | 1.4 | 6.4 | | 30.3 | 96 | CLAYEY SILT |
| 8.5 | 1397 | 2739 | | 1344 | 2706 | | 20.6 | 101 | 54 | 1.06 | 12.8 | 47.3 | | 2.1 | 18.2 | | 129.3 | 226 | SILT |
| 8.75 | 1173 | 2095 | | 1141 | 2062 | | 19.1 | 103 | 56 | 0.85 | 10.5 | 32.0 | | 1.9 | 13.3 | | 81.4 | 181 | SILT |
| 9.0 | 1058 | 2036 | | 1023 | 2003 | | 19.1 | 106 | 59 | 1.02 | 9.1 | 34.0 | | 1.7 | 10.7 | | 81.9 | 155 | SILT |
| 9.25 | 1457 | 3059 | | 1391 | 3026 | | 20.6 | 108 | 61 | 1.23 | 12.3 | 56.7 | | | | | 153.0 | | SANDY SILT |

| sDMT003 | LEGEND | INTERPRETED PARAMETERS | GENERAL PARAMETERS |
|---|---|---|---|
| 23 NOV 2020 | Z = Depth Below Ground Level<br>Po,P1,P2 = Corrected A,B,C readings<br>Id = Material Index<br>Ed = Dilatometer Modulus<br>Ud = Pore Press. Index = (P2-Uo)/(Po-Uo)<br>Gamma = Bulk unit weight<br>Sigma' = Effective overb. stress<br>Uo = Pore pressure | Phi = Safe floor value of Friction Angle<br>Ko = In situ earth press. coeff.<br>M = Constrained modulus (at Sigma')<br>Cu = Undrained shear strength<br>Ocr = Overconsolidation ratio<br>(OCR = 'relative OCR'- generally realistic. If accurate independent OCR available, apply suitable factor) | DeltaA = 15 kPa<br>DeltaB = 40 kPa<br>GammaTop = 17.0 kN/m^3<br>FactorEd = 34.7<br>Zm = 0.0 kPa<br>Zabs = 0.0 m<br>Zw = 0.9 m |
| Perry Geotech<br>Aurecon<br>Site Investigations<br>Fitzgerald Rd - Drury<br>Refusal (10ton) | | | |

WaterTable at 0.90 m
Reduction formulae according to Marchetti, ASCE Geot.Jnl.Mar. 1980, Vol.109, 299-321; Phi according to TC16 ISSMGE, 2001

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m^3) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | sDMT003 DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.25 | 252 | 679 | | 248 | 639 | | 16.7 | 4 | 0 | 1.57 | 58.4 | 13.6 | | | | | 56.5 | | SANDY SILT |
| 0.5 | 394 | 904 | | 386 | 864 | | 17.7 | 8 | 0 | 1.24 | 45.9 | 16.6 | | | | | 65.4 | | SANDY SILT |
| 0.75 | 301 | 1161 | | 276 | 1121 | | 18.6 | 13 | 0 | 3.07 | 21.5 | 29.3 | | | | 44 | 94.6 | | SILTY SAND |
| 1.0 | 387 | 1122 | | 368 | 1082 | | 18.6 | 17 | 1 | 1.95 | 22.2 | 24.8 | | | | 44 | 80.7 | | SILTY SAND |
| 1.25 | 322 | 798 | | 316 | 758 | | 17.7 | 19 | 3 | 1.41 | 16.7 | 15.3 | | | | | 45.8 | | SANDY SILT |
| 1.5 | 213 | 359 | | 223 | 319 | | 15.7 | 21 | 6 | 0.44 | 10.5 | 3.3 | | 1.9 | 13.4 | | 8.4 | 36 | SILTY CLAY |
| 1.75 | 200 | 394 | | 208 | 354 | | 16.7 | 22 | 8 | 0.73 | 9.0 | 5.1 | | 1.7 | 10.5 | | 12.1 | 32 | CLAYEY SILT |
| 2.0 | 276 | 505 | | 282 | 465 | | 16.7 | 24 | 11 | 0.67 | 11.4 | 6.3 | | 2.0 | 15.1 | | 16.6 | 46 | CLAYEY SILT |
| 2.25 | 397 | 685 | | 400 | 645 | | 17.7 | 26 | 13 | 0.63 | 15.1 | 8.5 | | 2.4 | 23.5 | | 24.6 | 71 | CLAYEY SILT |
| 2.5 | 589 | 1031 | | 585 | 991 | | 17.7 | 28 | 16 | 0.71 | 20.7 | 14.1 | | 2.8 | 38.3 | | 44.9 | 112 | CLAYEY SILT |
| 2.75 | 514 | 911 | | 512 | 871 | | 17.7 | 30 | 18 | 0.73 | 16.7 | 12.5 | | 2.5 | 27.6 | | 37.2 | 92 | CLAYEY SILT |
| 3.0 | 997 | 1681 | | 981 | 1641 | | 19.1 | 31 | 21 | 0.69 | 30.5 | 22.9 | | 3.5 | 70.3 | | 81.5 | 209 | CLAYEY SILT |
| 3.25 | 2076 | 4116 | | 1992 | 4076 | | 20.6 | 34 | 23 | 1.06 | 58.2 | 72.3 | | 5.0 | >99.9 | | 301.5 | 503 | SILT |
| 3.5 | 842 | 1353 | | 834 | 1313 | | 18.6 | 37 | 26 | 0.59 | 22.2 | 16.6 | | 2.9 | 42.7 | | 54.0 | 162 | SILTY CLAY |
| 3.75 | 733 | 1084 | | 733 | 1044 | | 17.7 | 39 | 28 | 0.44 | 18.2 | 10.8 | | 2.6 | 31.5 | | 33.1 | 135 | SILTY CLAY |
| 4.0 | 371 | 533 | | 381 | 493 | | 16.7 | 41 | 30 | 0.32 | 8.6 | 3.9 | | 1.7 | 9.8 | | 9.1 | 55 | CLAY |
| 4.25 | 630 | 958 | | 631 | 918 | | 17.7 | 42 | 33 | 0.48 | 14.1 | 9.9 | | 2.3 | 21.1 | | 28.1 | 107 | SILTY CLAY |
| 4.5 | 771 | 1072 | | 774 | 1032 | | 17.7 | 44 | 35 | 0.35 | 16.6 | 9.0 | | 2.5 | 27.3 | | 26.7 | 138 | SILTY CLAY |
| 4.75 | 568 | 930 | | 568 | 890 | | 17.7 | 46 | 38 | 0.61 | 11.4 | 11.2 | | 2.0 | 15.2 | | 29.4 | 90 | CLAYEY SILT |
| 5.0 | 730 | 1119 | | 728 | 1079 | | 17.7 | 48 | 40 | 0.51 | 14.3 | 12.2 | | 2.3 | 21.5 | | 34.5 | 124 | SILTY CLAY |
| 5.25 | 711 | 1190 | | 705 | 1150 | | 19.1 | 50 | 43 | 0.67 | 13.2 | 15.4 | | 2.2 | 19.0 | | 42.7 | 117 | CLAYEY SILT |
| 5.5 | 747 | 1308 | | 737 | 1268 | | 19.1 | 53 | 45 | 0.77 | 13.2 | 18.4 | | 2.2 | 18.9 | | 50.9 | 122 | CLAYEY SILT |
| 5.75 | 666 | 1006 | | 667 | 966 | | 17.7 | 55 | 48 | 0.48 | 11.3 | 10.4 | | 2.0 | 14.9 | | 27.1 | 105 | SILTY CLAY |
| 6.0 | 788 | 1126 | | 789 | 1086 | | 17.7 | 57 | 50 | 0.40 | 13.0 | 10.3 | | 2.2 | 18.6 | | 28.3 | 130 | SILTY CLAY |
| 6.25 | 673 | 1075 | | 671 | 1035 | | 17.7 | 59 | 52 | 0.59 | 10.5 | 12.6 | | 1.9 | 13.3 | | 32.2 | 103 | SILTY CLAY |
| 6.5 | 793 | 1210 | | 790 | 1170 | | 18.6 | 61 | 55 | 0.52 | 12.1 | 13.2 | | 2.1 | 16.6 | | 35.3 | 127 | SILTY CLAY |
| 6.75 | 853 | 1375 | | 845 | 1335 | | 19.1 | 63 | 57 | 0.62 | 12.5 | 17.0 | | 2.1 | 17.5 | | 46.1 | 137 | CLAYEY SILT |
| 7.0 | 881 | 2679 | | 809 | 2639 | | 19.6 | 65 | 60 | 2.44 | 11.5 | 63.5 | | | | 41 | 167.0 | | SILTY SAND |
| 7.25 | 1598 | 3632 | | 1514 | 3592 | | 20.6 | 68 | 62 | 1.43 | 21.4 | 72.1 | | | | | 232.3 | | SANDY SILT |
| 7.5 | 1634 | 3768 | | 1545 | 3728 | | 20.6 | 70 | 65 | 1.47 | 21.0 | 75.7 | | | | | 242.6 | | SANDY SILT |
| 7.75 | 1829 | 4150 | | 1731 | 4110 | | 20.6 | 73 | 67 | 1.43 | 22.7 | 82.6 | | | | | 270.6 | | SANDY SILT |
| 8.0 | 780 | 2521 | | 711 | 2481 | | 19.6 | 76 | 70 | 2.76 | 8.5 | 61.4 | | | | 40 | 144.4 | | SILTY SAND |
| 8.25 | 1970 | 4536 | | 1859 | 4496 | | 20.6 | 78 | 72 | 1.48 | 22.8 | 91.5 | | | | | 300.2 | | SANDY SILT |
| 8.5 | 796 | 3185 | | 694 | 3145 | | 19.6 | 81 | 75 | 3.95 | 7.6 | 85.0 | | | | 39 | 192.8 | | SAND |
| 8.75 | 412 | 3293 | | 286 | 3253 | | 18.6 | 83 | 77 | 14.22 | 2.5 | 103.0 | | | | 33 | 133.4 | | SAND |

| sDMT004 | LEGEND | INTERPRETED PARAMETERS | GENERAL PARAMETERS |
|---|---|---|---|
| 23 NOV 2020 | Z = Depth Below Ground Level<br>Po,P1,P2 = Corrected A,B,C readings<br>Id = Material Index<br>Ed = Dilatometer Modulus<br>Ud = Pore Press. Index = (P2-Uo)/(Po-Uo)<br>Gamma = Bulk unit weight<br>Sigma' = Effective overb. stress<br>Uo = Pore pressure | Phi = Safe floor value of Friction Angle<br>Ko = In situ earth press. coeff.<br>M = Constrained modulus (at Sigma')<br>Cu = Undrained shear strength<br>Ocr = Overconsolidation ratio<br>(OCR = 'relative OCR'- generally realistic. If accurate independent OCR available, apply suitable factor) | DeltaA = 12 kPa<br>DeltaB = 39 kPa<br>GammaTop = 17.0 kN/m^3<br>FactorEd = 34.7<br>Zm = 0.0 kPa<br>Zabs = 0.0 m<br>Zw > Zfinal |
| Perry Geotech<br>Aurecon<br>Site Investigations<br>Fitzgerald Rd - Drury<br>Refusal (10ton) | | | |

Water Level below end of sounding
Reduction formulae according to Marchetti, ASCE Geot.Jnl.Mar. 1980, Vol.109, 299-321; Phi according to TC16 ISSMGE, 2001

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m^3) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | sDMT004 DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.25 | 130 | 317 | | 135 | 278 | | 15.7 | 4 | 0 | 1.06 | 31.8 | 5.0 | | 3.6 | 75.1 | | 17.8 | 30 | SILT |
| 0.5 | 326 | 761 | | 319 | 722 | | 17.7 | 8 | 0 | 1.26 | 39.0 | 14.0 | | | | | 53.0 | | SANDY SILT |
| 0.75 | 331 | 788 | | 323 | 749 | | 17.7 | 13 | 0 | 1.32 | 25.6 | 14.8 | | | | | 50.2 | | SANDY SILT |
| 1.0 | 226 | 580 | | 223 | 541 | | 16.7 | 17 | 0 | 1.43 | 13.1 | 11.0 | | | | | 30.4 | | SANDY SILT |
| 1.25 | 199 | 548 | | 196 | 509 | | 16.7 | 21 | 0 | 1.60 | 9.3 | 10.9 | | | | | 26.3 | | SANDY SILT |
| 1.5 | 136 | 320 | | 141 | 281 | | 15.7 | 25 | 0 | 0.99 | 5.6 | 4.8 | | 1.3 | 5.0 | | 9.3 | 20 | SILT |
| 1.75 | 122 | 314 | | 127 | 275 | | 15.7 | 29 | 0 | 1.17 | 4.3 | 5.1 | | 1.0 | 3.4 | | 8.6 | 17 | SILT |
| 2.0 | 189 | 379 | | 194 | 340 | | 16.7 | 33 | 0 | 0.75 | 5.8 | 5.1 | | 1.3 | 5.3 | | 9.9 | 28 | CLAYEY SILT |
| 2.25 | 175 | 450 | | 176 | 411 | | 16.7 | 37 | 0 | 1.34 | 4.7 | 8.2 | | | | | 14.4 | | SANDY SILT |

| sDMT004a | LEGEND | INTERPRETED PARAMETERS | GENERAL PARAMETERS |
|---|---|---|---|
| 23 NOV 2020 | Z = Depth Below Ground Level<br>Po,P1,P2 = Corrected A,B,C readings<br>Id = Material Index<br>Ed = Dilatometer Modulus<br>Ud = Pore Press. Index = (P2-Uo)/(Po-Uo)<br>Gamma = Bulk unit weight<br>Sigma' = Effective overb. stress<br>Uo = Pore pressure | Phi = Safe floor value of Friction Angle<br>Ko = In situ earth press. coeff.<br>M = Constrained modulus (at Sigma')<br>Cu = Undrained shear strength<br>Ocr = Overconsolidation ratio<br>(OCR = 'relative OCR'- generally realistic. If accurate independent OCR available, apply suitable factor) | DeltaA = 11 kPa<br>DeltaB = 39 kPa<br>GammaTop = 17.0 kN/m^3<br>FactorEd = 34.7<br>Zm = 0.0 kPa<br>Zabs = 0.0 m<br>Zw > Zfinal |
| Perry Geotech<br>Aurecon<br>Site Investigations<br>Fitzgerald Rd - Drury<br>Refusal (10ton) | | | |

Water Level below end of sounding
Reduction formulae according to Marchetti, ASCE Geot.Jnl.Mar. 1980, Vol.109, 299-321; Phi according to TC16 ISSMGE, 2001

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m^3) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | sDMT004a DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.5 | 666 | 4502 | | 488 | 4463 | | 19.6 | 43 | 0 | 8.15 | 11.5 | 137.9 | | | | 41 | 362.8 | | SAND |

| sDMT005 | LEGEND | INTERPRETED PARAMETERS | GENERAL PARAMETERS |
|---|---|---|---|
| 25 NOV 2020 | Z = Depth Below Ground Level<br>Po,P1,P2 = Corrected A,B,C readings<br>Id = Material Index<br>Ed = Dilatometer Modulus<br>Ud = Pore Press. Index = (P2-Uo)/(Po-Uo)<br>Gamma = Bulk unit weight<br>Sigma' = Effective overb. stress<br>Uo = Pore pressure | Phi = Safe floor value of Friction Angle<br>Ko = In situ earth press. coeff.<br>M = Constrained modulus (at Sigma')<br>Cu = Undrained shear strength<br>Ocr = Overconsolidation ratio<br>(OCR = 'relative OCR'- generally realistic. If accurate independent OCR available, apply suitable factor) | DeltaA = 10 kPa<br>DeltaB = 36 kPa<br>GammaTop = 17.0 kN/m^3<br>FactorEd = 34.7<br>Zm = 0.0 kPa<br>Zabs = 0.0 m<br>Zw = 3.0 m |
| Perry Geotech<br>Aurecon<br>Site Investigations<br>Fitzgerald Rd - Drury<br>Inclination | | | |

WaterTable at 3.00 m
Reduction formulae according to Marchetti, ASCE Geot.Jnl.Mar. 1980, Vol.109, 299-321; Phi according to TC16 ISSMGE, 2001

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m^3) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | sDMT005 DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.25 | 174 | 427 | | 174 | 391 | | 16.7 | 4 | 0 | 1.25 | 40.9 | 7.5 | | | | | 28.9 | | SANDY SILT |
| 0.5 | 340 | 829 | | 328 | 793 | | 17.7 | 8 | 0 | 1.42 | 38.9 | 16.1 | | | | | 61.1 | | SANDY SILT |
| 0.75 | 338 | 818 | | 326 | 782 | | 17.7 | 13 | 0 | 1.40 | 25.4 | 15.8 | | | | | 53.5 | | SANDY SILT |
| 1.0 | 327 | 694 | | 321 | 658 | | 17.7 | 17 | 0 | 1.05 | 18.6 | 11.7 | | 2.7 | 32.5 | | 36.1 | 62 | SILT |
| 1.25 | 385 | 697 | | 382 | 661 | | 17.7 | 22 | 0 | 0.73 | 17.6 | 9.7 | | 2.6 | 29.9 | | 29.4 | 72 | CLAYEY SILT |
| 1.5 | 268 | 512 | | 268 | 476 | | 16.7 | 26 | 0 | 0.78 | 10.3 | 7.2 | | 1.9 | 12.9 | | 18.2 | 44 | CLAYEY SILT |
| 1.75 | 413 | 757 | | 408 | 721 | | 17.7 | 30 | 0 | 0.77 | 13.5 | 10.9 | | 2.2 | 19.7 | | 30.2 | 72 | CLAYEY SILT |
| 2.0 | 220 | 333 | | 227 | 297 | | 15.7 | 35 | 0 | 0.31 | 6.5 | 2.4 | | 1.4 | 6.4 | | 5.0 | 34 | CLAY |
| 2.25 | 1162 | 2358 | | 1115 | 2322 | | 20.6 | 39 | 0 | 1.08 | 28.9 | 41.9 | | 3.4 | 64.6 | | 146.8 | 239 | SILT |
| 2.5 | 487 | 1814 | | 433 | 1778 | | 19.6 | 44 | 0 | 3.11 | 9.9 | 46.7 | | | | 40 | 116.3 | | SILTY SAND |
| 2.75 | 245 | 330 | | 253 | 294 | | 15.7 | 49 | 0 | 0.16 | 5.2 | 1.4 | | 1.2 | 4.5 | | 2.6 | 35 | CLAY |
| 3.0 | 274 | 413 | | 279 | 377 | | 16.7 | 53 | 0 | 0.35 | 5.3 | 3.4 | | 1.2 | 4.6 | | 6.3 | 39 | SILTY CLAY |
| 3.25 | 445 | 777 | | 441 | 741 | | 17.7 | 54 | 2 | 0.69 | 8.1 | 10.4 | | 1.6 | 8.8 | | 23.8 | 68 | CLAYEY SILT |
| 3.5 | 604 | 1859 | | 554 | 1823 | | 19.6 | 56 | 5 | 2.31 | 9.8 | 44.0 | | | | 40 | 109.1 | | SILTY SAND |
| 3.75 | 1043 | 2839 | | 965 | 2803 | | 21.1 | 59 | 7 | 1.92 | 16.3 | 63.8 | | | | 43 | 189.0 | | SILTY SAND |
| 4.0 | 888 | 2789 | | 805 | 2753 | | 19.6 | 62 | 10 | 2.45 | 12.9 | 67.6 | | | | 42 | 185.4 | | SILTY SAND |
| 4.25 | 679 | 2280 | | 611 | 2244 | | 19.6 | 64 | 12 | 2.73 | 9.4 | 56.7 | | | | 40 | 138.3 | | SILTY SAND |
| 4.75 | 1463 | 4264 | | 1335 | 4228 | | 21.1 | 69 | 17 | 2.19 | 19.1 | 100.4 | | | | 43 | 312.6 | | SILTY SAND |
| 5.0 | 706 | 998 | | 704 | 962 | | 17.7 | 72 | 20 | 0.38 | 9.5 | 9.0 | | 1.8 | 11.5 | | 22.0 | 111 | SILTY CLAY |
| 5.25 | 1907 | 2901 | | 1870 | 2865 | | 20.1 | 74 | 22 | 0.54 | 25.1 | 34.5 | | 3.2 | 51.8 | | 116.4 | 382 | SILTY CLAY |
| 5.5 | 2590 | 3637 | | 2550 | 3601 | | 20.1 | 76 | 25 | 0.42 | 33.1 | 36.5 | | 3.7 | 80.0 | | 132.5 | 560 | SILTY CLAY |
| 5.75 | 2170 | 3016 | | 2140 | 2980 | | 20.1 | 79 | 27 | 0.40 | 26.8 | 29.1 | | 3.3 | 57.5 | | 100.1 | 445 | SILTY CLAY |
| 6.0 | 2400 | 3469 | | 2359 | 3433 | | 20.1 | 81 | 29 | 0.46 | 28.6 | 37.3 | | 3.4 | 63.7 | | 130.3 | 498 | SILTY CLAY |
| 6.25 | 1622 | 2618 | | 1585 | 2582 | | 20.6 | 84 | 32 | 0.64 | 18.5 | 34.6 | | 2.7 | 32.2 | | 106.7 | 298 | CLAYEY SILT |
| 6.5 | 2401 | 3597 | | 2354 | 3561 | | 20.1 | 87 | 34 | 0.52 | 26.8 | 41.9 | | 3.3 | 57.3 | | 143.8 | 488 | SILTY CLAY |
| 6.75 | 2512 | 3570 | | 2471 | 3534 | | 20.1 | 89 | 37 | 0.44 | 27.3 | 36.9 | | 3.3 | 59.1 | | 127.2 | 515 | SILTY CLAY |
| 7.25 | 1945 | 3190 | | 1895 | 3154 | | 20.6 | 94 | 42 | 0.68 | 19.6 | 43.7 | | 2.7 | 35.4 | | 137.1 | 361 | CLAYEY SILT |
| 7.5 | 1893 | 3180 | | 1841 | 3144 | | 20.6 | 97 | 44 | 0.73 | 18.5 | 45.2 | | 2.7 | 32.3 | | 139.4 | 345 | CLAYEY SILT |
| 7.75 | 1595 | 2496 | | 1562 | 2460 | | 20.1 | 100 | 47 | 0.59 | 15.2 | 31.2 | | 2.4 | 23.7 | | 90.2 | 277 | SILTY CLAY |
| 8.0 | 1587 | 2351 | | 1561 | 2315 | | 20.1 | 102 | 49 | 0.50 | 14.8 | 26.2 | | 2.3 | 22.7 | | 75.1 | 274 | SILTY CLAY |
| 8.25 | 1353 | 2017 | | 1332 | 1981 | | 18.6 | 105 | 52 | 0.51 | 12.2 | 22.5 | | 2.1 | 16.8 | | 60.5 | 221 | SILTY CLAY |
| 8.5 | 1225 | 1791 | | 1209 | 1755 | | 18.6 | 107 | 54 | 0.47 | 10.8 | 18.9 | | 1.9 | 13.9 | | 48.7 | 194 | SILTY CLAY |
| 8.75 | 1046 | 1547 | | 1033 | 1511 | | 18.6 | 109 | 56 | 0.49 | 8.9 | 16.6 | | 1.7 | 10.4 | | 39.5 | 156 | SILTY CLAY |
| 9.0 | 981 | 1467 | | 969 | 1431 | | 18.6 | 112 | 59 | 0.51 | 8.2 | 16.0 | | 1.6 | 9.0 | | 36.7 | 142 | SILTY CLAY |
| 9.25 | 692 | 1067 | | 686 | 1031 | | 17.7 | 114 | 61 | 0.55 | 5.5 | 12.0 | | 1.2 | 4.8 | | 22.6 | 88 | SILTY CLAY |
| 9.5 | 680 | 886 | | 682 | 850 | | 17.7 | 116 | 64 | 0.27 | 5.3 | 5.8 | | 1.2 | 4.6 | | 10.8 | 87 | CLAY |
| 9.75 | 821 | 1201 | | 814 | 1165 | | 18.6 | 118 | 66 | 0.47 | 6.4 | 12.2 | | 1.4 | 6.1 | | 24.8 | 110 | SILTY CLAY |
| 10.0 | 901 | 1278 | | 894 | 1242 | | 18.6 | 120 | 69 | 0.42 | 6.9 | 12.1 | | 1.4 | 6.9 | | 25.5 | 124 | SILTY CLAY |
| 10.25 | 1077 | 1537 | | 1066 | 1501 | | 18.6 | 122 | 71 | 0.44 | 8.2 | 15.1 | | 1.6 | 9.0 | | 34.5 | 156 | SILTY CLAY |
| 10.5 | 1018 | 1545 | | 1004 | 1509 | | 18.6 | 124 | 74 | 0.54 | 7.5 | 17.5 | | 1.5 | 7.9 | | 38.6 | 142 | SILTY CLAY |
| 10.75 | 1235 | 1792 | | 1219 | 1756 | | 18.6 | 127 | 76 | 0.47 | 9.0 | 18.6 | | 1.7 | 10.5 | | 44.6 | 183 | SILTY CLAY |
| 11.0 | 1755 | 2450 | | 1733 | 2414 | | 20.1 | 129 | 78 | 0.41 | 12.9 | 23.6 | | 2.1 | 18.3 | | 64.7 | 290 | SILTY CLAY |
| 11.25 | 1324 | 1878 | | 1309 | 1842 | | 18.6 | 131 | 81 | 0.43 | 9.4 | 18.5 | | 1.8 | 11.1 | | 45.0 | 199 | SILTY CLAY |

| Z (m) | A (kPa) | B (kPa) | C (kPa) | Po (kPa) | P1 (kPa) | P2 (kPa) | Gamma (kN/m^3) | Sigma' (kPa) | Uo (kPa) | Id | Kd | Ed (MPa) | Ud | Ko | Ocr | Phi (Deg) | M (MPa) | Cu (kPa) | sDMT005 DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11.5 | 1518 | 2305 | | 1491 | 2269 | | 20.1 | 133 | 83 | 0.55 | 10.5 | 27.0 | | 1.9 | 13.4 | | 68.9 | 235 | SILTY CLAY |
| 11.75 | 1739 | 2553 | | 1711 | 2517 | | 20.1 | 136 | 86 | 0.50 | 11.9 | 28.0 | | 2.0 | 16.3 | | 74.7 | 279 | SILTY CLAY |
| 12.0 | 1407 | 1978 | | 1391 | 1942 | | 18.6 | 139 | 88 | 0.42 | 9.4 | 19.1 | | 1.8 | 11.2 | | 46.6 | 211 | SILTY CLAY |
| 12.25 | 1171 | 1585 | | 1163 | 1549 | | 18.6 | 141 | 91 | 0.36 | 7.6 | 13.4 | | 1.5 | 8.1 | | 29.8 | 165 | SILTY CLAY |
| 12.5 | 1168 | 1643 | | 1157 | 1607 | | 18.6 | 143 | 93 | 0.42 | 7.4 | 15.6 | | 1.5 | 7.8 | | 34.3 | 162 | SILTY CLAY |
| 12.75 | 1115 | 1731 | | 1097 | 1695 | | 18.6 | 145 | 96 | 0.60 | 6.9 | 20.8 | | 1.4 | 6.9 | | 44.0 | 150 | SILTY CLAY |
| 13.0 | 983 | 1597 | | 965 | 1561 | | 19.1 | 147 | 98 | 0.69 | 5.9 | 20.7 | | 1.3 | 5.4 | | 40.5 | 125 | CLAYEY SILT |
| 13.25 | 1081 | 1759 | | 1059 | 1723 | | 19.1 | 150 | 101 | 0.69 | 6.4 | 23.0 | | 1.4 | 6.2 | | 47.1 | 141 | CLAYEY SILT |
| 13.5 | 1233 | 2364 | | 1189 | 2328 | | 20.6 | 152 | 103 | 1.05 | 7.1 | 39.5 | | 1.5 | 7.3 | | 85.6 | 164 | SILT |
| 15.0 | 1928 | 3140 | | 1880 | 3104 | | 20.6 | 168 | 118 | 0.69 | 10.5 | 42.5 | | 1.9 | 13.3 | | 108.0 | 293 | CLAYEY SILT |
| 15.25 | 1765 | 2665 | | 1732 | 2629 | | 20.1 | 171 | 120 | 0.56 | 9.4 | 31.1 | | 1.8 | 11.3 | | 75.9 | 261 | SILTY CLAY |
| 15.5 | 1584 | 2360 | | 1558 | 2324 | | 20.1 | 174 | 123 | 0.53 | 8.3 | 26.6 | | 1.6 | 9.2 | | 61.3 | 225 | SILTY CLAY |
| 15.75 | 1416 | 2274 | | 1385 | 2238 | | 20.6 | 176 | 125 | 0.68 | 7.2 | 29.6 | | 1.5 | 7.3 | | 63.9 | 191 | CLAYEY SILT |
| 16.0 | 1510 | 2455 | | 1475 | 2419 | | 20.6 | 179 | 128 | 0.70 | 7.5 | 32.8 | | 1.5 | 7.9 | | 72.4 | 207 | CLAYEY SILT |
| 16.25 | 1807 | 2819 | | 1769 | 2783 | | 20.6 | 182 | 130 | 0.62 | 9.0 | 35.2 | | 1.7 | 10.5 | | 84.3 | 263 | CLAYEY SILT |
| 16.5 | 2064 | 3171 | | 2021 | 3135 | | 20.1 | 184 | 132 | 0.59 | 10.2 | 38.7 | | 1.9 | 12.8 | | 97.5 | 313 | SILTY CLAY |
| 16.75 | 1609 | 2878 | | 1558 | 2842 | | 20.6 | 187 | 135 | 0.90 | 7.6 | 44.6 | | 1.5 | 8.1 | | 99.2 | 219 | SILT |
| 17.0 | 1811 | 3446 | | 1742 | 3410 | | 20.6 | 190 | 137 | 1.04 | 8.5 | 57.9 | | 1.7 | 9.5 | | 135.1 | 253 | SILT |
| 17.25 | 1732 | 3136 | | 1674 | 3100 | | 20.6 | 192 | 140 | 0.93 | 8.0 | 49.5 | | 1.6 | 8.7 | | 112.5 | 239 | SILT |
| 17.5 | 1797 | 4446 | | 1677 | 4410 | | 20.6 | 195 | 142 | 1.78 | 7.9 | 94.8 | | | | | 215.6 | | SANDY SILT |
| 17.75 | 2067 | 3273 | | 2019 | 3237 | | 20.6 | 198 | 145 | 0.65 | 9.5 | 42.3 | | 1.8 | 11.4 | | 103.4 | 304 | CLAYEY SILT |
| 18.0 | 1605 | 3057 | | 1545 | 3021 | | 20.6 | 200 | 147 | 1.06 | 7.0 | 51.2 | | 1.5 | 7.0 | | 109.7 | 210 | SILT |
| 18.25 | 1888 | 3869 | | 1801 | 3833 | | 20.6 | 203 | 150 | 1.23 | 8.1 | 70.5 | | | | | 161.9 | | SANDY SILT |
| 18.5 | 1660 | 3032 | | 1604 | 2996 | | 20.6 | 206 | 152 | 0.96 | 7.1 | 48.3 | | 1.5 | 7.2 | | 103.9 | 219 | SILT |
| 18.75 | 1909 | 3801 | | 1827 | 3765 | | 20.6 | 208 | 155 | 1.16 | 8.0 | 67.3 | | 1.6 | 8.8 | | 153.5 | 260 | SILT |
| 19.0 | 1725 | 3708 | | 1638 | 3672 | | 20.6 | 211 | 157 | 1.37 | 7.0 | 70.6 | | | | | 152.1 | | SANDY SILT |

# sDMT001 - Tabular data: Vs, Go, Vs Repeatability

*Each Vs value in the 'Vs Repeatability' column corresponds to a distinct energization.*

| Z | Vs | Go | Rho | Vs Repeatability | Var Coeff. |
|---|---|---|---|---|---|
| [m] | [m/s] | [MPa] | [kg/m^3] | [m/s] | [%] |
| 1.00 | 1153 | 2592 | 1950 | 1176,1123,1160 | 2.36 |
| 1.50 | 347 | 235 | 1950 | 349,347,346 | 0.46 |
| 2.00 | 192 | 71.9 | 1950 | 193,192,190 | 0.82 |
| 2.50 | 243 | 124 | 2100 | 246,242,241 | 1.09 |
| 3.00 | 272 | 144 | 1950 | 272,273,272 | 0.26 |
| 3.50 | 178 | 57.0 | 1800 | 176,179,178 | 0.89 |
| 4.00 | 121 | 24.9 | 1700 | 123,120,121 | 1.31 |
| 4.50 | 142 | 36.3 | 1800 | 143,143,140 | 1.22 |
| 5.00 | 186 | 65.7 | 1900 | 186,185,186 | 0.38 |
| 5.50 | 199 | 71.3 | 1800 | 197,199,200 | 0.79 |
| 6.00 | 306 | 201 | 2150 | 308,305,306 | 0.52 |
| 6.50 | 253 | 131 | 2050 | 249,255,256 | 1.51 |
| 7.00 | 159 | 45.5 | 1800 | 160,158,159 | 0.63 |
| 7.50 | 209 | 78.6 | 1800 | 210,209,209 | 0.34 |
| 8.00 | 186 | 58.8 | 1700 | 185,186,186 | 0.38 |
| 8.50 | 232 | 105 | 1950 | 231,232,232 | 0.30 |
| 9.00 | 194 | 73.4 | 1950 | 194,193,194 | 0.36 |
| 9.50 | 286 | 147 | 1800 | 288,288,283 | 1.02 |
| 10.00 | 314 | 207 | 2100 | 313,315,315 | 0.39 |
| 10.50 | 329 | 227 | 2100 | 329,328,329 | 0.21 |
| 11.00 | 404 | 351 | 2150 | 399,407,407 | 1.15 |

# sDMT002 - Tabular data: Vs, Go, Vs Repeatability

*Each Vs value in the 'Vs Repeatability' column corresponds to a distinct energization.*

| Z | Vs | Go | Rho | Vs Repeatability | Var Coeff. |
|---|---|---|---|---|---|
| [m] | [m/s] | [MPa] | [kg/m^3] | [m/s] | [%] |
| 1.00 | 471 | 399 | 1800 | 487,463,464 | 2.88 |
| 1.50 | 120 | 25.9 | 1800 | 122,118,121 | 1.77 |
| 2.00 | 189 | 60.7 | 1700 | 188,189,189 | 0.37 |
| 2.50 | 144 | 35.3 | 1700 | 144,144,145 | 0.49 |
| 3.00 | 166 | 46.8 | 1700 | 167,166,166 | 0.43 |
| 3.50 | 224 | 95.3 | 1900 | 224,224,224 | 0.00 |
| 4.00 | 300 | 189 | 2100 | 299,301,300 | 0.33 |
| 4.50 | 321 | 216 | 2100 | 323,322,319 | 0.66 |
| 5.00 | 282 | 167 | 2100 | 281,282,282 | 0.25 |
| 5.50 | 396 | 329 | 2100 | 393,397,399 | 0.78 |
| 6.00 | 185 | 61.6 | 1800 | 186,185,185 | 0.38 |
| 6.50 | 199 | 71.3 | 1800 | 200,199,198 | 0.50 |
| 7.00 | 133 | 30.1 | 1700 | 132,133,133 | 0.53 |
| 7.50 | 151 | 41.0 | 1800 | 151,151,151 | 0.00 |
| 8.00 | 230 | 95.2 | 1800 | 229,230,230 | 0.31 |
| 8.50 | 366 | 281 | 2100 | 369,366,363 | 0.82 |

# sDMT003 - Tabular data: Vs, Go, Vs Repeatability

*Each Vs value in the 'Vs Repeatability' column corresponds to a distinct energization.*

| Z | Vs | Go | Rho | Vs Repeatability | Var Coeff. |
|---|---|---|---|---|---|
| [m] | [m/s] | [MPa] | [kg/m^3] | [m/s] | [%] |
| 1.00 | 0 | 0.0 | 1900 | 0,0,0,0,0,0,0,0,0,0,0 | |
| 1.50 | 538 | 463 | 1600 | 546,523,546 | 2.47 |
| 2.00 | 100 | 17.0 | 1700 | 101,101,99 | 1.22 |
| 2.50 | 157 | 44.4 | 1800 | 157,156,157 | 0.45 |
| 3.00 | 332 | 215 | 1950 | 331,330,334 | 0.64 |
| 3.50 | 196 | 73.0 | 1900 | 196,196,196 | 0.00 |
| 4.00 | 135 | 31.0 | 1700 | 135,135,134 | 0.52 |
| 4.50 | 142 | 36.3 | 1800 | 142,142,142 | 0.00 |
| 5.00 | 161 | 46.7 | 1800 | 160,161,161 | 0.44 |
| 5.50 | 195 | 74.1 | 1950 | 197,193,194 | 1.09 |
| 6.00 | 179 | 57.7 | 1800 | 178,179,179 | 0.40 |
| 6.50 | 214 | 87.0 | 1900 | 214,215,213 | 0.47 |
| 7.00 | 236 | 111 | 2000 | 237,234,236 | 0.67 |
| 7.50 | 281 | 166 | 2100 | 280,279,285 | 1.15 |
| 8.00 | 290 | 168 | 2000 | 290,290,289 | 0.24 |
| 8.50 | 442 | 391 | 2000 | 446,441,439 | 0.82 |

# sDMT004 - Tabular data: Vs, Go, Vs Repeatability

*Each Vs value in the 'Vs Repeatability' column corresponds to a distinct energization.*

| Z | Vs | Go | Rho | Vs Repeatability | Var Coeff. |
|---|---|---|---|---|---|
| [m] | [m/s] | [MPa] | [kg/m^3] | [m/s] | [%] |
| 1.00 | 325 | 180 | 1700 | 331,329,316 | 2.51 |
| 1.50 | 34 | 1.8 | 1600 | 34,34,34 | 0.00 |
| 2.00 | 244 | 101 | 1700 | 245,245,243 | 0.50 |

# sDMT005 - Tabular data: Vs, Go, Vs Repeatability

*Each Vs value in the 'Vs Repeatability' column corresponds to a distinct energization.*

| Z | Vs | Go | Rho | Vs Repeatability | Var Coeff. |
|---|---|---|---|---|---|
| [m] | [m/s] | [MPa] | [kg/m^3] | [m/s] | [%] |
| 1.00 | 113 | 23.0 | 1800 | 112,114,114 | 1.08 |
| 1.50 | 175 | 52.1 | 1700 | 180,173,172 | 2.49 |
| 2.00 | 155 | 38.4 | 1600 | 155,156,155 | 0.46 |
| 2.50 | 142 | 40.3 | 2000 | 141,143,141 | 0.86 |
| 3.00 | 109 | 20.2 | 1700 | 109,110,109 | 0.65 |
| 3.50 | 209 | 87.4 | 2000 | 210,208,209 | 0.48 |
| 4.00 | 230 | 106 | 2000 | 228,232,231 | 0.92 |
| 4.50 | 298 | 184 | 2075 | 297,299,298 | 0.34 |
| 5.00 | 223 | 89.5 | 1800 | 225,223,222 | 0.71 |
| 5.50 | 354 | 257 | 2050 | 357,349,355 | 1.18 |
| 6.00 | 375 | 288 | 2050 | 375,375,375 | 0.00 |
| 6.50 | 307 | 193 | 2050 | 304,308,309 | 0.86 |
| 7.00 | 328 | 223 | 2075 | 328,329,328 | 0.22 |
| 7.50 | 311 | 203 | 2100 | 311,310,312 | 0.32 |
| 8.00 | 262 | 141 | 2050 | 262,261,262 | 0.27 |
| 8.50 | 248 | 117 | 1900 | 247,249,247 | 0.49 |
| 9.00 | 207 | 81.4 | 1900 | 208,205,209 | 1.02 |
| 9.50 | 205 | 75.6 | 1800 | 206,204,204 | 0.60 |
| 10.00 | 229 | 99.6 | 1900 | 230,229,227 | 0.69 |
| 10.50 | 255 | 124 | 1900 | 251,258,257 | 1.49 |
| 11.00 | 293 | 176 | 2050 | 294,293,293 | 0.24 |
| 11.50 | 239 | 117 | 2050 | 239,237,240 | 0.66 |
| 12.00 | 272 | 141 | 1900 | 270,273,272 | 0.58 |
| 12.50 | 213 | 86.2 | 1900 | 212,215,213 | 0.74 |
| 13.00 | 260 | 132 | 1950 | 261,260,259 | 0.38 |
| 13.50 | 304 | 194 | 2100 | 304,304,304 | 0.00 |
| 14.00 | 286 | 172 | 2100 | 288,286,284 | 0.70 |
| 14.50 | 431 | 390 | 2100 | 431,429,432 | 0.37 |
| 15.00 | 422 | 374 | 2100 | 419,425,423 | 0.73 |
| 15.50 | 322 | 213 | 2050 | 319,325,322 | 0.93 |
| 16.00 | 269 | 152 | 2100 | 270,271,267 | 0.79 |
| 16.50 | 369 | 279 | 2050 | 371,372,365 | 1.03 |
| 17.00 | 334 | 234 | 2100 | 339,336,327 | 1.87 |
| 17.50 | 327 | 225 | 2100 | 328,328,326 | 0.37 |
| 18.00 | 291 | 178 | 2100 | 294,292,288 | 1.06 |
| 18.50 | 352 | 260 | 2100 | 349,351,355 | 0.88 |

# Appendix H – Test Pit Logs

aurecon
Level 4, 139 Carlton Gore Road
PO Box 9762, Newmarket
Auckland, New Zealand
Tel: +64 9 520 6019
www.aurecongroup.com

Client: **Kiwi Properties Ltd**
Project: **Drury Development**
Location: **133 Fitzgerald Road, Drury**
Project Reference: **510611**

# TP001



| **TRIAL PIT INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 417228m | Width: 2m | Logged by: BGW |
| Excavator type: 13t Excavator | Northing: 774154m | Length: 3m | Input by: STH |
| Date started: 7/12/2020 | Ground level: 27.00m (NZVD2016) | A, B, C, D (Deg) | Checked by: GO |
| Date completed: 7/12/2020 | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay and organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. | 0m: ISHSV 106/39 kPa | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Clayey SILT with minor gravel; brown, speckled black. Very stiff, moist, high plasticity. Gravel is fine to medium, sub-angular to angular. | 0.5m: ISHSV 140/36 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | **0.75m:** CLAY with some silt, minor sand and gravel; brown orange, mottled grey. Very stiff, moist, high plasticity. Sand is fine to medium. Gravel is fine to medium, sub-angular to angular. | 1m: ISHSV 91/52 kPa<br>1.5m: ISHSV 161/73 kPa | 0.75m: 2x 5kg samples (0.8 to 1.2 m) | 26 |
| 2 | | | | 2m: ISHSV 179/43 kPa | | 25 |
| | | | **2.3m:** Silty CLAY with minor gravel; brown mottled grey. Very stiff, moist, high plasticity. Gravel is fine to medium, sub-angular to angular. | | | |
| 3 | | | **2.8m:** CLAY with some silt, minor sand and gravel; brown orange, mottled grey. Very stiff, moist, high plasticity. Sand is fine to medium. Gravel is fine to medium, sub-angular to angular. | | | 24 |
| 4 | | | Terminated at 3.2m (Target Depth Reached) | | | 23 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP001 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Auckland, New Zealand
Tel: +64 9 520 6019
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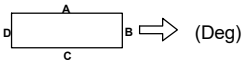
Client: **Kiwi Properties Ltd**
Project: **Drury Development**
Location: **133 Fitzgerald Road, Drury**
Project Reference: **510611**

# TP002



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 417225m | Width: 2m | | Logged by: BGW |
| Excavator type: | 13t Excavator | Northing: | 774257m | Length: 3m | | Input by: STH |
| Date started: | 7/12/2020 | Ground level: | 28.00m | | | Checked by: GO |
| Date completed: | 7/12/2020 | | (NZVD2016) | | | Verified by: JM |




| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. | 0m: ISHSV 152/43 kPa | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Clayey SILT with minor gravel; brown speckled black. Very stiff, moist, high plasticity. Gravel is fine to medium, sub-angular. | 0.5m: ISHSV 167/30 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD**<br>0.2m: 2x 5kg samples | |
| 1 | | | **0.9m:** CLAY with some silt with minor gravel; dark brown, mottled grey. Very stiff, moist, high plasticity. | 1m: ISHSV 213 kPa<br>1.5m: ISHSV 182/27 kPa<br>2m: ISHSV 149/24 kPa | 0.9m: 2x 5kg samples | 27 |
| 2 | | | | | | 26 |
| 3 | | | **2.5m:** Silty CLAY with minor gravel; brown mottled grey. Very stiff, moist, high plasticity. Gravel is fine to medium, sub-angular. | | | 25 |
| 4 | | | Terminated at 3.2m (Target Depth Reached) | | | 24 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP002 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Client: **Kiwi Properties Ltd**
Project: **Drury Development**
Location: **133 Fitzgerald Road, Drury**
Project Reference: **510611**

# TP003



| **TRIAL PIT INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | Logged by: BGW |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 417202m | Width: 2m | Input by: STH |
| Excavator type: 13t Excavator | Northing: 774328m | Length: 3m | Checked by: GO |
| Date started: 7/12/2020 | Ground level: 30.00m (NZVD2016) | A B C D (Deg) | Verified by: JM |
| Date completed: 7/12/2020 | | | |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics and fibrous rootlets. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT; brown. Very stiff, moist, high plasticity. | | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD**<br>0.25m: 2x 5kg samples | |
| 1 | | VRb | **0.8m:** Silty CLAY; brownish orange. Very stiff, moist, high plasticity. | | 0.8m: 2x 5kg samples | 29 |
| | | VRb | | 1.5m: ISHSV 194/36 kPa | | |
| 2 | | VRb | | 2m: ISHSV 167/129 kPa | | 28 |
| 3 | | VRb | **2.8m:** Silty CLAY with minor gravel; brown mottled black. Very stiff, moist, high plasticity. Gravel is fine to medium, sub-angular to rounded. | | | |
| | | VRb | **3m:** Silty CLAY; brownish orange. Very stiff, moist, high plasticity. | | 3m: 2x 5kg samples | 27 |
| 4 | | | Terminated at 3.5m (Target Depth Reached) | | | 26 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP003 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP004



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 417128m | Width: 2m | | Logged by: BGW |
| Excavator type: | 13t Excavator | Northing: | 774429m | Length: 3m | (Deg) | Input by: STH |
| Date started: | 7/12/2020 | Ground level: | 28.00m | | | Checked by: GO |
| Date completed: | 7/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. Sand is fine to medium. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT; brown. Very stiff, moist, high plasticity. | | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | | **0.45m:** Clayey SILT; brownish orange. Stiff, moist, low plasticity. | 0.5m: ISHSV 179/52 kPa | 0.45m: 2x 5kg samples | |
| 1 | | | | 1m: ISHSV 91/33 kPa | | 27 |
| | | | **1.8m:** Silty CLAY; orange brown. Stiff, moist, plastic. | | 1.8m: 2x 5kg sample taken. | |
| 2 | | | | 2m: ISHSV 161/33 kPa | | 26 |
| | | | Terminated at 2.5m (TP terminated) | 2.5m: ISHSV UTP | 2.5m: Unable to excavate deeper than 2.5m below ground level due to soil strength. | |
| 3 | | | | | | 25 |
| 4 | | | | | | 24 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP004 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP005



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 417081m | Width: 2m | | Logged by: BGW |
| Excavator type: | 13t Excavator | Northing: | 774296m | Length: 3m | (Deg) | Input by: STH |
| Date started: | 7/12/2020 | Ground level: | 31.00m | | | Checked by: GO |
| Date completed: | 7/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. Sand is fine to medium. | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Clayey SILT; brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 179/76 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | **0.7m:** Silty CLAY; brown mottled orange. Very stiff, moist, high plasticity. | 1m: ISHSV 147/43 kPa | | 30 |
| 2 | | | **1.4m:** CLAY with some silt; brown orange. Very stiff, moist, high plasticity. | 2m: ISHSV UTP | 1.4m: 50kg bulk sample. | 29 |
| 3 | | | Terminated at 3m (Target Depth Reached) | | | 28 |
| 4 | | | | | | 27 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP005 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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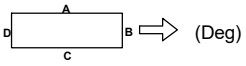
# TP006



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 417081m | Width: 2m | | Logged by: BGW |
| Excavator type: | 13t Excavator | Northing: | 774158m | Length: 3m | | Input by: STH |
| Date started: | 7/12/2020 | Ground level: | 27.00m | | | Checked by: GO |
| Date completed: | 7/12/2020 | | (NZVD2016) | | | Verified by: JM |




| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Clayey SILT with some organics and trace gravel; brown speckled black. Very stiff, moist, high plasticity. Organics are fibrous. Gravel is fine, sub-angular. | | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | | **0.8m:** Silty CLAY; pink, banded grey. Very stiff, moist, high plasticity. | | | |
| 1 | | | **1m:** Clayey SILT; reddish brown. Firm, moist, low plasticity. | 1m: ISHSV 30/46 kPa | 1m: 2x 5kg samples | 26 |
| | | | | 1.5m: ISHSV 19/28 kPa | | |
| 2 | | | | 2m: ISHSV 30/46 kPa | | 25 |
| 3 | | | Terminated at 2.8m (Target Depth Reached) | | | 24 |
| 4 | | | | | | 23 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP006 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP007

Sheet **1** of **1**

| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416992m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 774074m | Length: 3m | A, B, C, D; 210 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 23.00m (NZVD2016) | | | Checked by: GO |
| Date completed: | 8/12/2020 | | | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** Clayey SILT; dark brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Silty CLAY; brown, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 159/36 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | | **0.7m:** CLAY with some silt; brownish orange. Very stiff, moist, high plasticity. | | | |
| 1 | | | **0.9m:** CLAY with minor silt; bluish grey. Very stiff, moist, high plasticity. | 1m: ISHSV UTP | | 22 |
| | | | **1.1m:** CLAY with some silt and minor sand, fine to medium; orange brown. Very stiff, moist, high plasticity. | 1.5m: ISHSV UTP | | |
| 2 | | | **1.9m:** Highly weathered, reddish brown BASALT; extremely weak [Silty CLAY with some gravel; reddish brown. Very stiff, moist, high plasticity. Gravel is medium to coarse, sub-angular, very weak, basalt]. | 2m: ISHSV UTP | | 21 |
| 3 | | | Terminated at 3m (Target Depth Reached) | | | 20 |
| 4 | | | | | | 19 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP008



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416994m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 774162m | Length: 3m | 190 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 26.00m (NZVD2016) | | | Checked by: GO |
| Date completed: | 8/12/2020 | | | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay; dark brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Silty CLAY; brown, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 213+ kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | **0.7m:** Clayey SILT; orange brown. Hard, moist, high plasticity. | 1m: ISHSV 213+ kPa | | 25 |
| | | | **1.2m to 2.2m:**...Very stiff | 1.5m: ISHSV 134/49 kPa | | |
| 2 | | | | 2m: ISHSV 106/21 kPa | | 24 |
| | | | **2.2m:** Silty CLAY; brown, mottled orange. Very stiff, moist, high plasticity. | | 2.2m: Two ~25kg sample bags taken (2.3m to 2.7m) | |
| 3 | | | **2.7m:** CLAY with some silt; reddish brown, mottled grey. Very stiff, moist, high plasticity. | | | 23 |
| 4 | | | Terminated at 3.1m (Target Depth Reached) | | | 22 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP009



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416897m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 773892m | Length: 3m | 165 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 19.00m | | | Checked by: GO |
| Date completed: | 8/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay and trace sand; dark brown. Firm, moist, high plasticity, organics (rootlets). Sand is fine. | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Clayey SILT with minor gravel and cobbles; reddish brown. Stiff, moist, high plasticity. Gravel and cobbles are sub-rounded, slightly vesicular, completely weathered, very weak, basalt. | 0.5m: ISHSV 123/36 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | | 1m: ISHSV UTP | | 18 |
| | | | | 1.5m: ISHSV UTP | | |
| 2 | | | **1.9m:** Silty CLAY with minor gravel, fine to medium, sub-angular; reddish brown. Very stiff, moist, high plasticity. Gravel is fine to medium, sub-angular, highly weathered, very weak, basalt. | 2m: ISHSV UTP | 1.9m: Two ~25kg sample bags taken (2.2m to 2.7m) | 17 |
| 3 | | | Terminated at 3m (Target Depth Reached) | | | 16 |
| 4 | | | | | | 15 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP010



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416890m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 773844m | Length: 3m | 195 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 16.00m | | | Checked by: GO |
| Date completed: | 8/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay and trace sand; dark brown. Firm, moist, high plasticity, organics (rootlets). Sand is fine. | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Silty CLAY; brown, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 68/15 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | **0.6m:** CLAY with some silt; bluish grey, mottled orange. Stiff, moist, high plasticity. | 1m: ISHSV 91/52 kPa | 0.6m: Two ~25kg sample bags taken (1.5m to 1.8m) | 15 |
| 2 | | | **1.35m to 1.7m:**...Very stiff | 1.5m: ISHSV 161/52 kPa<br>2m: ISHSV 82/33 kPa | | 14 |
| | | | **2.4m:** CLAY with minor silt and gravel; reddish brown. Very stiff, moist to wet, high plasticity. Gravel is fine to medium, sub-angular, highly weathered, weak, basalt. | | | |
| 3 | | | Terminated at 2.8m (Target Depth Reached) | | | 13 |
| 4 | | | | | | 12 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
(1) 08/12/20 10:00 | m | 2.8 m bgl

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP011



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416629m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 773962m | Length: 3m | 315 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 12.00m | | | Checked by: GO |
| Date completed: | 8/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** Clayey SILT; dark brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Silty CLAY; brown. Stiff, moist, high plasticity. | | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | | **0.5m:** CLAY with some silt; bluish grey, banded brownish orange. Very stiff, moist, high plasticity. | 0.5m: ISHSV 158/37 kPa | | |
| 1 | | | | 1m: ISHSV 161/89 kPa | | 11 |
| | | | | 1.5m: ISHSV 131/79 kPa | | |
| | | | **1.8m:** CLAY with some silt and minor sand; bluish grey, mottled orange. Very stiff, moist, high plasticity. Sand is fine. | | 1.8m: Two ~25kg sample bags taken (2.2m to 2.5m) | |
| 2 | | | | 2m: ISHSV 109/76 kPa | | 10 |
| 3 | | | | | | 9 |
| | | | Terminated at 3m (Target Depth Reached) | | | |
| 4 | | | | | | 8 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP012



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416671m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 773922m | Length: 3m | A, B, C, D; 165 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 15.00m | | | Checked by: GO |
| Date completed: | 8/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** Clayey SILT; dark brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| 1 | | VRb | **0.2m:** Completely weathered, brownish orange BASALT; very weak, slightly vesicular [Clayey SILT with some gravel; brownish orange. Stiff, dry to moist, high plasticity. Gravel is fine to medium, sub-angular, highly weathered, very weak, basalt]. | 0.5m: ISHSV 74/24 kPa<br>1m: ISHSV UTP | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | 14 |
| | | | **1.2m:** Slightly weathered, bluish grey BASALT; moderately strong, slightly vesicular. Ripped from base of test pit as sub-angular boulders. | | | |
| | | | Terminated at 1.4m (Refusal On Basalt) | | | |
| 2 | | | | | | 13 |
| 3 | | | | | | 12 |
| 4 | | | | | | 11 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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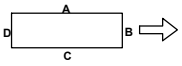
# TP013



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416820m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 774039m | Length: 3m |  190 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 22.00m (NZVD2016) | | | Checked by: GO |
| Date completed: | 8/12/2020 | | | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** Clayey SILT; dark brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Silty CLAY; brown, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 131/50 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | VRb | **0.7m:** CLAY with some silt; brownish orange. Very stiff, moist, high plasticity. | 1m: ISHSV 191/79 kPa<br>1.5m: ISHSV 167/61 kPa | | 21 |
| 2 | | VRb | **2m:** Silty CLAY; brown, mottled bluish grey. Very stiff, moist, high plasticity. | 2m: ISHSV 167/76 kPa | | 20 |
| 3 | | | Terminated at 2.9m (Target Depth Reached) | | | 19 |
| 4 | | | | | | 18 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP014

Sheet **1** of **1**

| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416871m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 774221m | Length: 3m | 70 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 22.00m (NZVD2016) | | | Checked by: GO |
| Date completed: | 8/12/2020 | | | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** Clayey SILT; dark brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Clayey SILT; brown, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 207/79 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | VRb | **0.7m:** CLAY with some silt; brownish orange. Very stiff, moist, high plasticity. | 1m: ISHSV 158/43 kPa<br>1.5m: ISHSV 188/82 kPa | | 21 |
| 2 | | VRb | **1.7m:** CLAY with minor silt; grey mottled orange. Very stiff, moist, high plasticity. | 2m: ISHSV 167/- kPa | 1.7m: Two ~25kg sample bags taken (1.7m to 2.8m) | 20 |
| 3 | | VRb | **2.8m:** Silty CLAY with minor gravel; reddish brown. Very stiff, moist, high plasticity. Gravel is fine to coarse, sub-angular, completely weathered, slightly vesicular, extremely weak, basalt. | | | 19 |
| 4 | | | Terminated at 3.1m (Target Depth Reached) | | | 18 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

**Database File:** 510611_V3.GPJ **Library file:** AURECON_AKL_20201012.GLB **Template:** AURECON_AKL_20130722.GDT **Report File:** AURECON TP LOG 1.0 **Date Generated:** 10/03/2021

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Project Reference: **510611**

# TP015



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416506m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 774075m | Length: 3m | 65 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 12.00m | | | Checked by: GO |
| Date completed: | 8/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay and trace sand; dark brown. Firm, moist, high plasticity, organics (rootlets). Sand is fine. | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Silty CLAY; brown, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 205/31 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | **0.7m:** CLAY with some silt; greyish brown. Very stiff, moist, high plasticity. | 1m: ISHSV 173/43 kPa | | 11 |
| | | | **1.2m:** Silty CLAY; orange brown with grey banding. Very stiff, moist, high plasticity. | 1.5m: ISHSV 161/65 kPa | | |
| 2 | | | **1.8m:** Silty CLAY with minor gravel and minor cobbles; brownish orange. Very stiff, moist, high plasticity. Gravel is fine to medium, sub-angular, highly weathered, slightly vesicular, weak, basalt. Cobbles are sub-angular, highly weathered, slightly vesicular, weak, basalt. | 2m: ISHSV 143/28 kPa | 1.8m: Two ~25kg sample bags taken (1.2m to 1.8m) | 10 |
| 3 | | | Terminated at 3m (Target Depth Reached) | | | 9 |
| 4 | | | | | | 8 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP016



| **TRIAL PIT INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 416561m | Width: 2m | Logged by: WBM |
| Excavator type: 13t Excavator | Northing: 774100m | Length: 3m | Input by: WBM |
| Date started: 8/12/2020 | Ground level: 14.00m (NZVD2016) | A, B, C, D; 340 (Deg) | Checked by: GO |
| Date completed: 8/12/2020 | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** Clayey SILT; dark brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Clayey SILT with minor gravel; orange brown. Very stiff, moist, high plasticity. Gravel is fine to medium, highly weathered, slightly vesicular, very weak, basalt. | | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | VRb | **0.5m:** Highly weathered, reddish brown BASALT; weak, slightly vesicular [Silty CLAY with some cobbles; reddish brown. Very stiff, moist, high plasticity. Cobbles are sub-angular, highly weathered, slightly vesicular, weak, basalt]. | 0.5m: ISHSV UTP<br>1m: ISHSV UTP<br>1.5m: ISHSV UTP<br>2m: ISHSV UTP | | |
| 1 | | | | | | 13 |
| 2 | | | | | | 12 |
| 3 | | VWb | **2.5m:** Moderately weathered, orange brown BASALT; weak, slightly vesicular [Clayey GRAVEL with some cobbles and minor silt; orange brown. Stiff, moist, low plasticity. Cobbles are sub-angular, moderately weathered, slightly vesicular, weak, basalt]. | | | 11 |
| 4 | | | Terminated at 3m (Target Depth Reached) | | | 10 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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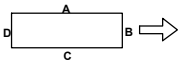
# TP017



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416723m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 774167m | Length: 3m | | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 27.00m | | | Checked by: GO |
| Date completed: | 8/12/2020 | | (NZVD2016) | | | Verified by: JM |




| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay and trace sand; dark brown. Firm, moist, high plasticity, organics (rootlets). Sand is fine. | | **0m: TOPSOIL** | |
| | | VRb | **0.2m:** Clayey SILT; brown, speckled black. Stiff, dry to moist, high plasticity. | | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | | **0.5m:** CLAY with some silt; brownish orange. Very stiff, moist, high plasticity. | 0.5m: ISHSV 213+ kPa | | |
| 1 | | | | 1m: ISHSV 213+ kPa | | 26 |
| | | | **1.2m:** Clayey SILT; orange brown. Very stiff, moist, high plasticity. | 1.5m: ISHSV 128/21 kPa | | |
| | | | **1.7m:** CLAY with some silt; brownish orange. Very stiff, moist, high plasticity. | | 1.7m: Two ~25kg sample bags taken (2.2m to 2.5m) | |
| 2 | | | | 2m: ISHSV 164/15 kPa | | 25 |
| | | | Terminated at 2.8m (Target Depth Reached) | | | |
| 3 | | | | | | 24 |
| 4 | | | | | | 23 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP018

Sheet **1** of **1**

| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416821m | Width: 2m | | Logged by: WBM |
| Excavator type: | 13t Excavator | Northing: | 774291m | Length: 3m | 10 (Deg) | Input by: WBM |
| Date started: | 8/12/2020 | Ground level: | 18.00m | | | Checked by: GO |
| Date completed: | 8/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** Clayey SILT; dark brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | VRb | **0.3m:** Clayey SILT; brown, speckled black. Very stiff, moist, moderate plasticity. | 0.5m: ISHSV 213+ kPa | **0.3m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | VRb | **0.6m:** CLAY with some silt; light orange brown. Very stiff, moist, high plasticity. | 1m: ISHSV 213+ kPa<br>1.5m: ISHSV 152/76 kPa<br>2m: ISHSV 167/52 kPa | | 17 |
| 2 | | | | | | 16 |
| 3 | | TAc | **2.7m:** CLAY with minor silt; bluish grey. Very stiff, moist, high plasticity. | | **2.7m: TAURANGA GROUP** | 15 |
| 4 | | | Terminated at 3.1m (Target Depth Reached) | | | 14 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP019



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416599m | Width: 2m | | Logged by: STH |
| Excavator type: | 13t Excavator | Northing: | 774210m | Length: 3m | 90 (Deg) | Input by: STH |
| Date started: | 10/12/2020 | Ground level: | 20.00m | | | Checked by: GO |
| Date completed: | 10/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; Dark brown. Very stiff, dry, non-plastic. Sand, fine to medium. Organics are rootlets. | | **0m: TOPSOIL** | |
| 1 | | VRb | **0.25m:** Clayey SILT with trace sand and organics; brown. Very stiff, moist; high plasticity. Sand, fine to medium. | 0.5m: ISHSV 143/24 kPa | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD**<br>0.25m: Samples taken 2x 5kg. | |
| 2 | | VWb | **1m:** Highly weathered, brownish red BASALT; extremely weak.<br>[Cobbly GRAVEL with some boulders, trace silt and clay. Very dense]. | 1m: ISHSV 97/64 kPa<br>1.5m: ISHSV UTP<br>2m: ISHSV UTP | 1m: Samples taken 1x 50kg. | 19<br>18 |
| 3 | | | **2.2m:** Moderately weathered; brownish black, moderately vesicular BASALT; very weak. | | 2.2m: Samples taken 1x 5kg. | |
| 4 | | | Terminated at 3m (Target depth reached) | | | 17<br>16 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP019 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP020

Sheet **1** of **1**

| **TRIAL PIT INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | Logged by: STH |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 416563m | Width: 2m | Input by: STH |
| Excavator type: 13t Excavator | Northing: 774281m | Length: 3m | Checked by: GO |
| Date started: 10/12/2020 | Ground level: 15.00m (NZVD2016) | A B C D → 90 (Deg) | Verified by: JM |
| Date completed: 10/12/2020 | | | |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; Dark brown. Very stiff, dry, non-plastic. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT with trace sand; brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV UTP | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | | 1m: ISHSV UTP | | 14 |
| | | | **1.1m:** Sandy CLAY; red brown. Stiff, moist, high plasticity. | | | |
| | | | **1.4m:** Highly weathered, brownish red BASALT; extremely weak. [Cobbly GRAVEL with some boulders, trace silt and clay. Very dense]. | 1.5m: ISHSV UTP | | |
| 2 | | | | 2m: ISHSV 82/24 kPa | 2m: UTP depending on what area of lithology tested | 13 |
| 3 | | VWb | **2.8m:** Moderately weathered; greyish black, moderately vesicular BASALT; very weak. | | | |
| | | | Terminated at 3m (Target depth reached) | | | 12 |
| 4 | | | | | | 11 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP020 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP022



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416429m | Width: 2m | | Logged by: STH |
| Excavator type: | 13t Excavator | Northing: | 774381m | Length: 3m | 90 (Deg) | Input by: STH |
| Date started: | 10/12/2020 | Ground level: | 7.00m | | | Checked by: GO |
| Date completed: | 10/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Sandy silty CLAY; yellowish brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 146/27 kPa | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | | 1m: ISHSV 131/39 kPa | | 6 |
| | | | **1.5m:**...Stiff | 1.5m: ISHSV 67/33 kPa | | |
| 2 | | | | 2m: ISHSV 67/33 kPa | | 5 |
| 3 | | | | | | 4 |
| | | | Terminated at 3m (Target depth reached) | | | |
| 4 | | | | | | 3 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP022 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# TP023

Sheet **1** of **1**

| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416534m | Width: 2m | | Logged by: STH |
| Excavator type: | 13t Excavator | Northing: | 774403m | Length: 3m | 180 (Deg) | Input by: STH |
| Date started: | 10/12/2020 | Ground level: | 21.00m | | | Checked by: GO |
| Date completed: | 10/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT; brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV UTP | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | VWb | **0.75m:** Highly weathered, brownish red BASALT; extremely weak. [Cobbly GRAVEL with some silt and clay. Very dense]. | 1m: ISHSV 115/24 kPa<br>1.5m: ISHSV 167/30 kPa<br>2m: ISHSV UTP | 0.75m: Samples taken 1x 50kg. Gravels and cobbles could be broken apart using hands. | 20 |
| 2 | | | | | | 19 |
| 3 | | | Terminated at 3m (Target depth reached) | | | 18 |
| 4 | | | | | | 17 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP023 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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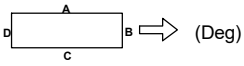
Project Reference: **510611**

# TP024



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416817m | Width: 2m | | Logged by: BGW |
| Excavator type: | 13t Excavator | Northing: | 774496m | Length: 3m | | Input by: STH |
| Date started: | 9/12/2020 | Ground level: | 19.00m | | | Checked by: GO |
| Date completed: | 9/12/2020 | | (NZVD2016) | | | Verified by: JM |




| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT with trace sand; brown. Very stiff, moist, high plasticity. Sand is fine. | 0.5m: ISHSV 170/43 kPa | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD**<br>0.25m: 1x 5kg sample | |
| 1 | | | | 1m: ISHSV 191/58 kPa | | 18 |
| | | | **1.1m:** Silty CLAY with trace sand; pinkish brown, mottled light brown. Very stiff, moist, high plasticity. Sand is fine. | 1.5m: ISHSV 140/52 kPa | 1.1m: 1x 5kg sample | |
| 2 | | | | 2m: ISHSV 143/70 kPa | | 17 |
| 3 | | | | | | 16 |
| | | | Terminated at 3m (Target depth reached) | | | |
| 4 | | | | | | 15 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP024 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Project Reference: **510611**

# TP025



| **TRIAL PIT INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | Logged by: BGW |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 416630m | Width: 2m | Input by: STH |
| Excavator type: 13t Excavator | Northing: 774512m | Length: 3m | Checked by: GO |
| Date started: 9/12/2020 | Ground level: 25.00m (NZVD2016) | A B C D (Deg) | Verified by: JM |
| Date completed: 9/12/2020 | | | |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT with trace sand; brown. Very stiff, moist, high plasticity. Sand is fine to medium. | 0.5m: ISHSV 194/21 kPa | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD**<br>0.25m: 2x 5kg samples | |
| 1 | | | **0.7m:** Silty CLAY with trace sand; light brown mottled green. Hard, moist, high plasticity. | 1m: ISHSV 213+ kPa | 0.7m: 2x 5kg samples | 24 |
| 2 | | | **1.5m:** Silty fine GRAVEL with some cobbles; reddish brown, spotted yellow. Tightly packed, dry. | 1.5m: ISHSV 125/30 kPa<br>2m: ISHSV 182/33 kPa | 1.5m: 50kg bulk samples | 23 |
| 3 | | | Terminated at 3m (Target depth reached) | | | 22 |
| 4 | | | | | | 21 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP025 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Project: **Drury Development**
Location: **132 Flanagan Road, Drury**
Project Reference: **510611**

# TP026



| **TRIAL PIT INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | Logged by: STH |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 416480m | Width: 2m | Input by: STH |
| Excavator type: 13t Excavator | Northing: 774510m | Length: 3m | Checked by: GO |
| Date started: 10/12/2020 | Ground level: 13.00m (NZVD2016) | A B C D → 90 (Deg) | Verified by: JM |
| Date completed: 10/12/2020 | | | |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics, rootlets. | | **0m: TOPSOIL** | |
| | | VRb | **0.3m:** Clayey SILT; dark brown. Very stiff, moist, low plasticity. | | **0.3m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | | **0.5m:** Silty fine to coarse GRAVEL with minor cobbles; brownish red. Moist. Gravel and cobbles are sub-angular, highly weathered to completely weathered, brownish red, moderately vesicular, basalt. [Completely weathered BASALT]. | 0.5m: ISHSV 161/33 kPa | | |
| 1 | | | | 1m: ISHSV UTP | | 12 |
| | | | **1.3m to 1.6m:**...Amorphous organics | | | |
| | | | | 1.5m: ISHSV UTP | | |
| 2 | | | | 2m: ISHSV 164/43 kPa | | 11 |
| 3 | | | | | | 10 |
| | | | Terminated at 3m (Target depth reached) | | | |
| 4 | | | | | | 9 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP026 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Project: **Drury Development**
Location: **114 Flanagan Road, Drury**
Project Reference: **510611**

# TP028



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416477m | Width: 2m | | Logged by: STH |
| Excavator type: | 13t Excavator | Northing: | 774604m | Length: 3m | 180 (Deg) | Input by: STH |
| Date started: | 10/12/2020 | Ground level: | 10.00m | | | Checked by: GO |
| Date completed: | 10/12/2020 | | (NZVD2016) | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; brownish black. Very stiff, dry, non-plastic. Organics, rootlets. Sand, fine to medium. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT; dark brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 188/30 kPa | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | VWb | **0.65m:** Highly weathered, brownish red, moderately vesicular BASALT; extremely weak. [Silty fine to coarse GRAVEL with minor cobbles; brownish red, loosely packed]. | 1m: ISHSV 197/46 kPa | | 9 |
| | | | | 1.5m: ISHSV 143/27 kPa | | |
| 2 | | | | 2m: ISHSV 179/36 kPa | | 8 |
| 3 | | | **2.8m:** Moderately weathered, black, moderately vesicular BASALT; very weak. | | 2.8m: Small amount of recovery from bottom of the test pit, not enough for photo of lithology | 7 |
| | | | Terminated at 3m (Target depth reached) | | | |
| 4 | | | | | | 6 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP028 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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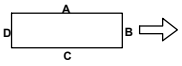
# TP029



| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416572m | Width: 2m | | Logged by: STH |
| Excavator type: | 13t Excavator | Northing: | 774665m | Length: 3m | 180 (Deg) | Input by: STH |
| Date started: | 10/12/2020 | Ground level: | 19.00m | | | Checked by: GO |
| Date completed: | 10/12/2020 | | (NZVD2016) | | | Verified by: JM |




| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, rootlets and trace sand; brownish black. Very stiff, dry, non-plastic. Organics, rootlets. Sand, fine to medium. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT with minor gravel and trace sand; brown speckled black. Very stiff, moist, high plasticity. Gravel, fine to medium, sub-angular to angular, highly weathered basalt. Sand, fine to medium. | 0.5m: ISHSV 185/49 kPa | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | **0.7m:** Silty CLAY; reddish brown. Very stiff, moist, high plasticity. | 1m: ISHSV 213+ kPa<br>1.5m: ISHSV UTP | 0.7m: Samples taken 2x 5kg. | 18 |
| 2 | | | **1.8m:** Silty CLAY; grey, mottled reddish brown. Very stiff, moist, high plasticity. | 2m: ISHSV UTP | 1.8m: Samples taken 2x 5kg. | 17 |
| 3 | | | **2.4m:** CLAY with some silt; grey, speckled red. Very stiff, moist, high plasticity. | | 2.4m: Samples taken 2x 5kg. | 16 |
| 4 | | | Terminated at 3.6m (Target depth reached) | | | 15 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP029 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Location:
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# TP030

Sheet **1** of **1**

| **TRIAL PIT INFORMATION** | | **CO-ORDINATES:** | **Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | | Logged by: | BGW |
|---|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416635m | Width: 2m | | Input by: | STH |
| Excavator type: | 13t Excavator | Northing: | 774648m | Length: 3m | A, B, C, D; 180 (Deg) | Checked by: | GO |
| Date started: | 9/12/2020 | Ground level: | 19.00m (NZVD2016) | | | Verified by: | JM |
| Date completed: | 9/12/2020 | | | | | | |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; brownish black. Very stiff, dry, non-plastic. Organics are fibrous rootlets. Sand is fine to medium. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT; brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 188/36 kPa | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | | | 1m: ISHSV 201/55 kPa | | 18 |
| | | | **1.5m:** CLAY with some silt; yellow brown. Very stiff, moist, high plasticity. | 1.5m: ISHSV 155/36 kPa | | |
| 2 | | | | 2m: ISHSV 140/43 kPa | | 17 |
| | | | **2.2m:** Silty CLAY; grey. Very stiff, moist, high plasticity. | | | |
| | | | **2.7m:** Silty CLAY; yellow brown, mottled grey. Very stiff, moist, high plasticity. | | | |
| 3 | | | | | | 16 |
| | | | Terminated at 3m (Target depth reached) | | | |
| 4 | | | | | | 15 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

2. TP030 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Location:
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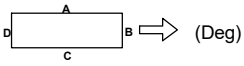
# TP031



| TRIAL PIT INFORMATION | | CO-ORDINATES: Mt Eden 2000 | | DIMENSIONS AND ORIENTATION | | |
|---|---|---|---|---|---|---|
| Excavated by: | LCS Ltd | Easting: | 416764m | Width: 2m | | Logged by: BGW |
| Excavator type: | 13t Excavator | Northing: | 774654m | Length: 3m | | Input by: STH |
| Date started: | 9/12/2020 | Ground level: | 10.00m | | | Checked by: GO |
| Date completed: | 9/12/2020 | | (NZVD2016) | | | Verified by: JM |




| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. Sand is fine to medium. | 0m: ISHSV 97/52 kPa | **0m: TOPSOIL** | |
| | | VRb | **0.3m:** Clayey SILT; brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 213 kPa | **0.3m: TAURANGA GROUP** | |
| 1 | | | **0.6m:** Silty CLAY with trace sand; yellow brown mottled light grey. Very stiff, moist, high plasticity. Sand is fine to medium. | 1m: ISHSV 146/52 kPa | 0.6m: 1x 5kg sample | 9 |
| | | | **1.5m:**...Soft | 1.5m: ISHSV 39/24 kPa | | |
| 2 | | | **1.8m:** Clayey SILT; dark grey. Stiff, moist, high plasticity. | 2m: ISHSV 70/24 kPa | | 8 |
| | | | **2.3m:** SILT with some sand; light grey yellow. Stiff, wet, non-plastic. Sand is fine to medium. | | | |
| 3 | | | **2.7m:** SILT with minor clay; light grey. Very stiff, moist, low plasticity. | | 2.7m: 1x 5kg sample | 7 |
| 4 | | | Terminated at 3m (Target depth reached) | | | 6 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

2. TP031 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Location:
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# TP032



| **TRIAL PIT INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | **DIMENSIONS AND ORIENTATION** | Logged by: BGW |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 416622m | Width: 2m | Input by: STH |
| Excavator type: 13t Excavator | Northing: 774751m | Length: 3m | Checked by: GO |
| Date started: 9/12/2020 | Ground level: 14.00m (NZVD2016) | A, B, C, D; 180 (Deg) | Verified by: JM |
| Date completed: 9/12/2020 | | | |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; brownish black. Very stiff, dry, non-plastic. Organics are fibrous rootlets. | | **0m: TOPSOIL** | |
| | | | **0.3m:** Clayey SILT with trace organics; brown. Very stiff, moist, high plasticity. Organics are fibrous rootlets. | 0.5m: ISHSV 109/46 kPa | **0.3m: TAURANGA GROUP** | |
| 1 | | | **0.7m:** Silty CLAY with minor sand; greyish brown, mottled pink. Very stiff, moist, high plasticity. Sand is fine to medium. | 1m: ISHSV 134/46 kPa<br>1.5m: ISHSV 137/39 kPa | 0.7m: 1x 5kg sample taken at 0.7m. | 13 |
| 2 | | | **2m:** SILT with some clay and trace sand; greyish white, mottled pinkish red. Stiff, moist, high plasticity. Sand is fine to medium. | 2m: ISHSV 85/15 kPa | 2m: 1x 5kg sample taken at 2m. | 12 |
| 3 | | | Terminated at 3m (Target depth reached) | | | 11 |
| 4 | | | | | | 10 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP032 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

**Database File:** 510611_V3.GPJ **Library file:** AURECON_AKL_20201012.GLB **Template:** AURECON_AKL_20130722.GDT **Report File:** AURECON TP LOG 1.0 **Date Generated:** 10/03/2021

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Client: **Kiwi Properties Ltd**
Project: **Drury Development**
Location:
Project Reference: **510611**

# TP033

Sheet **1** of **1**

| TRIAL PIT INFORMATION | CO-ORDINATES: Mt Eden 2000 | DIMENSIONS AND ORIENTATION | |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 416651m | Width: 2m | Logged by: BGW |
| Excavator type: 13t Excavator | Northing: 774725m | Length: 3m | Input by: STH |
| Date started: 9/12/2020 | Ground level: 9.00m (NZVD2016) | A, B, C, D; 315 (Deg) | Checked by: GO |
| Date completed: 9/12/2020 | | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay and organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. | | **0m: TOPSOIL** | |
| | | | **0.4m:** Clayey SILT with minor sand; brown. Very stiff, moist, high plasticity. Sand is fine to medium. | 0.5m: ISHSV 149/30 kPa | **0.4m: TAURANGA GROUP** | |
| 1 | | | **0.7m:** Silty CLAY; grey, mottled light grey. Very stiff, moist, high plasticity. | 1m: ISHSV 134/52 kPa<br>1.5m: ISHSV 88/39 kPa | | 8 |
| 2 | | | **1.9m:** Silty CLAY; yellow brown, mottled light grey. Stiff, moist, high plasticity. | 2m: ISHSV 70/21 kPa | | 7 |
| 3 | | | **2.9m to 3m:**...Minor fibrous organics [fresh <100mm].<br>**2.93m:**...Dark grey<br>Terminated at 3m (Target depth reached) | | | 6 |
| 4 | | | | | | 5 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.
2. TP033 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Location:
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# TP034

Sheet **1** of **1**

| TRIAL PIT INFORMATION | CO-ORDINATES: Mt Eden 2000 | DIMENSIONS AND ORIENTATION | |
|---|---|---|---|
| Excavated by: LCS Ltd | Easting: 416794m | Width: 2m | Logged by: BGW |
| Excavator type: 13t Excavator | Northing: 774760m | Length: 3m | Input by: STH |
| Date started: 9/12/2020 | Ground level: 13.00m | A, B, C, D (Deg) | Checked by: GO |
| Date completed: 9/12/2020 | (NZVD2016) | | Verified by: JM |

| Depth (m) | Graphic Log | Layer Code | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | T | **0m:** SILT with some clay, organics and trace sand; dark brown. Very stiff, dry, non-plastic. Organics are fibrous rootlets. Sand is fine to medium. | | **0m: TOPSOIL** | |
| | | VRb | **0.25m:** Clayey SILT; brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 170/43 kPa | **0.25m: TAURANGA GROUP** | |
| 1 | | | **0.75m:** CLAY; yellowish brown, mottled grey. Very stiff, moist, high plasticity. | 1m: ISHSV 185/112 kPa<br>1.5m: ISHSV UTP | | 12 |
| 2 | | | **1.8m:** SILT with some clay; greyish white, mottled orange and pink. Very stiff, moist, high plasticity. | 2m: ISHSV UTP | | 11 |
| 3 | | | Terminated at 3m (Target depth reached) | | | 10 |
| 4 | | | | | | 9 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

2. TP034 backfilled upon completion.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

# Appendix I – Hand Auger Logs

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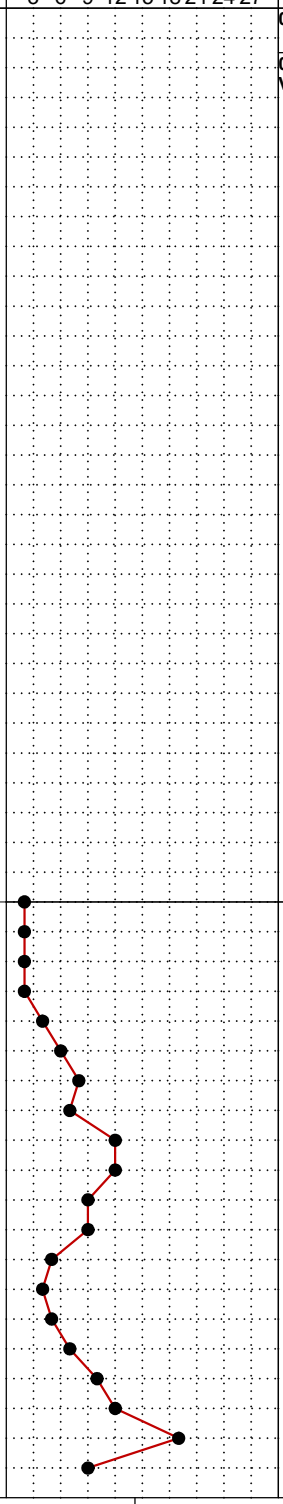
Location: **132 Flanagan Road, Drury**
Project Reference: **510611**

# HA001

Sheet **1** of **1**

| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416556m | Date started: 13/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774146m | Date completed: 13/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 15.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|
| | | **0m:** Clayey SILT; brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | **0.15m:** Silty CLAY; orange brown, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 213+/- kPa | **0.15m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | **0.8m:** CLAY with some silt; brownish orange. Very stiff, moist, high plasticity. | | | 14 |
| | | **1m:** Silty CLAY; orange brown, mottled grey. Very stiff, moist, high plasticity. | 1m: ISHSV 207/107 kPa | | |
| | | **1.4m:** CLAY with some silt; brownish orange, speckled black. Very stiff, moist, high plasticity. | 1.5m: ISHSV 210/98 kPa | | |
| 2 | | **1.65m:** CLAY with some silt; orange brown, mottled brown. Stiff, moist, high plasticity. | 2m: ISHSV 159/92 kPa | | 13 |
| | | **2.35m:** CLAY with minor silt; pinkish red. Stiff, moist, high plasticity. | 2.5m: ISHSV 107/33 kPa | | |
| | | **2.65m to 2.7m:**...Pumiceous gravel, fine, sub-angular. | | | |
| 3 | | **2.8m:** Silty CLAY; orange brown. Stiff, moist, high plasticity. Bands of light grey silt (ash), 2mm thick. | | | |
| | | Hand Auger terminated at 3m (Target Depth Reached) | 3m: ISHSV 82/34 kPa | | 12 |
| 4 | | | | | 11 |




REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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# HA002



| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416540m | Date started: 13/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774248m | Date completed: 13/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 12.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Scala Penetrometer Test (Blows/100mm) 3 6 9 12 15 18 21 24 27 | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | **0m:** Silty CLAY; brown. Soft, moist, high plasticity, organics (rootlets). | | | **0m: TOPSOIL** | |
| | | **0.15m:** Clayey SILT; orange brown, speckled black. Firm, moist, high plasticity. | | | **0.15m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | **0.4m:** CLAY with minor silt; brownish orange. Stiff, moist, high plasticity. | 0.5m: ISHSV 173/79 kPa | | | |
| | | **0.75m:** Clayey SILT with minor gravel; dark brown. Very stiff, moist, high plasticity. Gravel is fine, sub-rounded, slightly vesicular basalt. | | | | |
| 1 | | | 1m: ISHSV UTP | | | 11 |
| | | | 1.5m: ISHSV UTP | | | |
| | | **1.55m:** SILT with some clay; brown, mottled yellowish brown. Very stiff, moist, high plasticity. | | | | |
| 2 | | | 2m: ISHSV UTP | | | 10 |
| | | **2.4m to 2.8m:**...Mottled yellowish brown. | 2.5m: ISHSV UTP | | | |
| | | Hand Auger terminated at 2.8m (Effective Refusal) | | | | |
| 3 | | | 3m: ISHSV UTP | | | 9 |
| 4 | | | | | | 8 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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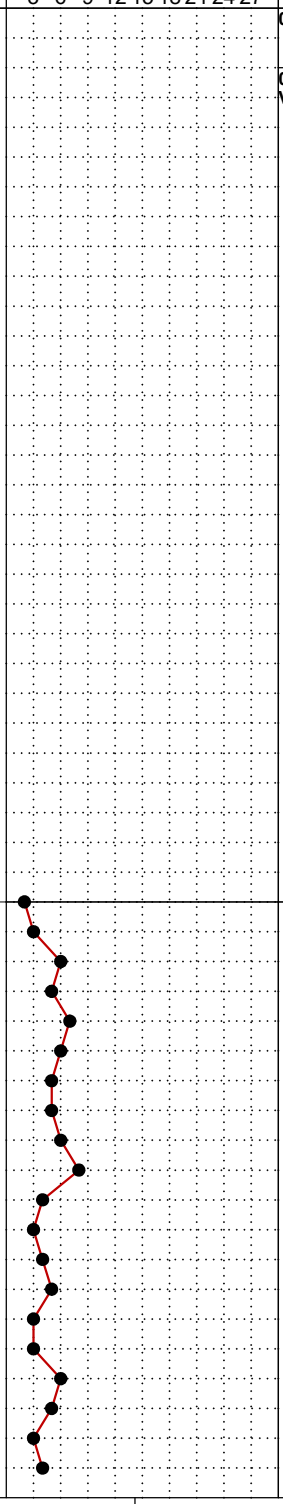
Project Reference: **510611**

# HA003



| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416641m | Date started: 14/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774280m | Date completed: 14/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 25.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|
| | | **0m:** Silty CLAY; brown. Firm, moist, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | **0.2m:** CLAY with minor silt; orange brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 147/44 kPa | **0.2m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | **0.8m:** CLAY with some silt; brown. Very stiff, moist, high plasticity. | | | |
| 1 | | **1.05m to 1.45m:**...Trace fine basalt gravel. | 1m: ISHSV 153/16 kPa | | 24 |
| | | | 1.5m: ISHSV 107/- kPa | | |
| 2 | | | 2m: ISHSV 213/41 kPa | | 23 |
| | | **2.3m to 2.65m:**...Trace fine basalt gravel. | 2.5m: ISHSV UTP | | |
| | | **2.65m:** CLAY with minor silt; brown. Soft, moist, high plasticity. | | | |
| | | **2.75m:** SILT with some clay and minor sand; brown, mottled orange brown. Firm, moist, moderate plasticity. Sand is medium, yellowish brown, pumiceous. | | | |
| 3 | | **2.8m:** CLAY with minor silt; brown. Soft, moist, high plasticity. | 3m: ISHSV 92/30 kPa | | 22 |
| | | Hand Auger terminated at 3m (Target Depth Reached) | | | |
| 4 | | | | | 21 |




REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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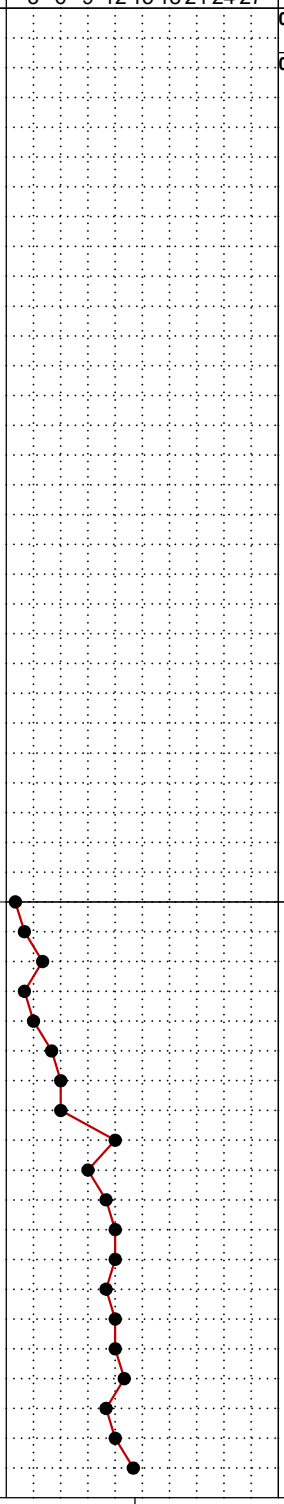
Client: **Kiwi Properties Ltd**
Project: **Drury Development**
Location: **132 Flanagan Road, Drury**
Project Reference: **510611**

# HA004



| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416461m | Date started: 14/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774430m | Date completed: 14/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 8.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Scala Penetrometer Test (Blows/100mm) 3 6 9 12 15 18 21 24 27 | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | **0m:** Silty CLAY; brown. Soft, dry, high plasticity, organics (rootlets). | | | **0m: TOPSOIL** | |
| | | **0.15m:** Clayey SILT; orange brown. Stiff, dry, high plasticity. | 0.5m: ISHSV 95/25 kPa | | **0.15m: TAURANGA GROUP** | |
| 1 | | **0.8m:** Gravelly CLAY with some silt; brown. Firm, moist, high plasticity. Gravel is fine to coarse, black, sub-angular, slightly vesicular basalt [Completely weathered, brown BASALT, extremely weak]. | 1m: ISHSV 33/19 kPa | | | 7 |
| | | **1.1m:** Sandy SILT with minor clay; green grey. Firm, moist, low plasticity. Sand is fine to medium. | | | | |
| | | **1.5m:**...Very stiff | 1.5m: ISHSV 197/24 kPa | | | |
| 2 | | **1.8m:** Silty SAND with minor clay; greenish grey. Soft, wet, low plasticity. | | | | 6 |
| 3 | | | | | | 5 |
| | | Hand Auger terminated at 3m (Target Depth Reached) | | | | |
| 4 | | | | | | 4 |



REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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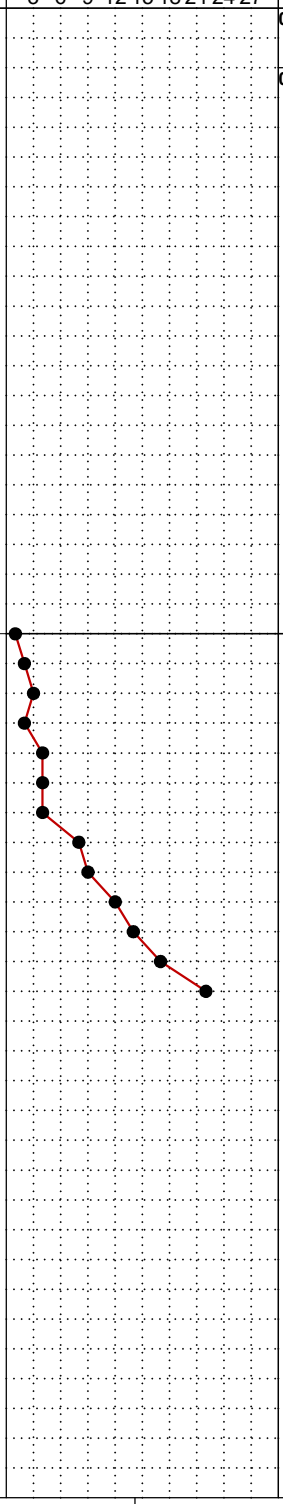
Location: **132 Flanagan Road, Drury**
Project Reference: **510611**

# HA005



| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416643m | Date started: 15/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774789m | Date completed: 15/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 10.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|
| | | **0m:** Silty CLAY; brown. Soft, dry, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | **0.2m:** CLAY with minor silt; greenish grey, mottled orange brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 107/33 kPa | **0.2m: TAURANGA GROUP** | |
| 1 | | **0.6m:** CLAY with some silt and trace sand; yellowish brown. Very stiff, moist, high plasticity. Sand is fine. | 1m: ISHSV 113/41 kPa | | 9 |
| 2 | | **1.4m:** Sandy CLAY with some silt; yellowish brown. Very stiff, moist to wet, low plasticity. | 1.5m: ISHSV 153/52 kPa<br>2m: ISHSV 94/41 kPa | | 8 |
| 3 | | Hand Auger terminated at 2.1m (Hole Collapse) | | | 7 |
| 4 | | | | | 6 |




REMARKS:
1. Hand auger terminated due to frequent hole collapse. A twin hole complete ~1m south of the original hole confirmed these conditions.
2. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Location: **132 Flanagan Road, Drury**
Project Reference: **510611**

# HA006



| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416817m | Date started: 15/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774612m | Date completed: 15/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 12.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Scala Penetrometer Test (Blows/100mm) 3 6 9 12 15 18 21 24 27 | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | **0m:** Silty CLAY; brown. Soft, dry, high plasticity, organics (rootlets). | | | **0m: TOPSOIL** | |
| | | **0.2m:** CLAY with minor silt; greyish brown. Stiff, moist, high plasticity. | 0.5m: ISHSV 73/27 kPa | | **0.2m: TAURANGA GROUP** | |
| | | **0.6m:** SILT with some clay; yellowish brown. Stiff, moist, high plasticity. | | | | |
| | | **0.75m:** SILT with some sand and minor clay; greenish grey. Very stiff, moist to wet, low plasticity. Sand is fine. | | | | |
| 1 | | **1m to 1.4m:**...Wet | 1m: ISHSV 213+/- kPa | | | 11 |
| | | Hand Auger terminated at 1.4m (Effective Refusal) | 1.5m: ISHSV UTP | | 1.4m: Scala bouncing | |
| 2 | | | | | | 10 |
| 3 | | | | | | 9 |
| 4 | | | | | | 8 |

REMARKS:
1. Effective refusal at 1.4m for both hand auger and scala penetrometer.
2. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
(1) 15/01/21 13:00 | m | 1 m bgl

HSV Serial No: DR4938 Correction Factor: 1.519

**Database File:** 510611_V3.GPJ **Library file:** AURECON_AKL_20201012.GLB **Template:** AURECON_AKL_20130722.GDT **Report File:** AURECON HA LOG WITH SCALA 1.0 **Date Generated:** 29/03/2021

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Project: **Drury Development**
Location: **132 Flanagan Road, Drury**
Project Reference: **510611**

# HA007



| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416465m | Date started: 15/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774645m | Date completed: 15/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 10.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Scala Penetrometer Test (Blows/100mm) 3 6 9 12 15 18 21 24 27 | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | **0m:** Silty CLAY with trace sand; brown. Soft to firm, dry, high plasticity. Sand is fine. | | | **0m: TOPSOIL** | |
| | | **0.35m:** CLAY with some silt; brownish orange, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 122/52 kPa | | **0.35m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| 1 | | **0.8m:** Silty CLAY with trace sand; orange brown. Very stiff, moist, high plasticity. Sand is fine. | 1m: ISHSV 213+/- kPa | | | 9 |
| | | | 1.5m: ISHSV 167/94 kPa | | | |
| 2 | | | 2m: ISHSV 129/97 kPa | | | 8 |
| | | | 2.5m: ISHSV UTP | | | |
| 3 | | Hand Auger terminated at 3m (Target Depth Reached) | 3m: ISHSV UTP | | | 7 |
| 4 | | | | | | 6 |

REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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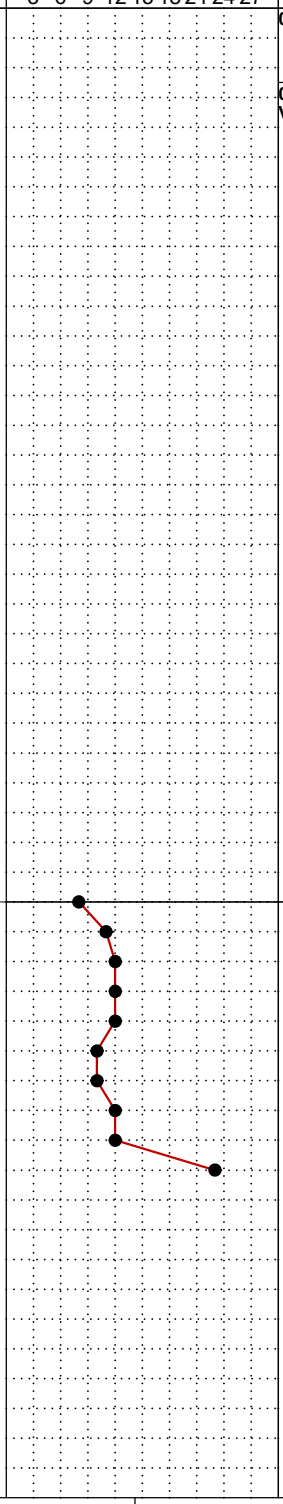
Client: **Kiwi Properties Ltd**
Project: **Drury Development**
Location: **133 Fitzgerald Road, Drury**
Project Reference: **510611**

# HA008

Sheet **1** of **1**

| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 417189m | Date started: 18/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774090m | Date completed: 18/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 25.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|
| | | **0m:** Clayey SILT; brown. Firm, dry, high plasticity, organics (rootlets). | | **0m: TOPSOIL** | |
| | | **0.25m:** Silty CLAY; orange brown, speckled black. Very stiff, moist, high plasticity. | 0.5m: ISHSV 134/34 kPa | **0.25m: SOUTH AUCKLAND VOLCANIC FIELD** | |
| | | **0.65m:** CLAY with some silt; brownish orange. Very stiff, moist, high plasticity. | | | |
| 1 | | | 1m: ISHSV 213+/- kPa | | 24 |
| | | **1.45m to 1.6m:**...Reddish brown. | 1.5m: ISHSV 213+/- kPa | | |
| 2 | | | 2m: ISHSV UTP | | 23 |
| | | | 2.5m: ISHSV UTP | | |
| 3 | | Hand Auger terminated at 3m (Target Depth Reached) | 3m: ISHSV UTP | | 22 |
| 4 | | | | | 21 |




REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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Project Reference: **510611**

# HA009



| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416352m | Date started: 18/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774619m | Date completed: 18/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 6.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Scala Penetrometer Test (Blows/100mm) 3 6 9 12 15 18 21 24 27 | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | **0m:** Clayey SILT; brown. Firm, dry, high plasticity. | | | **0m: TOPSOIL** | |
| | | **0.05m:** CLAY with minor silt; brownish orange, mottled dark brown. Very stiff, moist, high plasticity. | | | **0.05m: FILL** | |
| | | **0.2m:** CLAY with some gravel and minor silt; orange brown. Very stiff, moist, high plasticity. Gravel is fine to medium, sub-rounded, slightly vesicular basalt. | | | | |
| | | Hand Auger terminated at 0.4m (Effective Refusal) | 0.5m: ISHSV UTP | | 0.4m: Scala bouncing. | |
| 1 | | | | | | 5 |
| 2 | | | | | | 4 |
| 3 | | | | | | 3 |
| 4 | | | | | | 2 |

REMARKS:
1. Effective refusal at 0.4m for both hand auger and scala penetrometer.
2. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

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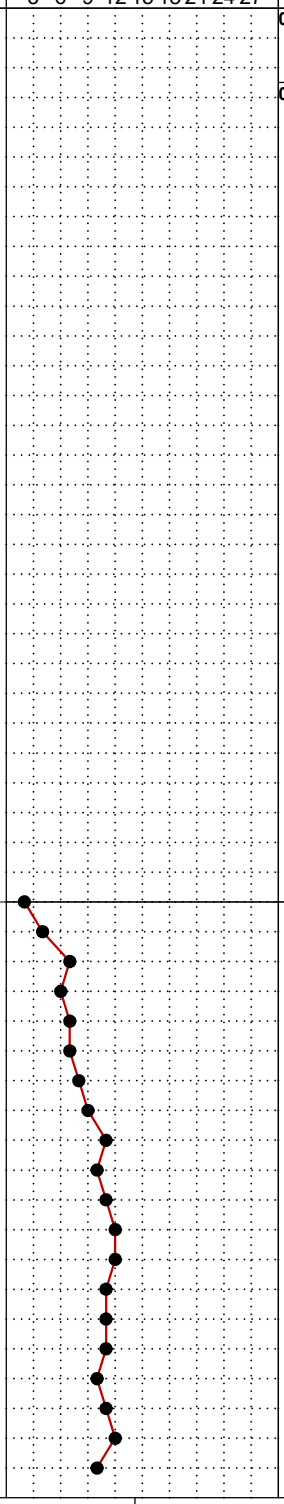
Location: **132 Flanagan Road, Drury**
Project Reference: **510611**

# HA010



| **DRILLING INFORMATION** | **CO-ORDINATES: Mt Eden 2000** | | |
|---|---|---|---|
| Method: Hand Auger | Easting: 416408m | Date started: 18/01/2021 | Logged by: WBM |
| Equipment: 50mm Auger | Northing: 774537m | Date completed: 18/01/2021 | Input by: WBM |
| Contractor: Aurecon | Ground Level: 8.000m (NZVD2016) | Inclination: 90° | Reviewed by GO |
| | | Orientation: N/A | Verified by: JM |

| Depth (m) | Graphic Log | Soil Description | Testing | Scala Penetrometer Test (Blows/100mm) 3 6 9 12 15 18 21 24 27 | Additional Observations | R.L. (m) |
|---|---|---|---|---|---|---|
| | | **0m:** Clayey SILT; brown. Soft, dry, high plasticity. | | | **0m: TOPSOIL** | |
| | | **0.25m:** CLAY with some silt; light brown. Very stiff, moist, high plasticity. | 0.5m: ISHSV 197/37 kPa | | **0.25m: TAURANGA GROUP** | |
| 1 | | **0.6m:** Silty CLAY; light orange brown. Very stiff, moist, high plasticity. | 1m: ISHSV 213+/- kPa<br>1.5m: ISHSV 177/68 kPa | | | 7 |
| 2 | | **1.6m:** CLAY with minor silt; brownish orange. Very stiff, moist, high plasticity.<br>**2.15m to 3m:**...Greyish brown. | 2m: ISHSV 161/91 kPa<br>2.5m: ISHSV 199/109 kPa | | | 6 |
| 3 | | Hand Auger terminated at 3m (Target Depth Reached) | 3m: ISHSV 185/126 kPa | | | 5 |
| 4 | | | | | | 4 |



REMARKS:
1. Investigation collar is recorded to an accuracy of ±10 m horizontal and ±1 m vertical.

**Water Level Readings:**
**Date Time | Hole Depth | Water Level**
No water level recorded

HSV Serial No: DR4938 Correction Factor: 1.519

# Appendix J – Geophysical Investigation

March 2021

GEOPHYSICAL REPORT

# Drury, Auckland:

# MASW Survey

# Report prepared for Aurecon

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Web: www.southerngeophysical.com

Data collected and report prepared for Southern Geophysical Ltd by:

Christian Rüegg, MSc, Senior Geophysicist

Internal review by:

Mike Finnemore, PhD, Senior Geophysicist

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Results: .....3

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SGL Reference: 2056

Report Version 2

**Summary:**

Southern Geophysical Ltd was contracted to undertake a geophysical survey using Multi-channel Analysis of Surface Waves (MASW) at a site in Drury, Auckland. The survey was conducted from November 16th to 20th, 2020, and included 19 MASW lines (Figure 1). The aim of the survey was to assess the shear-wave velocities of the subsurface to a depth of over 20 m. This report provides the graphical results of the survey and a brief interpretation of the geological trends at the site based on borehole logs provided by Aurecon.

**Methodology:**

MASW is a geophysical technique that uses the dispersive nature of surface waves to model shear-wave velocity versus depth.

A MASW survey is undertaken as a series of lines or points across the surface of the site. The MASW lines in this survey were acquired using a 24-channel towed seismic array, with 4.5 Hz geophones. The geophone spacing was 1 m, the source offset was 10 m, and shot records were acquired at 5 m spacing along each line. The seismic source was an 8 lb sledgehammer impacting an aluminium plate. Recording parameters for the MASW survey were set with a 0.25 ms sample interval, 1.5 s record length, 24 dB gains, and a geophone trigger system.

The shot records were processed using the Kansas Geological Survey software package SurfSeis6++ ©. The geometry for each shot record was set according to the survey parameters and the dispersion curves were generated and edited. The inversions were run using a 10 layer variable depth model. The velocity data was interpolated into 2D profiles showing $V_s$ variations with depth (Figures 5 to 11). The output shear-wave velocity data is included as data files (CSV format), supplementary to this report.

Survey positions were recorded using a Geo 7X Trimble GNSS system with a Tornado antenna. The GNSS positions were differentially corrected using a local GeoNet base station. The GNSS points were output in NZTM2000, with heights in Mean Sea Level (MSL). The accuracy of the survey positions is +/- 0.1 m for >95% of the data. The MASW profiles have all been adjusted to show topography.

## Results:

Nineteen MASW lines were acquired at the site with a total line length of 5.7 kilometres (Figures 1 to 4). The ground conditions were rolling farmland, with a few lines along or crossing farm tracks. The grass in the paddocks was too long to guarantee good coupling between the towed MASW array and the ground. A contractor was organised to cut the grass along the lines, and where necessary the cut grass was raked out of the path of the towed MASW array. Sources of noise at the site included wind, rain, traffic, and heavy plant operations on neighbouring sites. Contamination of the data was mitigated through real-time monitoring of background seismic noise, and increasing the signal-to-noise ratio through stacking shot records.

The MASW profiles have been plotted at a 1:1000 scale (Figures 5 to 11). The shear-wave contours are only plotted to the depth penetration for each shot record.

In homogenous soils, with gradually increasing shear-wave velocities and no sharp lateral discontinuities, the accuracy of the shear-wave velocities derived from the MASW processing is considered to be +/- 10%.[1] The quality of the seismic data and the dispersion curves used in this report is very good, with a good signal-to-noise ratio. If there is a velocity inversion present in the shear-wave profile (decreasing velocity with depth), the shear-wave velocity of the reduced velocity zone and the thickness of that zone can often be underestimated by the inversion process.

## Conclusions:

While the limitations of the MASW method should be considered when evaluating these results, the quality of the data collected at the site and the confidence in the shear-wave velocities derived from the MASW data is high. Fifteen borehole logs (Figures 1 to 4) were provided by Aurecon for ground truthing. While the site geology appears to be complex, some sitewide trends can be observed.

The southern part of the site (MASW 1 to MASW 9) appears to consist of stiff near surface clays and silts (generally $V_s$ 200 m/s to 500 m/s with some lower velocity zones) overlying basalt. The basalt is highly weathered close to the surface ($V_s$ 150 m/s to 400 m/s), with

[1] Stephenson, W.J., Louie, J.N., Pullammanappallil, S., Williams, R.A., and Odum, J.K. 2005. Blind Shear-wave Velocity Comparison of ReMi and MASW Results with Boreholes to 200 m in Santa Clara Valley: Implications for Earthquake Ground-Motion Assessment. *Bulletin of the Seismological Society of America*, Vol. 95, pp. 2506-2516.

unweathered basalt ranging from 400 m/s to over 700 m/s. The basalt in this part of the site is over 20 m in thickness – the contact with the underlying sediments was not observed in any of the boreholes or in the MASW.

The middle part of the site (MASW 10 to MASW 12, MASW 14 and MASW 16) shows basalt thinning to the north. There is still a stiff surface layer of silts and clays overlying weathered basalt, but the contact between the basalt and the underlying sediments is hard to clearly delineate due to overlapping $V_s$ ranges between the two units.

To the north (ends of MASW 10, 11, 14, 16, and 17, MASW 13, 15, 18, and 19) the basalt is no longer present in the boreholes or the MASW. The MASW in this area shows a sequence of silts and clays ($V_s$ 100 m/s to 300 m/s) overlying a higher velocity sequence of sands, silts and clays ($V_s$ 300 m/s to over 500 m/s).

The site is rich in data, both from the geophysical survey and from the intrusive test program. The intrusive tests included boreholes, CPTs, seismic dilatometer tests, and test pits. Broadly speaking, the borehole logs correlate well with the MASW results. If a more detailed treatment of the data is required for any part of the site, additional data analysis can be undertaken to build a more detailed geological model.

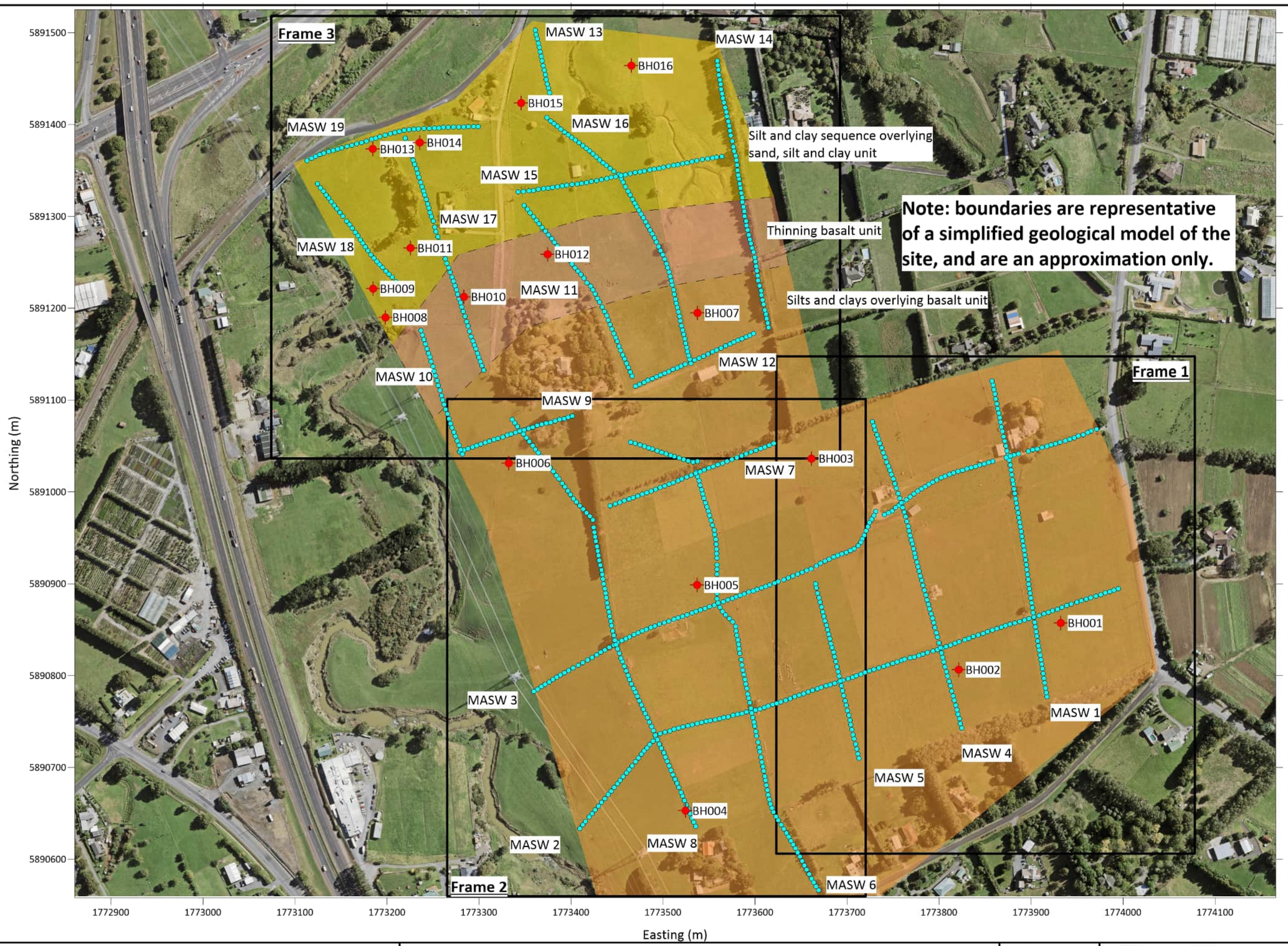
**Disclaimer:**

This document has been provided by Southern Geophysical Ltd subject to the following:

Non-invasive geophysical testing has limitations and is not a complete source of testing. Often there is a need to couple non-invasive methods with invasive testing methods, such as drilling, especially in cases where the non-invasive testing indicates anomalies.

This document has been prepared for the particular purpose outlined in the project proposal and no responsibility is accepted for the use of this document, in whole or in part, in other contexts or for any other purpose. Southern Geophysical Ltd did not perform a complete assessment of all possible conditions or circumstances that may exist at the site. Conditions may exist which were undetectable given the limited nature of the enquiry Southern Geophysical Ltd was retained to undertake with respect to the site. Variations in conditions often occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account. Accordingly, additional studies and actions may be required by the client.

We collected our data and based our report on information which was collected at a specific point in time. The passage of time affects the information and assessment provided by Southern Geophysical Ltd. It is understood that the services provided allowed Southern Geophysical Ltd to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes for whatever reason. Where data is supplied by the client or other sources, including where previous site investigation data have been used, it has been assumed that the information is correct. No responsibility is accepted by Southern Geophysical Ltd for incomplete or inaccurate data supplied by others. This document is provided for sole use by the client and is confidential to that client and its professional advisers. No responsibility whatsoever for the contents of this document will be accepted to any person other than the client. Any use which a third party makes of this document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Southern Geophysical Ltd accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.




DRAWING- **Figure 1: Overview of MASW Test Locations**

LOCATION- **Drury, Auckland**

NOTES- Coordinates NZ2000 TM Grid.
Aerial photograph sourced from LINZ, Crown Copyright ©

N

A3

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SCALE (m)

0 25 50 75 100

**Figure 2: MASW Line Locations (Frame 1)**

**Drury, Auckland**

NOTES- Coordinates NZ2000 TM Grid.
Aerial photograph sourced from LINZ, Crown Copyright ©

Every second MASW point labelled with chainage.

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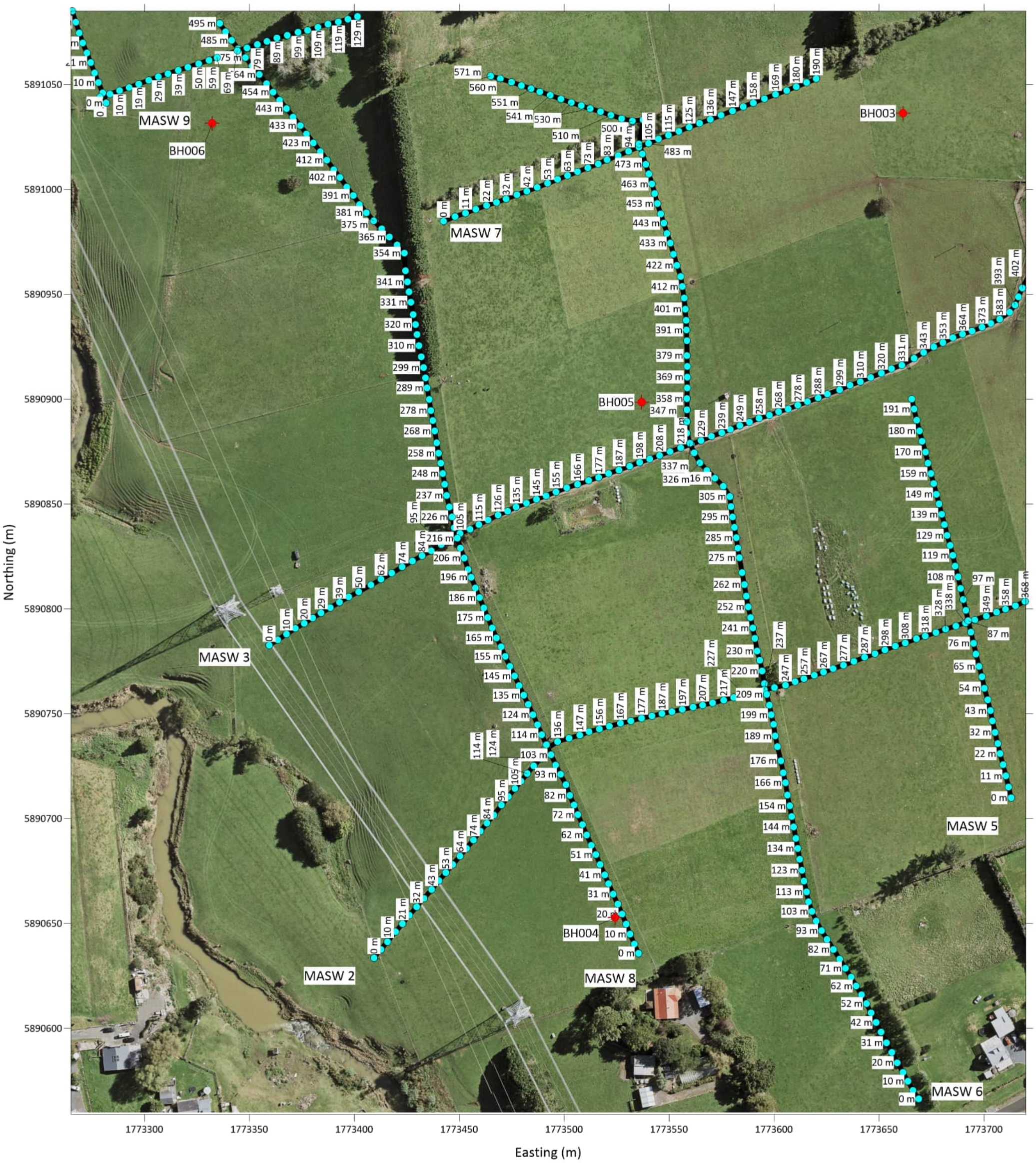


SCALE (m)

0 25 50 75 100

**Figure 3: MASW Line Locations (Frame 2)**

**Drury, Auckland**

NOTES- Coordinates NZ2000 TM Grid.
Aerial photograph sourced from LINZ, Crown Copyright ©

Every second MASW point labelled with chainage.

N

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SCALE (m)

0 25 50 75 100

**Figure 4: MASW Line Locations (Frame 3)**

**Drury, Auckland**

NOTES- Coordinates NZ2000 TM Grid.
Aerial photograph sourced from LINZ, Crown Copyright ©

Every second MASW point labelled with chainage.

N

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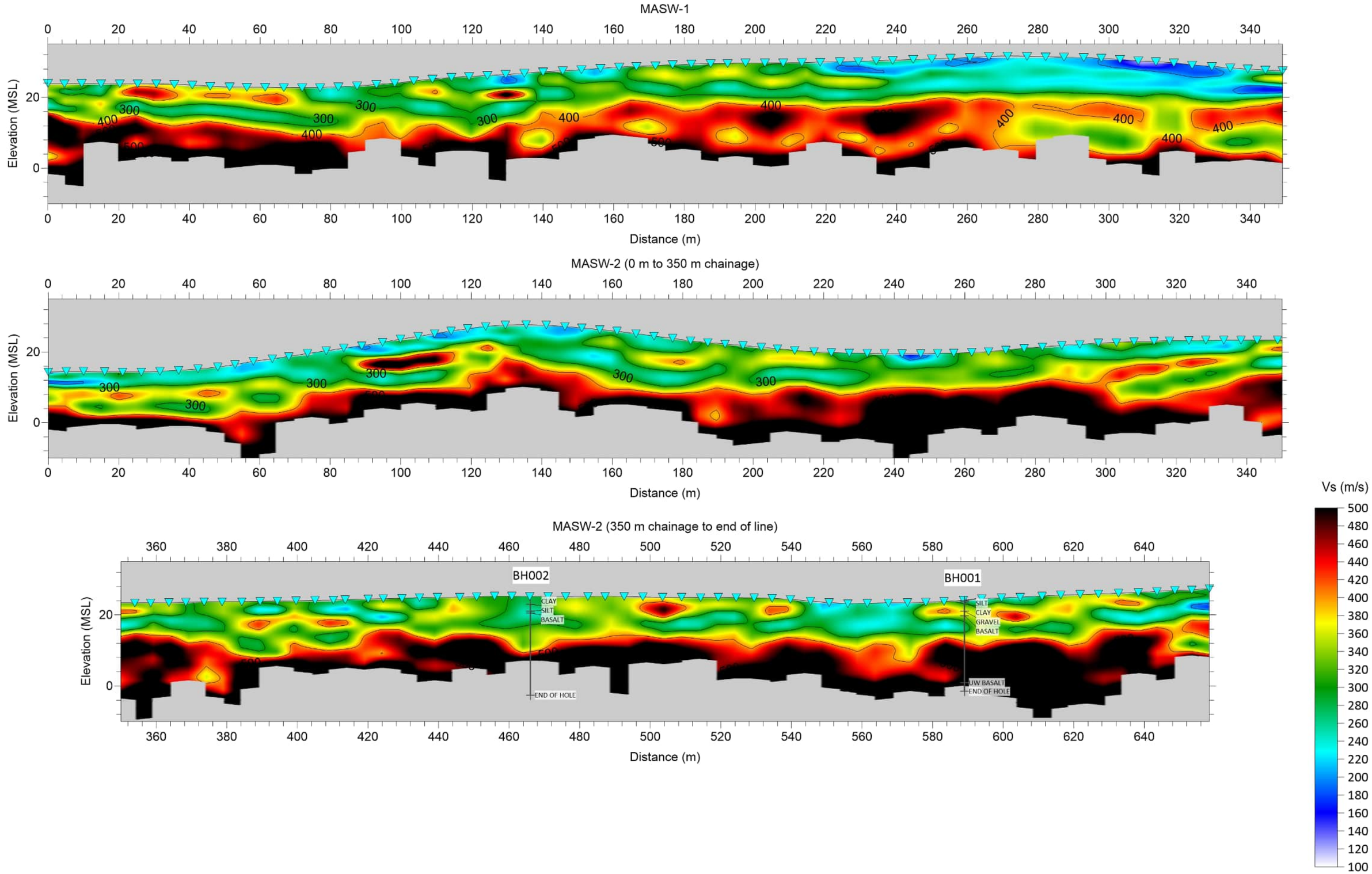


DRAWING- **Figure 5: MASW-1 and MASW-2**

LOCATION- **Drury, Auckland**

NOTES

Boreholes are labelled with the main soil types.

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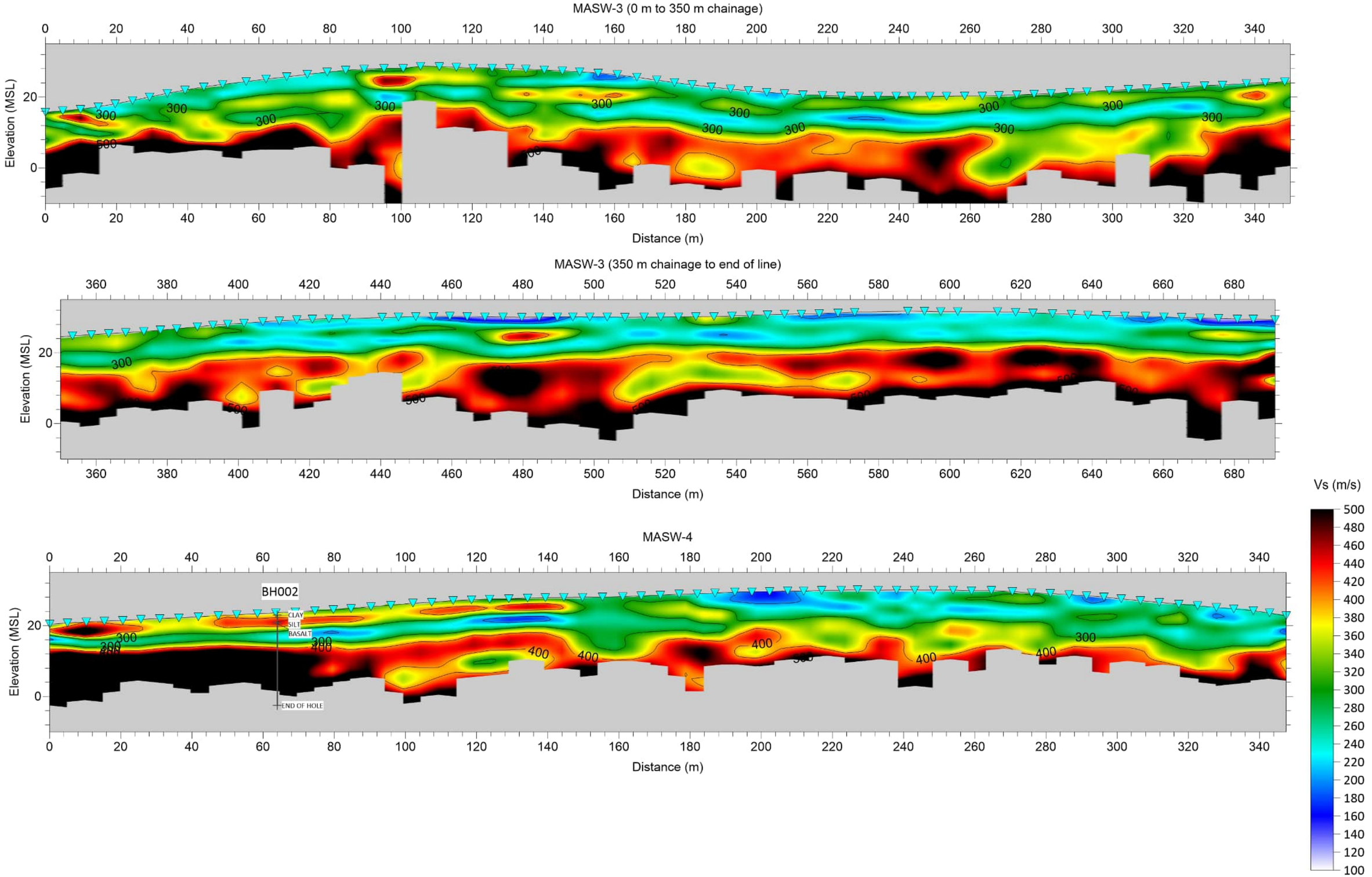


DRAWING- **Figure 6: MASW-3 and MASW-4**

LOCATION- **Drury, Auckland**

NOTES

Boreholes are labelled with the main soil types.

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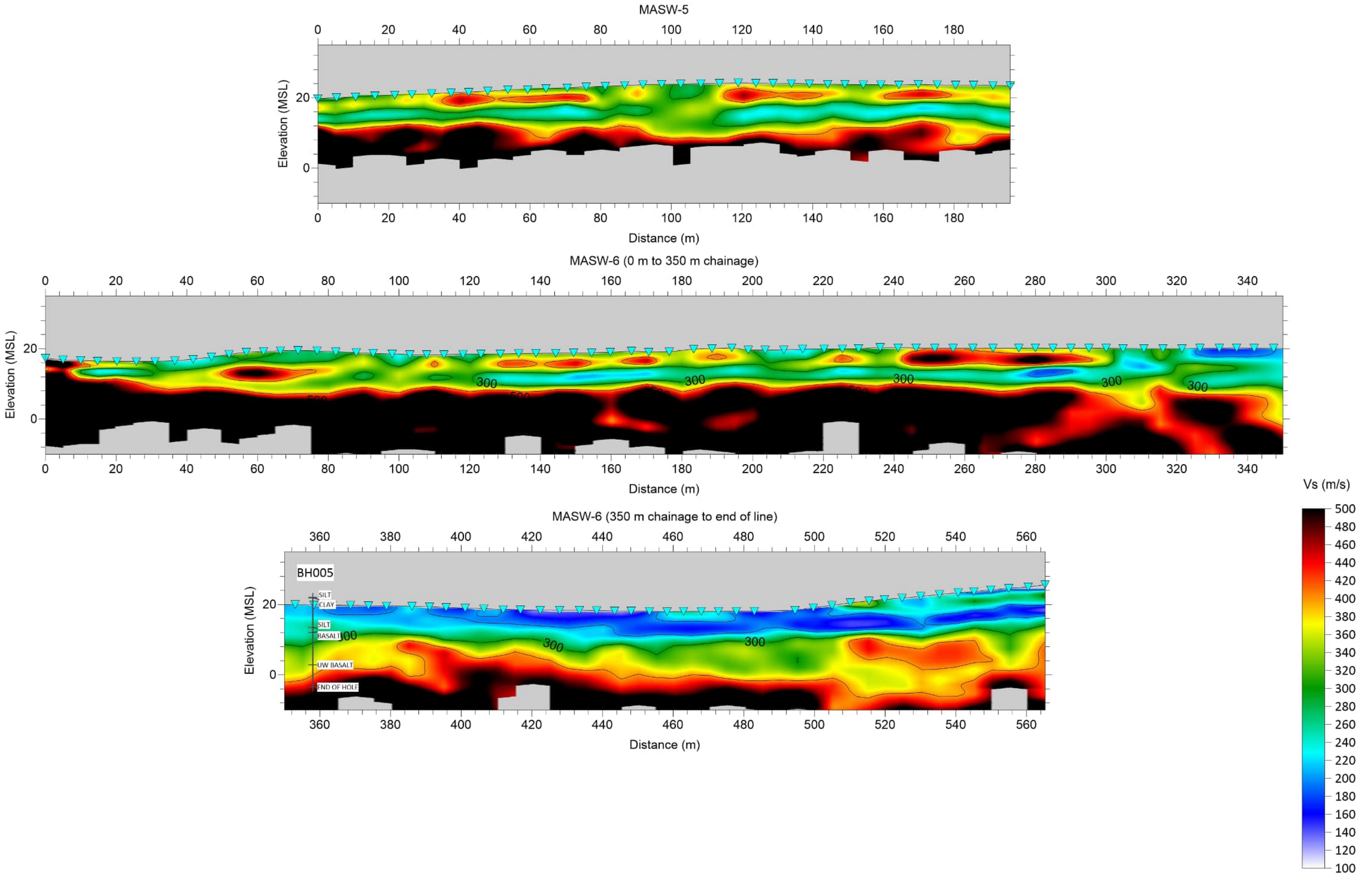


DRAWING- **Figure 7: MASW-5 and MASW-6**

LOCATION- **Drury, Auckland**

NOTES

Boreholes are labelled with the main soil types.

A3

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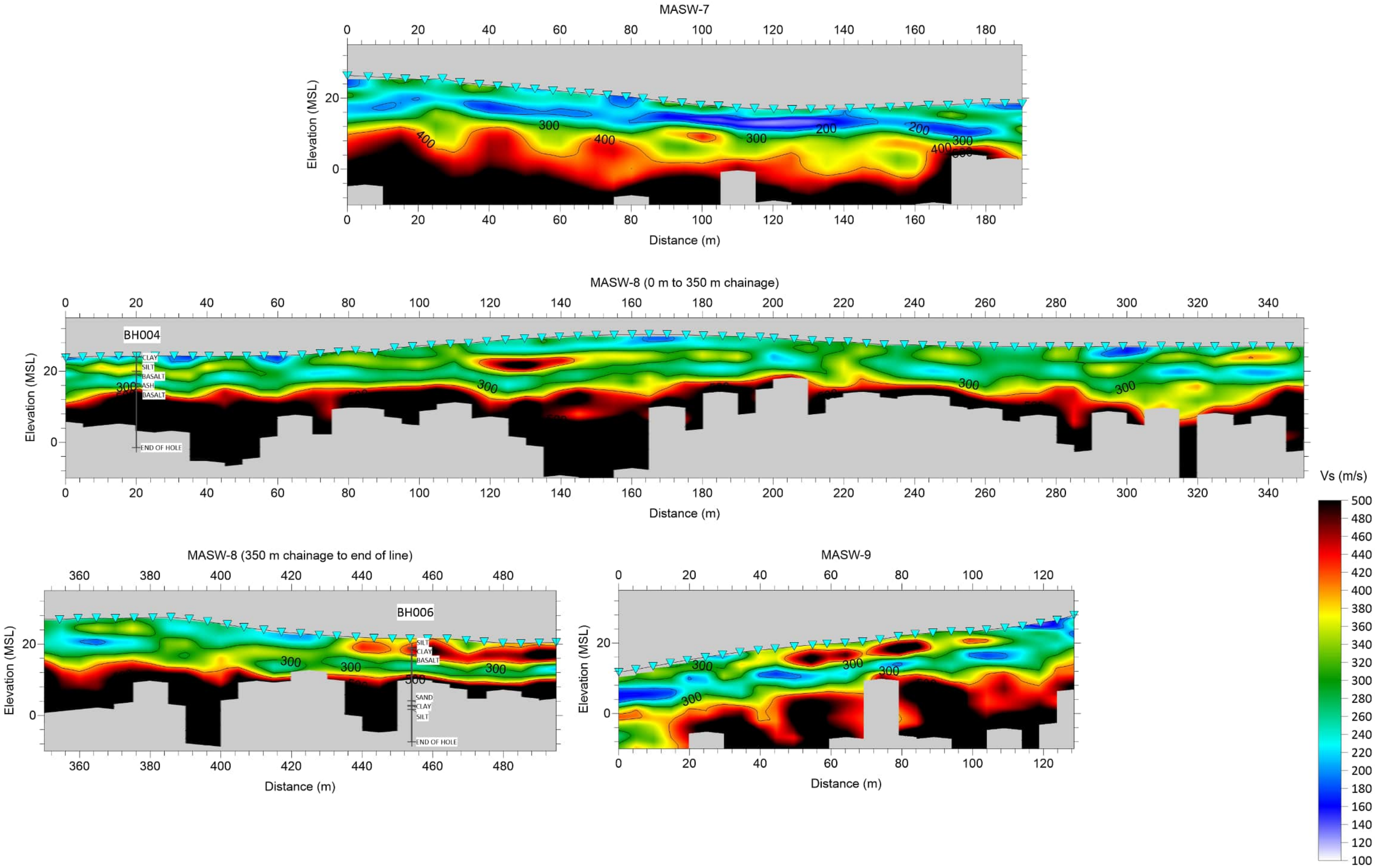


DRAWING- **Figure 8: MASW-7 to MASW-9**

LOCATION- **Drury, Auckland**

NOTES

Boreholes are labelled with the main soil types.

A3

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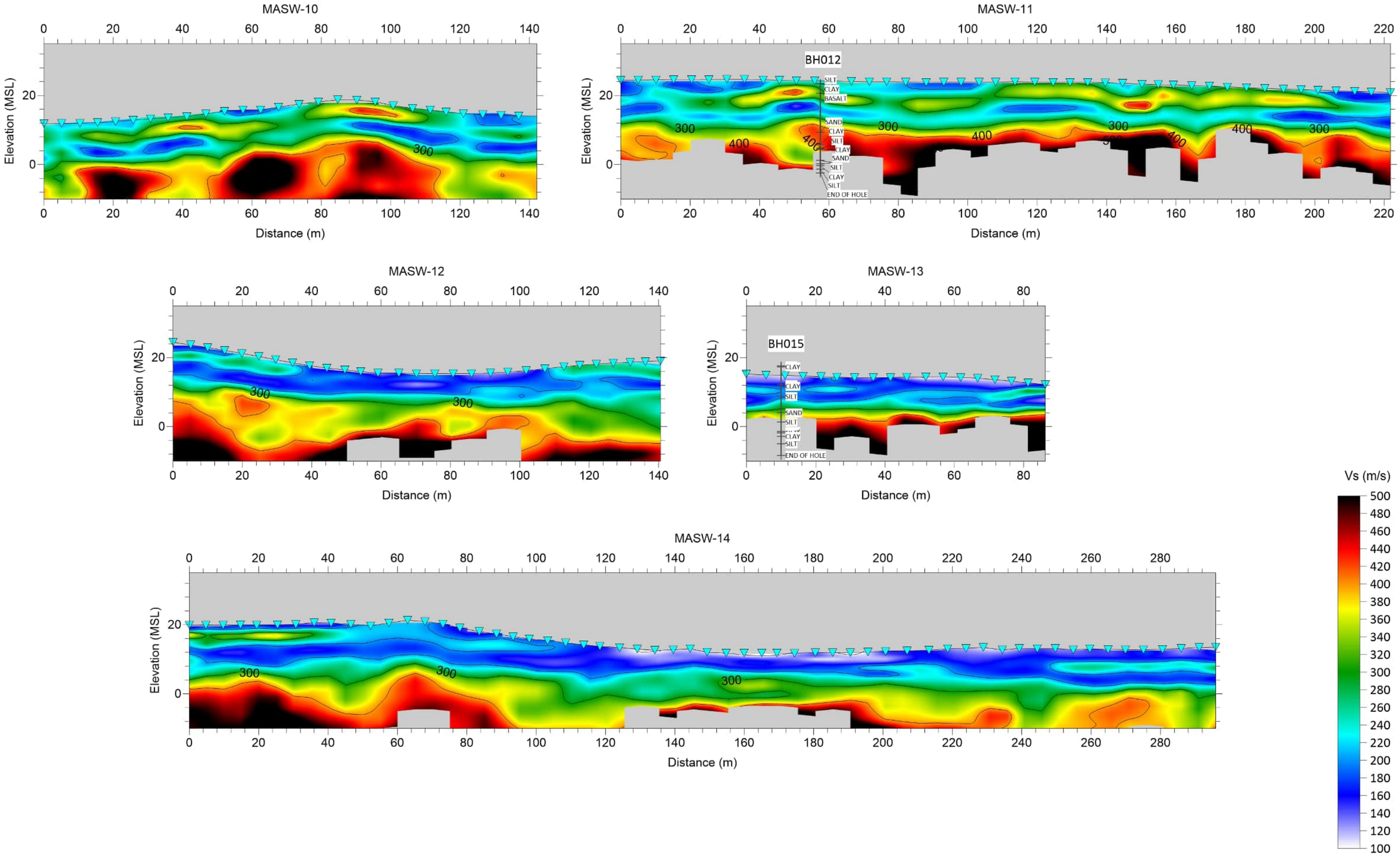


DRAWING- **Figure 9: MASW-10 to MASW-14**

LOCATION- **Drury, Auckland**

NOTES

Boreholes are labelled with the main soil types.

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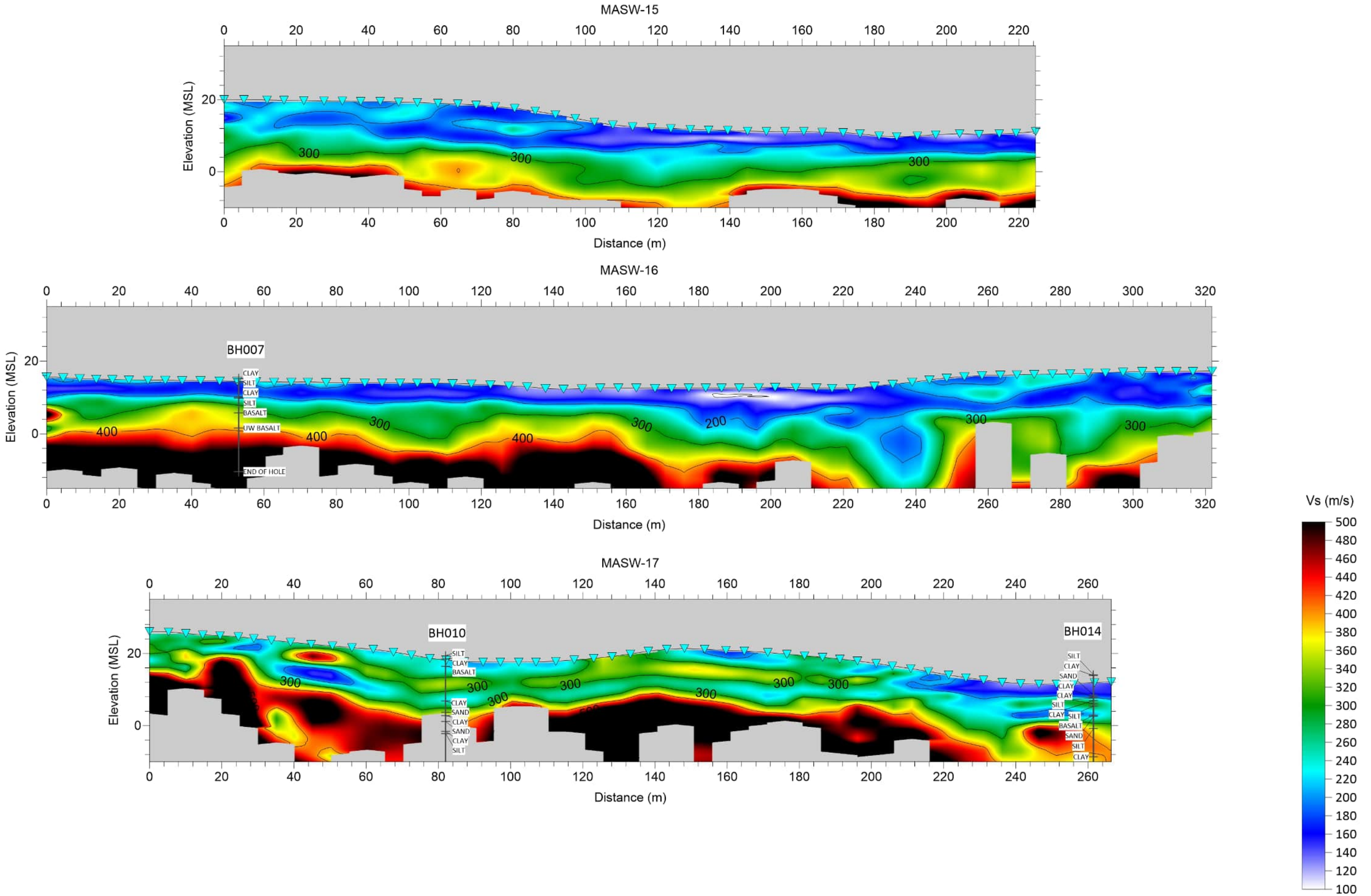


DRAWING- **Figure 10: MASW-15 to MASW-17**

LOCATION- **Drury, Auckland**

NOTES

Boreholes are labelled with the main soil types.

A3

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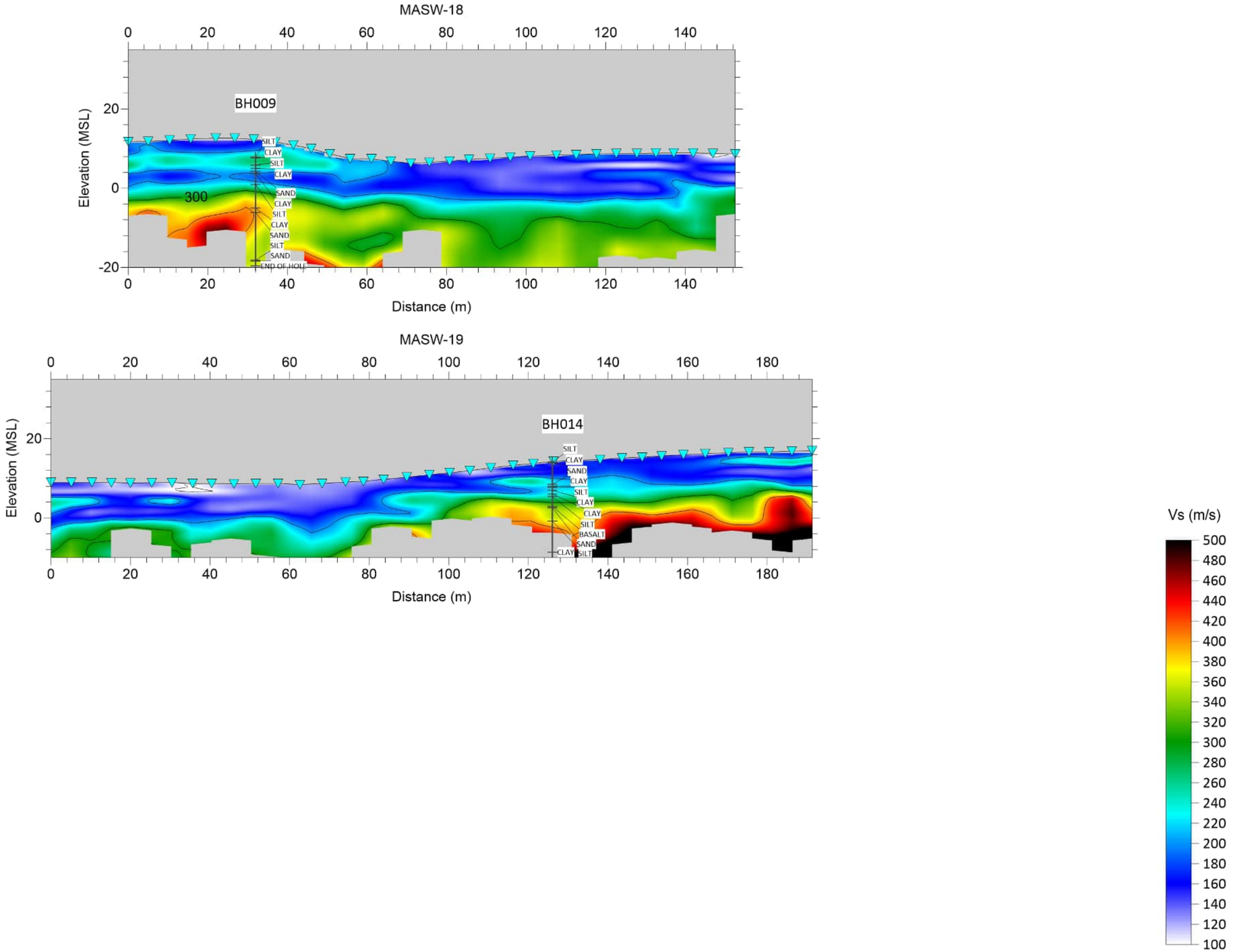


DRAWING- **Figure 11: MASW-18 to MASW-19**

LOCATION- **Drury, Auckland**

NOTES

Boreholes are labelled with the main soil types.

A3

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# Appendix K – Laboratory Test Results

Babbage Geotechnical Laboratory
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Please reply to: W.E. Campton



Aurecon New Zealand Limited
PO Box 9762
Newmarket
Auckland 1149

Attention: **SAM MacKAY**

Job Number: 64121#L
BGL Registration Number: 2884
Checked by: WEC

12th February 2021

# DETECTION OF THE PRESENCE OF ALLOPHANE

Dear Sam,

***Re: DRURY CENTRE PROJECT***
***Report Number: 64121#L/Allophane***

The following table presents the results of 'Detection of the Presence of Allophane in Soils' testing at BGL of soil samples delivered to this laboratory on the 29th of January 2021.

The samples were tested in accordance with the following standard:

**Detection of Presence of Allophane in Soils:** NZS4402:1986:Test 3.4

| Borehole Number | Sample Number | Depth (m) | Allophane Content |
|---|---|---|---|
| TP001 | BULK | 0.80 – 1.20 | > 7% |
| TP002 | BULK | 0.50 – 0.90 | > 7% |
| TP003 | BULK | 0.25 – 0.80 | > 7% |
| TP003 | BULK | 1.60 – 1.90 | > 7% |
| TP004 | BULK | 0.60 – 1.10 | > 7% |
| TP004 | BULK | 2.00 – 2.50 | > 7% |
| TP005 | BULK | 2.10 – 2.40 | > 7% |
| TP006 | BULK | 1.80 – 2.10 | > 7% |
| TP008 | BULK | 2.30 – 2.70 | > 7% |
| TP009 | BULK | 2.40 – 2.80 | > 7% |

Babbage Geotechnical Laboratory

| Borehole Number | Sample Number | Depth (m) | Allophane Content |
|---|---|---|---|
| TP010 | BULK | 1.50 – 1.80 | < 5% |
| TP011 | BULK | 2.20 – 2.50 | < 5% |
| TP014 | BULK | 1.70 – 2.80 | < 5% |
| TP015 | BULK | 1.20 – 1.80 | 5 – 7% |
| TP017 | BULK | 2.20 – 2.50 | 5 – 7% |
| TP019 | BULK | 0.25 – 0.75 | 5 – 7% |
| TP023 | BULK | 0.75 – 3.00 | < 5% |
| TP024 | BULK | 1.10 – 1.80 | > 7% |
| TP025 | BULK | 0.70 – 1.50 | < 5% |
| TP029 | BULK | 0.70 – 1.80 | > 7% |
| TP029 | BULK | 1.80 – 2.40 | < 5% |
| TP031 | BULK | 0.60 – 1.80 | < 5% |
| TP032 | BULK | 0.70 – 2.00 | < 5% |
| BH007 | BULK | 2.00 – 2.50 | < 5% |

Please note that the test results relate only to the samples as-received, and relate only to the samples under test. Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
**Signatory (Assistant Laboratory Manager)**
**Babbage Geotechnical Laboratory**

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TESTING LABORATORY
№ 126

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Aurecon New Zealand Limited
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Newmarket
Auckland 1149

Attention: **SAM MacKAY**

Job Number: 64121#L
BGL Registration Number: 2884
Checked by: WEC

22nd February 2021

# SOAKED CALIFORNIA BEARING RATIO (CBR) TESTING

Dear Sam,

## *Re: DRURY CENTRE PROJECT*
***Report Number: 64121#L/CBR***

The following report presents the results of California Bearing Ratio testing at BGL of bulk soil samples delivered to this laboratory on the 29th of January 2021. Test results are summarised below, with the following pages showing graphs and detailed results.

Test standards used were:

| | |
|---|---|
| **Water Content:** | NZS4402:1986:Test 2.1 |
| **NZ Standard Compaction:** | NZS4402:1986:Test 4.1.1 |
| **California Bearing Ratio (CBR) – Remoulded:** | NZS4402:1986:Test 6.1.1 (soaked) |

The bulk samples were sieved through a 9.50mm aperture sieve (*which is a departure from the NZS4402 Standard which requires a 4.75mm sieve to be used*), and were then compacted into CBR moulds using the NZ Standard Compaction method. The compacted samples were then soaked for four days. The CBR value was then measured using a plunger penetration rate of 1mm per minute.

| Sample Details | Water Content (%) | | Dry Density ($t/m^3$) | CBR (soaked) | Swell (%) |
|---|---|---|---|---|---|
| | Initial (trimmings) | Final (under plunger) | | | |
| **TP005 / BULK / 2.10 – 2.40m** | **46.9** | **47.8** | **1.16** | **12** | **0.0** |
| | CLAY, silty, sllightly to moderately plastic, brown & reddish grey, moist. | | | | |

*Note that sample descriptions above are not part of BGL IANZ Accreditation.*

| Sample Details | Water Content (%) | | Dry Density ($t/m^3$) | CBR (soaked) | Swell (%) |
|---|---|---|---|---|---|
| | Initial (trimmings) | Final (under plunger) | | | |
| **TP009 / BULK / 2.40 – 2.80m** | **53.8** | **53.9** | **1.10** | **2.5** | **0.0** |
| | SILT, fine gravelly, slightly plastic, dark reddish brown, moist. | | | | |
| **TP014 / BULK / 1.70 – 2.80m** | **51.6** | **52.3** | **1.10** | **7** | **0.0** |
| | CLAY, silty, moderately plastic, mottled orangish brown & grey, slightly moist. | | | | |
| **TP025 / BULK / 1.50 – 3.00m** | **54.6** | **56.1** | **1.08** | **4.0** | **0.0** |
| | SILT, clayey, fine gravelly (basalt scoria), slightly plastic, reddish brown, moist. | | | | |
| **TP029 / BULK / 0.70 – 1.80m*** | not enough sample | **61.8** | **1.22** | **4.5** | **0.0** |
| | CLAY, silty, fine gravelly, moderately plastic, brown & reddish grey, moist. | | | | |

**Please note that a small amount of soil from TP029 / BULK / 1.80 – 2.40m was added to this sample to provide enough soil to carry out the test.*

*Note that sample descriptions above are not part of BGL IANZ Accreditation.*

A solid density value of 2.65t/m³ was used in the calculation of the air voids for these compacted samples. This value is assumed, and is not part of the IANZ endorsement for this report.

As per the reporting requirements of NZS4402: 1986: Test 6.1.1, dry density is reported to the nearest 0.02t/m³, swell to the nearest 0.2%, CBR's > 20 to the nearest 5, CBR's between 5 and 20 to the nearest 1, and for CBR's < 5 to the nearest 0.5. As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater.

Please note that the test results relate only to the samples as-received, and relate only to the samples under test.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
**Signatory (Assistant Laboratory Manager)**
**Babbage Geotechnical Laboratory**

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№ 126

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full & with written approval from BGL.

| BGL Babbage Geotechnical Laboratory | JOB NUMBER: | 64121#L | REPORT NUMBER: | Page 4 of 8 |
|---|---|---|---|---|
| | REG. NUMBER: | 2884 | 64121#L/CBR | Ver.2, Issued July 2017 |
| | PROJECT: | DRURY CENTRE PROJECT | | |

## CALIFORNIA BEARING RATIO TEST:
## REMOULDED SAMPLE, SOAKED

**Test Method: NZS4402:1986:Test 6.1.1**
**NZS4402:1986:Test 2.1 Moisture Content**

| | Initials | Date |
|---|---|---|
| Tested By: | WEC | 16/02/2021 |
| Compiled By: | WEC | 17/02/2021 |
| Checked By: | JF | 22/02/2021 |

**Sample Number:** TP005 / BULK

**Sample Depth (m):** 2.10 - 2.40m

**Sample History:** ~~dried / wetted / lime added / cement added/ unknown~~ / natural

**Compaction Used:** NZ Standard / ~~NZ Heavy~~

| | |
|---|---|
| Proving Ring No: | 1155-10-13232 |
| Calibration Factor: | 335.37 |

(dial divisions / kN: from calibration worksheet)

# SOAKED CBR

| | | |
|---|---|---|
| Soil Sieved Over: | 9.50 | mm sieve |
| Surcharge Used: | 4.00 | kg |
| Mould Number: | B3 | |

***BULK DENSITY***

| | | |
|---|---|---|
| Mass Mould + Base + Soil | 10,832.80 | (g) |
| Mass Mould + Base | 6,911.80 | (g) |
| Volume Mould (from calibration) | 2,303.00 | (ml) |
| **Bulk Density** | **1.70** | ($t/m^3$) |

***WATER CONTENT***

| | Before (trimmings) | After (under plunger) |
|---|---|---|
| Mass Wet Soil + Tin (g) | 380.756 | 361.295 |
| Mass Dry Soil + Tin (g) | 284.194 | 270.877 |
| Mass Tin (g) | 78.380 | 81.826 |
| **Water Content (%)** | **46.9** | **47.8** |
| **Dry Density ($t/m^3$)** | **1.16** | |

***DETERMINATION OF SWELL***

| | |
|---|---|
| Initial Reading (mm) | 2.75 |
| Final Reading (mm) | 2.71 |
| Change in Height (mm) | -0.04 |
| Initial Height (mm) | 126.94 |
| **Swell (%)** | **0.0** |

***DETERMINATION OF BEARING VALUE***

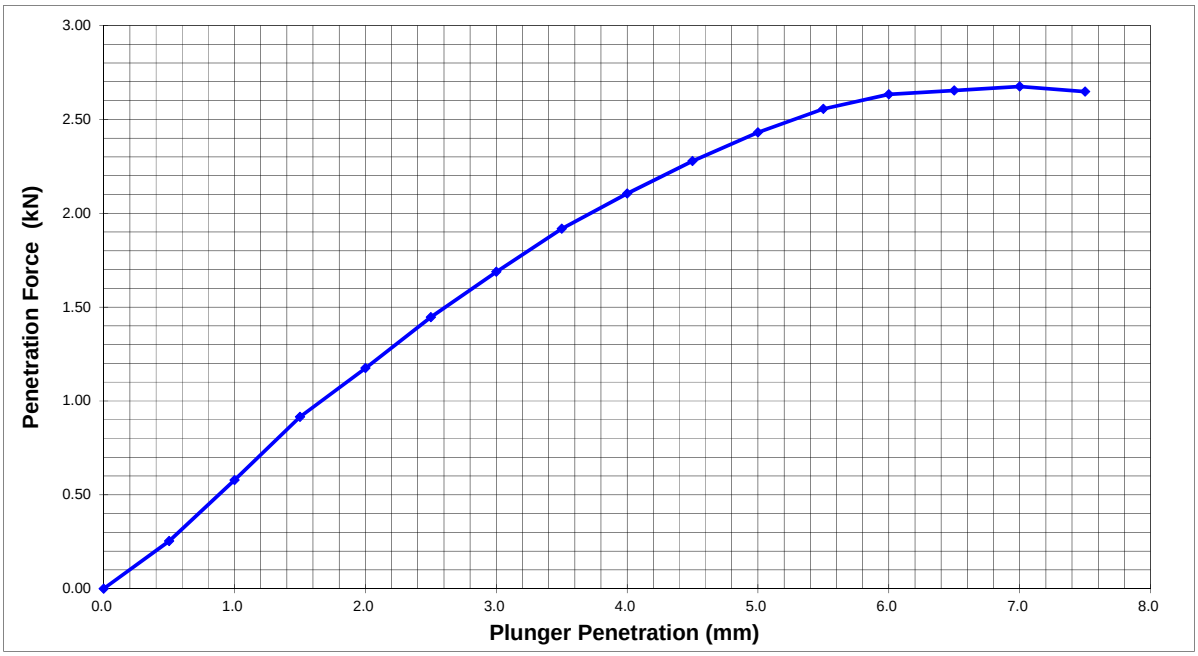
| Plunger Penetration (mm) | Proving Ring Dial (divisions) | Force (kN) |
|---|---|---|
| 0.0 | 0.0 | 0.00 |
| 0.5 | 85.0 | 0.25 |
| 1.0 | 194.0 | 0.58 |
| 1.5 | 307.0 | 0.92 |
| 2.0 | 394.0 | 1.17 |
| **2.5** | **485.0** | **1.45** |
| 3.0 | 566.0 | 1.69 |
| 3.5 | 643.0 | 1.92 |
| 4.0 | 706.0 | 2.11 |
| 4.5 | 764.0 | 2.28 |
| **5.0** | **815.0** | **2.43** |
| 5.5 | 857.0 | 2.56 |
| 6.0 | 883.0 | 2.63 |
| 6.5 | 890.0 | 2.65 |
| 7.0 | 897.0 | 2.67 |
| 7.5 | 888.0 | 2.65 |

| | |
|---|---|
| **2.5mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **11.0** |
| ***with curve shape correction (if needed)*** | **11.0** |
| **5.0mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **12.2** |
| ***with curve shape correction (if needed)*** | **12.2** |
| **FINAL CBR VALUE:** | **12** |

| | | |
|---|---|---|
| Air Voids: | 1.9 | % |
| Time of Soaking: | 4 | days |
| Plunger Penetration Rate: | 1.0 | mm / minute |

| | | |
|---|---|---|
| Lime Added: | 0.0 | % |
| Cement Added: | 0.0 | % |

## CBR FORCE-PENETRATION CURVE



| BGL Babbage Geotechnical Laboratory | JOB NUMBER: | 64121#L | REPORT NUMBER: | Page 5 of 8 |
|---|---|---|---|---|
| | REG. NUMBER: | 2884 | 64121#L/CBR | Ver.2, Issued July 2017 |
| | PROJECT: | DRURY CENTRE PROJECT | | |

## CALIFORNIA BEARING RATIO TEST:
## REMOULDED SAMPLE, SOAKED

**Test Method: NZS4402:1986:Test 6.1.1**

**NZS4402:1986:Test 2.1 Moisture Content**

| | Initials | Date |
|---|---|---|
| Tested By: | WEC | 16/02/2021 |
| Compiled By: | WEC | 17/02/2021 |
| Checked By: | JF | 22/02/2021 |

**Sample Number:** TP009 / BULK

**Sample Depth (m):** 2.40 - 2.80m

**Sample History:** ~~dried / wetted / lime added / cement added/ unknown~~ / natural

**Compaction Used:** NZ Standard / ~~NZ Heavy~~

| | |
|---|---|
| Proving Ring No: | 1155-10-13232 |
| Calibration Factor: | 335.37 |

(dial divisions / kN: from calibration worksheet)

# SOAKED CBR

| | | |
|---|---|---|
| Soil Sieved Over: | 9.50 | mm sieve |
| Surcharge Used: | 4.00 | kg |
| Mould Number: | B2 | |

***BULK DENSITY***

| | | |
|---|---|---|
| Mass Mould + Base + Soil | 10,682.60 | (g) |
| Mass Mould + Base | 6,761.00 | (g) |
| Volume Mould (from calibration) | 2,299.00 | (ml) |
| **Bulk Density** | **1.71** | ($t/m^3$) |

***WATER CONTENT***

| | Before (trimmings) | After (under plunger) |
|---|---|---|
| Mass Wet Soil + Tin (g) | 408.182 | 407.098 |
| Mass Dry Soil + Tin (g) | 293.992 | 292.599 |
| Mass Tin (g) | 81.830 | 80.154 |
| **Water Content (%)** | **53.8** | **53.9** |
| **Dry Density ($t/m^3$)** | **1.10** | |

***DETERMINATION OF SWELL***

| | |
|---|---|
| Initial Reading (mm) | 9.84 |
| Final Reading (mm) | 9.73 |
| Change in Height (mm) | -0.11 |
| Initial Height (mm) | 127.13 |
| **Swell (%)** | **0.00** |

***DETERMINATION OF BEARING VALUE***

| Plunger Penetration (mm) | Proving Ring Dial (divisions) | Force (kN) |
|---|---|---|
| 0.0 | 0.0 | 0.00 |
| 0.5 | 4.0 | 0.01 |
| 1.0 | 10.0 | 0.03 |
| 1.5 | 21.0 | 0.06 |
| 2.0 | 33.0 | 0.10 |
| **2.5** | **47.0** | **0.14** |
| 3.0 | 61.0 | 0.18 |
| 3.5 | 77.0 | 0.23 |
| 4.0 | 93.0 | 0.28 |
| 4.5 | 109.0 | 0.33 |
| **5.0** | **127.0** | **0.38** |
| 5.5 | 145.0 | 0.43 |
| 6.0 | 162.0 | 0.48 |
| 6.5 | 180.0 | 0.54 |
| 7.0 | 198.0 | 0.59 |
| 7.5 | 217.0 | 0.65 |

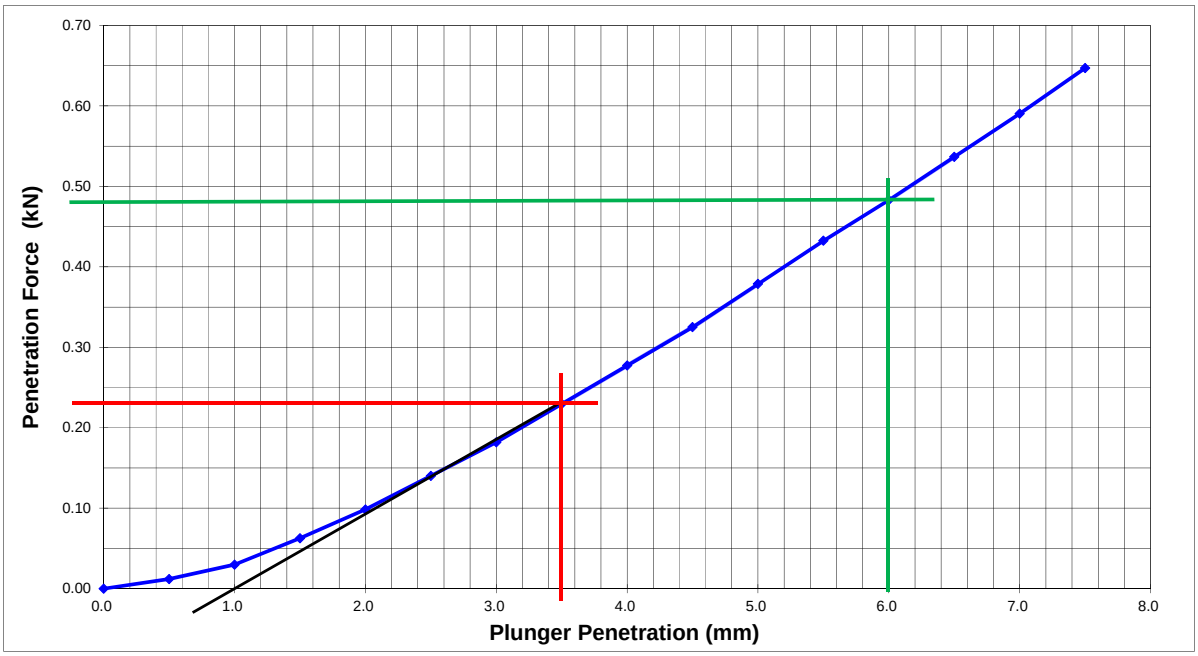
| | |
|---|---|
| **2.5mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **1.1** |
| ***with curve shape correction (if needed)*** | **1.7** |
| **5.0mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **1.9** |
| ***with curve shape correction (if needed)*** | **2.4** |

**FINAL CBR VALUE: 2.5**

| | | |
|---|---|---|
| Air Voids: | 0 | % |
| Time of Soaking: | 4 | days |
| Plunger Penetration Rate: | 1.0 | mm / minute |

| | | |
|---|---|---|
| Lime Added: | 0.0 | % |
| Cement Added: | 0.0 | % |

## CBR FORCE-PENETRATION CURVE



| BGL Babbage Geotechnical Laboratory | JOB NUMBER: | 64121#L | REPORT NUMBER: | Page 6 of 8 |
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| | REG. NUMBER: | 2884 | 64121#L/CBR | Ver.2, Issued July 2017 |
| | PROJECT: | DRURY CENTRE PROJECT | | |

## CALIFORNIA BEARING RATIO TEST:
## REMOULDED SAMPLE, SOAKED

**Test Method: NZS4402:1986:Test 6.1.1**

**NZS4402:1986:Test 2.1 Moisture Content**

| | Initials | Date |
|---|---|---|
| Tested By: | WEC | 16/02/2021 |
| Compiled By: | WEC | 17/02/2021 |
| Checked By: | JF | 22/02/2021 |

**Sample Number:** TP014 / BULK

**Sample Depth (m):** 1.70 - 2.80m

**Sample History:** ~~dried / wetted / lime added / cement added/ unknown~~ / natural

**Compaction Used:** NZ Standard / ~~NZ Heavy~~

| | |
|---|---|
| Proving Ring No: | 1155-10-13232 |
| Calibration Factor: | 335.37 |

(dial divisions / kN: from calibration worksheet)

# SOAKED CBR

| | | |
|---|---|---|
| Soil Sieved Over: | 9.50 | mm sieve |
| Surcharge Used: | 4.00 | kg |
| Mould Number: | B5 | |

***BULK DENSITY***

| | | |
|---|---|---|
| Mass Mould + Base + Soil | 10,636.00 | (g) |
| Mass Mould + Base | 6,758.60 | (g) |
| Volume Mould (from calibration) | 2,308.00 | (ml) |
| **Bulk Density** | **1.68** | ($t/m^3$) |

***WATER CONTENT***

| | Before (trimmings) | After (under plunger) |
|---|---|---|
| Mass Wet Soil + Tin (g) | 361.872 | 960.930 |
| Mass Dry Soil + Tin (g) | 265.824 | 849.460 |
| Mass Tin (g) | 79.519 | 636.520 |
| **Water Content (%)** | **51.6** | **52.3** |
| **Dry Density ($t/m^3$)** | **1.10** | |

***DETERMINATION OF SWELL***

| | |
|---|---|
| Initial Reading (mm) | 12.90 |
| Final Reading (mm) | 13.00 |
| Change in Height (mm) | 0.10 |
| Initial Height (mm) | 127.23 |
| **Swell (%)** | **0.0** |

***DETERMINATION OF BEARING VALUE***

| Plunger Penetration (mm) | Proving Ring Dial (divisions) | Force (kN) |
|---|---|---|
| 0.0 | 0.0 | 0.00 |
| 0.5 | 51.0 | 0.15 |
| 1.0 | 115.0 | 0.34 |
| 1.5 | 183.0 | 0.55 |
| 2.0 | 249.0 | 0.74 |
| **2.5** | **302.0** | **0.90** |
| 3.0 | 343.0 | 1.02 |
| 3.5 | 377.0 | 1.12 |
| 4.0 | 407.0 | 1.21 |
| 4.5 | 437.0 | 1.30 |
| **5.0** | **461.0** | **1.37** |
| 5.5 | 481.0 | 1.43 |
| 6.0 | 495.0 | 1.48 |
| 6.5 | 507.0 | 1.51 |
| 7.0 | 505.0 | 1.51 |
| 7.5 | 508.0 | 1.51 |

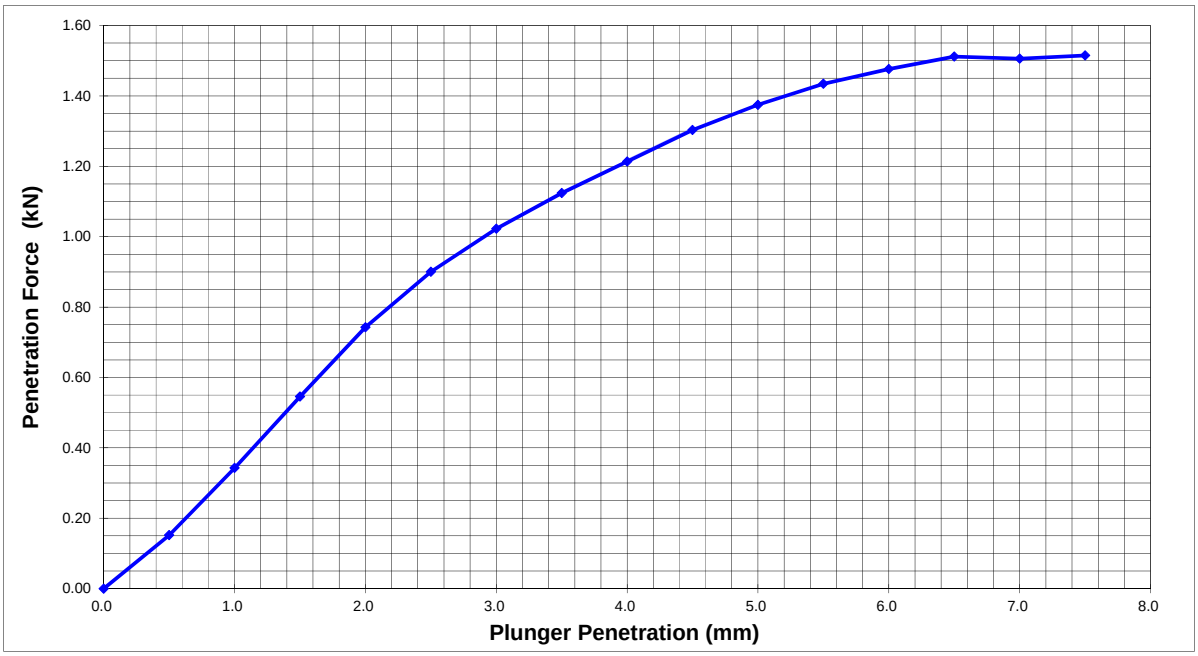
| | |
|---|---|
| **2.5mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **6.8** |
| ***with curve shape correction (if needed)*** | **6.8** |
| **5.0mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **6.9** |
| ***with curve shape correction (if needed)*** | **6.9** |

**FINAL CBR VALUE: 7**

| | | |
|---|---|---|
| Air Voids: | 1.8 | % |
| Time of Soaking: | 4 | days |
| Plunger Penetration Rate: | 1.0 | mm / minute |

| | | |
|---|---|---|
| Lime Added: | 0.0 | % |
| Cement Added: | 0.0 | % |

## CBR FORCE-PENETRATION CURVE



| BGL Babbage Geotechnical Laboratory | JOB NUMBER: | 64121#L | REPORT NUMBER: | Page 7 of 8 |
|---|---|---|---|---|
| | REG. NUMBER: | 2884 | 64121#L/CBR | Ver.2, Issued July 2017 |
| | PROJECT: | DRURY CENTRE PROJECT | | |

## CALIFORNIA BEARING RATIO TEST:
## REMOULDED SAMPLE, SOAKED

**Test Method: NZS4402:1986:Test 6.1.1**

**NZS4402:1986:Test 2.1 Moisture Content**

| | Initials | Date |
|---|---|---|
| Tested By: | WEC | 16/02/2021 |
| Compiled By: | WEC | 17/02/2021 |
| Checked By: | JF | 22/02/2021 |

**Sample Number:** TP025 / BULK

**Sample Depth (m):** 1.50 - 3.00m

**Sample History:** ~~dried / wetted / lime added / cement added/ unknown~~ / natural

**Compaction Used:** NZ Standard / ~~NZ Heavy~~

| | |
|---|---|
| Proving Ring No: | 1155-10-13232 |
| Calibration Factor: | 335.37 |

(dial divisions / kN: from calibration worksheet)

# SOAKED CBR

| | | |
|---|---|---|
| Soil Sieved Over: | 9.50 | mm sieve |
| Surcharge Used: | 4.00 | kg |
| Mould Number: | B1 | |

### BULK DENSITY

| | | |
|---|---|---|
| Mass Mould + Base + Soil | 10,496.00 | (g) |
| Mass Mould + Base | 6,631.50 | (g) |
| Volume Mould (from calibration) | 2,309.00 | (ml) |
| **Bulk Density** | **1.67** | ($t/m^3$) |

### WATER CONTENT

| | Before (trimmings) | After (under plunger) |
|---|---|---|
| Mass Wet Soil + Tin (g) | 394.310 | 375.238 |
| Mass Dry Soil + Tin (g) | 283.158 | 278.825 |
| Mass Tin (g) | 79.471 | 107.011 |
| **Water Content (%)** | **54.6** | **56.1** |
| **Dry Density ($t/m^3$)** | **1.08** | |

### DETERMINATION OF SWELL

| | |
|---|---|
| Initial Reading (mm) | 11.81 |
| Final Reading (mm) | 11.70 |
| Change in Height (mm) | -0.11 |
| Initial Height (mm) | 127.00 |
| **Swell (%)** | **0.0** |

### DETERMINATION OF BEARING VALUE

| Plunger Penetration (mm) | Proving Ring Dial (divisions) | Force (kN) |
|---|---|---|
| 0.0 | 0.0 | 0.00 |
| 0.5 | 15.0 | 0.04 |
| 1.0 | 36.0 | 0.11 |
| 1.5 | 62.0 | 0.18 |
| 2.0 | 89.0 | 0.27 |
| **2.5** | **118.0** | **0.35** |
| 3.0 | 147.0 | 0.44 |
| 3.5 | 174.0 | 0.52 |
| 4.0 | 200.0 | 0.60 |
| 4.5 | 229.0 | 0.68 |
| **5.0** | **254.0** | **0.76** |
| 5.5 | 279.0 | 0.83 |
| 6.0 | 304.0 | 0.91 |
| 6.5 | 329.0 | 0.98 |
| 7.0 | 351.0 | 1.05 |
| 7.5 | 367.0 | 1.09 |

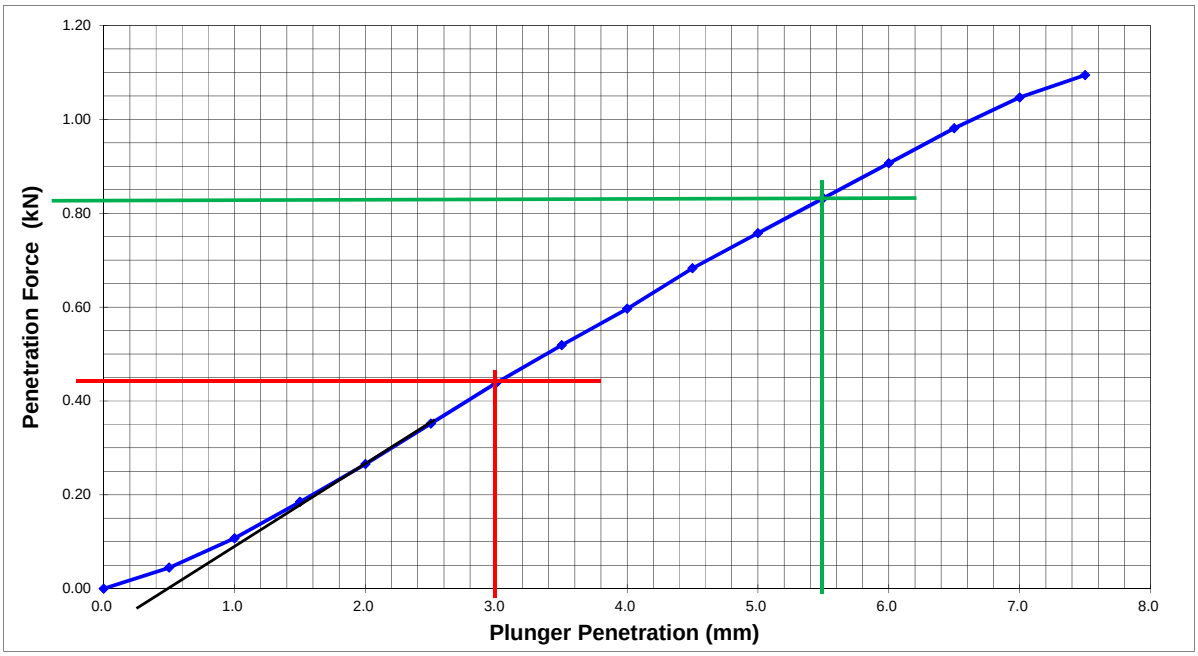
| | |
|---|---|
| **2.5mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **2.7** |
| ***with curve shape correction (if needed)*** | **3.3** |
| **5.0mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **3.8** |
| ***with curve shape correction (if needed)*** | **4.2** |

**FINAL CBR VALUE: 4.0**

| | | |
|---|---|---|
| Air Voids: | 0.1 | % |
| Time of Soaking: | 4 | days |
| Plunger Penetration Rate: | 1.0 | mm / minute |

| | | |
|---|---|---|
| Lime Added: | 0.0 | % |
| Cement Added: | 0.0 | % |

## CBR FORCE-PENETRATION CURVE



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|---|---|---|---|---|
| | REG. NUMBER: | 2884 | 64121#L/CBR | Ver.2, Issued July 2017 |
| | PROJECT: | DRURY CENTRE PROJECT | | |

## CALIFORNIA BEARING RATIO TEST:
## REMOULDED SAMPLE, SOAKED

**Test Method: NZS4402:1986:Test 6.1.1**

**NZS4402:1986:Test 2.1 Moisture Content**

| | Initials | Date |
|---|---|---|
| Tested By: | WEC | 16/02/2021 |
| Compiled By: | WEC | 17/02/2021 |
| Checked By: | JF | 22/02/2021 |

**Sample Number:** TP029 / BULK

**Sample Depth (m):** 0.70 - 1.80m

**Sample History:** ~~dried / wetted / lime added / cement added/ unknown~~ / natural

**Compaction Used:** NZ Standard / ~~NZ Heavy~~

| | |
|---|---|
| Proving Ring No: | 1155-10-13232 |
| Calibration Factor: | 335.37 |

(dial divisions / kN: from calibration worksheet)

# SOAKED CBR

| | | |
|---|---|---|
| Soil Sieved Over: | 9.50 | mm sieve |
| Surcharge Used: | 4.00 | kg |
| Mould Number: | B6 | |

***BULK DENSITY***

| | | |
|---|---|---|
| Mass Mould + Base + Soil | 10,362.40 | (g) |
| Mass Mould + Base | 6,623.00 | (g) |
| Volume Mould (from calibration) | 2,296.00 | (ml) |
| **Bulk Density** | **1.63** | ($t/m^3$) |

***WATER CONTENT***

| | Before (trimmings) | After (under plunger) |
|---|---|---|
| Mass Wet Soil + Tin (g) | not enough sample | 363.896 |
| Mass Dry Soil + Tin (g) | | 254.853 |
| Mass Tin (g) | | 78.384 |
| **Water Content (%)** | | **61.8** |
| **Dry Density ($t/m^3$)** | **1.22** | |

***DETERMINATION OF SWELL***

| | |
|---|---|
| Initial Reading (mm) | 9.92 |
| Final Reading (mm) | 10.02 |
| Change in Height (mm) | 0.10 |
| Initial Height (mm) | 126.88 |
| **Swell (%)** | **0.0** |

***DETERMINATION OF BEARING VALUE***

| Plunger Penetration (mm) | Proving Ring Dial (divisions) | Force (kN) |
|---|---|---|
| 0.0 | 0.0 | 0.00 |
| 0.5 | 16.0 | 0.05 |
| 1.0 | 36.0 | 0.11 |
| 1.5 | 62.0 | 0.18 |
| 2.0 | 92.0 | 0.27 |
| **2.5** | **124.0** | **0.37** |
| 3.0 | 154.0 | 0.46 |
| 3.5 | 181.0 | 0.54 |
| 4.0 | 209.0 | 0.62 |
| 4.5 | 238.0 | 0.71 |
| **5.0** | **264.0** | **0.79** |
| 5.5 | 292.0 | 0.87 |
| 6.0 | 310.0 | 0.92 |
| 6.5 | 330.0 | 0.98 |
| 7.0 | 344.0 | 1.03 |
| 7.5 | 356.0 | 1.06 |

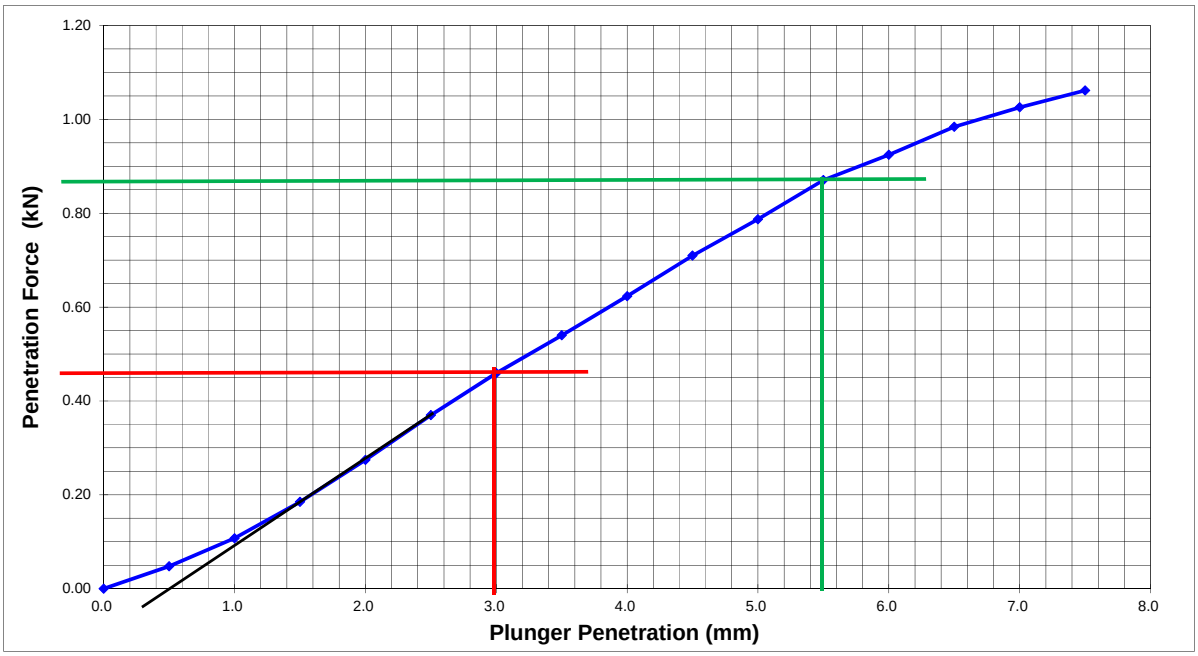
| | |
|---|---|
| **2.5mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **2.8** |
| ***with curve shape correction (if needed)*** | **3.5** |
| **5.0mm PENETRATION BEARING VALUE** | |
| ***uncorrected*** | **3.9** |
| ***with curve shape correction (if needed)*** | **4.4** |

**FINAL CBR VALUE: 4.5**

| | | |
|---|---|---|
| Air Voids: | - | % |
| Time of Soaking: | 4 | days |
| Plunger Penetration Rate: | 1.0 | mm / minute |

| | | |
|---|---|---|
| Lime Added: | 0.0 | % |
| Cement Added: | 0.0 | % |

## CBR FORCE-PENETRATION CURVE



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Attention: **SAM MacKAY**

Job Number: 64121#L
BGL Registration Number: 2884
Checked by: WEC

23rd February 2021

# DRY DENSITY / WATER CONTENT RELATIONSHIP (COMPACTION CURVE) TESTING

Dear Sam,

## *Re: DRURY CENTRE PROJECT*
***Report Number: 64121#L/CC***

The following report presents the results of compaction curve testing at BGL of bulk soil samples delivered to this laboratory on the 29th of January 2021. Test results are summarised below, with the following pages showing graphs and detailed results.

A single shear vane test was carried out on each compacted sample while it was still in the proctor mould, and these results are included on the results tables and water content / density graphs. The shear vane results are included for your information only, and are not included in the IANZ endorsement for this report.

Test standards used were:

| | |
|---|---|
| **Water Content:** | NZS4402:1986:Test 2.1 |
| **NZ Standard Compaction:** | NZS4402:1986:Test 4.1.1 |
| **Vane Shear Strength:** | NZ Geotechnical Society Guideline 2001 |

| Sample Details | Maximum Dry Density ($t/m^3$) | Optimum Water Content (%) | Natural Water Content (%) |
|---|---|---|---|
| **TP005 / BULK / 2.10 – 2.40m** | **1.17** | **44** | **46.9** |
| | SILT, minor fine gravel, moderately plastic, mottled grey & reddish brown. | | |

*Note that sample descriptions above are not part of BGL IANZ Accreditation.*

Babbage Geotechnical Laboratory

| Sample Details | Maximum Dry Density ($t/m^3$) | Optimum Water Content (%) | Natural Water Content (%) |
|---|---|---|---|
| **TP008 / BULK / 2.30 – 2.70m** | **1.24** | **40** | **43.5** |
| | SILT, clayey, minor fine gravel, moderately plastic, brown with orangish red mottles, slightly moist. | | |
| **TP017 / BULK / 2.20 – 2.50m** | **1.21** | **44** | **45.1** |
| | SILT, moderately plastic, orange, slightly moist, very friable | | |
| **TP023 / BULK / 0.75 – 3.00m** | **1.14** | **43** | **59.0** |
| | SILT to COARSE GRAVEL (completely to highly weathered basalt scoria), slightly plastic, red, grey & brown. | | |
| **TP025 / BULK / 1.50 – 3.00m** | **1.17** | **44** | **55.3** |
| | SILT, clayey, gravelly, slightly plastic, reddish brown, moist. | | |

*Note that sample descriptions above are not part of BGL IANZ Accreditation.*

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater. As per the reporting requirements of NZS4402: 1986: Test 4.1.1: New Zealand Standard Compaction Test, maximum dry density is reported to the nearest $0.01t/m^3$, optimum water content is reported to the nearest 0.2% for values below 5%, to the nearest 0.5% for values from 5 to 10%, and to the nearest whole number for values greater than 10%.

For calculating the air voids percentages a solid density of $2.65t/m^3$ was assumed for TP005, a solid density of $2.61t/m^3$ was assumed for TP008, a solid density of $2.72t/m^3$ was assumed for TP017, a solid density of $2.76t/m^3$ was assumed for TP023, and a solid density of $2.71t/m^3$ was assumed for TP025. Please note that these assumed values are not part of the IANZ endorsement for this report.

Please note that the test results relate only to the samples as-received, and relate only to the samples under test. Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
**Signatory (Assistant Laboratory Manager)**
**Babbage Geotechnical Laboratory**

ACCREDITED IANZ TESTING LABORATORY № 126

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full & with written approval from BGL.

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|---|---|---|---|---|---|---|
| | | | | | Version No: | 3 |
| | Report No: | 64121#L/CC | | | Issue Date: | Jul-17 |
| | PROJECT: | DRURY CENTRE PROJECT | | | | |

| Determination of the Dry Density / Water Content Relationship by Standard Compaction | Tested By: | WEC / JW | Feb 2021 |
|---|---|---|---|
| | Compiled By: | WEC | 23/02/2021 |
| Test Method: NZS4402: 1986: Test 4.1.1 | Checked By: | JF | 23/02/2021 |

**Sample No:** **TP005 / BULK** **Sample Depth:** **2.10 - 2.40m**

**Sample History:** Air-dried and wetted from natural water content

**Compaction Used:** New Zealand Standard Compaction

**Test Performed On:** Whole Soil / ~~Fraction Passing the 19mm Sieve~~

**Solid Density of Soil Particles:** 2.65 $t/m^3$ (~~measured~~ / assumed)

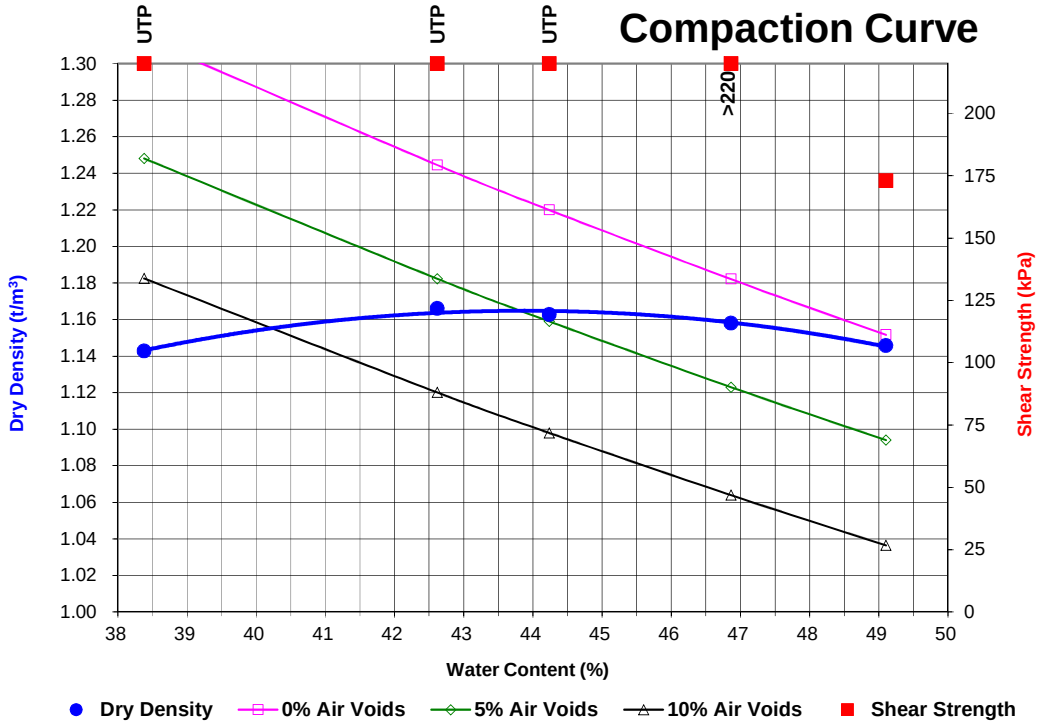
**Natural Water Content (%):** **46.9**

## TEST RESULTS

| Water Content (%) | 38.4 | 42.6 | 44.2 | 46.9 | 49.1 |
|---|---|---|---|---|---|
| Bulk Density ($t/m^3$) | 1.58 | 1.66 | 1.68 | 1.70 | 1.71 |
| Dry Density ($t/m^3$) | 1.14 | 1.17 | 1.16 | 1.16 | 1.15 |
| Air Voids (%) | 13.0 | 6.3 | 4.7 | 2.0 | 0.5 |
| Shear Strength (kPa) | UTP* | UTP* | UTP* | >220 | 110 |

***UTP = unable to penetrate sample with the shear vane.***

| Maximum Dry Density: | 1.17 $t/m^3$ | Optimum Water Content: | 44 % |
|---|---|---|---|



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|---|---|---|---|---|---|---|
| | | | | | Version No: | 3 |
| | Report No: | 64121#L/CC | | | Issue Date: | Jul-17 |
| | PROJECT: | DRURY CENTRE PROJECT | | | | |

| Determination of the Dry Density / Water Content Relationship by Standard Compaction | Tested By: | WEC / JW | Feb 2021 |
|---|---|---|---|
| | Compiled By: | WEC | 23/02/2021 |
| Test Method: NZS4402: 1986: Test 4.1.1 | Checked By: | JF | 23/02/2021 |

**Sample No: TP008 / BULK** **Sample Depth: 2.30 - 2.70m**

**Sample History:** Air-dried and wetted from natural water content

**Compaction Used:** New Zealand Standard Compaction

**Test Performed On:** Whole Soil / ~~Fraction Passing the 19mm Sieve~~

**Solid Density of Soil Particles:** 2.61 $t/m^3$ (~~measured~~ / assumed)

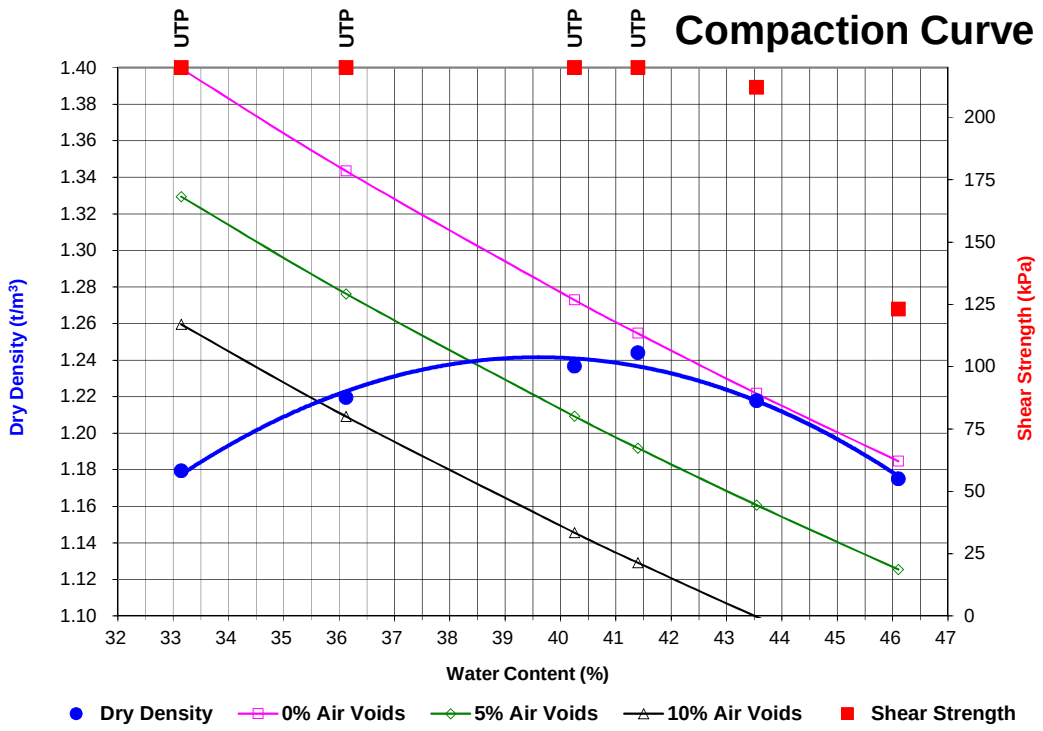
**Natural Water Content (%): 43.5**

## TEST RESULTS

| Water Content (%) | 33.1 | 36.1 | 40.2 | 41.4 | 43.5 | 46.1 |
|---|---|---|---|---|---|---|
| Bulk Density ($t/m^3$) | 1.57 | 1.66 | 1.73 | 1.76 | 1.75 | 1.72 |
| Dry Density ($t/m^3$) | 1.18 | 1.22 | 1.24 | 1.24 | 1.22 | 1.17 |
| Air Voids (%) | 15.7 | 9.2 | 2.9 | 0.8 | 0.3 | 0.8 |
| Shear Strength (kPa) | UTP* | UTP* | UTP* | UTP* | 212 | 123 |

***UTP = unable to penetrate sample with the shear vane.***

| Maximum Dry Density: | 1.24 $t/m^3$ | Optimum Water Content: | 40 % |
|---|---|---|---|



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| | | | | | Version No: | 3 |
| | Report No: | 64121#L/CC | | | Issue Date: | Jul-17 |
| | PROJECT: | DRURY CENTRE PROJECT | | | | |

| Determination of the Dry Density / Water Content Relationship by Standard Compaction | Tested By: | WEC / CBH | Feb 2021 |
|---|---|---|---|
| | Compiled By: | WEC | 23/02/2021 |
| Test Method: NZS4402: 1986: Test 4.1.1 | Checked By: | JF | 23/02/2021 |

**Sample No:** **TP017 / BULK** **Sample Depth:** **2.20 - 2.50m**

**Sample History:** Air-dried and wetted from natural water content

**Compaction Used:** New Zealand Standard Compaction

**Test Performed On:** Whole Soil / ~~Fraction Passing the 19mm Sieve~~

**Solid Density of Soil Particles:** 2.72 $t/m^3$ (~~measured~~ / assumed)

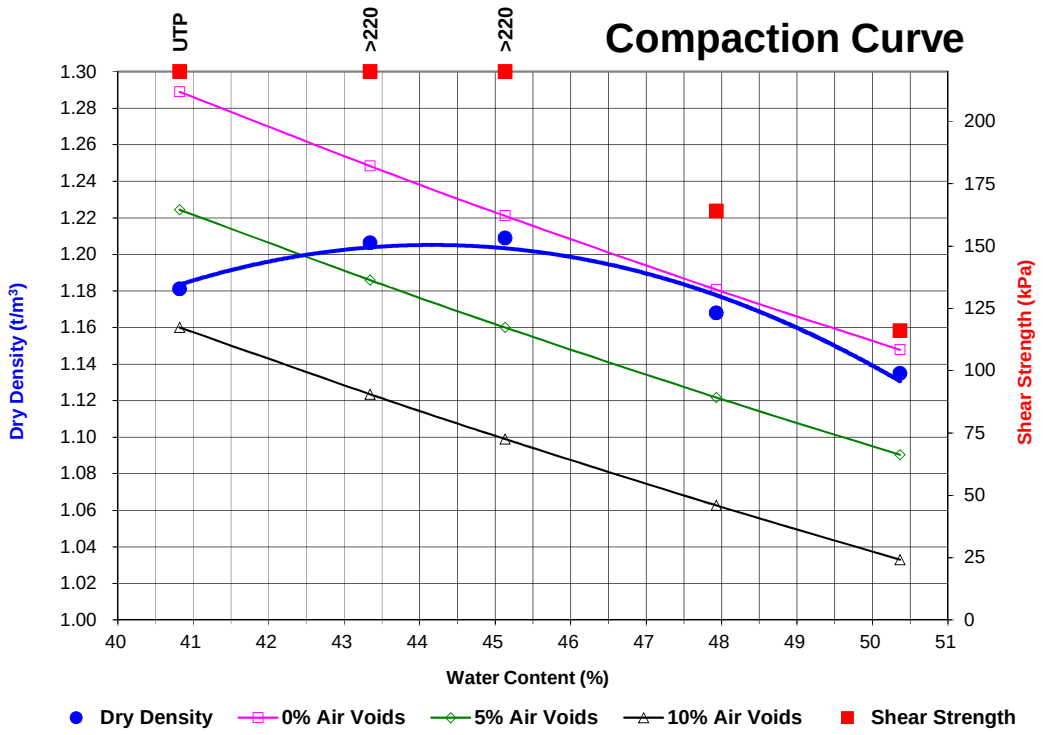
**Natural Water Content (%):** **45.1**

## TEST RESULTS

| Water Content (%) | 40.8 | 43.3 | 45.1 | 47.9 | 50.4 |
|---|---|---|---|---|---|
| Bulk Density ($t/m^3$) | 1.66 | 1.73 | 1.75 | 1.73 | 1.71 |
| Dry Density ($t/m^3$) | 1.18 | 1.21 | 1.21 | 1.17 | 1.13 |
| Air Voids (%) | 8.4 | 3.4 | 1.0 | 1.1 | 1.1 |
| Shear Strength (kPa) | UTP* | >220 | >220 | 164 | 116 |

***UTP = unable to penetrate sample with the shear vane.***

| Maximum Dry Density: | 1.21 $t/m^3$ | Optimum Water Content: | 44 % |
|---|---|---|---|



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| | | | | | Version No: | 3 |
| | Report No: | 64121#L/CC | | | Issue Date: | Jul-17 |
| | PROJECT: | DRURY CENTRE PROJECT | | | | |

| Determination of the Dry Density / Water Content Relationship by Standard Compaction | Tested By: | WEC / CBH | Feb 2021 |
|---|---|---|---|
| | Compiled By: | WEC | 23/02/2021 |
| Test Method: NZS4402: 1986: Test 4.1.1 | Checked By: | JF | 23/02/2021 |

**Sample No:** **TP023 / BULK** **Sample Depth:** **0.75 - 3.00m**

**Sample History:** Air-dried from natural water content

**Compaction Used:** New Zealand Standard Compaction

**Test Performed On:** ~~Whole Soil~~ / Fraction Passing the 19mm Sieve

**Solid Density of Soil Particles:** 2.76 $t/m^3$ (~~measured~~ / assumed)

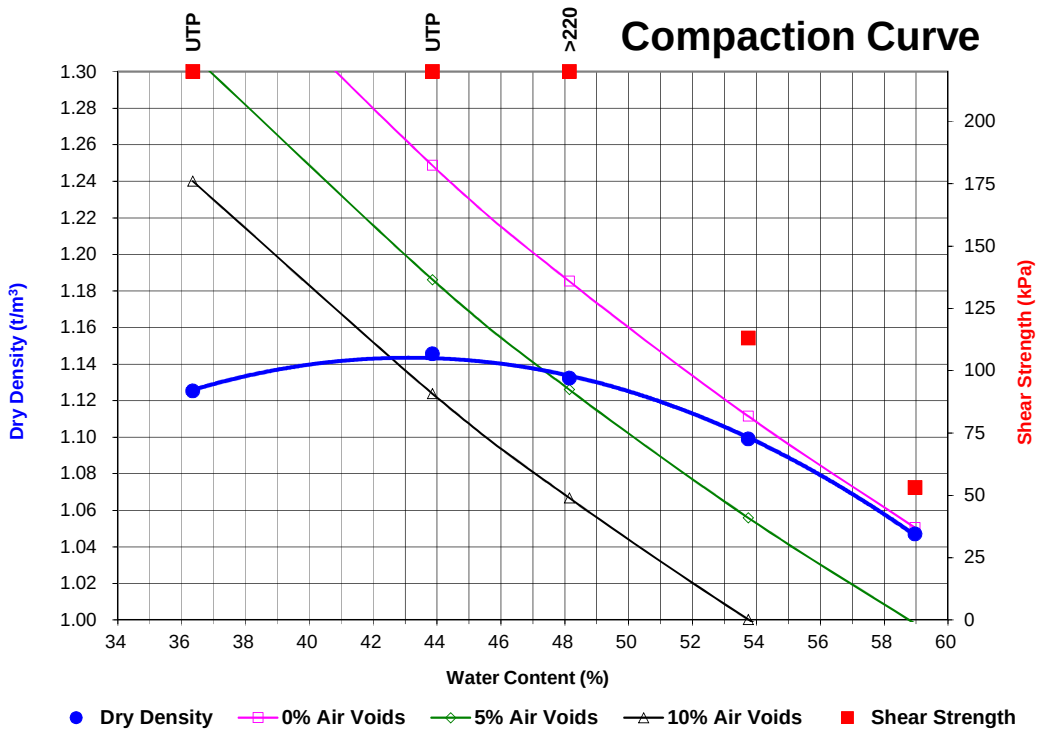
**Natural Water Content (%):** **59.0**

## TEST RESULTS

| Water Content (%) | 36.3 | 43.9 | 48.1 | 53.7 | 59.0 |
|---|---|---|---|---|---|
| Bulk Density ($t/m^3$) | 1.53 | 1.65 | 1.68 | 1.69 | 1.66 |
| Dry Density ($t/m^3$) | 1.13 | 1.15 | 1.13 | 1.10 | 1.05 |
| Air Voids (%) | 18.3 | 8.3 | 4.5 | 1.1 | 0.3 |
| Shear Strength (kPa) | UTP* | UTP* | >220 | 113 | 53 |

***UTP = unable to penetrate sample with the shear vane.***

| Maximum Dry Density: | 1.14 $t/m^3$ | Optimum Water Content: | 43 % |
|---|---|---|---|



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|---|---|---|---|---|---|---|
| | | | | | Version No: | 3 |
| | Report No: | 64121#L/CC | | | Issue Date: | Jul-17 |
| | PROJECT: | DRURY CENTRE PROJECT | | | | |

| Determination of the Dry Density / Water Content Relationship by Standard Compaction | Tested By: | WEC / JW | Feb 2021 |
|---|---|---|---|
| | Compiled By: | WEC | 23/02/2021 |
| Test Method: NZS4402: 1986: Test 4.1.1 | Checked By: | JF | 23/02/2021 |

**Sample No:** **TP025 / BULK** **Sample Depth:** **1.50 - 3.00m**

**Sample History:** Air-dried from natural water content

**Compaction Used:** New Zealand Standard Compaction

**Test Performed On:** Whole Soil / ~~Fraction Passing the 19mm Sieve~~

**Solid Density of Soil Particles:** 2.71 $t/m^3$ (~~measured~~ / assumed)

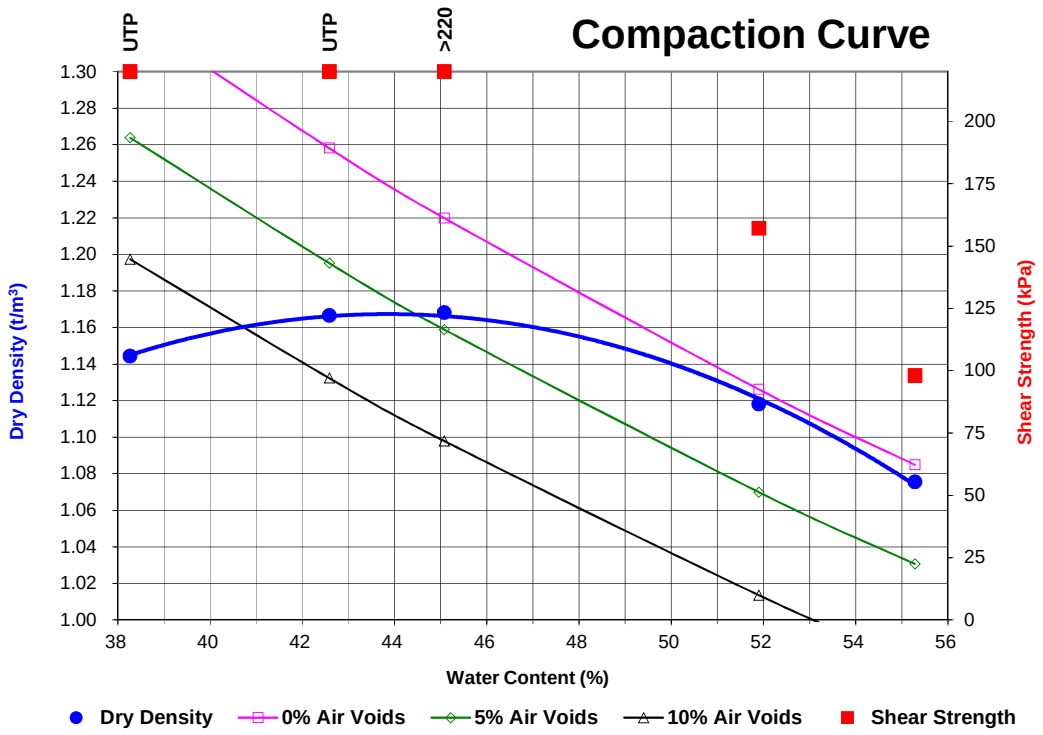
**Natural Water Content (%):** **55.3**

## TEST RESULTS

| Water Content (%) | 38.3 | 42.6 | 45.1 | 51.9 | 55.3 |
|---|---|---|---|---|---|
| Bulk Density ($t/m^3$) | 1.58 | 1.66 | 1.69 | 1.70 | 1.67 |
| Dry Density ($t/m^3$) | 1.14 | 1.17 | 1.17 | 1.12 | 1.08 |
| Air Voids (%) | 14.0 | 7.3 | 4.2 | 0.7 | 0.9 |
| Shear Strength (kPa) | UTP* | UTP* | >220 | 157 | 98 |

***UTP = unable to penetrate sample with the shear vane.***

| Maximum Dry Density: | 1.17 $t/m^3$ | Optimum Water Content: | 44 % |
|---|---|---|---|



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Please reply to: W.E. Campton



Aurecon New Zealand Limited
PO Box 9762
Newmarket
Auckland 1149

Attention: **SAM MacKAY**

Job Number: 64121#L
BGL Registration Number: 2884
Checked by: WEC

22nd February 2021

# HYDROMETER PARTICLE-SIZE DISTRIBUTION TESTING

Dear Sam,

## *Re: DRURY CENTRE PROJECT*
***Report Number: 64121#L/HYD***

The following report presents the results of hydrometer particle-size distribution testing at BGL of soil samples delivered to this laboratory on the 29th of January 2021. Test results are summarised below, with the following pages showing graphs and detailed results. Test standards used were:

| | |
|---|---|
| **Water Content:** | NZS4402:1986:Test 2.1 |
| **Wet Sieve Test:** | NZS4402:1986:Test 2.8.1 |
| **Hydrometer Test:** | NZS4402:1986:Test 2.8.4 |

| Test Pit / Borehole Number | Sample Number | Depth (m) | Hydrometer Grading (% of Dry Mass) | | | |
|---|---|---|---|---|---|---|
| | | | GRAVEL (2 – <9.50mm) | SAND (0.06 – 2mm) | SILT FRACTION (0.002 – 0.06mm) | CLAY FRACTION (< 0.002mm) |
| TP003 | BULK | 0.25 – 0.80 | 1 | 4 | 20 | 75 |
| TP004 | BULK | 0.60 – 1.10 | 0 | 3 | 23 | 74 |
| TP023 | BULK | 0.75 – 3.00 | 2 | 16 | 53 | 29 |
| TP029 | BULK | 1.80 – 2.40 | 0 | 12 | 44 | 44 |
| TP031 | BULK | 2.70 – 3.00 | 0 | 28 | 50 | 22 |
| BH015 | BAG | 14.00 – 14.50 | 0 | 75 | 19 | 6 |
| BH016 | BAG | 13.50 – 14.00 | 0 | 11 | 61 | 28 |

The whole soil was used for these hydrometer tests, except for sample TP023 0.75 – 3.00m, where the soil fraction passing a 9.50mm sieve was used. NZS4402:1986:Test 2.8.4 uses a 2.00mm sieve as the separation point for obtaining the hydrometer sample, therefore the use of the whole soil & the soil fraction passing a 9.50mm sieve represents a departure from the test standard.

As the organic content of the soils tested was very low, peroxide pretreatment was not carried out. A solid density of 2.65t/m$^3$ was assumed for these hydrometer tests, and is not part of the IANZ endorsement for this report.

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater. Test 2.8.1: wet sieve & Test 2.8.4: hydrometer, the 'percentages passing' and 'percentages finer than' are reported to nearest 1%.

Please note that the test results relate only to the samples as-received, and relate only to the samples under test.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
**Signatory (Assistant Laboratory Manager)**
**Babbage Geotechnical Laboratory**

ACCREDITED
IANZ
TESTING LABORATORY
№ 126

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation. This report may not be reproduced except in full & with written approval from BGL.

| Babbage Geotechnical Laboratory | Job Number: | 64121#L | Sheet 1 of 1 | Page 3 of 9 |
|---|---|---|---|---|
| | Reg. Number: | 2884 | Version No: | 6 |
| | Report No: | 64121#L/HYD | Issue Date: | December 2019 |
| | Project: | DRURY CENTRE PROJECT | | |

# PARTICLE-SIZE DISTRIBUTION BY HYDROMETER

Test Methods: NZS4402: 1986: Test 2.1, Test 2.8.1, Test 2.8.4

| | | |
|---|---|---|
| Tested By: | JW | 12-Feb-21 |
| Compiled By: | JW | 13-Feb-21 |
| Checked By: | JF | 16-Feb-21 |

**BH No:** TP003 **Sample No:** BULK **Depth:** 0.25 - 0.80m

***Water Content (%):*** **53.3**

Sample History: Natural / ~~Air Dried / Oven Dried / Unknown~~

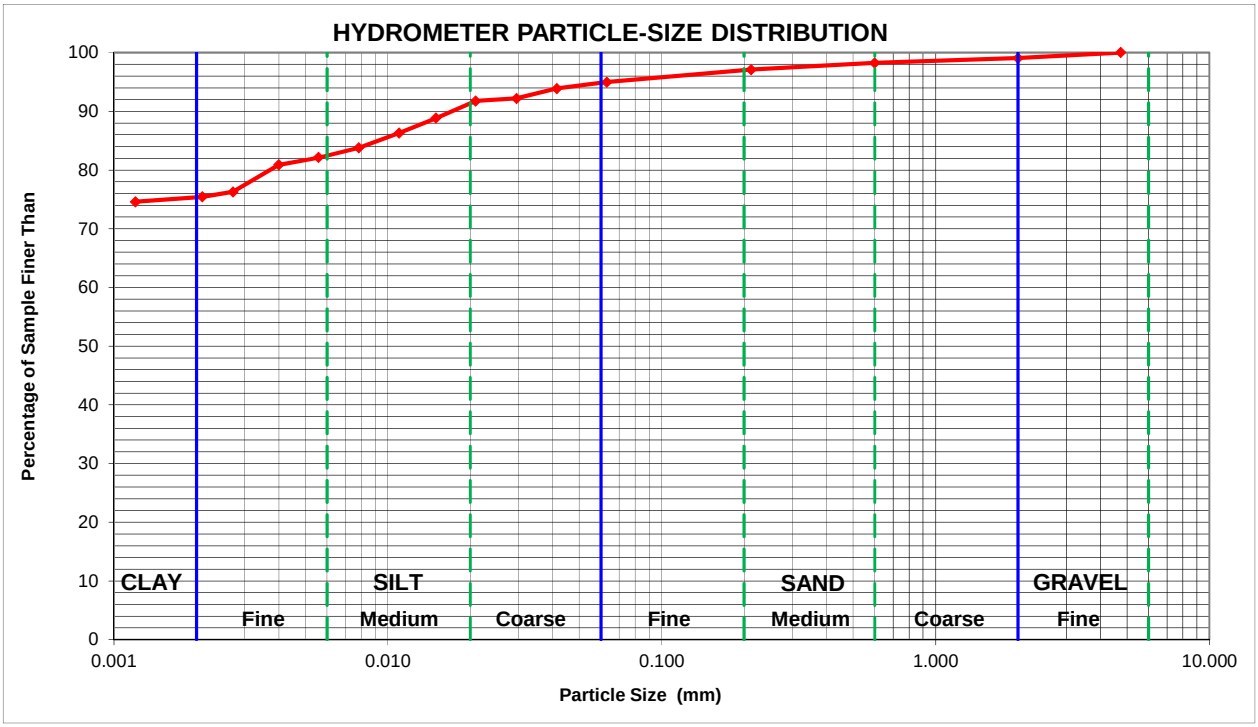
pH of sedimentation suspension: 8.5

| Particle Size (mm) | % Finer Than |
|---|---|
| 4.75 | 100 |
| 2.00 | 99 |
| 0.600 | 98 |
| 0.212 | 97 |
| 0.063 | 95 |
| 0.041 | 94 |
| 0.029 | 92 |
| 0.021 | 92 |
| 0.015 | 89 |
| 0.011 | 86 |
| 0.0078 | 84 |
| 0.0056 | 82 |
| 0.0040 | 81 |
| 0.0027 | 76 |
| 0.0021 | 75 |
| 0.0012 | 75 |

**HYDROMETER ANALYSIS (% of dry mass)**

| | | | | TOTAL | |
|---|---|---|---|---|---|
| GRAVEL: | (Medium) | *< 9.5 - 6mm* | 0 | 1 | % |
| | (Fine) | *6 - 2mm* | 1 | | |
| SAND: | (Coarse) | *2.0 - 0.6mm* | 1 | 4 | % |
| | (Medium) | *0.6 - 0.2mm* | 1 | | |
| | (Fine) | *0.2 - 0.06mm* | 2 | | |
| SILT FRACTION: | (Coarse) | *0.06 - 0.02mm* | 4 | 20 | % |
| | (Medium) | *0.02 - 0.006mm* | 9 | | |
| | (Fine) | *0.006 - 0.002mm* | 7 | | |
| CLAY FRACTION: | *< 0.002mm* | | | 75 | % |
| | | | | 100% | |

HYDROMETER TEST WAS CARRIED OUT ON THE WHOLE SOIL / ~~SOIL FRACTION PASSING A 9.50mm SIEVE~~



| Babbage Geotechnical Laboratory | Job Number: | 64121#L | Sheet 1 of 1 | Page 4 of 9 |
|---|---|---|---|---|
| | Reg. Number: | 2884 | Version No: | 6 |
| | Report No: | 64121#L/HYD | Issue Date: | December 2019 |
| | Project: | DRURY CENTRE PROJECT | | |

# PARTICLE-SIZE DISTRIBUTION BY HYDROMETER

Test Methods: NZS4402: 1986: Test 2.1, Test 2.8.1, Test 2.8.4

| | | |
|---|---|---|
| Tested By: | JW | 12-Feb-21 |
| Compiled By: | JW | 13-Feb-21 |
| Checked By: | JF | 16-Feb-21 |

***BH No:*** **TP004** ***Sample No:*** **BULK** ***Depth:*** **0.60 - 1.10m**

***Water Content (%):*** **68.6**

Sample History: Natural / ~~Air Dried / Oven Dried / Unknown~~

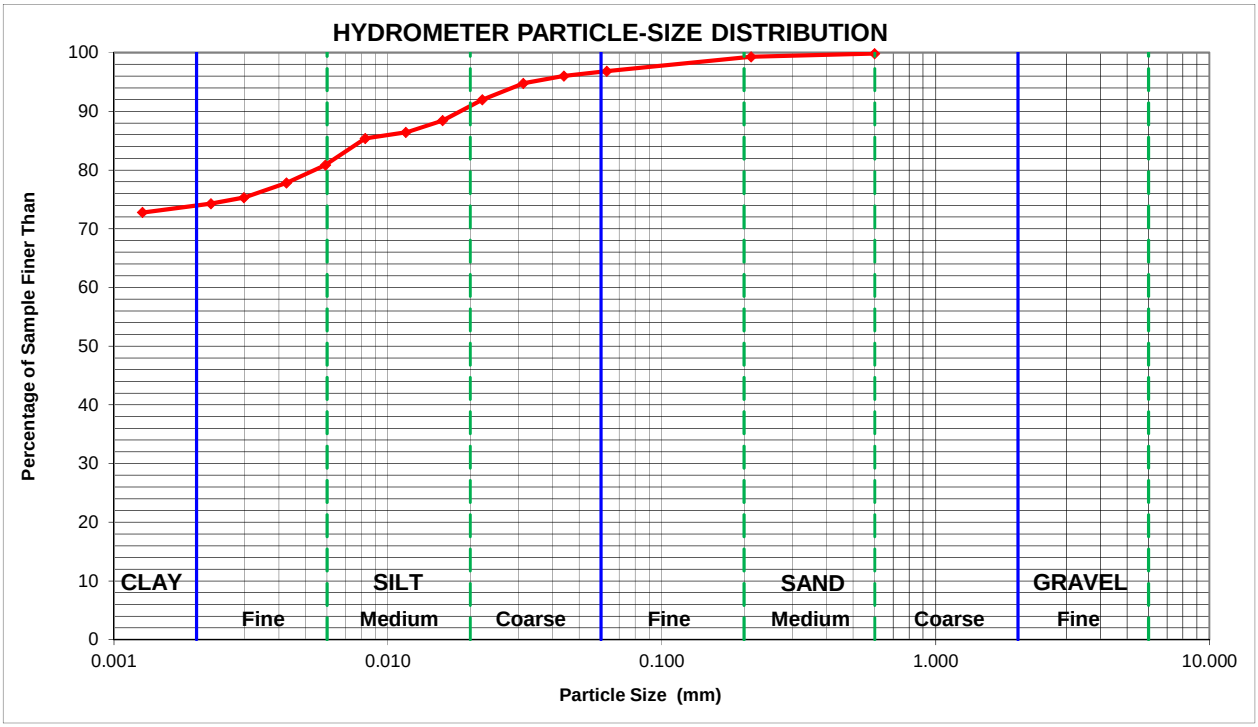
pH of sedimentation suspension: 8.5

| Particle Size (mm) | % Finer Than |
|---|---|
| 0.600 | 100 |
| 0.212 | 99 |
| 0.063 | 97 |
| 0.044 | 96 |
| 0.031 | 95 |
| 0.022 | 92 |
| 0.016 | 88 |
| 0.012 | 86 |
| 0.0083 | 85 |
| 0.0059 | 81 |
| 0.0043 | 78 |
| 0.0030 | 75 |
| 0.0023 | 74 |
| 0.0013 | 73 |

**HYDROMETER ANALYSIS (% of dry mass)**

| | | | | TOTAL | |
|---|---|---|---|---|---|
| GRAVEL: | (Medium) | *< 9.5 - 6mm* | 0 | 0 | % |
| | (Fine) | *6 - 2mm* | 0 | | |
| SAND: | (Coarse) | *2.0 - 0.6mm* | 0 | 3 | % |
| | (Medium) | *0.6 - 0.2mm* | 1 | | |
| | (Fine) | *0.2 - 0.06mm* | 2 | | |
| SILT FRACTION: | (Coarse) | *0.06 - 0.02mm* | 6 | 23 | % |
| | (Medium) | *0.02 - 0.006mm* | 10 | | |
| | (Fine) | *0.006 - 0.002mm* | 7 | | |
| CLAY FRACTION: | | *< 0.002mm* | | 74 | % |
| | | | | 100% | |

**HYDROMETER TEST WAS CARRIED OUT ON THE WHOLE SOIL / ~~SOIL FRACTION PASSING A 9.50mm SIEVE~~**



| Babbage Geotechnical Laboratory | Job Number: | 64121#L | Sheet 1 of 1 | Page 5 of 9 |
|---|---|---|---|---|
| | Reg. Number: | 2884 | Version No: | 6 |
| | Report No: | 64121#L/HYD | Issue Date: | December 2019 |
| | Project: | DRURY CENTRE PROJECT | | |

# PARTICLE-SIZE DISTRIBUTION BY HYDROMETER

Test Methods: NZS4402: 1986: Test 2.1, Test 2.8.1, Test 2.8.4

| | | |
|---|---|---|
| Tested By: | JW | 17-Feb-21 |
| Compiled By: | JW | 18-Feb-21 |
| Checked By: | JF | 22-Feb-21 |

***BH No:*** **TP023** ***Sample No:*** **BULK** ***Depth:*** **0.75 - 3.00m**

***Water Content (%):*** **58.4**

Sample History: Natural / ~~Air Dried / Oven Dried / Unknown~~

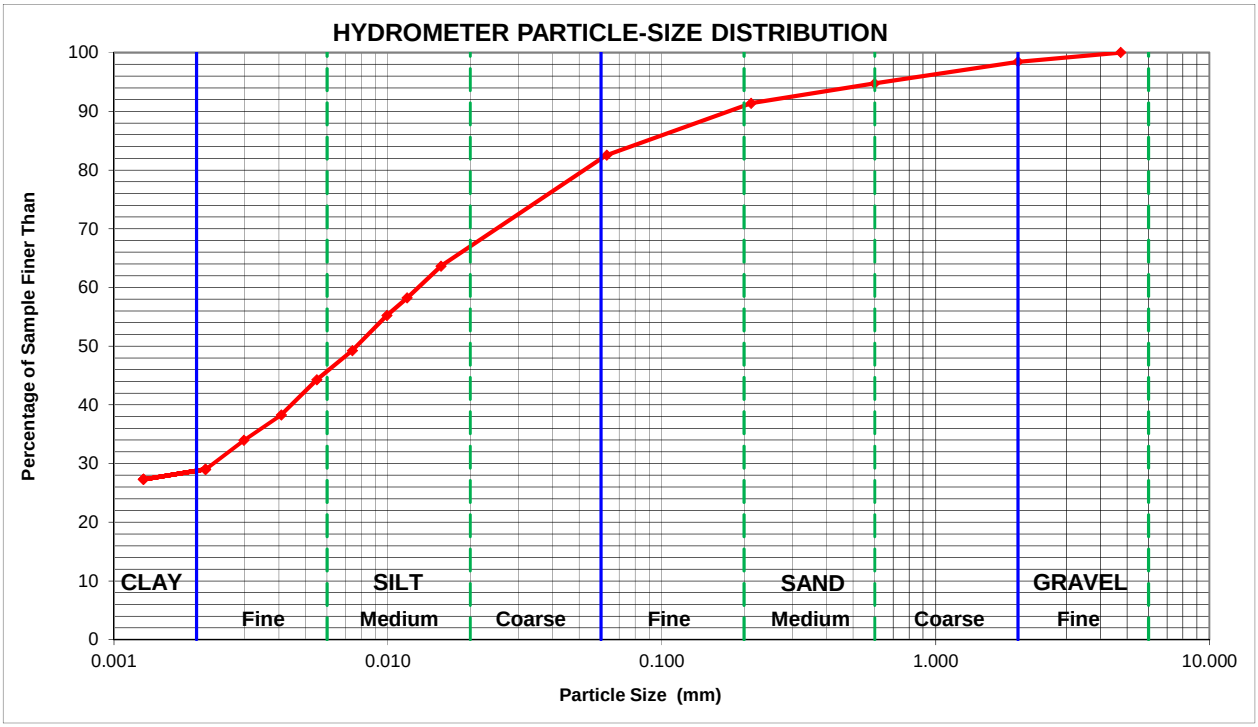
pH of sedimentation suspension: 8.0

| Particle Size (mm) | % Finer Than |
|---|---|
| 4.75 | 100 |
| 2.00 | 98 |
| 0.60 | 95 |
| 0.212 | 91 |
| 0.06 | 83 |
| 0.02 | 64 |
| 0.012 | 58 |
| 0.010 | 55 |
| 0.007 | 49 |
| 0.006 | 44 |
| 0.004 | 38 |
| 0.003 | 34 |
| 0.002 | 29 |
| 0.001 | 27 |
| 0.002 | 29 |
| 0.001 | 27 |
| 0.002 | 29 |
| 0.001 | 27 |

**HYDROMETER ANALYSIS (% of dry mass)**

| | | | | TOTAL | |
|---|---|---|---|---|---|
| GRAVEL: | (Medium) | *< 9.5 - 6mm* | 0 | 2 | % |
| | (Fine) | *6 - 2mm* | 2 | | |
| SAND: | (Coarse) | *2.0 - 0.6mm* | 3 | 16 | % |
| | (Medium) | *0.6 - 0.2mm* | 4 | | |
| | (Fine) | *0.2 - 0.06mm* | 9 | | |
| SILT FRACTION: | (Coarse) | *0.06 - 0.02mm* | 15 | 53 | % |
| | (Medium) | *0.02 - 0.006mm* | 21 | | |
| | (Fine) | *0.006 - 0.002mm* | 17 | | |
| CLAY FRACTION: | | *< 0.002mm* | | 29 | % |
| | | | | 100% | |

**HYDROMETER TEST WAS CARRIED OUT ON THE ~~WHOLE SOIL~~ / SOIL FRACTION PASSING A 9.50mm SIEVE**



| Babbage Geotechnical Laboratory | Job Number: | 64121#L | Sheet 1 of 1 | Page 6 of 9 |
|---|---|---|---|---|
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| | Report No: | 64121#L/HYD | Issue Date: | December 2019 |
| | Project: | DRURY CENTRE PROJECT | | |

# PARTICLE-SIZE DISTRIBUTION BY HYDROMETER

Test Methods: NZS4402: 1986: Test 2.1, Test 2.8.1, Test 2.8.4

| | | |
|---|---|---|
| Tested By: | JW | 12-Feb-21 |
| Compiled By: | JW | 13-Feb-21 |
| Checked By: | JF | 16-Feb-21 |

**BH No:** TP029 **Sample No:** BULK **Depth:** 1.80 - 2.40m

***Water Content (%):*** **32.6**

Sample History: Natural / ~~Air Dried / Oven Dried / Unknown~~

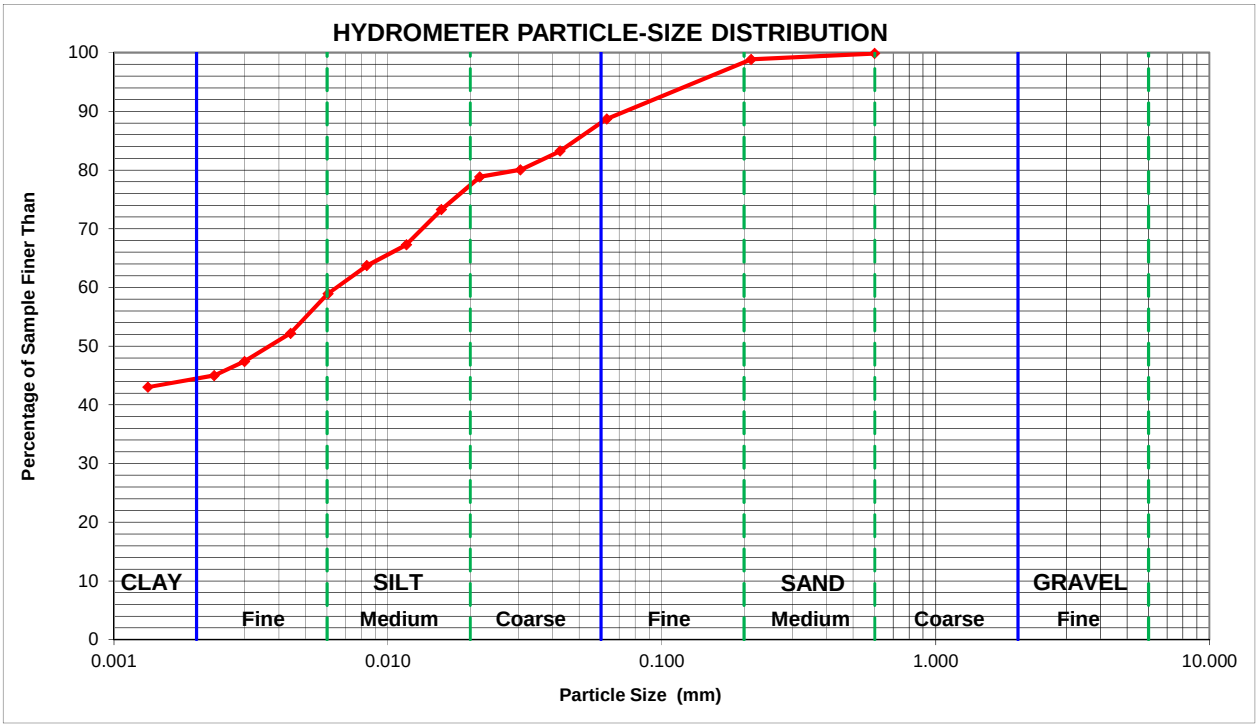
pH of sedimentation suspension: 8.5

| Particle Size (mm) | % Finer Than |
|---|---|
| 0.600 | 100 |
| 0.212 | 99 |
| 0.063 | 89 |
| 0.043 | 83 |
| 0.030 | 80 |
| 0.022 | 79 |
| 0.016 | 73 |
| 0.012 | 67 |
| 0.0084 | 64 |
| 0.0060 | 59 |
| 0.0044 | 52 |
| 0.0030 | 47 |
| 0.0023 | 45 |
| 0.0013 | 43 |

**HYDROMETER ANALYSIS (% of dry mass)**

| | | | | TOTAL | |
|---|---|---|---|---|---|
| GRAVEL: | (Medium) | *< 9.5 - 6mm* | 0 | 0 | % |
| | (Fine) | *6 - 2mm* | 0 | | |
| SAND: | (Coarse) | *2.0 - 0.6mm* | 0 | 12 | % |
| | (Medium) | *0.6 - 0.2mm* | 2 | | |
| | (Fine) | *0.2 - 0.06mm* | 10 | | |
| SILT FRACTION: | (Coarse) | *0.06 - 0.02mm* | 11 | 44 | % |
| | (Medium) | *0.02 - 0.006mm* | 18 | | |
| | (Fine) | *0.006 - 0.002mm* | 15 | | |
| CLAY FRACTION: | | *< 0.002mm* | | 44 | % |
| | | | | 100% | |

**HYDROMETER TEST WAS CARRIED OUT ON THE WHOLE SOIL / ~~SOIL FRACTION PASSING A 9.50mm SIEVE~~**



| Babbage Geotechnical Laboratory | Job Number: | 64121#L | Sheet 1 of 1 | Page 7 of 9 |
|---|---|---|---|---|
| | Reg. Number: | 2884 | Version No: | 6 |
| | Report No: | 64121#L/HYD | Issue Date: | December 2019 |
| | Project: | DRURY CENTRE PROJECT | | |

# PARTICLE-SIZE DISTRIBUTION BY HYDROMETER

Test Methods: NZS4402: 1986: Test 2.1, Test 2.8.1, Test 2.8.4

| | | |
|---|---|---|
| Tested By: | JW | 17-Feb-21 |
| Compiled By: | JW | 18-Feb-21 |
| Checked By: | JF | 22-Feb-21 |

**BH No:** TP031 **Sample No:** BULK **Depth:** 2.70 - 3.00m

***Water Content (%):*** **47.3**

Sample History: Natural / ~~Air Dried / Oven Dried / Unknown~~

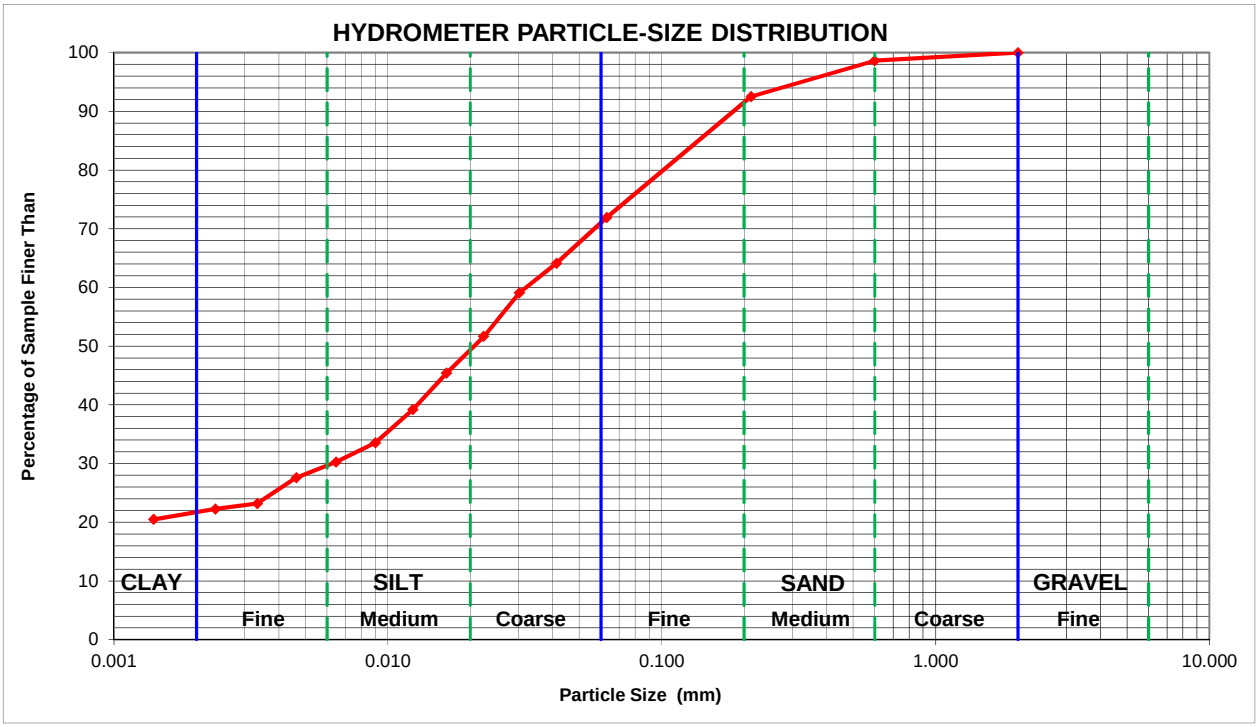
pH of sedimentation suspension: 8.5

| Particle Size (mm) | % Finer Than |
|---|---|
| 2.00 | 100 |
| 0.600 | 99 |
| 0.212 | 93 |
| 0.063 | 72 |
| 0.041 | 64 |
| 0.030 | 59 |
| 0.022 | 52 |
| 0.016 | 45 |
| 0.012 | 39 |
| 0.0090 | 34 |
| 0.0065 | 30 |
| 0.0046 | 28 |
| 0.0033 | 23 |
| 0.0023 | 22 |
| 0.0014 | 20 |

**HYDROMETER ANALYSIS (% of dry mass)**

| | | | | TOTAL | |
|---|---|---|---|---|---|
| GRAVEL: | (Medium) | *< 9.5 - 6mm* | 0 | 0 | % |
| | (Fine) | *6 - 2mm* | 0 | | |
| SAND: | (Coarse) | *2.0 - 0.6mm* | 2 | 28 | % |
| | (Medium) | *0.6 - 0.2mm* | 6 | | |
| | (Fine) | *0.2 - 0.06mm* | 20 | | |
| SILT FRACTION: | (Coarse) | *0.06 - 0.02mm* | 22 | 50 | % |
| | (Medium) | *0.02 - 0.006mm* | 20 | | |
| | (Fine) | *0.006 - 0.002mm* | 8 | | |
| CLAY FRACTION: | | *< 0.002mm* | | 22 | % |
| | | | | 100% | |

**HYDROMETER TEST WAS CARRIED OUT ON THE WHOLE SOIL / ~~SOIL FRACTION PASSING A 9.50mm SIEVE~~**



| Babbage Geotechnical Laboratory | Job Number: | 64121#L | Sheet 1 of 1 | Page 8 of 9 |
|---|---|---|---|---|
| | Reg. Number: | 2884 | Version No: | 6 |
| | Report No: | 64121#L/HYD | Issue Date: | December 2019 |
| | Project: | DRURY CENTRE PROJECT | | |

# PARTICLE-SIZE DISTRIBUTION BY HYDROMETER

Test Methods: NZS4402: 1986: Test 2.1, Test 2.8.1, Test 2.8.4

| | | |
|---|---|---|
| Tested By: | JW | 17-Feb-21 |
| Compiled By: | JW | 22-Feb-21 |
| Checked By: | JF | 22-Feb-21 |

**BH No:** BH015 **Sample No:** BAG **Depth:** 14.00 - 14.50m

***Water Content (%):*** **25.1**

Sample History: Natural / ~~Air Dried / Oven Dried / Unknown~~

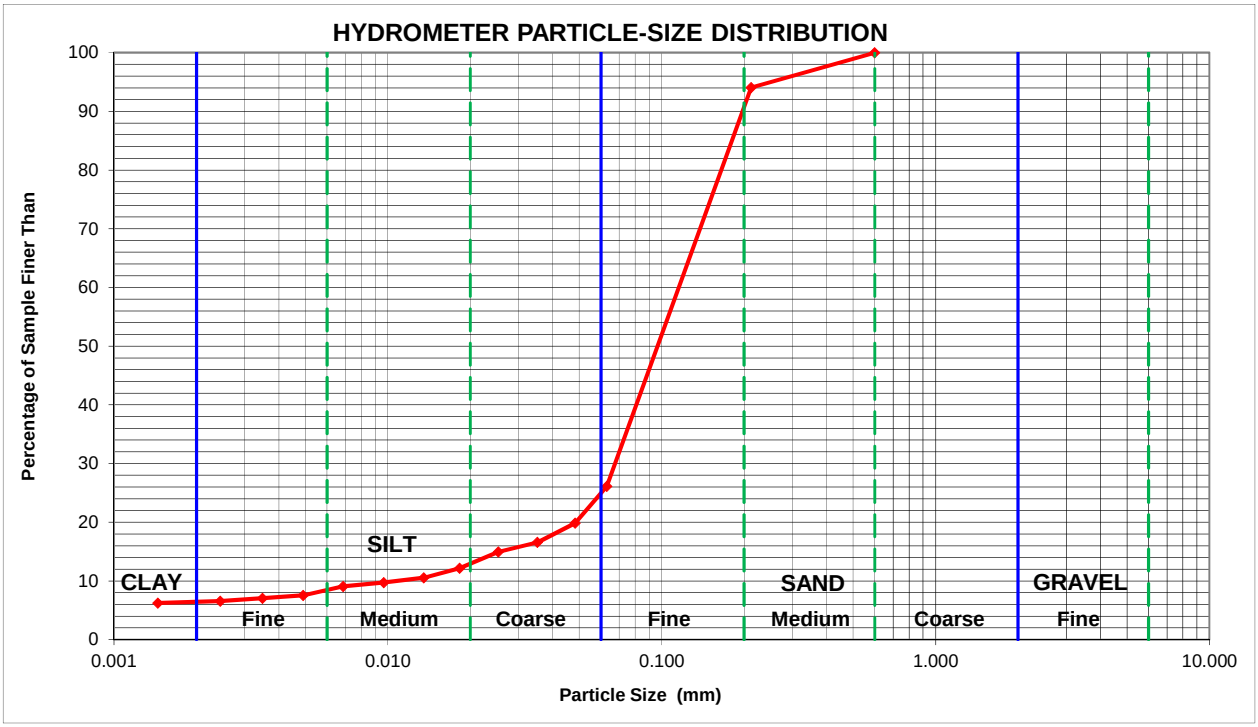
pH of sedimentation suspension: 8.5

| Particle Size (mm) | % Finer Than |
|---|---|
| 0.600 | 100 |
| 0.212 | 94 |
| 0.063 | 26 |
| 0.048 | 20 |
| 0.035 | 17 |
| 0.025 | 15 |
| 0.018 | 12 |
| 0.014 | 11 |
| 0.0096 | 10 |
| 0.0069 | 9 |
| 0.0049 | 8 |
| 0.0035 | 7 |
| 0.0024 | 7 |
| 0.0014 | 6 |

**HYDROMETER ANALYSIS (% of dry mass)**

| | | | | TOTAL | |
|---|---|---|---|---|---|
| GRAVEL: | (Medium) | *< 9.5 - 6mm* | 0 | 0 | % |
| | (Fine) | *6 - 2mm* | 0 | | |
| SAND: | (Coarse) | *2.0 - 0.6mm* | 0 | 75 | % |
| | (Medium) | *0.6 - 0.2mm* | 9 | | |
| | (Fine) | *0.2 - 0.06mm* | 66 | | |
| SILT FRACTION: | (Coarse) | *0.06 - 0.02mm* | 12 | 19 | % |
| | (Medium) | *0.02 - 0.006mm* | 5 | | |
| | (Fine) | *0.006 - 0.002mm* | 2 | | |
| CLAY FRACTION: | | *< 0.002mm* | | 6 | % |
| | | | | 100% | |

**HYDROMETER TEST WAS CARRIED OUT ON THE WHOLE SOIL / ~~SOIL FRACTION PASSING A 9.50mm SIEVE~~**



| Job Number: | 64121#L | Sheet 1 of 1 | Page 9 of 9 |
|---|---|---|---|
| Reg. Number: | 2884 | Version No: | 6 |
| Report No: | 64121#L/HYD | Issue Date: | December 2019 |
| Project: | DRURY CENTRE PROJECT | | |

Babbage Geotechnical Laboratory

# PARTICLE-SIZE DISTRIBUTION BY HYDROMETER

Test Methods: NZS4402: 1986: Test 2.1, Test 2.8.1, Test 2.8.4

| | | |
|---|---|---|
| Tested By: | JW | 17-Feb-21 |
| Compiled By: | JW | 22-Feb-21 |
| Checked By: | JF | 22-Feb-21 |

***BH No:*** **BH016** ***Sample No:*** **BAG** ***Depth:*** **13.50 - 14.00m**

***Water Content (%):*** **90.6**

Sample History: Natural / ~~Air Dried / Oven Dried / Unknown~~

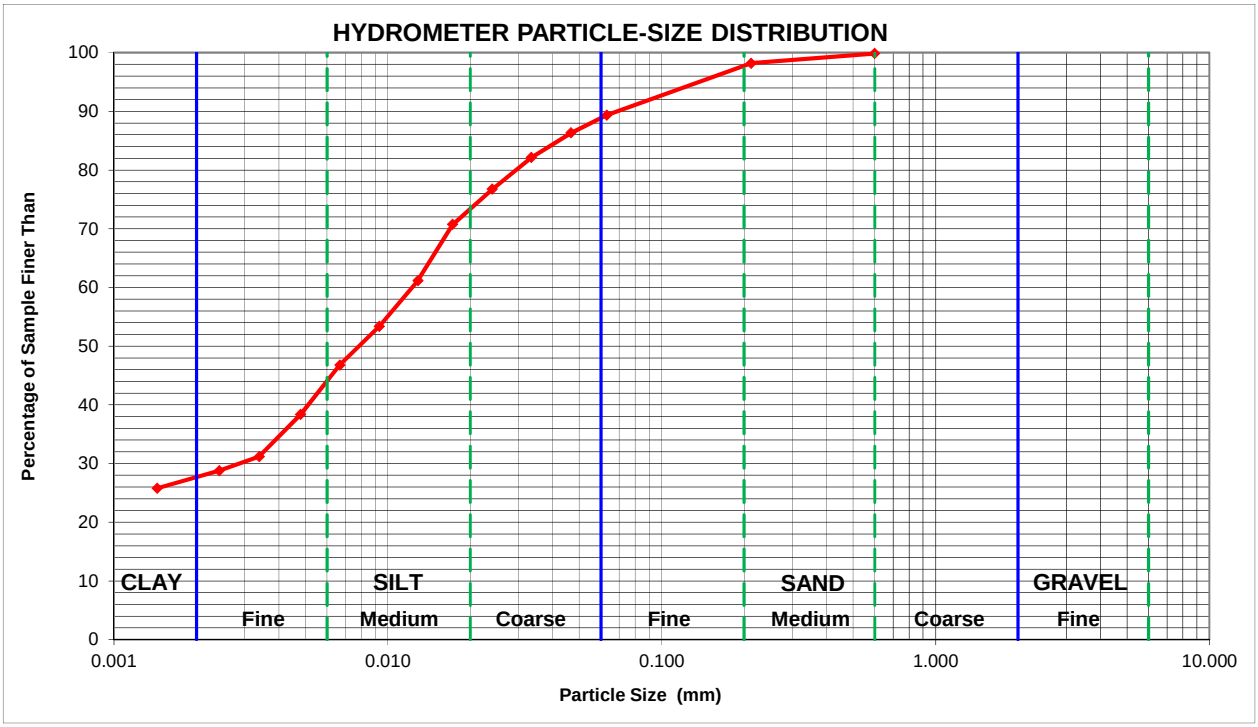
pH of sedimentation suspension: 8.5

| Particle Size (mm) | % Finer Than |
|---|---|
| 0.600 | 100 |
| 0.212 | 98 |
| 0.063 | 89 |
| 0.047 | 86 |
| 0.033 | 82 |
| 0.024 | 77 |
| 0.017 | 71 |
| 0.013 | 61 |
| 0.0093 | 53 |
| 0.0067 | 47 |
| 0.0048 | 38 |
| 0.0034 | 31 |
| 0.0024 | 29 |
| 0.0014 | 26 |

**HYDROMETER ANALYSIS (% of dry mass)**

| | | | | TOTAL | |
|---|---|---|---|---|---|
| GRAVEL: | (Medium) | *< 9.5 - 6mm* | 0 | 0 | % |
| | (Fine) | *6 - 2mm* | 0 | | |
| SAND: | (Coarse) | *2.0 - 0.6mm* | 0 | 11 | % |
| | (Medium) | *0.6 - 0.2mm* | 3 | | |
| | (Fine) | *0.2 - 0.06mm* | 8 | | |
| SILT FRACTION: | (Coarse) | *0.06 - 0.02mm* | 16 | 61 | % |
| | (Medium) | *0.02 - 0.006mm* | 29 | | |
| | (Fine) | *0.006 - 0.002mm* | 16 | | |
| CLAY FRACTION: | | *< 0.002mm* | | 28 | % |
| | | | | 100% | |

**HYDROMETER TEST WAS CARRIED OUT ON THE WHOLE SOIL / ~~SOIL FRACTION PASSING A 9.50mm SIEVE~~**



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Please reply to: W.E. Campton



Aurecon New Zealand Limited
PO Box 9762
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Auckland 1149

Attention: **SAM MacKAY**

Job Number: 64121#L
BGL Registration Number: 2884
Checked by: WEC

23rd February 2021

# ATTERBERG LIMITS & LINEAR SHRINKAGE TESTING

Dear Sam,

## *Re: DRURY CENTRE PROJECT*
***Report Number: 64121#L/AL***

The following report presents the results of Atterberg Limits & Linear Shrinkage testing at BGL of soil samples delivered to this laboratory on the 29th of January 2021. Test results are summarised below, with pages 3 & 4 showing where the samples plot on the Unified Soil Classification System (Casagrande) Chart. Test standards used were:

| | |
|---|---|
| **Water Content:** | NZS4402:1986:Test 2.1 |
| **Liquid Limit:** | NZS4402:1986:Test 2.2 |
| **Plastic Limit:** | NZS4402:1986:Test 2.3 |
| **Plasticity Index:** | NZS4402:1986:Test 2.4 |
| **Linear Shrinkage:** | NZS4402:1986:Test 2.6 |

| Test Pit / Borehole Number | Sample Number | Depth (m) | Water Content (%) | Liquid Limit | Plastic Limit | Plasticity Index | Linear Shrinkage (%) |
|---|---|---|---|---|---|---|---|
| TP003 | BULK | 0.25 – 0.80 | 53.3 | 104 | 42 | 62 | 22 |
| TP004 | BULK | 2.00 –2.50 | 47.3 | 83 ◆ | 51 ◆ | 32 ◆ | 21 ◆ |
| TP005 | BULK | 2.10 – 2.40 | 46.9 | 75 | 50 | 25 | 18 |
| TP006 | BULK | 1.80 – 2.10 | 39.3 | 68 ◆ | 44 ◆ | 24 ◆ | 16 ◆ |
| TP008 | BULK | 2.30 – 2.70 | 43.5 | 74 | 36 | 38 | 18 |
| TP010 | BULK | 1.50 – 1.80 | 43.0 | 74 | 33 | 41 | 19 |
| TP014 | BULK | 1.70 – 2.80 | 51.6 | 97 | 46 | 51 | 21 |

***◆ = The soil fraction passing a 425$\mu$m sieve was used for the liquid limit, plastic limit and linear shrinakge tests.***

Babbage Geotechnical Laboratory

| Test Pit / Borehole Number | Sample Number | Depth (m) | Water Content (%) | Liquid Limit | Plastic Limit | Plasticity Index | Linear Shrinkage (%) |
|---|---|---|---|---|---|---|---|
| TP017 | BULK | 2.20 – 2.50 | 45.1 | 77 | 48 | 29 | 16 |
| TP019 | BULK | 0.25 – 0.75 | 33.3 | 79 | 34 | 45 | 20 |
| TP025 | BULK | 0.70 – 1.50 | 40.2 | 83 | 37 | 46 | 20 |
| TP029 | BULK | 1.80 – 2.40 | 32.6 | 82 | 27 | 55 | 23 |
| TP031 | BULK | 0.60 – 1.80 | 49.3 | 66 | 33 | 33 | 14 |
| TP032 | BULK | 0.70 – 2.00 | 53.6 | 109 | 33 | 76 | 26 |
| BH007 | BAG | 2.00 – 2.50 | 74.3 | 100 | 42 | 58 | not tested |
| BH008 | BAG | 8.00 – 8.50 | 92.6 | 131 | 42 | 89 | not tested |
| BH015 | BAG | 8.50 – 9.00 | 58.9 | 85 | 25 | 60 | not tested |
| BH016 | BAG | 11.00 – 11.50 | 83.8 | 108 | 33 | 75 | not tested |

The whole soil was used for all water content tests (the soils were in a natural state), and for the liquid limit, plastic limit and linear shrinkage tests without a diamond beside them. The soil fraction passing a 425µm sieve was used for the liquid limit, plastic limit and linear shrinakge tests with a diamond (◆) beside them. The soil was wet up and dried where required for the liquid limit, plastic limit and linear shrinkage tests.

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater. Test 2.2: liquid limit, test 2.3: plastic limit, and test 2.6: linear shrinkage are reported to the nearest whole number.

Please note that the test results relate only to the samples as-received, and relate only to the samples under test. Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
**Signatory (Assistant Laboratory Manager)**
**Babbage Geotechnical Laboratory**

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№ 126

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| Babbage Geotechnical Laboratory | Job Number: 64121#L | Sheet 1 of 1 | Page 3 of 4 |
|---|---|---|---|
| | Reg. Number: 2884 | Version No: | 6 |
| | Report No: 64121#L/AL | Version Date: | September 2018 |
| | Project: | DRURY CENTRE PROJECT | |

## DETERMINATION OF THE LIQUID LIMIT, PLASTIC LIMIT & THE PLASTICITY INDEX

Test Methods: NZS4402: 1986: Test 2.2, Test 2.3 and Test 2.4

| | | |
|---|---|---|
| Tested By: | JW/TH/CB/WC | February 2021 |
| Compiled By: | JF | 23/02/2021 |
| Checked By: | JF | 23/02/2021 |

### SUMMARY OF TESTING

| Borehole Number | Sample Number | Depth (m) | Liquid Limit | Plastic Limit | Plasticity Index | Soil Classification Based on USCS Chart Below |
|---|---|---|---|---|---|---|
| TP003 | BULK | 0.25 - 0.80 | 104 | 42 | 62 | CH |
| TP004 | BULK | 2.00 - 2.50 | 83 | 51 | 32 | MH |
| TP005 | BULK | 2.10 - 2.40 | 75 | 50 | 25 | MH |
| TP006 | BULK | 1.80 - 2.10 | 68 | 44 | 24 | MH |
| TP008 | BULK | 2.30 - 2.70 | 74 | 36 | 38 | MH |
| TP010 | BULK | 1.50 - 1.80 | 74 | 33 | 41 | CH |
| TP014 | BULK | 1.70 - 2.80 | 97 | 46 | 51 | MH |
| TP017 | BULK | 2.20 - 2.50 | 77 | 48 | 29 | MH |
| TP019 | BULK | 0.25 - 0.75 | 79 | 34 | 45 | CH |
| TP025 | BULK | 0.70 - 1.50 | 83 | 37 | 46 | CH / MH |

*The chart below & soil classification terminology is taken from ASTM D2487-17 "Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)", January 2018, & is based on the classification scheme developed by A. Casagrande in the 1940's (Casagrande, A., 1948: Classification and identification of soil. Transactions of the American Society of Civil Engineers, v. 113, p. 901-930). The chart below & the soil classification given in the table above are included for your information only, and are not included in the IANZ endorsement for this report.*

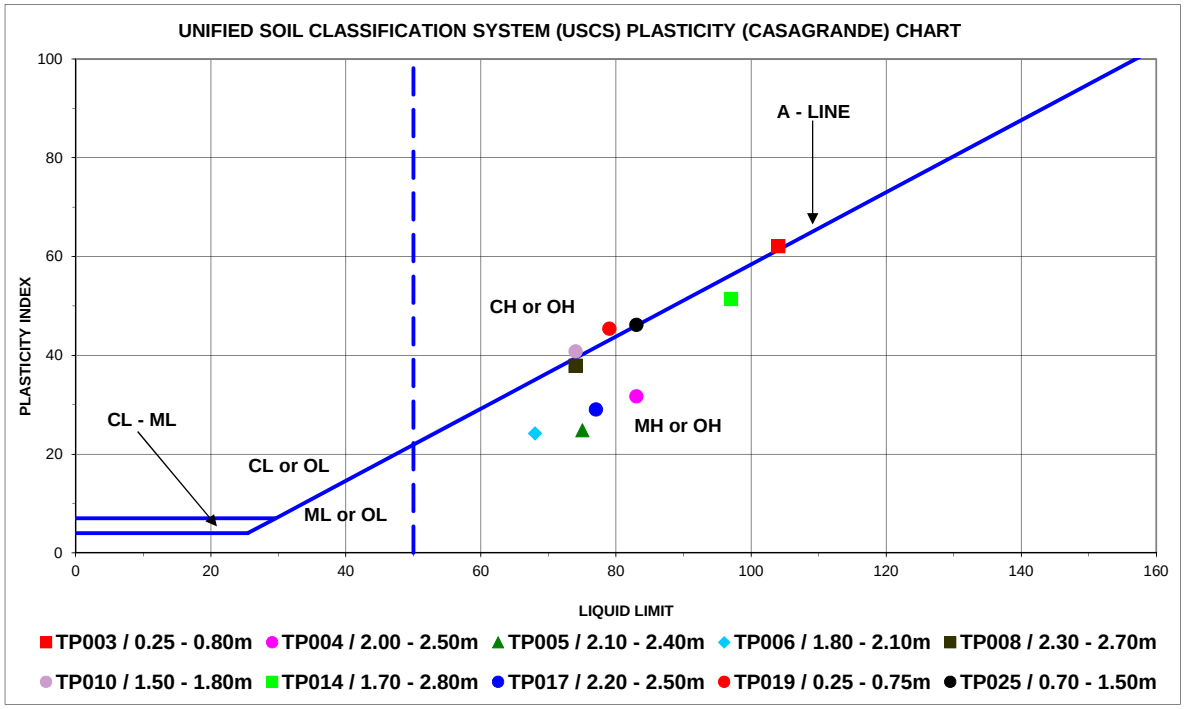



CHART LEGEND

CL = CLAY, low plasticity ('lean' clay)
OL = ORGANIC CLAY or ORGANIC SILT, low liquid limit
ML = SILT, low liquid limit
CL - ML = SILTY CLAY
CH = CLAY, high plasticity ('fat' clay)
OH = ORGANIC CLAY or ORGANIC SILT, high liquid limit
MH = SILT, high liquid limit ('elastic silt')

| Babbage Geotechnical Laboratory | Job Number: 64121#L | Sheet 1 of 1 | Page 4 of 4 |
|---|---|---|---|
| | Reg. Number: 2884 | Version No: | 6 |
| | Report No: 64121#L/AL | Version Date: | September 2018 |
| | Project: | DRURY CENTRE PROJECT | |

## DETERMINATION OF THE LIQUID LIMIT, PLASTIC LIMIT & THE PLASTICITY INDEX

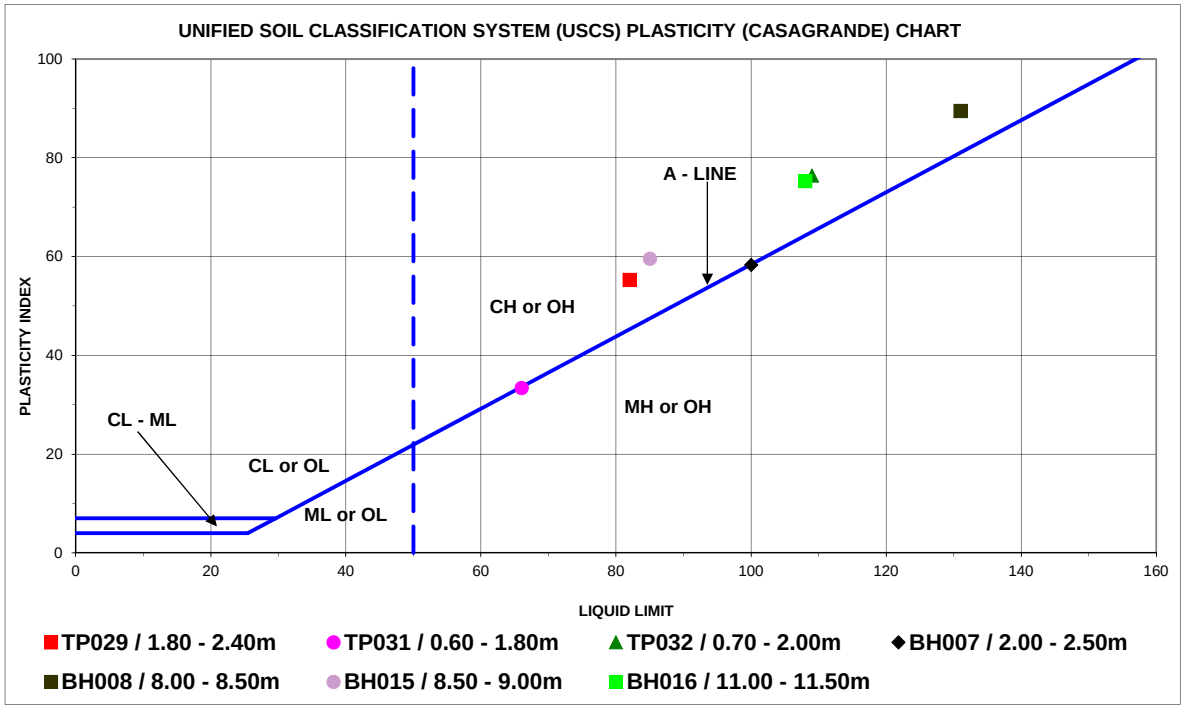
Test Methods: NZS4402: 1986: Test 2.2, Test 2.3 and Test 2.4

| | | |
|---|---|---|
| Tested By: | JW/TH/CB/WC | February 2021 |
| Compiled By: | JF | 23/02/2021 |
| Checked By: | JF | 23/02/2021 |

### SUMMARY OF TESTING

| Borehole Number | Sample Number | Depth (m) | Liquid Limit | Plastic Limit | Plasticity Index | Soil Classification Based on USCS Chart Below |
|---|---|---|---|---|---|---|
| TP029 | BULK | 1.80 - 2.40 | 82 | 27 | 55 | CH |
| TP031 | BULK | 0.60 - 1.80 | 66 | 33 | 33 | CH / MH |
| TP032 | BULK | 0.70 - 2.00 | 109 | 33 | 76 | CH |
| BH007 | BAG | 2.00 - 2.50 | 100 | 42 | 58 | CH / MH |
| BH008 | BAG | 8.00 - 8.50 | 131 | 42 | 89 | CH |
| BH015 | BAG | 8.50 - 9.00 | 85 | 25 | 60 | CH |
| BH016 | BAG | 11.00 - 11.50 | 108 | 33 | 75 | CH |
| | | | | | | |
| | | | | | | |
| | | | | | | |

*The chart below & soil classification terminology is taken from ASTM D2487-17 "Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)", January 2018, & is based on the classification scheme developed by A. Casagrande in the 1940's (Casagrande, A., 1948: Classification and identification of soil. Transactions of the American Society of Civil Engineers, v. 113, p. 901-930). The chart below & the soil classification given in the table above are included for your information only, and are not included in the IANZ endorsement for this report.*

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OL = ORGANIC CLAY or ORGANIC SILT, low liquid limit
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CL - ML = SILTY CLAY
CH = CLAY, high plasticity ('fat' clay)
OH = ORGANIC CLAY or ORGANIC SILT, high liquid limit
MH = SILT, high liquid limit ('elastic silt')

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PO Box 9762
Newmarket
Auckland 1149

Attention: **SAM MacKAY**

Job Number: 64121#L
BGL Registration Number: 2884
Checked by: WEC

1st March 2021

# ATTERBERG LIMITS & WATER CONTENT TESTING

Dear Sam,

## *Re: DRURY CENTRE PROJECT*
***Report Number: 64121#L/AL2***

The following report presents the results of Atterberg Limits & water content testing at BGL of soil samples delivered to this laboratory on the 23rd February 2021. Test results are summarised below, with page 3 showing where the samples plot on the Unified Soil Classification System (Casagrande) Chart. Test standards used were:

| | |
|---|---|
| **Water Content:** | NZS4402:1986:Test 2.1 |
| **Liquid Limit:** | NZS4402:1986:Test 2.2 |
| **Plastic Limit:** | NZS4402:1986:Test 2.3 |
| **Plasticity Index:** | NZS4402:1986:Test 2.4 |

| Borehole Number | Sample Number | Depth (m) | Water Content (%) | Liquid Limit | Plastic Limit | Plasticity Index |
|---|---|---|---|---|---|---|
| **BH014** | **BAG** | **18.00 – 18.50** | **96.3** | **130** | **38** | **92** |
| **BH014** | **BAG** | **33.00** | **52.0** | limits not carried out | | |
| **BH016*** | **BAG** | **24.00 – 24.50** | **113** | **173 ◆** | **60 ◆** | **113 ◆** |
| **BH014** | **BAG** | **34.50** | **136** | limits not carried out | | |

***◆ = The soil fraction passing a 425μm sieve was used for the liquid limit, plastic limit and linear shrinakge tests.***

***Organic soil**

The whole soil was used for all water content tests (the soils were in a natural state), and for the liquid limit and plastic limit tests for BH014 18.00 – 18.50m. The soil fraction passing a 0.425mm sieve was used for the liquid limit and plastic limit tests for sample BH016 24.00 – 24.50m. The soil was wet up and dried where required for the liquid limit and plastic limit tests.

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater. Test 2.2: liquid limit and test 2.3: plastic limit are reported to the nearest whole number.

Please note that the test results relate only to the samples as-received, and relate only to the samples under test.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
**Signatory (Assistant Laboratory Manager)**
**Babbage Geotechnical Laboratory**

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|---|---|---|---|
| BGL Babbage Geotechnical Laboratory | Job Number: 64121#L | Sheet 1 of 1 | Page 3 of 3 |
| | Reg. Number: 2884 | Version No: | 6 |
| | Report No: 64121#L/AL2 | Version Date: | September 2018 |
| | Project: | DRURY CENTRE PROJECT | |

# DETERMINATION OF THE LIQUID LIMIT, PLASTIC LIMIT & THE PLASTICITY INDEX

Test Methods: NZS4402: 1986: Test 2.2, Test 2.3 and Test 2.4

| | | |
|---|---|---|
| Tested By: | JW / CBH | February 2021 |
| Compiled By: | JF | 1/03/2021 |
| Checked By: | JF | 1/03/2021 |

## SUMMARY OF TESTING

| Borehole Number | Sample Number | Depth (m) | Liquid Limit | Plastic Limit | Plasticity Index | Soil Classification Based on USCS Chart Below |
|---|---|---|---|---|---|---|
| BH014 | BAG | 18.00 - 18.50 | 130 | 38 | 92 | CH |
| BH016 | BAG | 24.00 - 24.50 | 173 | 60 | 113 | OH - ORGANIC CLAY |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

*The chart below & soil classification terminology is taken from ASTM D2487-17 "Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)", January 2018, & is based on the classification scheme developed by A. Casagrande in the 1940's (Casagrande, A., 1948: Classification and identification of soil. Transactions of the American Society of Civil Engineers, v. 113, p. 901-930). The chart below & the soil classification given in the table above are included for your information only, and are not included in the IANZ endorsement for this report.*

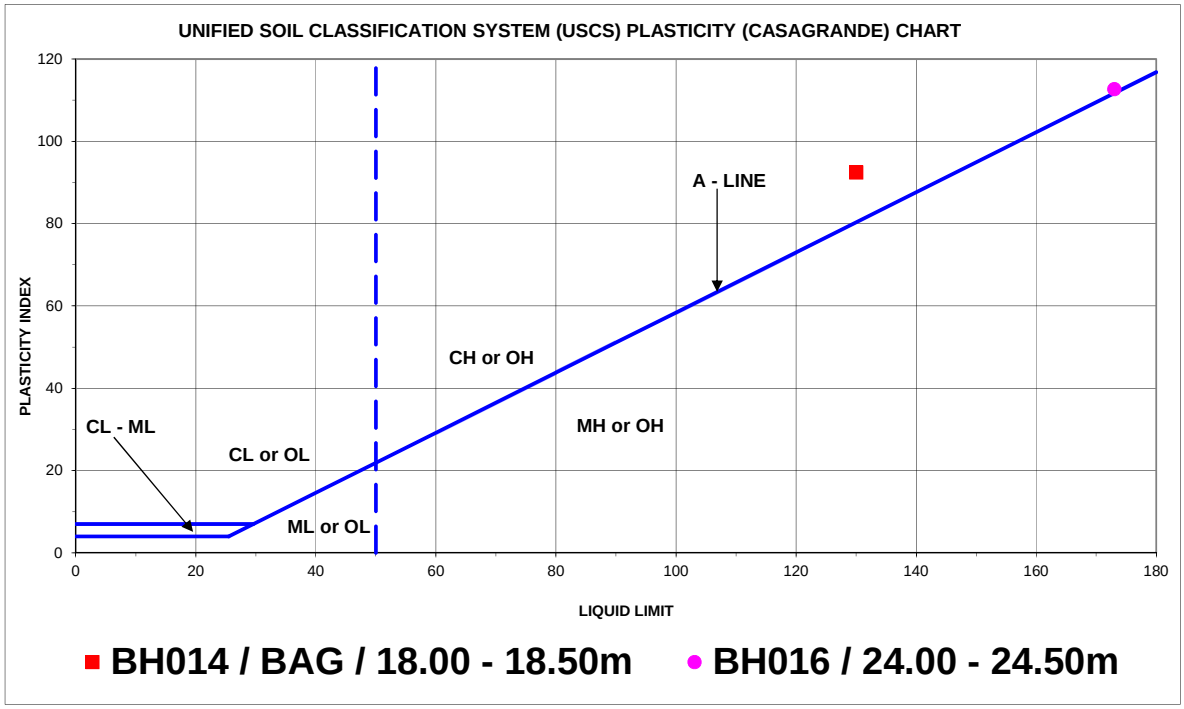


CHART LEGEND

CL = CLAY, low plasticity ('lean' clay)
OL = ORGANIC CLAY or ORGANIC SILT, low liquid limit
ML = SILT, low liquid limit
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CH = CLAY, high plasticity ('fat' clay)
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Please reply to: W.E. Campton



Aurecon New Zealand Limited
PO Box 9762
Newmarket
Auckland 1149

Attention: **SAM MacKAY**

Job Number: 64121#L
BGL Registration Number: 2884
Checked by: WEC

16th February 2021

# SOIL WATER CONTENT TESTING

Dear Sam,

## *Re: DRURY CENTRE PROJECT*
***Report Number: 64121#L/WC***

The following page presents the results of water content testing at BGL of soil samples delivered to this laboratory on the 29th of January 2021. These samples were tested in accordance with the following standard:

**Water Content:** NZS4402:1986:Test 2.1

As per the reporting requirements of NZS4402: 1986: Test 2.1: water content is reported to two significant figures for values below 10%, and to three significant figures for values of 10% or greater.

Please note that the test results relate only to the samples as-received, and relate only to the samples under test.

Thank you for the opportunity to carry out this testing. If you have any queries regarding the content of this report please contact the person authorising this report below at your convenience.

Yours faithfully,

Justin Franklin
**Signatory (Assistant Laboratory Manager)**
**Babbage Geotechnical Laboratory**

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| | | | | |
|---|---|---|---|---|
| BGL Babbage Geotechnical Laboratory | Job Number: | 64121#L | Sheet 1 of 1 | Page 2 of 2 |
| | Reg. Number: | 2884 | Version No: | 2 |
| | Report Number: | 64121#L/WC | Issue Date: | July 2017 |
| | PROJECT: | DRURY CENTRE PROJECT | | |

## DETERMINATION OF THE WATER CONTENT

Test Method: NZS4402: 1986: Test 2.1

| | | |
|---|---|---|
| Tested By: | JF | 11/02/2021 |
| Compiled By: | JF | 15/02/2021 |
| Checked By: | WEC | 15/02/2021 |

| BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (m) | WATER CONTENT (%) |
|---|---|---|---|
| TP001 | BULK | 0.80 - 1.20 | 61.9 |
| TP002 | BULK | 0.50 - 0.90 | 40.0 |
| TP002 | BULK | 0.90 - 2.50 | 69.7 |
| TP003 | BULK | 1.60 - 1.90 | 73.9 |
| TP011 | BULK | 2.20 - 2.50 | 27.1 |
| TP015 | BULK | 1.20 - 1.80 | 69.9 |
| TP019 | BULK | 1.00 - 2.20 | 49.7 |
| TP024 | BULK | 1.10 - 1.80 | 56.0 |
| TP032 | BULK | 2.00 - 3.00 | 73.6 |
| BH007 | BAG | 6.00 - 6.50 | 62.6 |

| BOREHOLE NUMBER | SAMPLE NUMBER | DEPTH (m) | WATER CONTENT (%) |
|---|---|---|---|

# Appendix L – Indicative Earthworks Plans


| AREA SCHEDULE | |
|---|---|
| LFR AREAS - Phase 1 | |
| M09 | 10200m² |
| M10 | 6400m² |
| M11 | 5000m² |
| M13a | 1650m² |
| M13b | 375m² |
| M13c | 375m² |
| **Total** | **24000m²** |

| LFR AREAS - Phase 2 | | |
|---|---|---|
| M10 | 3910m² | |
| M12a | 1310m² | |
| M12b | 2500m² | 9400m² |
| M13d | 280m² | |
| **Total** | **8000m²** | |

# DRURY CENTRE - LFR - FAST TRACK - REVISED SCOPE

SK-01a- 220906

## CUT AND FILL LEGEND

| FROM | TO | COLOUR |
|---|---|---|
| ≤-20 | -9.0 | |
| -9.0 | -8.5 | |
| -8.5 | -8.0 | |
| -8.0 | -7.5 | |
| -7.5 | -7.0 | |
| -7.0 | -6.5 | |
| -6.5 | -6.0 | |
| -6.0 | -5.5 | |
| -5.5 | -5.0 | |
| -5.0 | -4.5 | |
| -4.5 | -4.0 | |
| -4.0 | -3.5 | |
| -3.5 | -3.0 | |
| -3.0 | -2.5 | |
| -2.5 | -2.0 | |
| -2.0 | -1.5 | |
| -1.5 | -1.0 | |
| -1.0 | -0.5 | |
| -0.5 | 0 | |
| 0 | 0.5 | |
| 0.5 | 1.0 | |
| 1.0 | 1.5 | |
| 1.5 | 2.0 | |
| 2.0 | 2.5 | |
| 2.5 | 3.0 | |
| 3.0 | 3.5 | |
| 3.5 | 4.0 | |
| 4.0 | 4.5 | |
| 4.5 | 5.0 | |
| 5.0 | 5.5 | |
| 5.5 | 6.0 | |
| 6.0 | 6.5 | |
| 6.5 | 7.0 | |
| 7.0 | 7.5 | |
| 7.5 | 8.0 | |
| 8.0 | 8.5 | |
| 8.5 | ≥20 | |

## TABLE 1: STAGE 1 OVERALL CUT AND FILL VOLUMES (m³)

| | |
|---|---|
| CUT | |
| FILL | |
| BALANCE | |

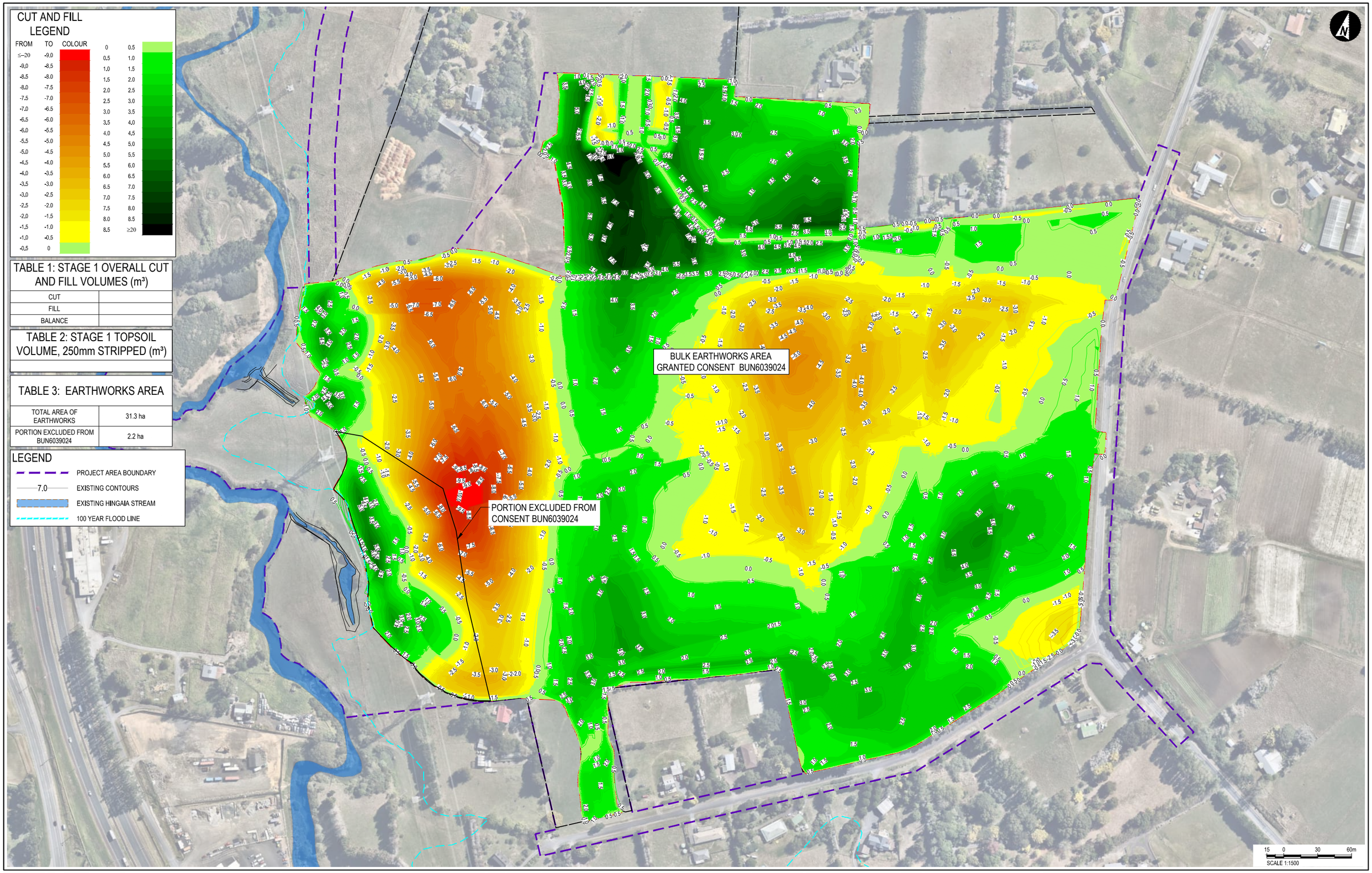
## TABLE 2: STAGE 1 TOPSOIL VOLUME, 250mm STRIPPED (m³)

## TABLE 3: EARTHWORKS AREA

| | |
|---|---|
| TOTAL AREA OF EARTHWORKS | 31.3 ha |
| PORTION EXCLUDED FROM BUN6039024 | 2.2 ha |

## LEGEND

- PROJECT AREA BOUNDARY
- 7.0 EXISTING CONTOURS
- EXISTING HINGAIA STREAM
- 100 YEAR FLOOD LINE

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CLIENT: Kiwi Property

| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 2022-11-07 | ISSUED FOR FAST TRACK CONSENT | W.NEL |

| SCALE | SIZE |
|---|---|
| 1:1500 | A1 |

DRAWN: R.FORBES
DESIGNED: Z.TANG
REVIEWED: J.VORSTER

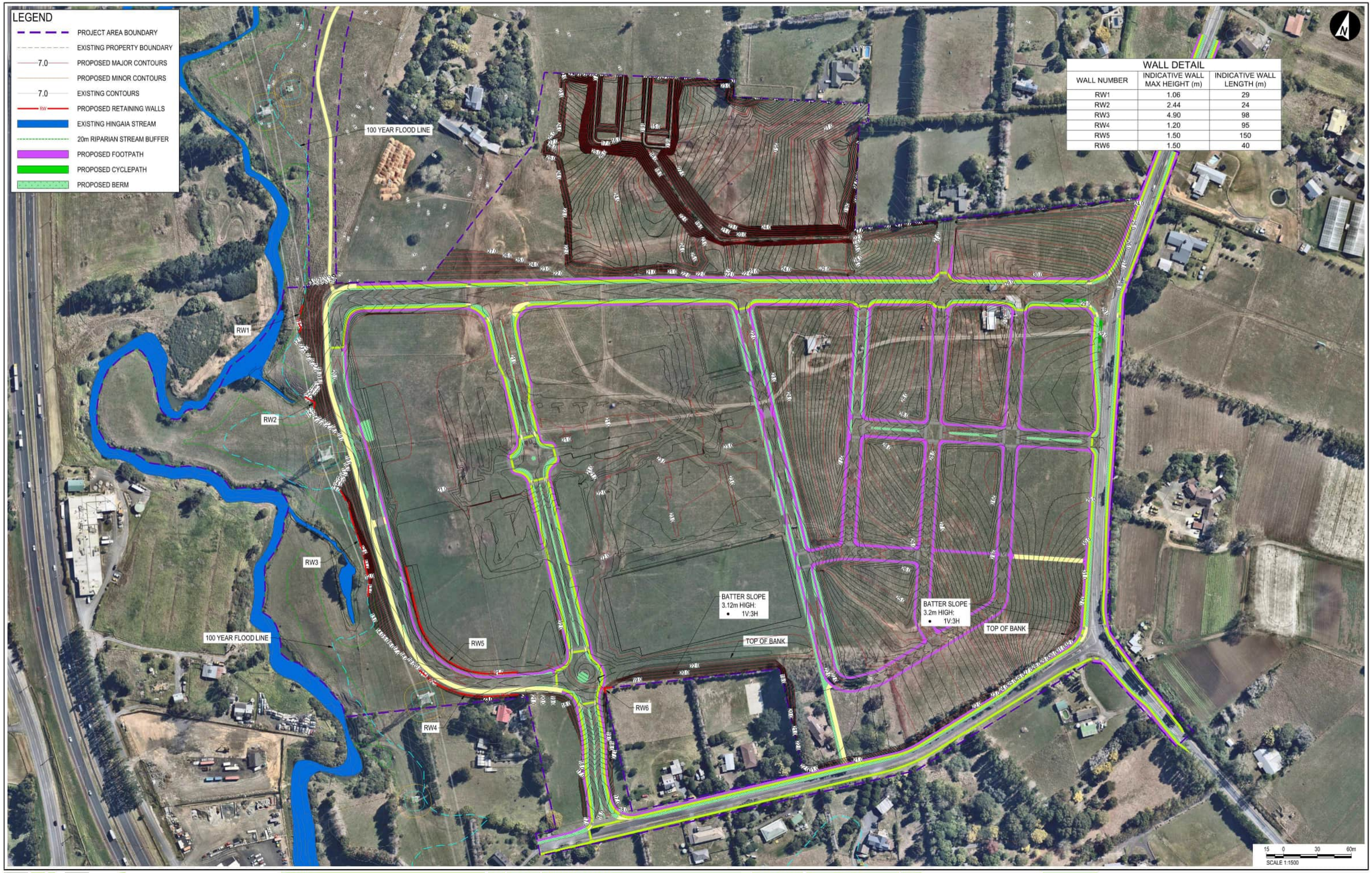
CONSENT
NOT FOR CONSTRUCTION

APPROVED: W.NEL — DATE: 2022-11-07
W.NEL

PROJECT: DRURY CENTRE PROJECT

TITLE: CIVILS EARTHWORKS PLAN SHEET 1

DRAWING No.: 510611 – 0100 – DRG – CC – 3201 – A
(PROJECT No. / AREA / TYPE / DISC / NUMBER / REV)




WALL DETAIL

| WALL NUMBER | INDICATIVE WALL MAX HEIGHT (m) | INDICATIVE WALL LENGTH (m) |
|---|---|---|
| RW1 | 1.06 | 29 |
| RW2 | 2.44 | 24 |
| RW3 | 4.90 | 98 |
| RW4 | 1.20 | 95 |
| RW5 | 1.50 | 150 |
| RW6 | 1.50 | 40 |

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CLIENT: Kiwi Property

| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 2022-11-07 | ISSUED FOR FAST TRACK CONSENT | W.NEL |

| SCALE | SIZE |
|---|---|
| 1:1500 | A1 |

DRAWN: K HORGAN
DESIGNED: J.MUIRSON
REVIEWED: J.VORSTER

CONSENT
NOT FOR CONSTRUCTION

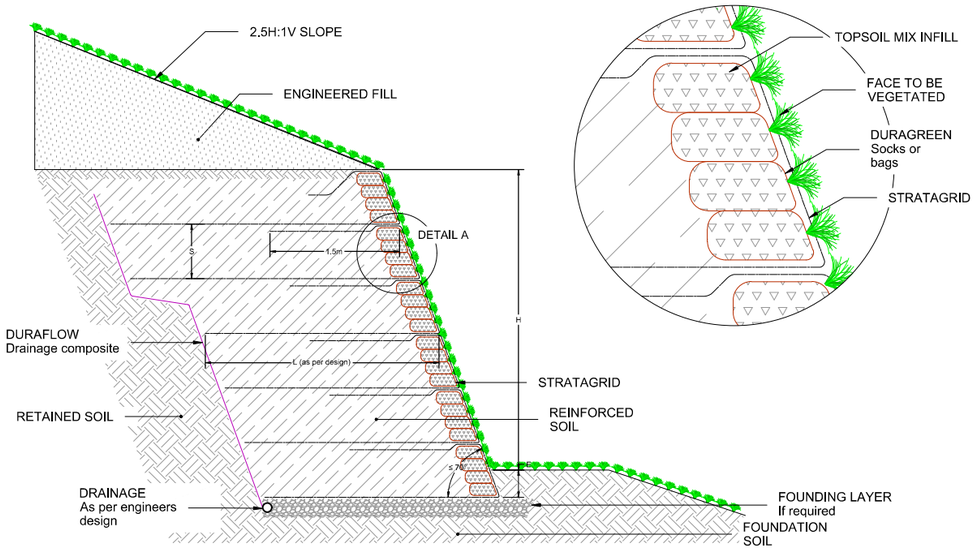
APPROVED
DATE 2022-11-07
W.NEL
W.NEL

PROJECT: DRURY CENTRE PROJECT

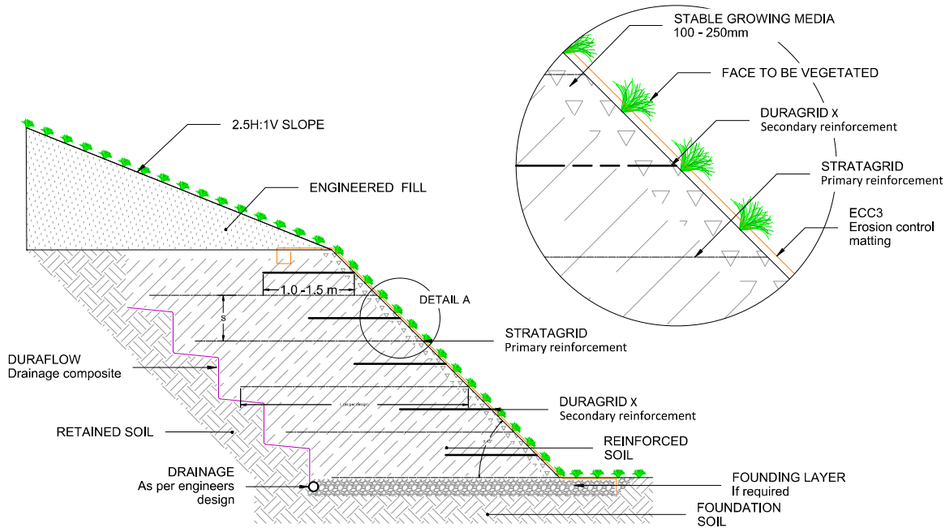
TITLE: GEOTECHNICAL
PROPOSED RETAINING WALL LAYOUT PLAN
SHEET 1

| DRAWING No. | PROJECT No. | AREA | TYPE | DISC | NUMBER | REV |
|---|---|---|---|---|---|---|
| | 510611 | 0100 | DRG | GG | 0101 | A |

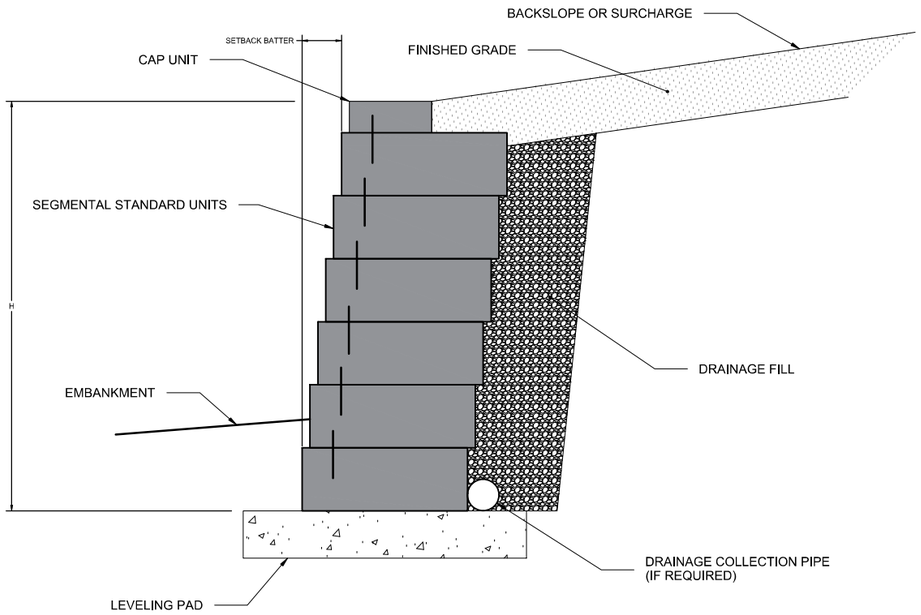
## WALL 1, 2 AND 6 TYPICAL DETAIL - GEOGRID REINFORCED MSE WALL




## WALL 3 TYPICAL DETAIL - GEOGRID REINFORCED SLOPE




## WALL 4 AND 5 TYPICAL DETAIL - SEGMENTAL BLOCK WALL

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CLIENT: Kiwi Property

| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 2022-11-07 | ISSUED FOR FAST TRACK CONSENT | W.NEL |

| SCALE | SIZE |
|---|---|
| NOT TO SCALE | A1 |

DRAWN: K HORGAN
DESIGNED: J.MUIRSON
REVIEWED: J.VORSTER

CONSENT
NOT FOR CONSTRUCTION

APPROVED: W.NEL
DATE: 2022-11-07
W.NEL

PROJECT: DRURY CENTRE PROJECT

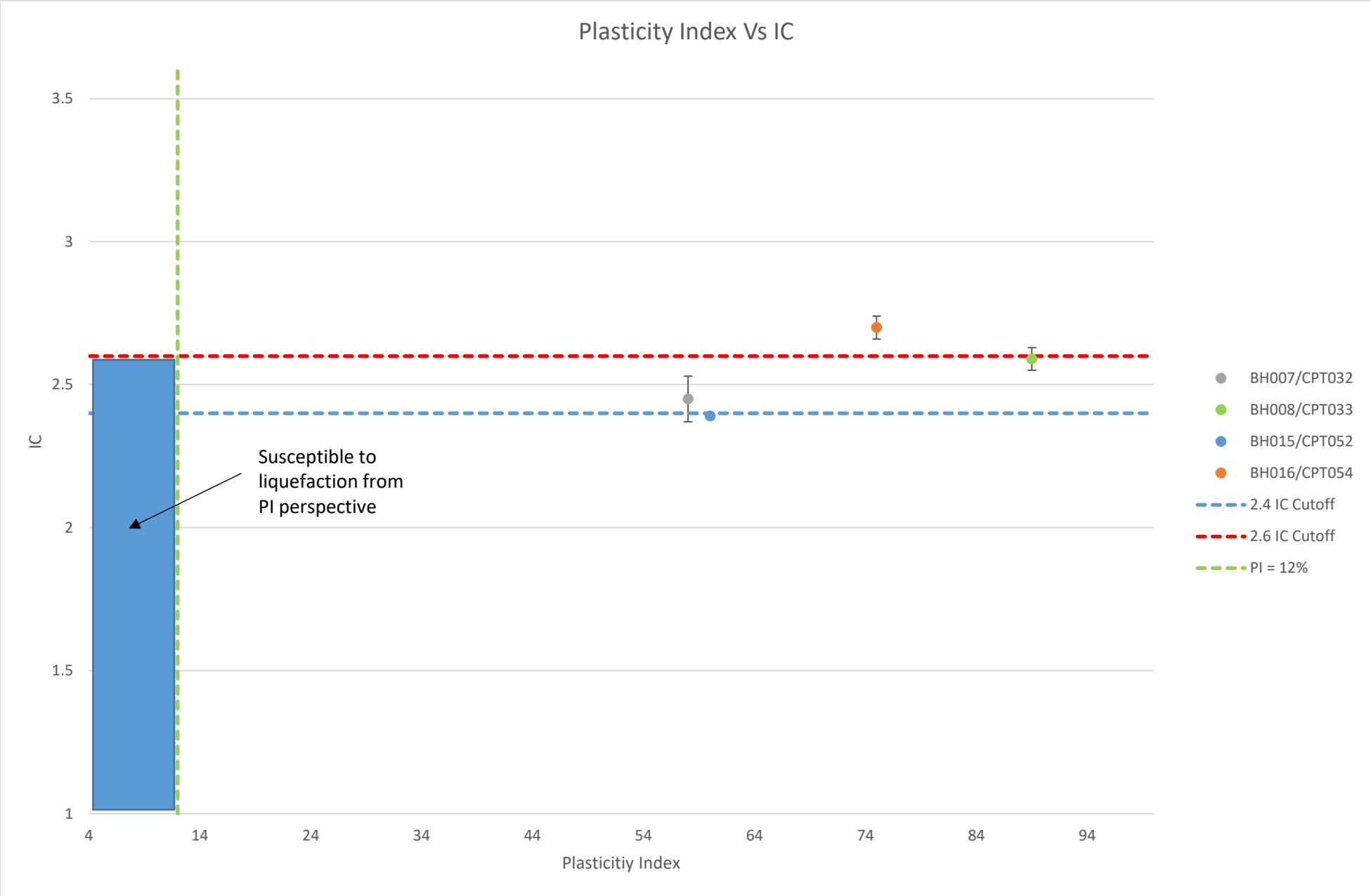
TITLE: GEOTECHNICAL TYPICAL DETAILS FOR RETAINING WALLS SHEET 1

| DRAWING No. | PROJECT No. | AREA | TYPE | DISC | NUMBER | REV |
|---|---|---|---|---|---|---|
| | 510611 | 0100 | DRG | GG | 0301 | A |

# Appendix M – Liquefaction Assessment Results

| CPT no. | CPT Depth (m) | GWT (mbgl) | ULS | | | SLS | | |
|---|---|---|---|---|---|---|---|---|
| | | | Total Settlement | Index | LSN | Total Settlement | Index | LSN |
| CPT001 | 9.33 | 19.3 | N/A | N/A | N/A | N/A | N/A | N/A |
| CPT002 | 12.1 | 9.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT003 | 19.42 | 10.6 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT004 | 15.04 | 12.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT005 | 21.21 | 14.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT006 | 21.21 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT007 | 21.21 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT008 | 7.96 | 14.8 | N/A | N/A | N/A | N/A | N/A | N/A |
| CPT009 | 13.02 | 7.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT010 | 11.48 | 5.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT011 | 6.98 | 5.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT012 | 12.63 | 7.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT013 | 19.7 | 12.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT014 | 17.89 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT015 | 17.34 | 8.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT016 | 11.27 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT017 | 13.73 | 4.7 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT018 | 17.52 | 6.9 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT019 | 11.49 | 10.6 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT020 | 14.55 | 6.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT021 | 10.16 | 8.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT022 | 17.12 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT023 | 19.43 | 13.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT024 | 14.4 | 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT025 | 24.9 | 13.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT026 | 11.5 | 4.7 | 2 | 2 | 1 | 0 | 0 | 0 |
| CPT027 | 16.04 | 5.5 | 9 | 5 | 1 | 0 | 0 | 0 |
| CPT028 | 16.35 | 8.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT029 | 2.28 | 9.6 | N/A | N/A | N/A | N/A | N/A | N/A |
| CPT030 | 24.9 | 14 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT031 | 5.49 | 7 | N/A | N/A | N/A | N/A | N/A | N/A |
| CPT032 | 11.56 | 4 | 3 | 0 | 0 | 0 | 0 | 0 |
| CPT033 | 20.42 | 4.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT034 | 24.9 | 11.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT035 | 19.52 | 13.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT036 | 24.9 | 13.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT037 | 24.9 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT038 | 9.98 | 3.9 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT039 | 13.3 | 5.1 | 1 | 0 | 1 | 0 | 0 | 0 |
| CPT040 | 18.03 | 2.5 | 4 | 0 | 1 | 0 | 0 | 0 |
| CPT041 | 24.9 | 9.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT042 | 24.9 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT043 | 9.7 | 3.4 | 2 | 2 | 0 | 0 | 0 | 0 |
| CPT044 | 7.88 | 2.5 | 6 | 6 | 2 | 0 | 0 | 0 |
| CPT045 | 21.5 | 4.6 | 0 | 0 | 1 | 0 | 0 | 0 |
| CPT046 | 24.9 | 8.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT047 | 24.91 | 9.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT048a | 24.9 | 5.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT049 | 8.81 | 5.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT050 | 12.53 | 6.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT051 | 24.91 | 7.6 | 0 | 0 | 0 | 0 | 0 | 0 |
| CPT052 | 24.9 | 6 | 1 | 0 | 0 | 0 | 0 | 0 |
| CPT053 | 24.9 | 6.5 | 3 | 0 | 1 | 0 | 0 | 0 |
| CPT054 | 24.91 | 6.5 | 1 | 0 | 0 | 0 | 0 | 0 |
| CPT055 | 7.46 | 7.6 | N/A | N/A | N/A | N/A | N/A | N/A |

N/A - Groundwater deeper than CPT investigation depth


Plasticity Index Vs IC
3.5
3
2.5
2
1.5
1
IC
4
14
24
34
44
54
64
74
84
94
Plasticitiy Index
Susceptible to liquefaction from PI perspective
BH007/CPT032
BH008/CPT033
BH015/CPT052
BH016/CPT054
2.4 IC Cutoff
2.6 IC Cutoff
PI = 12%

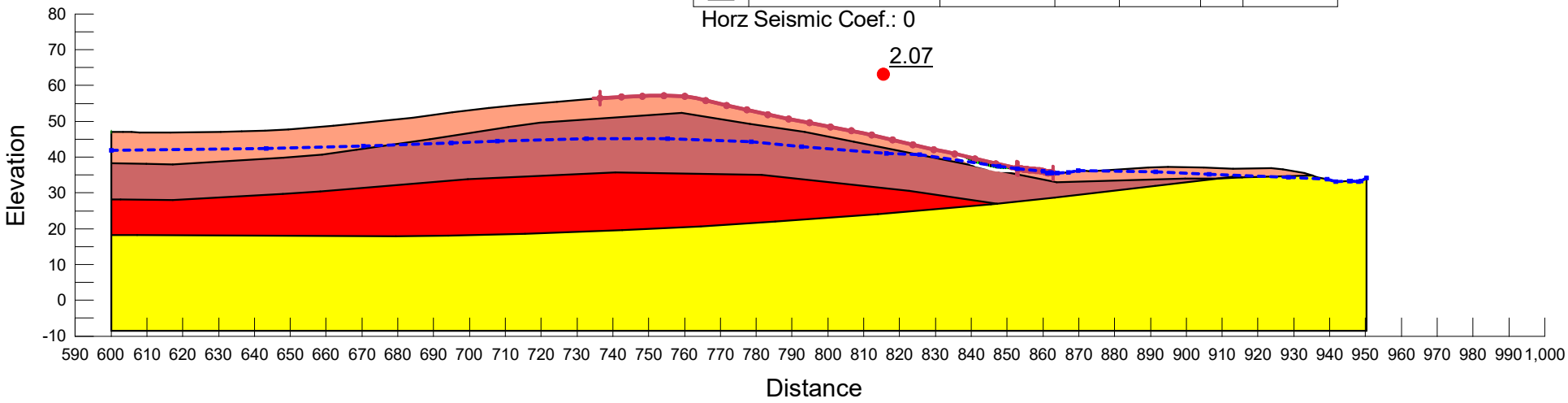
# Appendix N – Slope Stability Results

# Slope/W Section XS1 existing slope - Static Condition with Global Rotational Failure

XS1
Global Rotational Failure
Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

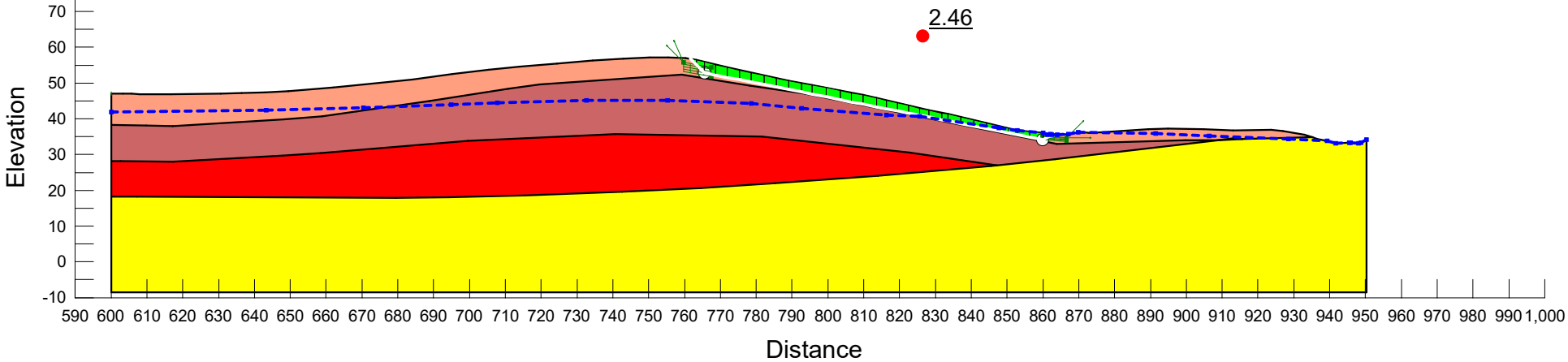


# Slope/W Section XS1 existing slope - Static Condition with Global Translational Failure

XS1
Global Translational Failure
Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

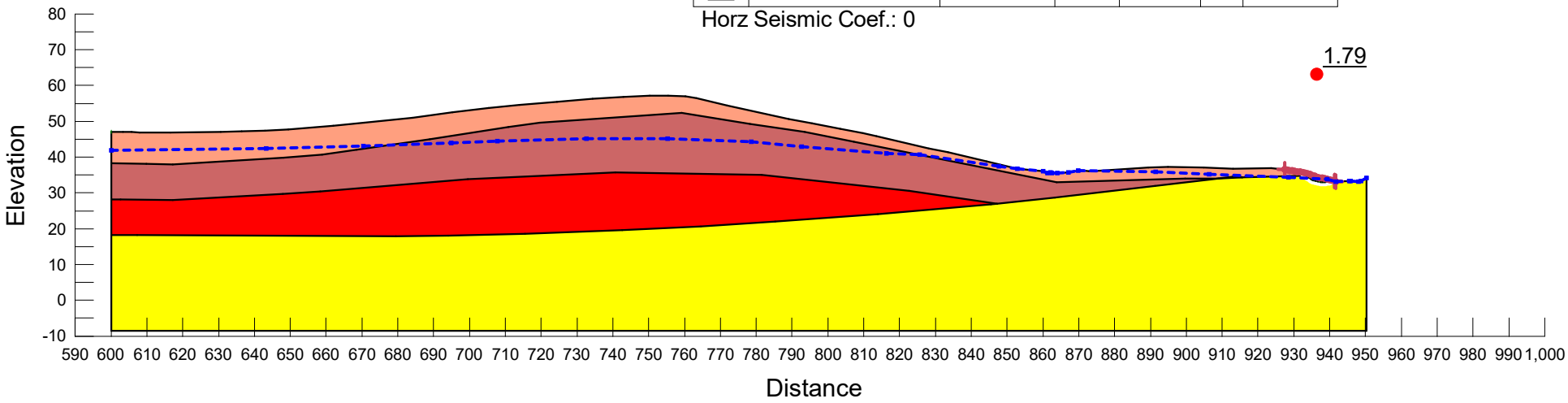


# Slope/W Section XS1 existing slope - Static Condition with Toe Failure

XS1
Toe Failure
Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

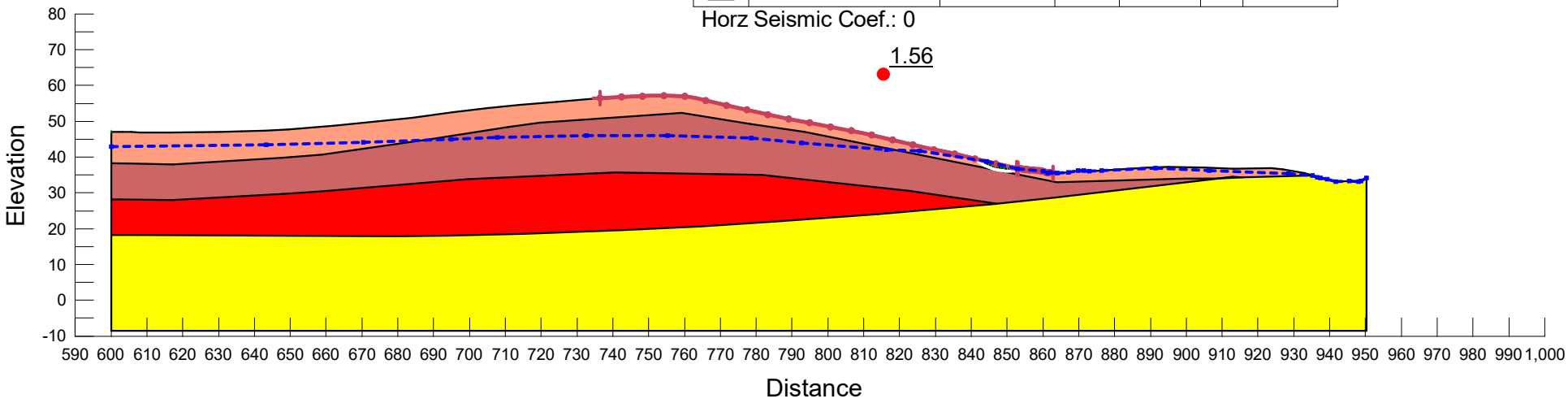


XS1
Global Rotational Failure
High GW Case

# Slope/W Section XS1 existing slope - High Groundwater Condition with Global Rotational Failure

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

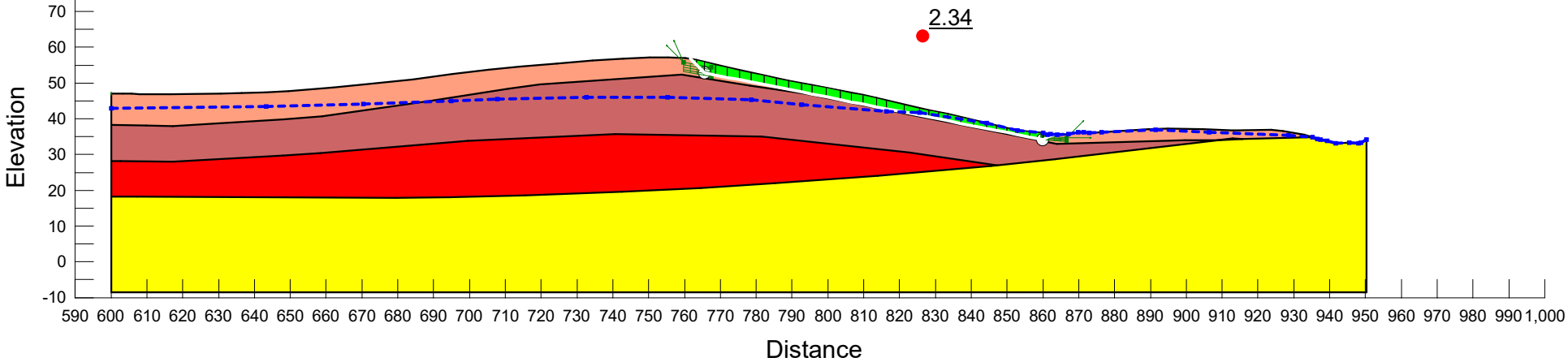


XS1
Global Translational Failure
High GW Case

# Slope/W Section XS1 existing slope - High Groundwater Condition with Global Translational Failure

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

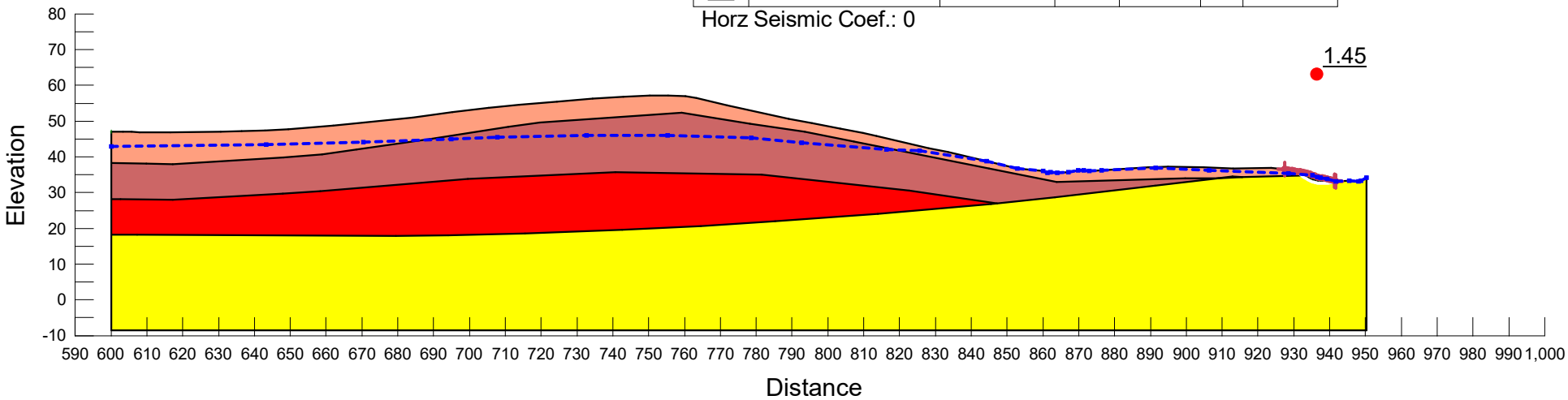


# Slope/W Section XS1 existing slope - High Groundwater Condition with Toe Failure

XS1
Toe Failure
High GW Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

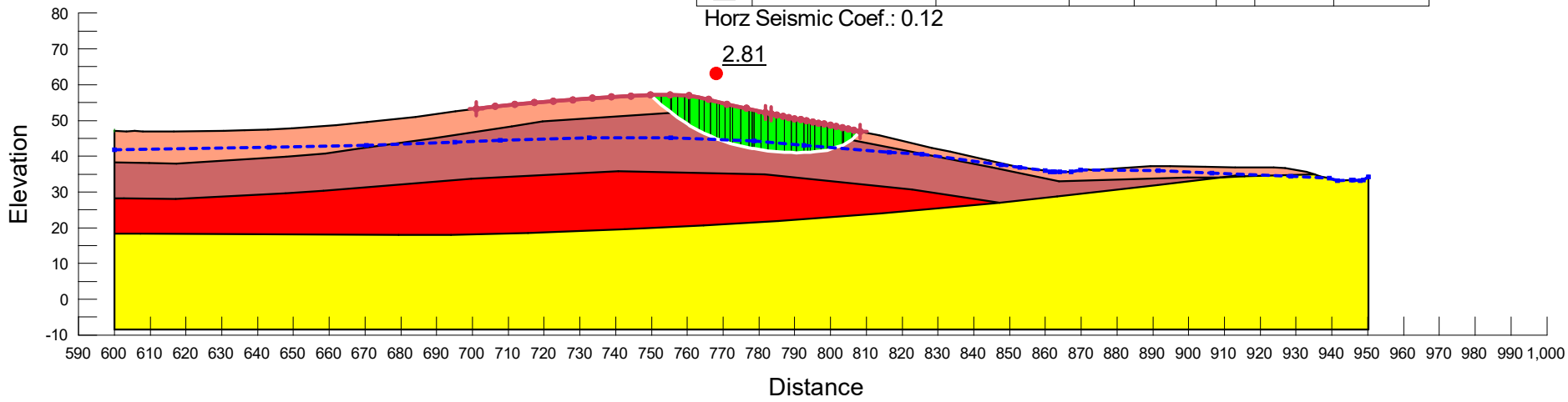


XS1
Global Rotational Failure
Seismic Case

# Slope/W Section XS1 existing slope - Seismic Condition with Global Rotational Failure

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | | | 75 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | | | 40 | 1 |

Horz Seismic Coef.: 0.12

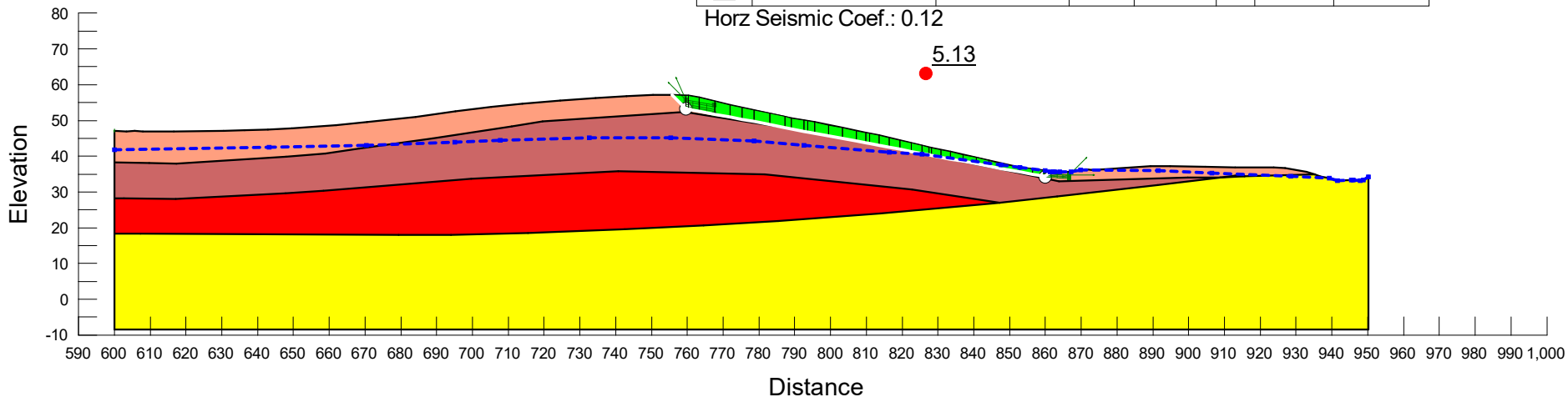


# Slope/W Section XS1 existing slope - Seismic Condition with Global Translational Failure

XS1
Global Translational Failure
Seismic Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | | | 75 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | | | 40 | 1 |

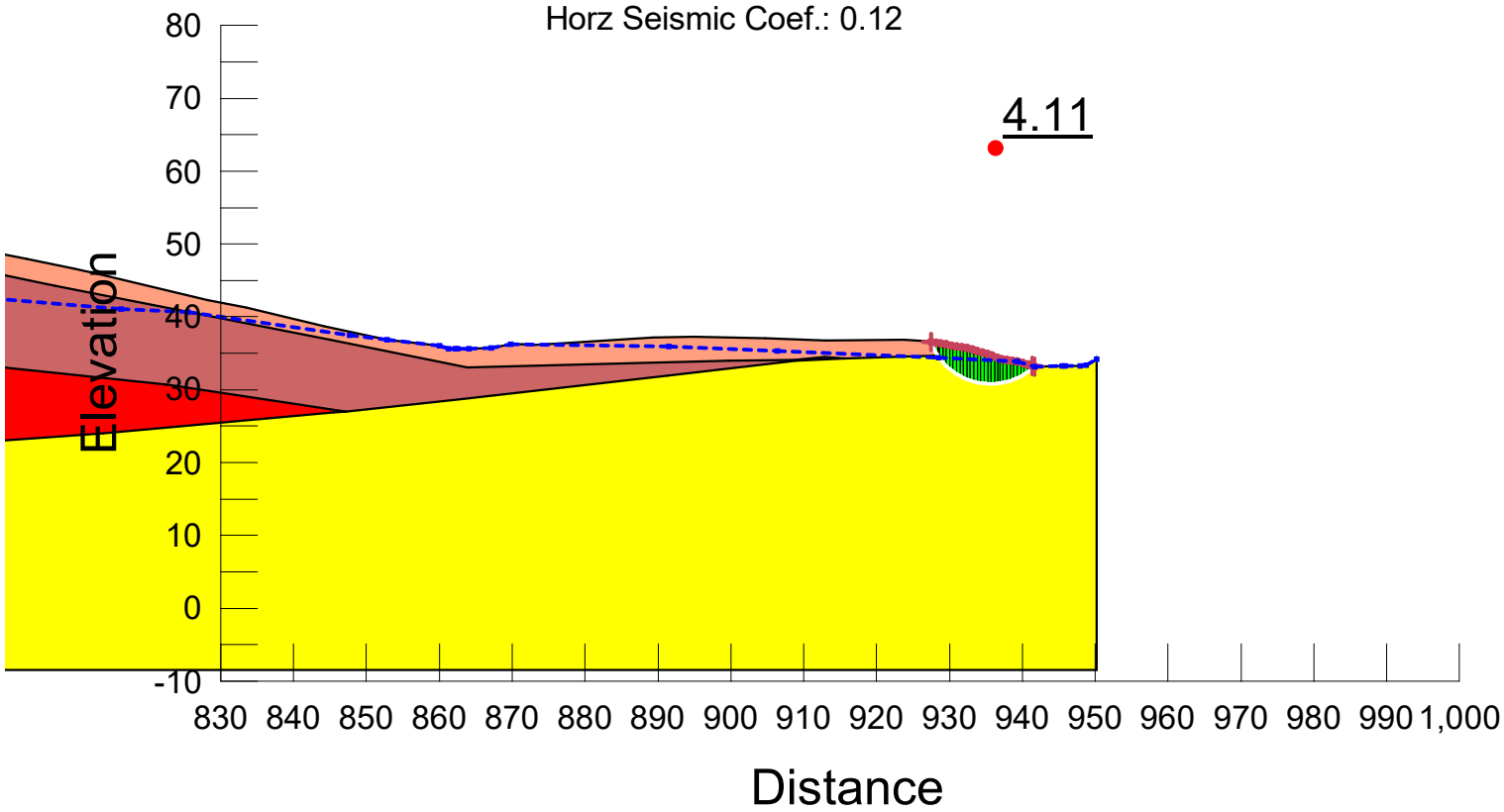
Horz Seismic Coef.: 0.12



# Slope/W Section XS1 existing slope - Seismic Condition with Toe Failure

XS1
Toe Failure
Seismic Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | | | 75 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | | | 40 | 1 |

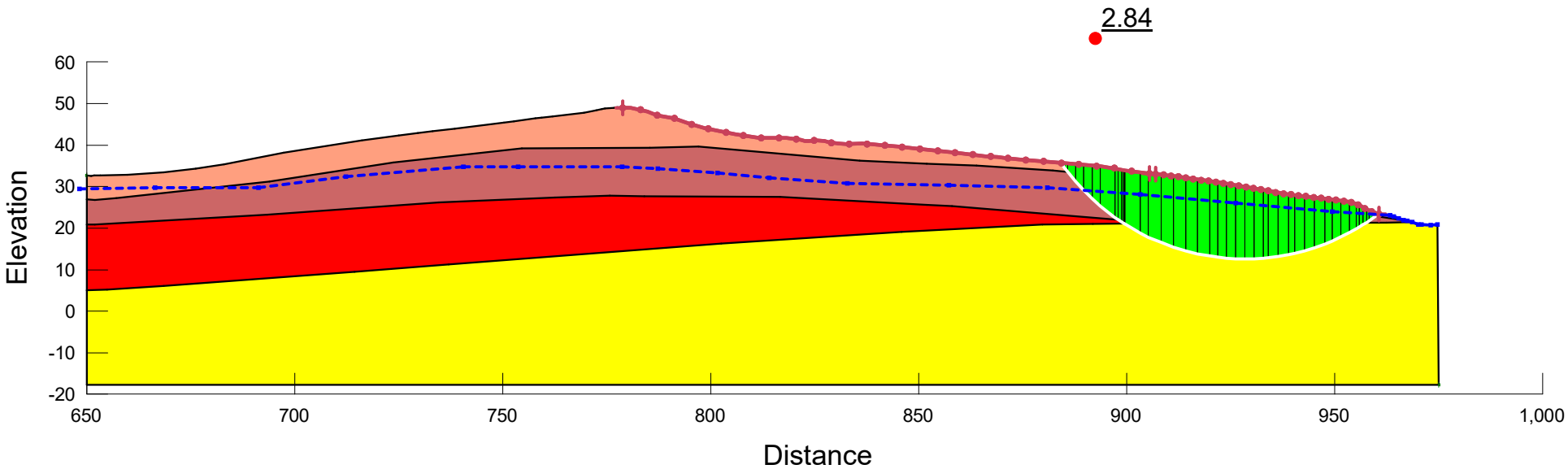


# Slope/W Section XS2 existing slope - Static Condition with Global Rotational Failure

XS2
Global Rotational
Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.:

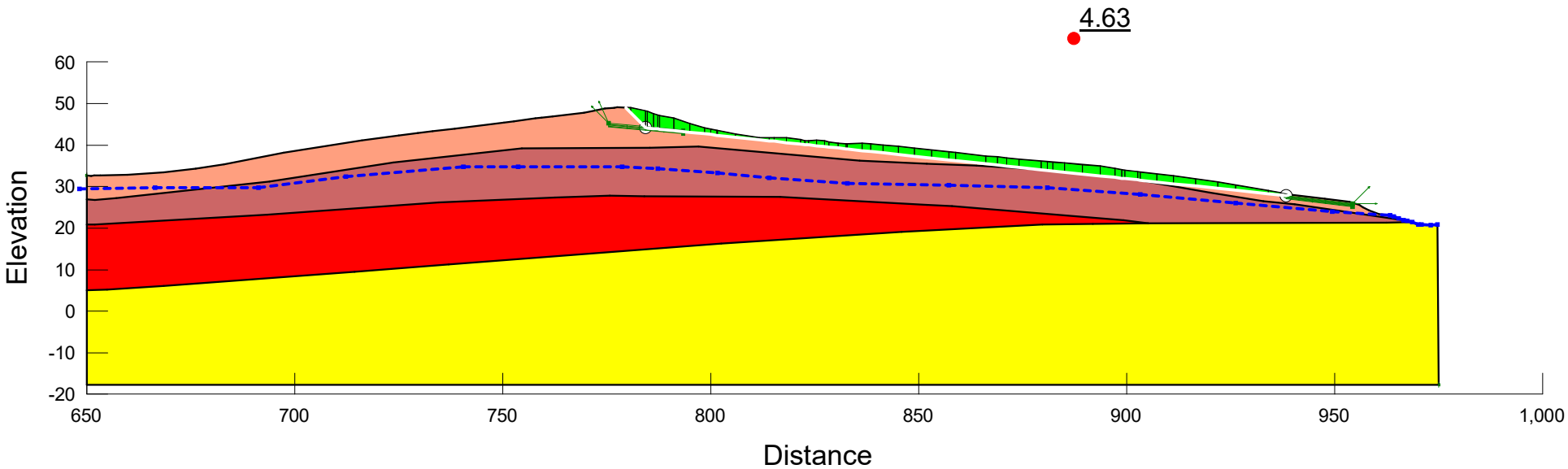


# Slope/W Section XS2 existing slope - Static Condition with Global Translational Failure

XS2
Global Translational
Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

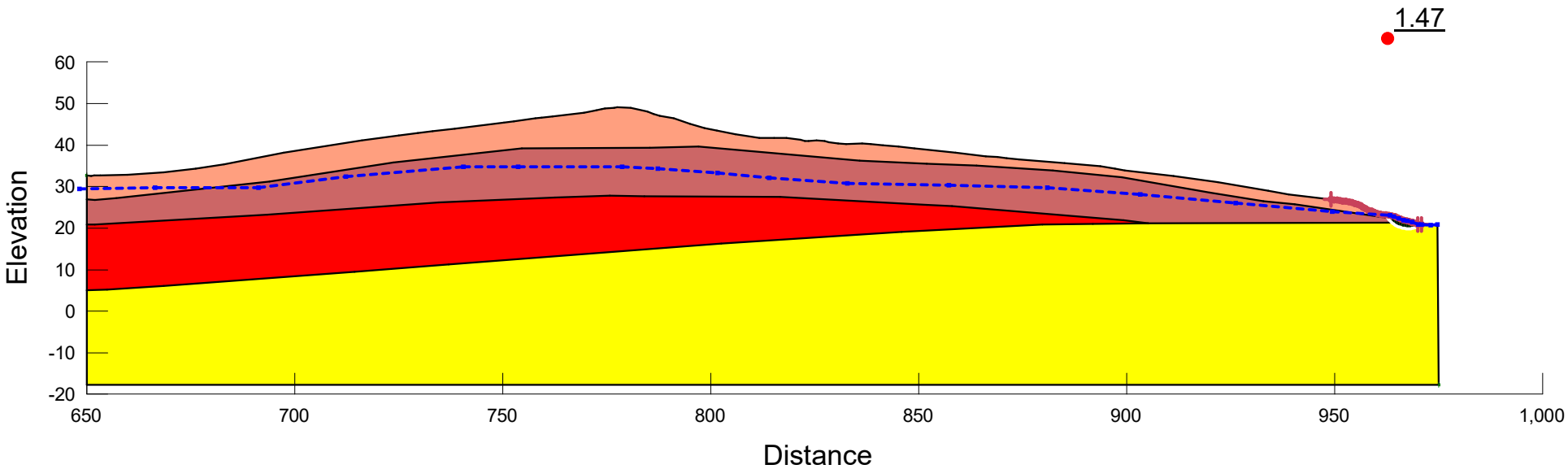


# Slope/W Section XS2 existing slope - Static Condition with Toe Failure

XS2
Toe stability
Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

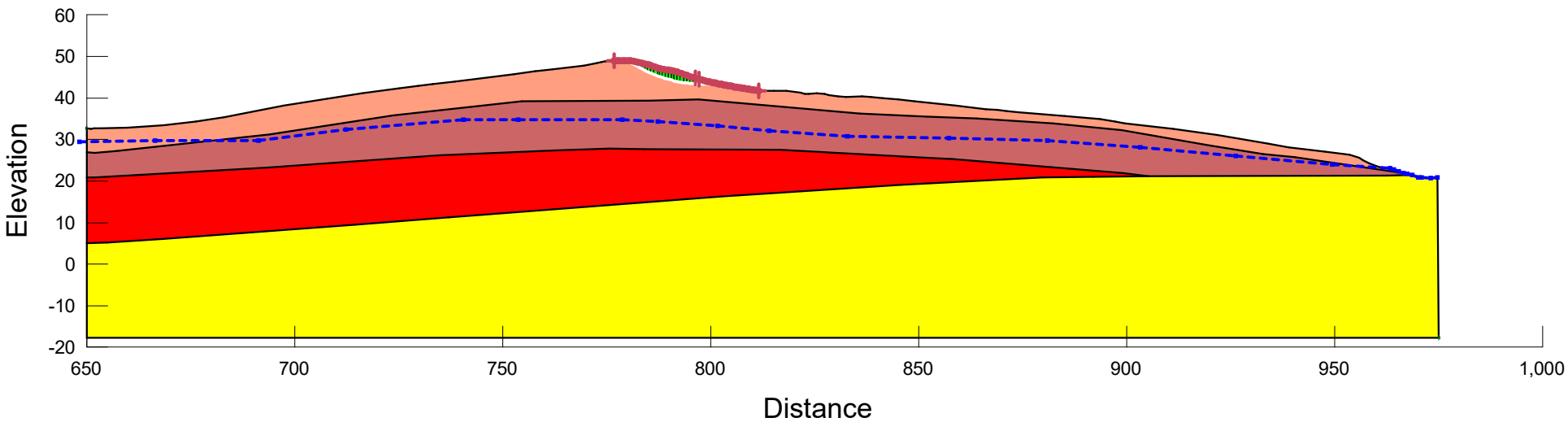


# Slope/W Section XS2 existing slope - Static Condition with Scarp Failure

XS2
Scarp Stability
Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.:
2.21

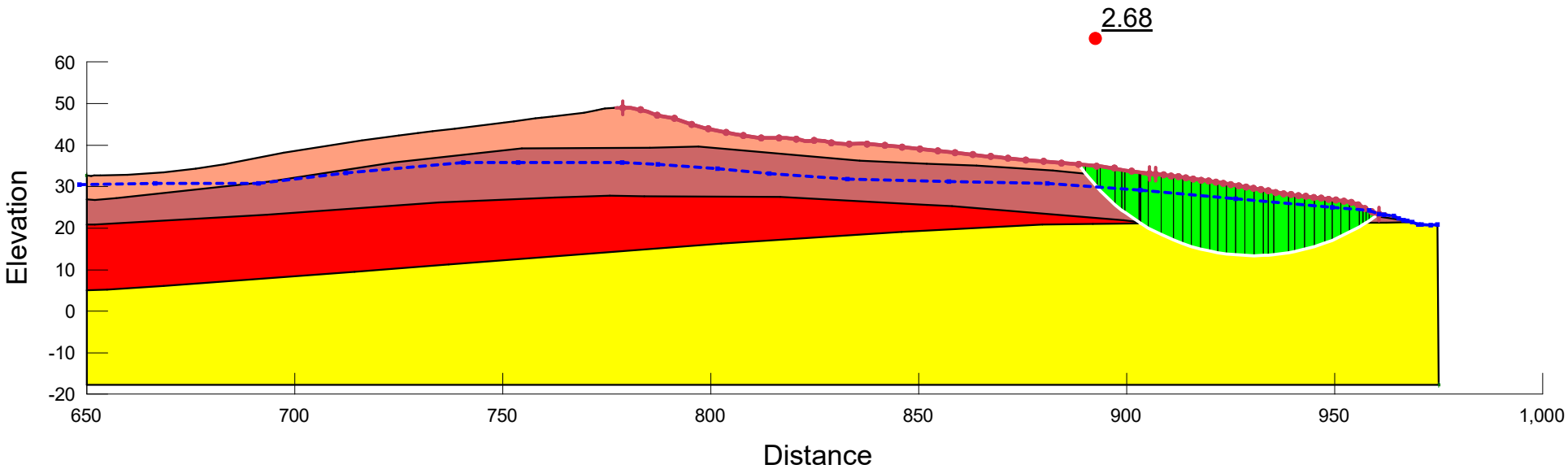


# Slope/W Section XS2 existing slope - High Groundwater Condition with Global Rotational Failure

XS2
Global Rotational
High GW Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.:

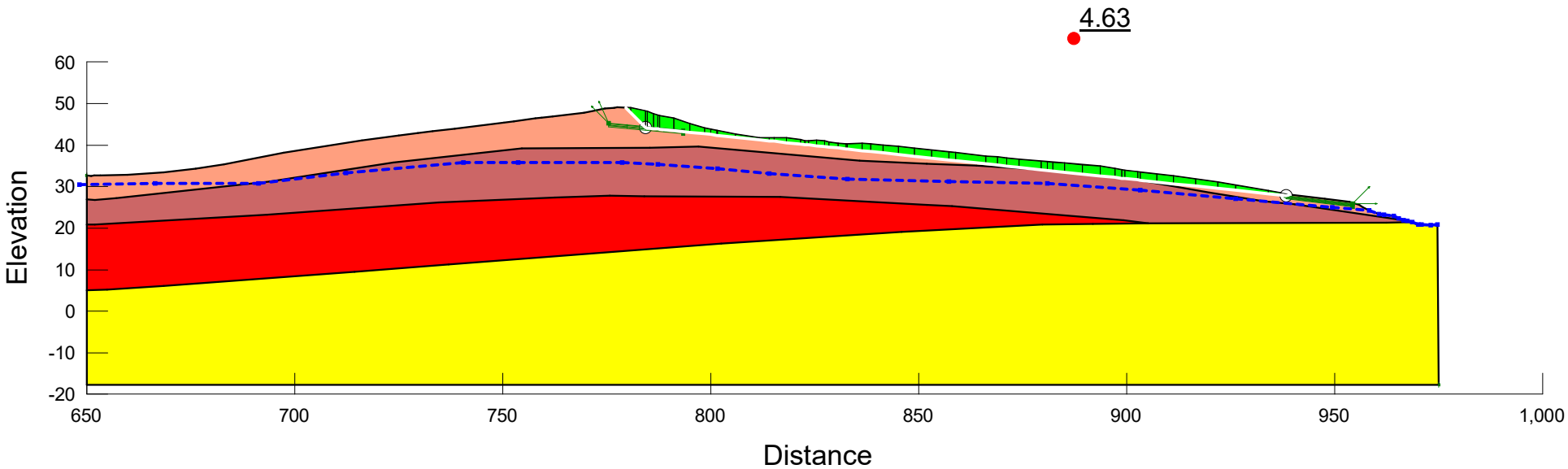


# Slope/W Section XS2 existing slope - High Groundwater Condition with Global Translational Failure

XS2
Global Translational
High GW Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

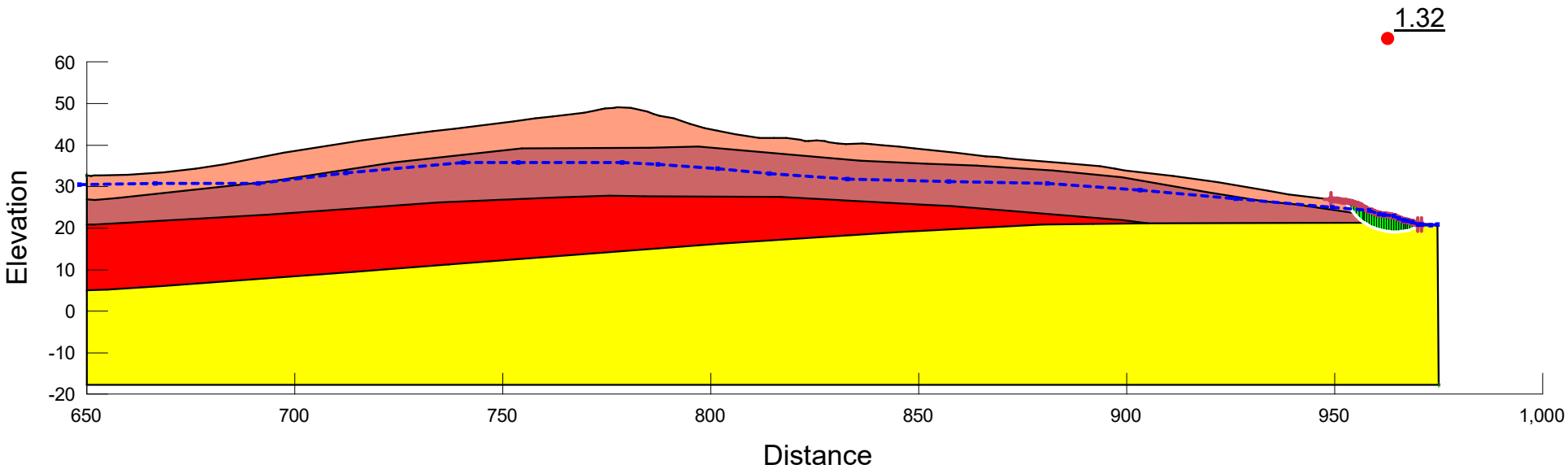


# Slope/W Section XS2 existing slope - High Groundwater Condition with Toe Failure

XS2
Toe stability
High GW Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

Horz Seismic Coef.: 0

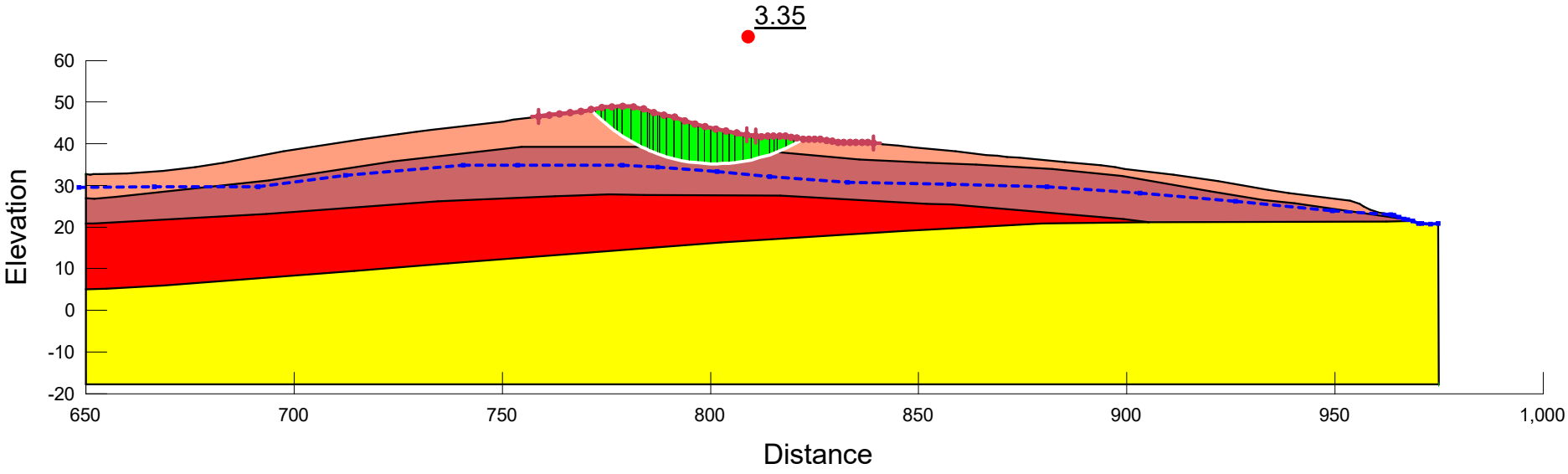


# Slope/W Section XS2 existing slope - Seismic Condition with Global Rotational Failure

XS2
Global Rotational
Seismic Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | | | 75 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | | | 40 | 1 |

Horz Seismic Coef.: 0.12

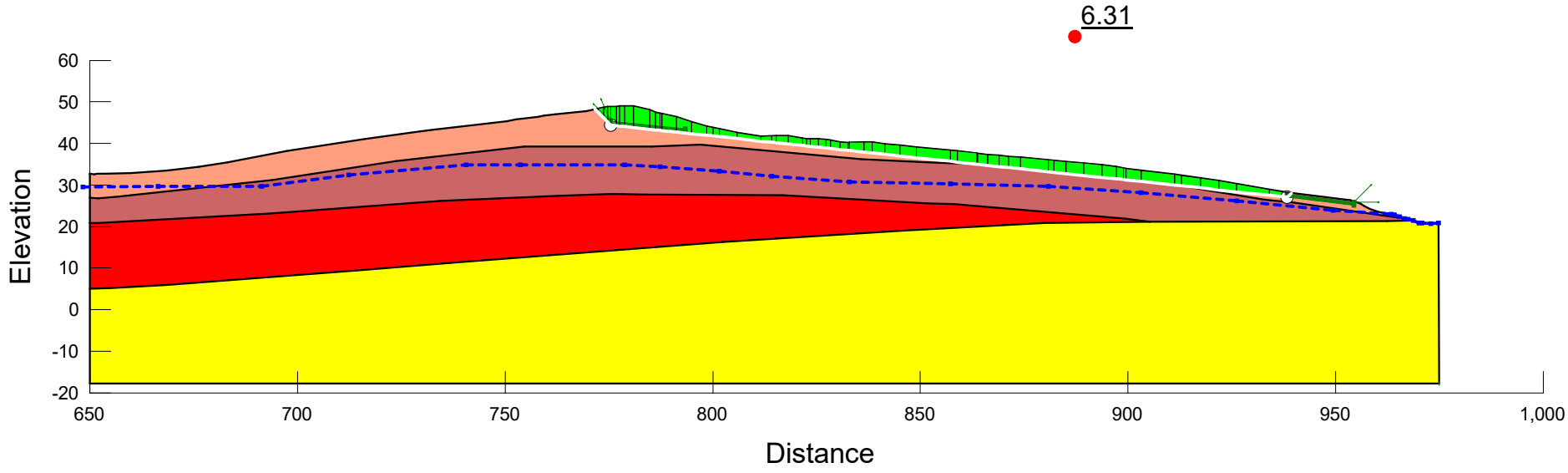


# Slope/W Section XS2 existing slope - Seismic Condition with Global Translational Failure

XS2
Global Translational
Seismic Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | | | 75 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | | | 40 | 1 |

Horz Seismic Coef.: 0.12

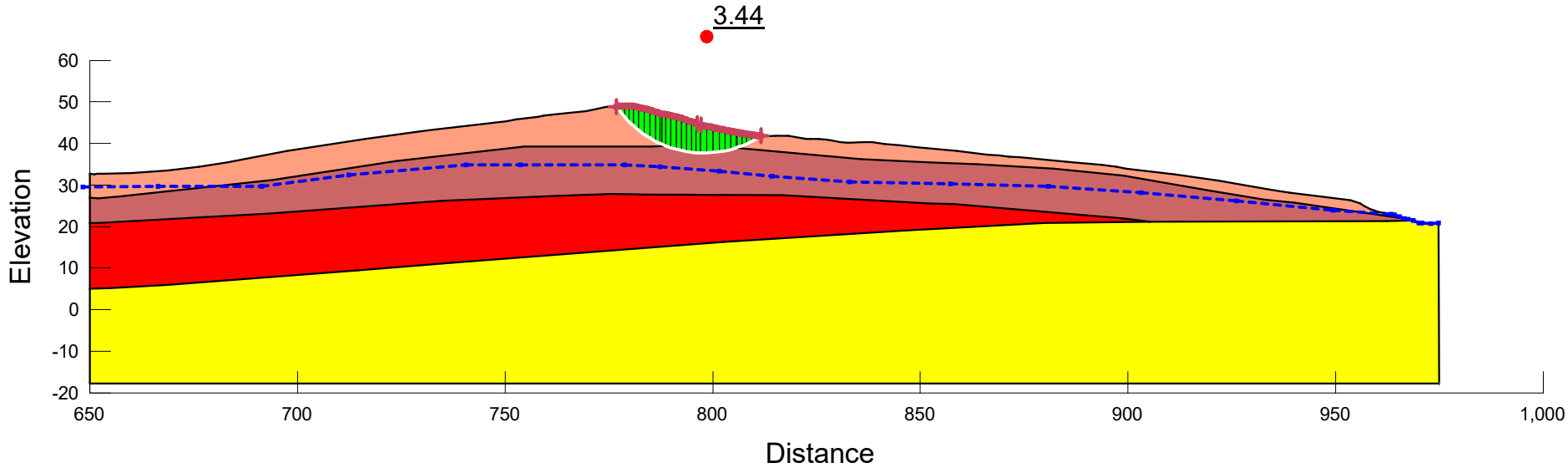


# Slope/W Section XS2 existing slope - Seismic Condition with Scarp Failure

XS2
Scarp Stability
Seismic Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | | | 75 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | | | 40 | 1 |

Horz Seismic Coef.: 0.12

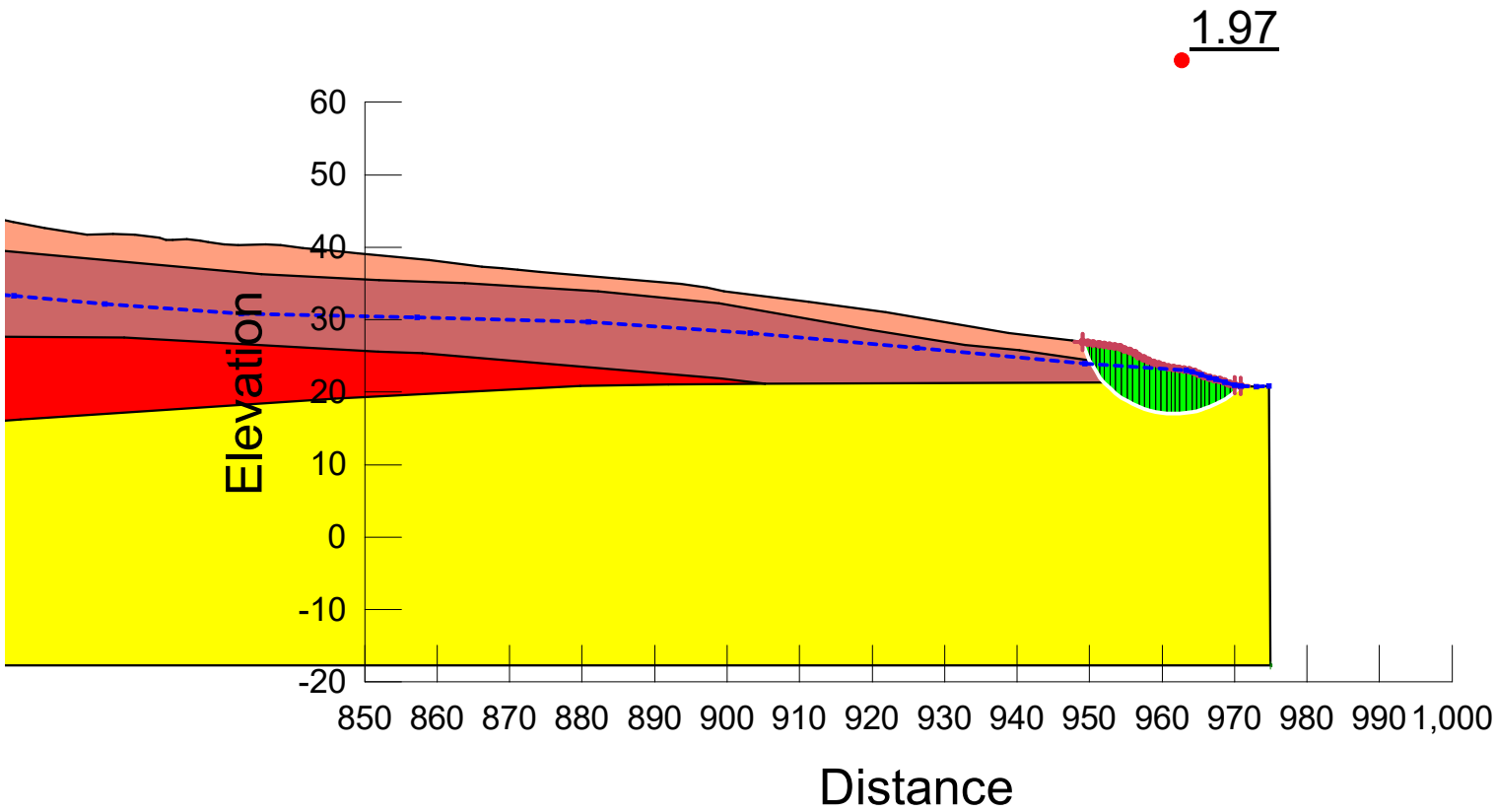


# Slope/W Section XS2 existing slope - Seismic Condition with Toe Failure

XS2
Toe stability
Seismic Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | | | 75 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | | | 40 | 1 |

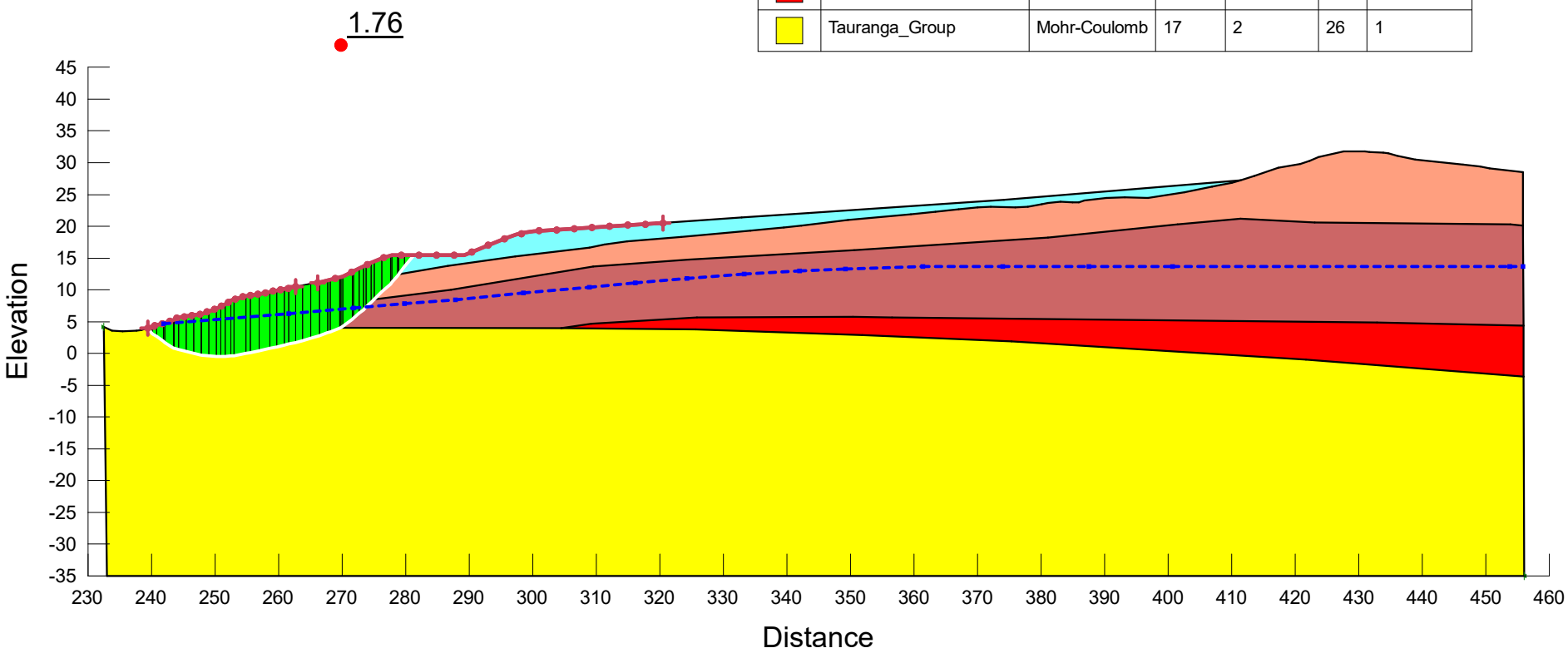
Horz Seismic Coef.: 0.12



# Slope/W Section XS2 with earthworks slope - Static Condition

## XS2 - Fill
## Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | Engineered Fill | Mohr-Coulomb | 18.5 | 5 | 32 | 1 |
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |

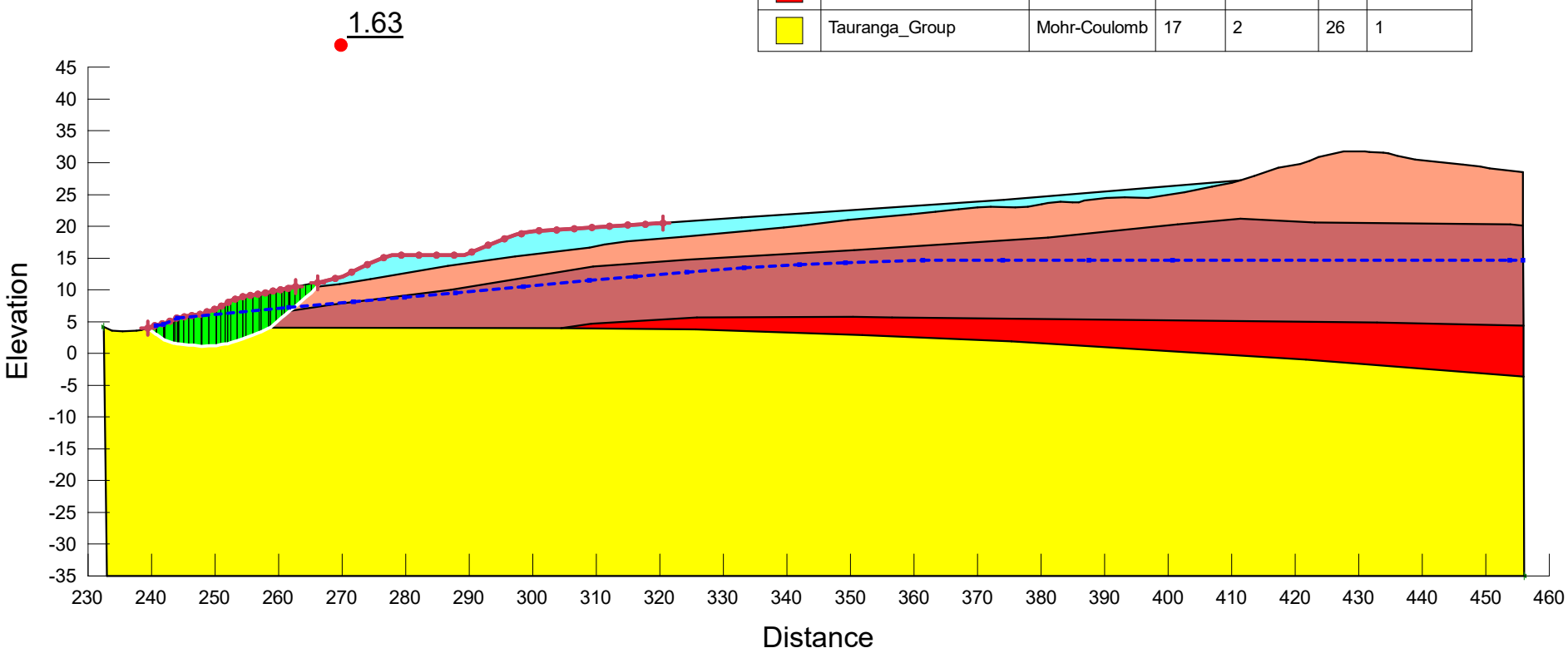



| | |
|---|---|
| Global | |
| Fill_XS2_Static Case_16.03.21.gsz | |
| 03/22/2021 | 1:990 |

# Slope/W Section XS2 with earthworks slope
# - High Groundwater Condition

## XS2 - Fill
## High Groundwater Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Piezometric Line |
|---|---|---|---|---|---|---|
| | Engineered Fill | Mohr-Coulomb | 18.5 | 5 | 32 | 1 |
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 1 |



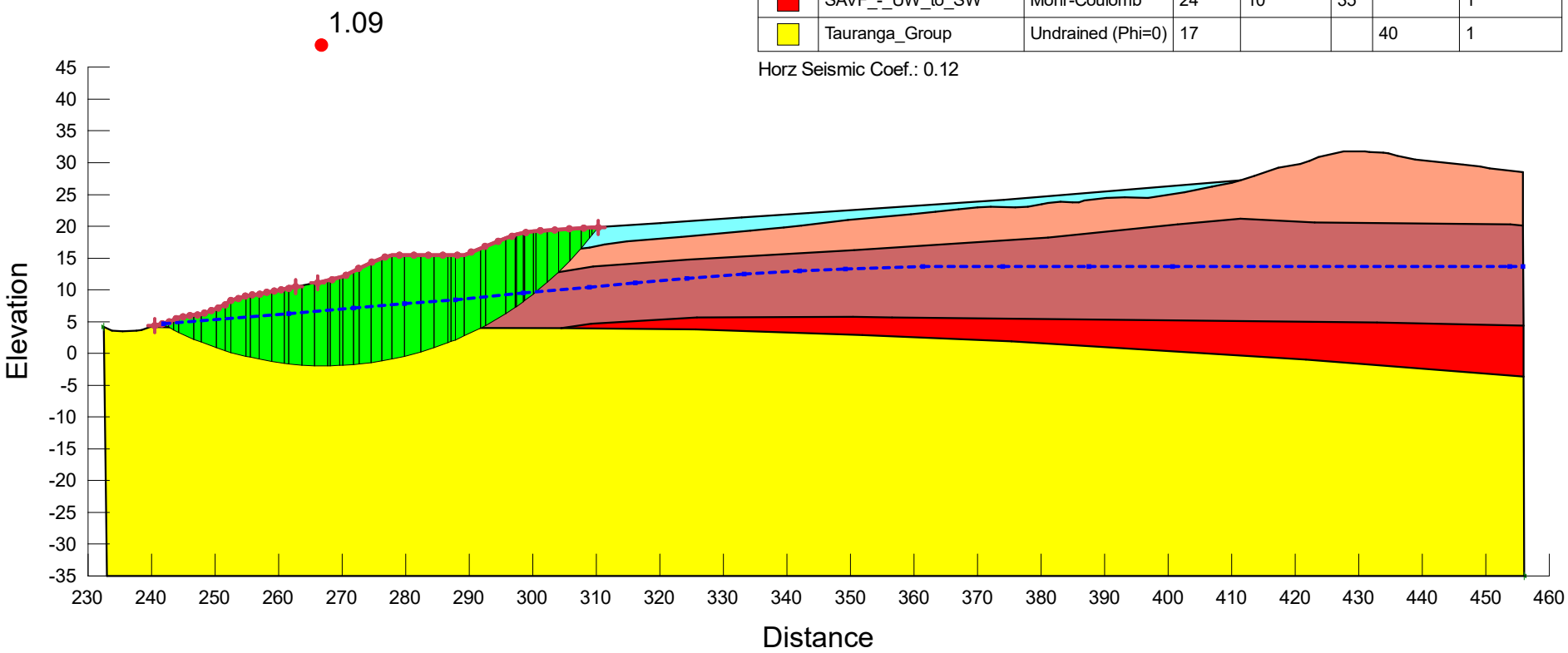

| | |
|---|---|
| Global | |
| Fill_XS2_HGW Case_16.03.21.gsz | |
| 03/22/2021 | 1:990 |

# Slope/W Section XS2 with earthworks slope - Seismic Condition

## XS2 - Fill
## Seismic Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | Engineered Fill | Undrained (Phi=0) | 18.5 | | | 100 | 1 |
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | | | 75 | 1 |
| | SAVF_-_MW_to_HW | Mohr-Coulomb | 23 | 10 | 33 | | 1 |
| | SAVF_-_UW_to_SW | Mohr-Coulomb | 24 | 10 | 35 | | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | | | 40 | 1 |

Horz Seismic Coef.: 0.12

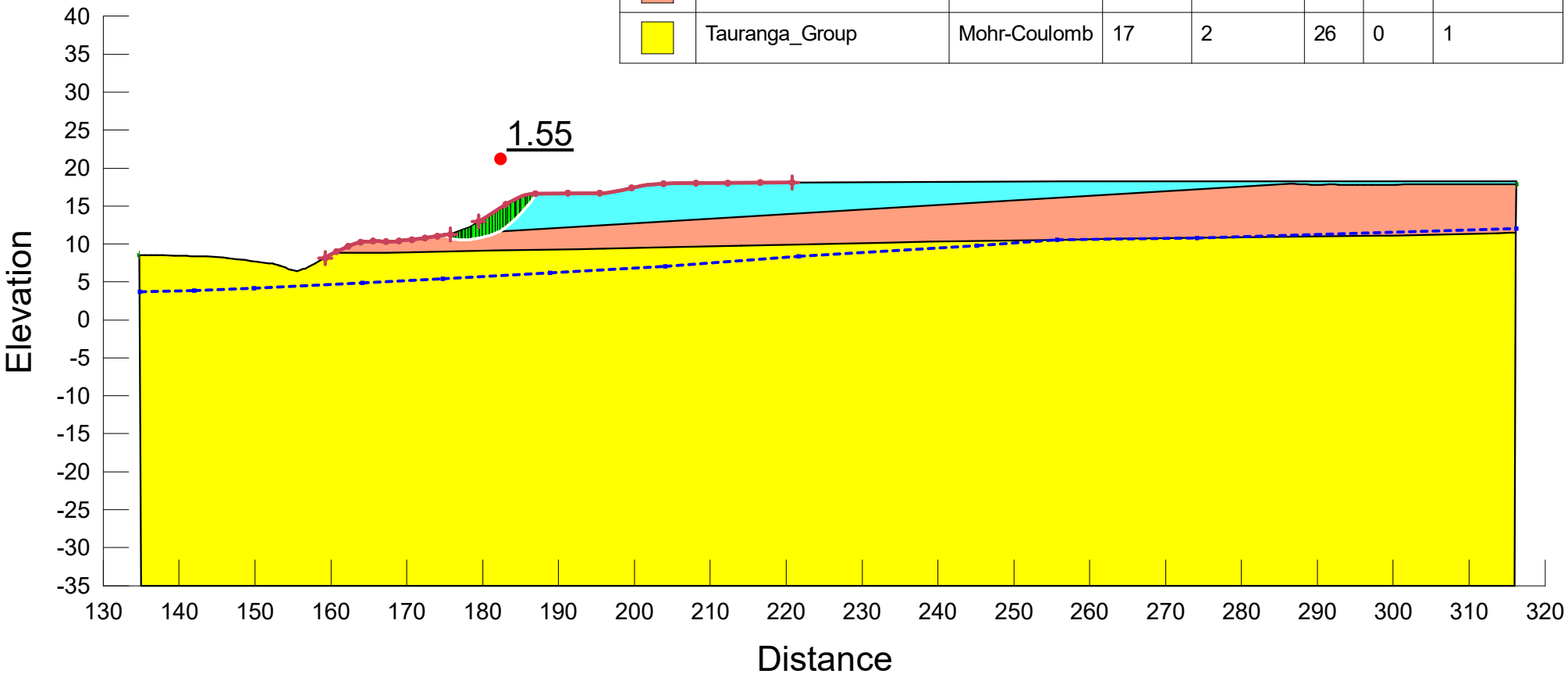



| | |
|---|---|
| Global | |
| Fill_XS2_Seismic Case_16.03.21.gsz | |
| 03/29/2021 | 1:990 |

# Slope/W Section XS3 with earthworks slope - Static Condition

## XS3 Fill
## Static Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | Engineered Fill | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

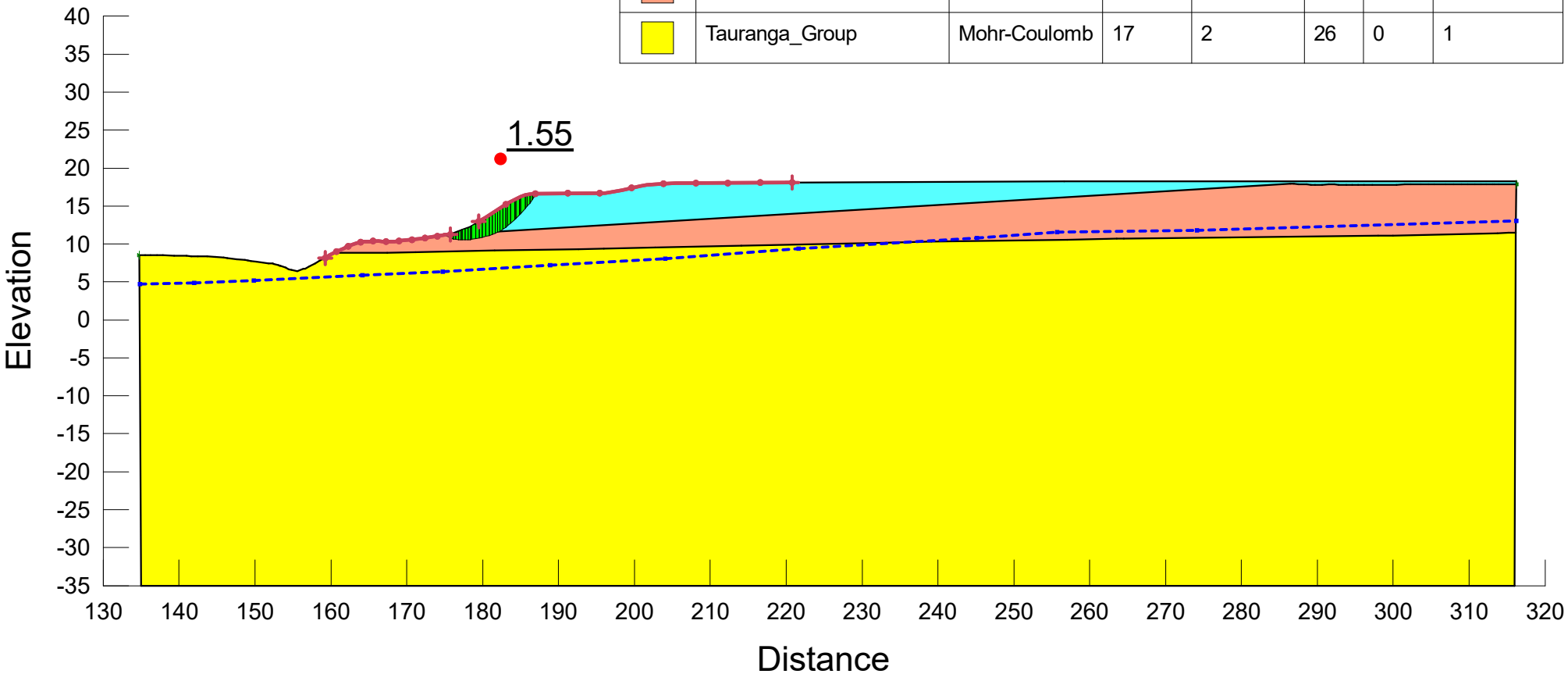



| | |
|---|---|
| Global | |
| Fill_XS3_Static Case_16.03.21.gsz | |
| 03/22/2021 | 1:777.85714 |

# Slope/W Section XS3 with earthworks slope
# - High Groundwater Condition

## XS3 Fill
## High Groundwater Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion' (kPa) | Phi' (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | Engineered Fill | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |
| | SAVF_-_CW_to_Residual | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Tauranga_Group | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |



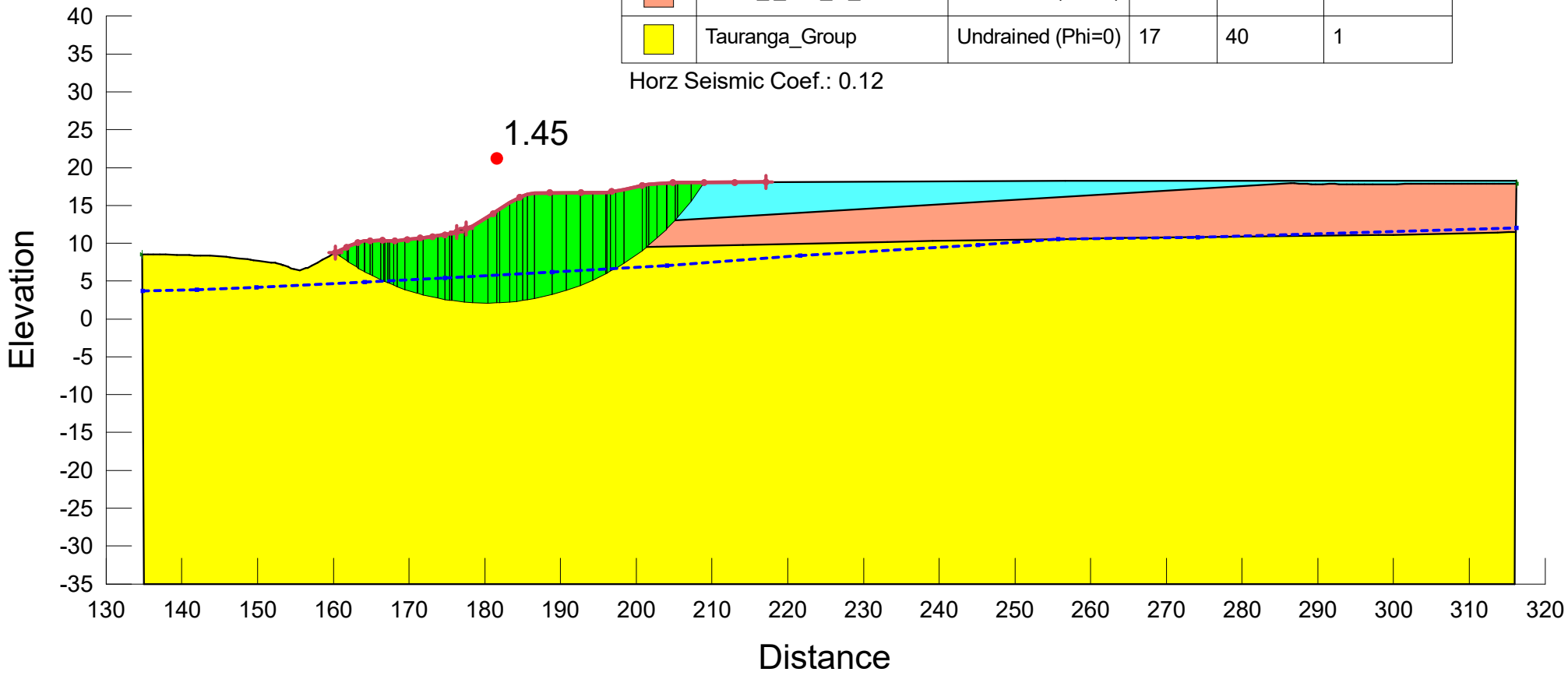

| | |
|---|---|
| Global | |
| Fill_XS3_HGW Case_16.03.21.gsz | |
| 03/22/2021 | 1:777.85714 |

# Slope/W Section XS3 with earthworks slope - Seismic Condition

## XS3 Fill
## Seismic Case

| Color | Name | Model | Unit Weight (kN/m³) | Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | Engineered Fill | Undrained (Phi=0) | 18.5 | 100 | 1 |
| | SAVF_-_CW_to_Residual | Undrained (Phi=0) | 17 | 75 | 1 |
| | Tauranga_Group | Undrained (Phi=0) | 17 | 40 | 1 |

Horz Seismic Coef.: 0.12




| | |
|---|---|
| Global | |
| Fill_XS3_Seismic Case_16.03.21.gsz | |
| 03/29/2021 | 1:777.85714 |

# Appendix O – Boundary Slope Stability

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2022-09-09

Emma McDonald
c/o Kiwi Property Group
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Auckland 1010

Dear Emma

**Drury Centre Development – Boundary Slope Stability Assessment**

## 1 Introduction

Site works have commenced at the Drury Centre development, located south of Drury, Auckland. The initial works will include bulk earthworks, which will result in cut and engineered fill area across the site, some of which will be adjacent to neighbouring properties. Detailed civil design is still required for the development, which will include detailed design of retaining wall elements and final earthworks level adjacent to boundaries, however in the meantime cuts and engineered fills will be undertaken as part of the bulk earthworks.

Where these earthworks are less than 3.0m, maximum slope angles for permanent and temporary slopes have been provided. For slopes greater than 3.0m in height a specific assessment is required to confirm stability. Based on the current landform model, bulk earthworks will result in slopes 3m or greater in height in four locations around the site boundary, and a slope stability analysis for each slope has been completed.

This letter report has been produced to satisfy the Condition 30 of the Earthworks Resource Consent (BUN60390224), for the Drury Centre Development. These conditions relate to ensuring the stability of earthworks, 3.0m in height or greater, around the site's boundary is maintained throughout the civil works stage of the development.

### 1.1 Previous Investigations

The Drury Centre Development has been previously investigated as part of the Aurecon 2021 Geotechnical Investigation Report (GIR)[1] and information contained within the GIR has been used to undertake this boundary slope stability assessment.

## 2 Slope Stability Analysis

### 2.1 Slope Model Design

The future site development will include boundary slopes with earthfill up to 7.0m thick, and temporary cut slopes up to 7.0m high. Representative cross sections have been constructed to assess whether the proposed earthfill or cut slopes will have a detrimental effect on slope stability at the site's boundary.

[1] *Drury Centre Geotechnical Investigation Report (GIR),* prepared for Kiwi Property Holdings No.2 Ltd. Dated: 11 November 2021. Report Ref: 510611-002-REP-GG-001[4].

The cut and fill slopes will be constructed according to the Auckland Council (2013) *Code of Practice for Land Development and Subdivision*: *Section 2: Earthworks and Geotechnical Requirements*. The geotechnical investigation report recommends cut and fill design slopes to be a 3H:1V, however we have also assessed potential steeper design slopes at 2.5H:1V. Therefore, stability analysis has been undertaken for both finished slope geometries. We note that this is a preliminary analysis based on the current earthworks design and further assessment of the earthfill slope stability may be required should the earthworks design change.

The analysis is based on the following:

- Four slope profiles have been assessed (at the two slope grades) and are based on the highest proposed sections of cut or fill, in the respective areas as outlined below:
  - 3.5m Cut Slope – Cut slopes along the eastern boundary, with the greatest slope height occurring at the corner of Brookfield and Fitzgerald Roads.
  - 7.0m Fill Slope – Fill slopes along the western boundary, where existing shallow gullies are proposed to be filled. Some of these areas may require retaining walls to limit the extent of fill downslope. These have not been included in this analysis as the design of any retaining walls will be part of the detailed civil design.
  - 6.0m Fill Slope – Fill slopes bordering the northern boundary.
  - 7.0m Cut Slope – A large temporary cut slope along the western side of the northern boundary. It is noted that this is not an external boundary and the land to the north is part of the same development (for future stages). However, as the cut slope is relatively high, we have included it in the analysis.
- Slope geometries have been derived from the proposed earthworks design (shown in *Drawing 510611-0100-DRG-CC-0003-B,* Attachment 1) and the existing surface topography (shown in Drawing *510611-0100-DRG-CC-0002-B*, Attachment 1). To simplify the modelling of the slope geometries, the slopes have been modelled with horizontal material contacts. This simplification is considered generally representative of these boundary slopes as the current topography is relatively horizontal, and the finished earthworks design aims to achieve a near horizontal surface for construction of the development's buildings and infrastructure.
- The engineered fill has been modelled as a layer immediately overlying the insitu soil. It is expected that where the underlying insitu soil is not horizontal, the slope will be benched to allow placement of earthfill during construction.
- A geological model for the site was produced as part of the GIR and indicates that the surficial geology within the earthworks area is exclusively comprised of completely weathered basalt or residual soils, derived from the South Auckland Volcanic Field. For modelling purposes, this unit alone has been used to define the underlying insitu material properties for each of the four slope geometries. While less weathered materials may be encountered on excavation of the larger cut slopes, we consider that using the weakest identified material in the models is an appropriately conservative measure.
- Groundwater data has been measured for the existing site topography, but as the proposed earthworks will greatly alter the surface geometry and the hydrogeologic structure of the site, we have not used any existing groundwater surface models to determine the groundwater conditions in the slope models. Instead, we have adopted an assumed depth to groundwater of 2.0m bgl (below ground level) for normal conditions, with a piezometric gradient across the slope equivalent to 6V:1H (double the gradient of the 3H:1V design slope surface). Based on the current depths to groundwater which range from 4.0m to 11.0m bgl across the site, we consider the above assumed depth to groundwater to be appropriately conservative.

## 2.2 Model Parameters

In accordance with Auckland Council (2013) *Code of Practice for Land Development and Subdivision*: *Section 2: Earthworks and Geotechnical Requirements*, we have carried out modelling for three cases, which include normal groundwater conditions, extreme (high) groundwater conditions and seismic conditions (150-year event).

For the extreme groundwater condition, we have taken the modelled static groundwater levels and raised them by 2.0m to represent a worst-case scenario, where the soils above and below the slope are completely saturated. Given the elevated nature of the site, we consider that this is an unlikely occurrence, but appropriate for conservative modelling purposes. It is also noted once the site is developed there will be low surface water infiltration as the majority of the site will be buildings or hardstand areas with stormwater runoff controlled, so in the future surface recharge is likely to be minimal.

The original stability assessment undertaken as part of the GIR used a peak ground acceleration (PGA) for the seismic assessment of 0.12g. However, since the issue of this report the guidance *Earthquake geotechnical engineering practice: Module 1*, dated November 2021, has provided updated PGAs. The guidance provides PGAs for 100 year and 250-year return period. To obtain a 150-year return, as required by *Code of Practice for Land Development and Subdivision*: *Section 2: Earthworks and Geotechnical Requirements,* we have extrapolated between 100 year and 250-year return period. Based on this a PGA of 0.11g can be used, however, to maintain consistency with previous assessments we will continue to use a higher and more conservative value of 0.12g. No topographic amplification factors have been applied to the slope due to the low terrain.

For the normal and extreme groundwater conditions effective (drained) soil parameters have been used, while for the seismic case undrained shear strength parameters have been used. All analyses were completed using the limit equilibrium software SLOPE/W from GeoStudio (version 10.0.2.18035).

The effective and undrained shear strength soil parameters provided in Table 1 have been used to define the model material properties. These parameters are based on the investigations and laboratory testing completed as part of the GIR, experience with similar materials and applied engineering judgement.

**Table 1 Preliminary Geotechnical Design Parameters**

| Layer Description | Unit Weight ($\gamma$, kN/m$^3$) | Effective Cohesion (c', kPa) | Effective Friction Angle ($\phi$', °) | Undrained Shear Strength (Su, kPa) |
|---|---|---|---|---|
| Topsoil* | 14-16 | - | - | - |
| Completely Weathered Volcanics to Residual Soil [SAVF] | 17 | 2 | 26 | 75 |
| Engineered Fill (Site-won Silts/Clays) | 18.5 | 5 | 32 | 100 |

**Not modelled – assumed to be stripped prior to earthworks commencing.*

## 2.3 Assessment criteria

To assess the sensitivity of the slope analysis to the failure surface location on the slope we have reviewed the following failure cases:

- Global Failure – Modelled a global failure through the main part of the slope using an entry and exit slip surface.
- Scarp Failure – Modelled a failure through upper part of the slope, with an exit through the slope face itself. For this an entry and exit slip surface has been used.

Note that for the global failure mode in the seismic case, and the scarp failure assessment in general, the modelled failure is constrained by the slip entry and exit limits. While typically the limits should be increased to assess whether a lower FoS may be predicted, in these cases the limits are being used to constrain the failure to a particular section of the slope (scarp failure) or to prevent excessively large and unrealistic rotational failures from occurring (as for the global seismic case).

The target factors of safety (FoS) for each case are as follows:

- Normal (static) conditions FoS = 1.5
- Extreme (high) groundwater condition FoS = 1.3
- Seismic condition FoS = 1.2

## 2.4 Stability Modelling Results

A summary of the slope stability analysis results is presented in Table 2 and Table 3 below, with the outputs of the analysis provided in Attachment 2. It is noted that the seismic cases tend to have higher FoS as the undrained shear strengths are used in the analysis.

**Table 2 Slope Stability Analysis Results (3H:1V slopes)**

| Cross Section | Case | Global Failure | Scarp Failure |
|---|---|---|---|
| 3.5m Cut Slope | Static | 2.03 | 2.02 |
| | High Groundwater | 1.54 | 1.56 |
| | Seismic | 4.15 | 5.95 |
| 6.0m Fill Slope | Static | 2.09 | 2.14 |
| | High Groundwater | 1.53 | 1.60 |
| | Seismic | 2.65 | 3.64 |
| 7.0m Cut Slope | Static | 1.81 | 1.80 |
| | High Groundwater | 1.37 | 1.40 |
| | Seismic | 2.35 | 3.04 |
| 7.0m Fill Slope | Static | 1.98 | 2.05 |
| | High Groundwater | 1.50 | 3.01 |
| | Seismic | 2.51 | 1.57 |

**Table 3 Slope Stability Analysis Results (2.5H:1V slopes)**

| Cross Section | Case | Global Failure | Scarp Failure |
|---|---|---|---|
| 3.5m Cut Slope | Static | 1.76 | 1.75 |
| | High Groundwater | 1.44 | 1.47 |
| | Seismic | 4.10 | 6.08 |
| 6.0m Fill Slope | Static | 1.94 | 1.94 |
| | High Groundwater | 1.46 | 1.52 |
| | Seismic | 2.56 | 3.60 |
| 7.0m Cut Slope | Static | 1.55 | 1.57 |
| | High Groundwater | **1.28** | 1.31 |
| | Seismic | 2.47 | 3.03 |
| 7.0m Fill Slope | Static | 1.86 | 1.90 |
| | High Groundwater | 1.42 | 1.50 |
| | Seismic | 2.39 | 3.04 |

*Note: FoS have been rounded to 2 decimal places*

## 3 Summary and Recommendations

The results of the stability analysis indicate an adequate factor of safety can be achieved for all proposed boundary slope geometries in all assessed cases, with only one exception in the 7.0m Cut Slope. This slope represents a temporary internal slope which will, be removed as future stages of the development are completed. Therefore, we consider that conservatively the 7.0m Cut Slope could be graded at 3H:1V. If graded steeper than 3H:1V, the risk that the slope may fail in extreme groundwater conditions will need to be accepted, or internal drainage installed (sub-horizontal drains). All other boundary slopes may be graded at up to 2.5H:1V. With these slope grades the proposed bulk earthworks design is unlikely to pose a risk of slope failure to neighbouring properties.

In addition, Aurecon recommends the following:

- Should the earthworks design change, or additional retaining walls are proposed along any of the site's boundaries, further slope stability assessment will be required for those areas.
- If on construction of the boundary earthworks the ground conditions encountered are found to be different to those used in the above models (changing stratigraphy, groundwater conditions, uncontrolled fill etc.), a reassessment of the slope stability model will be required to confirm an adequate FoS can still be achieved.

## 4 Limitations

We have prepared this letter report in accordance with, and to satisfy the conditions associated with Resource Consent BUN60390224. The contents of the letter report are for the sole use of the Client and Auckland Council, and no responsibility or liability will be accepted to any third party. Data or opinions contained within the letter report may not be used in other contexts or for any other purposes without our prior review and agreement.

The recommendations in this letter report are based on data collected at specific locations and by using appropriate investigation methods with limited site coverage. Only a finite amount of information has been collected to meet the specific financial and technical requirements of the Client's brief and this letter report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgment and it must be appreciated that actual conditions could vary from the assumed model.

Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

Subsurface conditions, such as groundwater levels, can change over time. This should be borne in mind, particularly if the letter report is used after a protracted delay.

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Yours sincerely

Prepared by
Fraser Monteith
*Engineering Geologist*

Reviewed by
James Muirson
*Lead Engineering Geologist*

Approved by
Jan Kupec *PhD MSc candIng FEngNZ CPEng IntPE APEC Engineer*
*Principal – Ground Engineering*
Auckland Council Producer Statement author 123320
CPEng 1008597

Enc: Attachment 1 – Drawings
Attachment 2 – Slope Stability Analysis Results

Copies:

# Attachment 1 – Drawings

## CUT AND FILL RANGES

| FROM | TO | COLOUR |
|---|---|---|
| 99.5 | -9.0 | |
| -9.0 | -8.5 | |
| -8.5 | -8.0 | |
| -8.0 | -7.5 | |
| -7.5 | -7.0 | |
| -7.0 | -6.5 | |
| -6.5 | -6.0 | |
| -6.0 | -5.5 | |
| -5.5 | -5.0 | |
| -5.0 | -4.5 | |
| -4.5 | -4.0 | |
| -4.0 | -3.5 | |
| -3.5 | -3.0 | |
| -3.0 | -2.5 | |
| -2.5 | -2.0 | |
| -2.0 | -1.5 | |
| -1.5 | -1.0 | |
| -1.0 | -0.5 | |
| -0.5 | 0 | |
| 0 | 0.5 | |
| 0.5 | 1.0 | |
| 1.0 | 1.5 | |
| 1.5 | 2.0 | |
| 2.0 | 2.5 | |
| 2.5 | 3.0 | |
| 3.0 | 3.5 | |
| 3.5 | 4.0 | |
| 4.0 | 4.5 | |
| 4.5 | 5.0 | |
| 5.0 | 5.5 | |
| 5.5 | 6.0 | |
| 6.0 | 6.5 | |
| 6.5 | 7.0 | |
| 7.0 | 7.5 | |
| 7.5 | 8.0 | |
| 8.0 | 8.5 | |
| 8.5 | 99.0 | |

## TABLE 1: OVERALL CUT AND FILL VOLUMES (m³)

| | |
|---|---|
| CUT | -350100 m³ |
| FILL | 350 000 m³ |
| BALANCE | -100 m³ |

## TABLE 2: TOPSOIL VOLUME (m³)

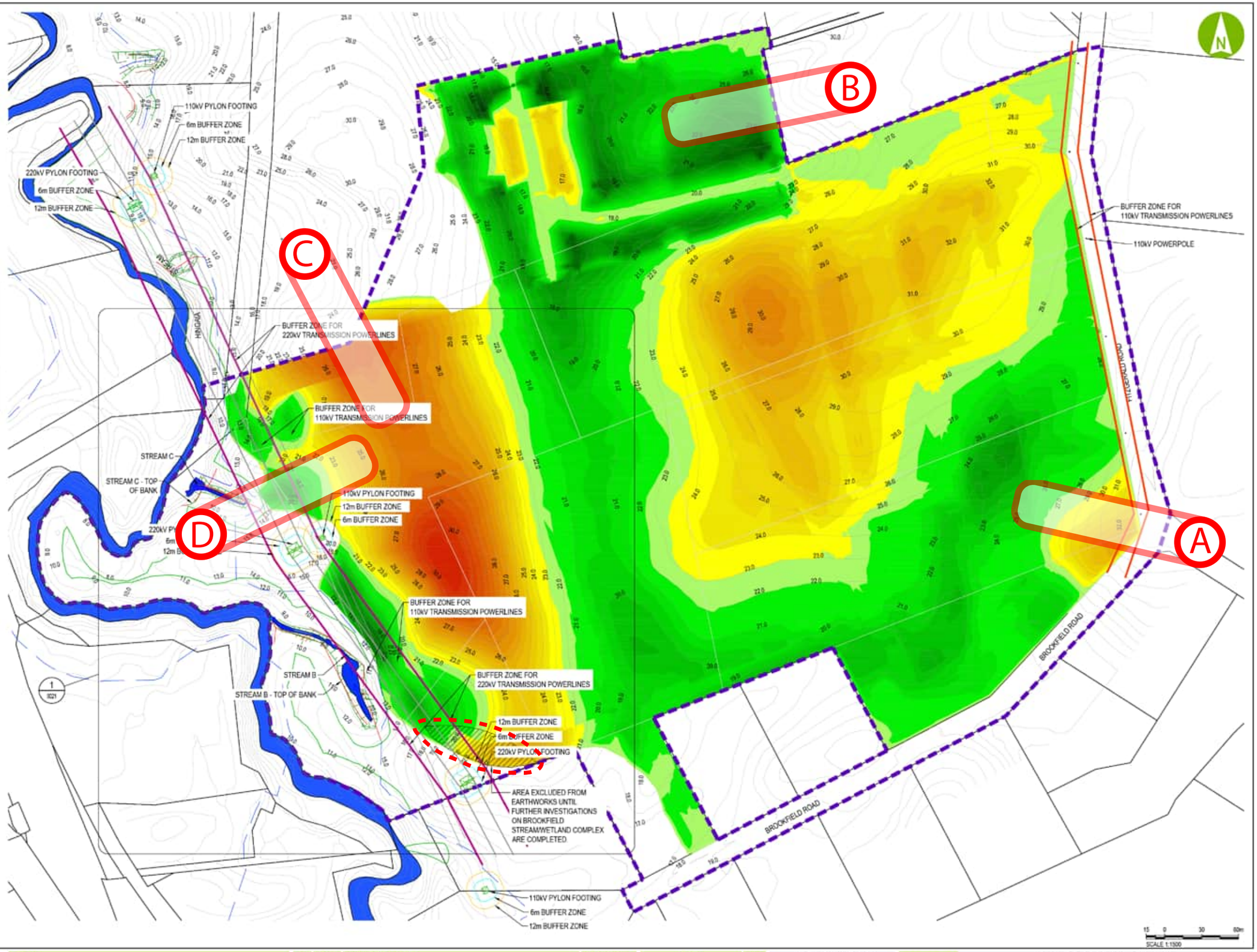
| |
|---|
| 73,200 m³ |

## LEGEND

- CADASTRAL BOUNDARIES
- EXISTING REGISTRAR OF TITLE
- PROPOSED DEVELOPMENT BOUNDARY
- BUFFER ZONE FOR 110kV TRANSMISSION POWERLINES
- BUFFER ZONE FOR 220kV TRANSMISSION POWERLINES
- EXTENT OF WORKS
- 100 YEAR FLOOD LEVEL EXTENT

SLOPE STABILITY MODEL CROSS SECTION LOCATIONS

- A — 3.5M CUT SLOPE
- B — 6.0M FILL SLOPE
- C — 7.0M CUT SLOPE
- D — 7.0M FILL SLOPE

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CLIENT: Kiwi Property

| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 21.05.21 | ISSUED FOR CONSENT | W.NEL |
| B | 29.10.21 | ISSUED FOR CONSENT | W.NEL |

| | |
|---|---|
| SCALE | 1:1500 |
| SIZE | A1 |
| DRAWN | M.KAUR |
| DESIGNED | J.WARLICH-KOOLE |
| REVIEWED | J.A.VORSTER |

FOR CONSENT
NOT FOR CONSTRUCTION

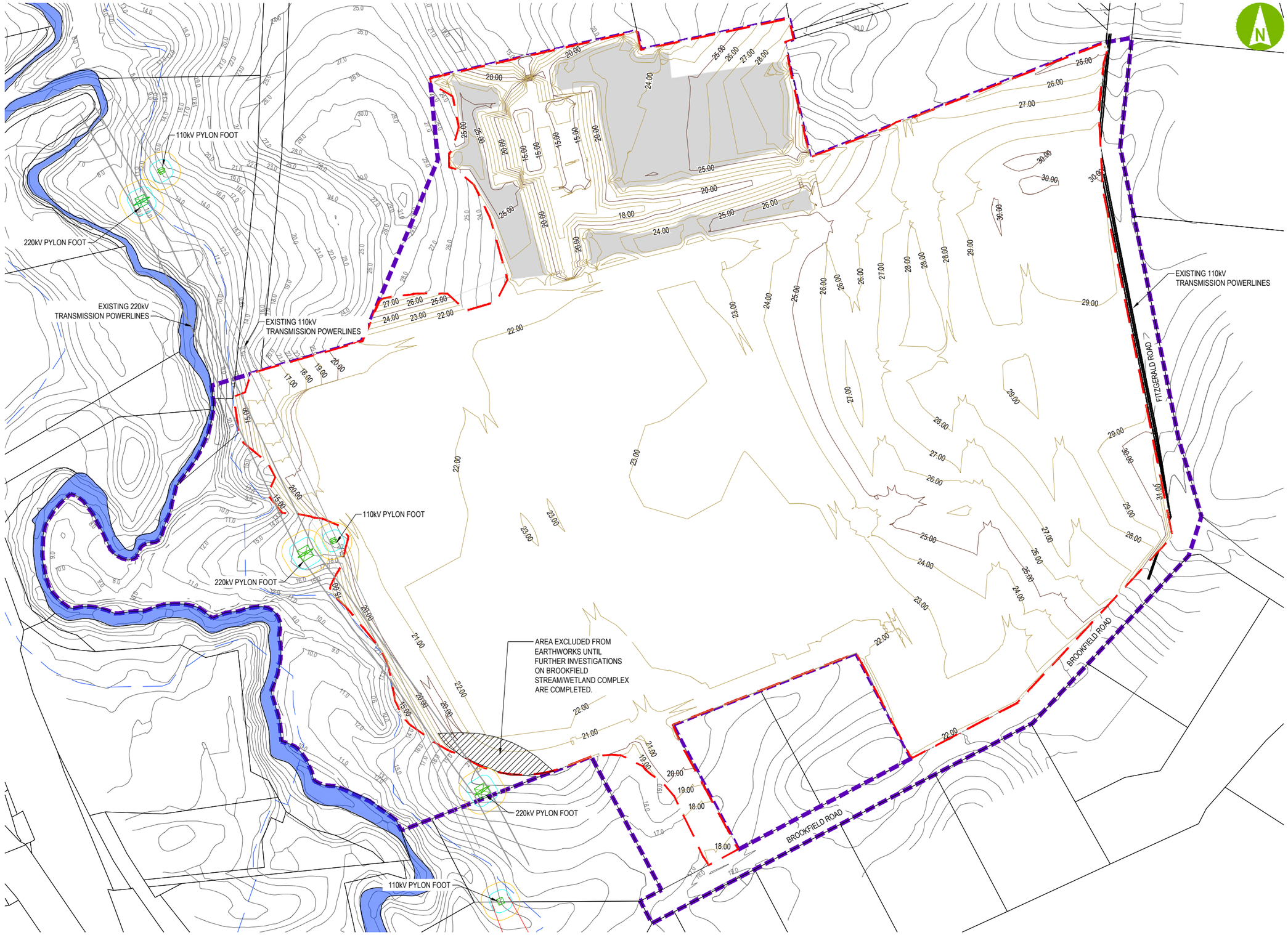
APPROVED
DATE
29.10.2021
W.NEL

| | |
|---|---|
| PROJECT | KIWI PROPERTY - DRURY |
| TITLE | CUT AND FILL LAYOUT PLAN |

DRAWING No. 510611 - 0100 - DRG - CC - 0002 - B

## LEGEND

- CADASTRAL BOUNDARIES
- PROPOSED DEVELOPMENT BOUNDARY
- PROPOSED MAJOR CONTOUR 5m INTERVALS
- PROPOSED MINOR CONTOUR 1m INTERVALS
- EXTENT OF WORKS
- 100 YEAR FLOOD LEVEL EXTENT




## NOTES

1. PROPOSED CONTOURS ARE DRAFT ONLY.

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CLIENT: Kiwi Property

| REV | DATE | REVISION DETAILS | APPROVED |
|---|---|---|---|
| A | 21.05.21 | ISSUED FOR CONSENT | W.NEL |
| B | 29.10.21 | ISSUED FOR CONSENT | W.NEL |

| SCALE | SIZE |
|---|---|
| 1:1500 | A1 |

DRAWN: M.KAUR
DESIGNED: J.WARLICH-KOOLE
REVIEWED: J.A.VORSTER

FOR CONSENT
NOT FOR CONSTRUCTION

APPROVED
DATE
29.10.2021
W.NEL

PROJECT: KIWI PROPERTY - DRURY

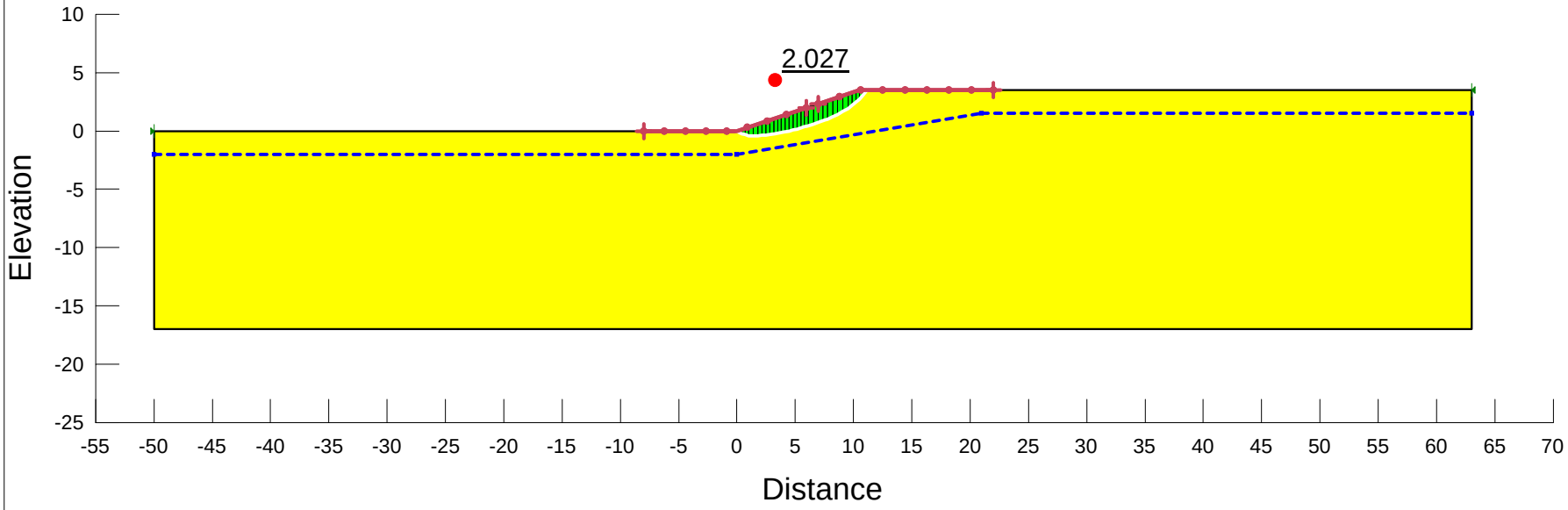
TITLE: DESIGN CONTOUR LAYOUT PLAN

| DRAWING No. | PROJECT No. | WBS | TYPE | DISC | NUMBER | REV |
|---|---|---|---|---|---|---|
| | 510611 | 0100 | DRG | CC | 0003 | B |

Plot Date: Office: NZCHC Filename:

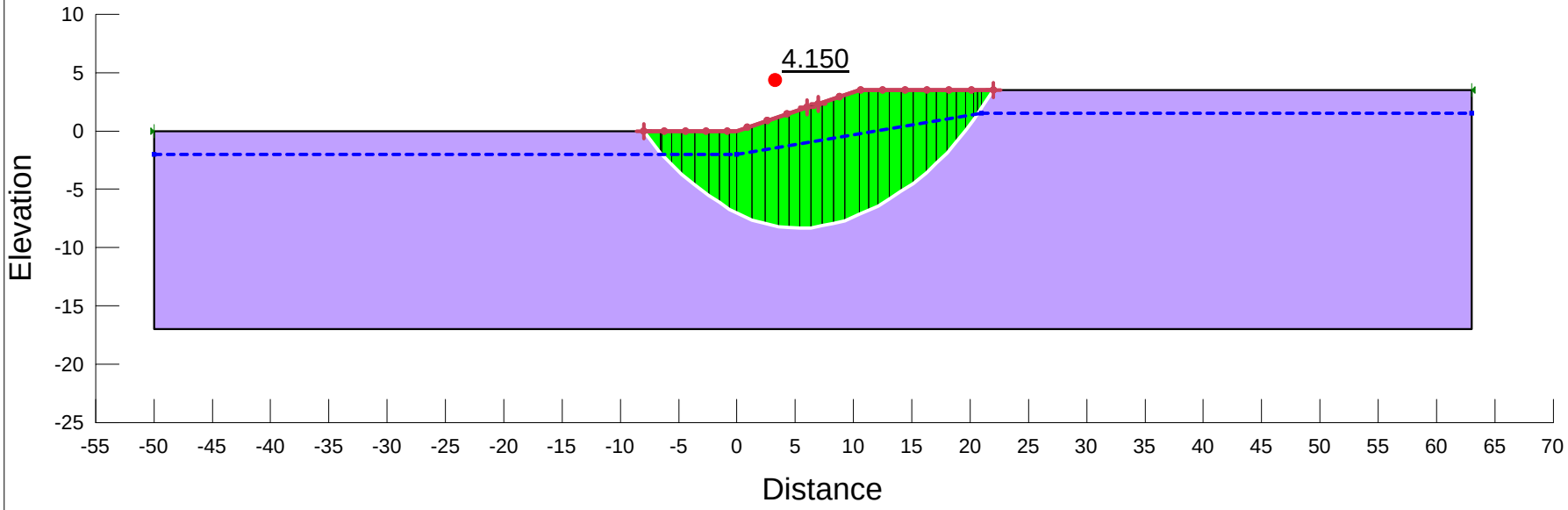
# Attachment 2 – Slope Stability Analysis Results

3.5m Cut Slope (3H:1V)
Global Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

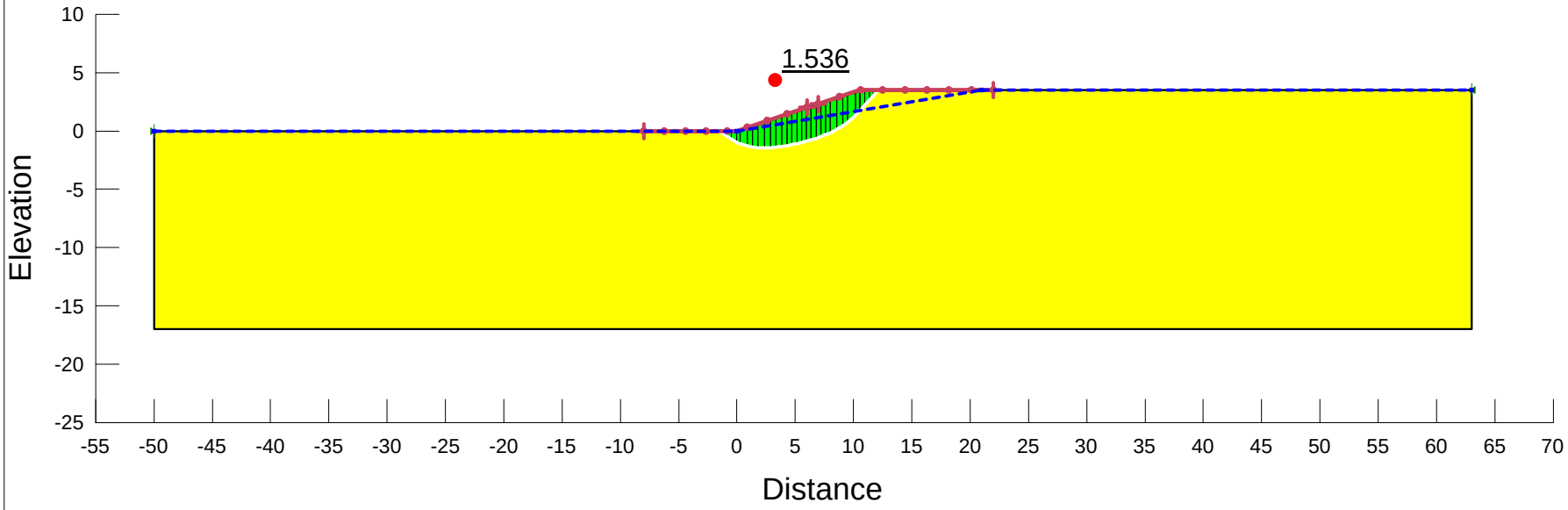
3.5m Cut Slope (3H:1V)
Global Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |

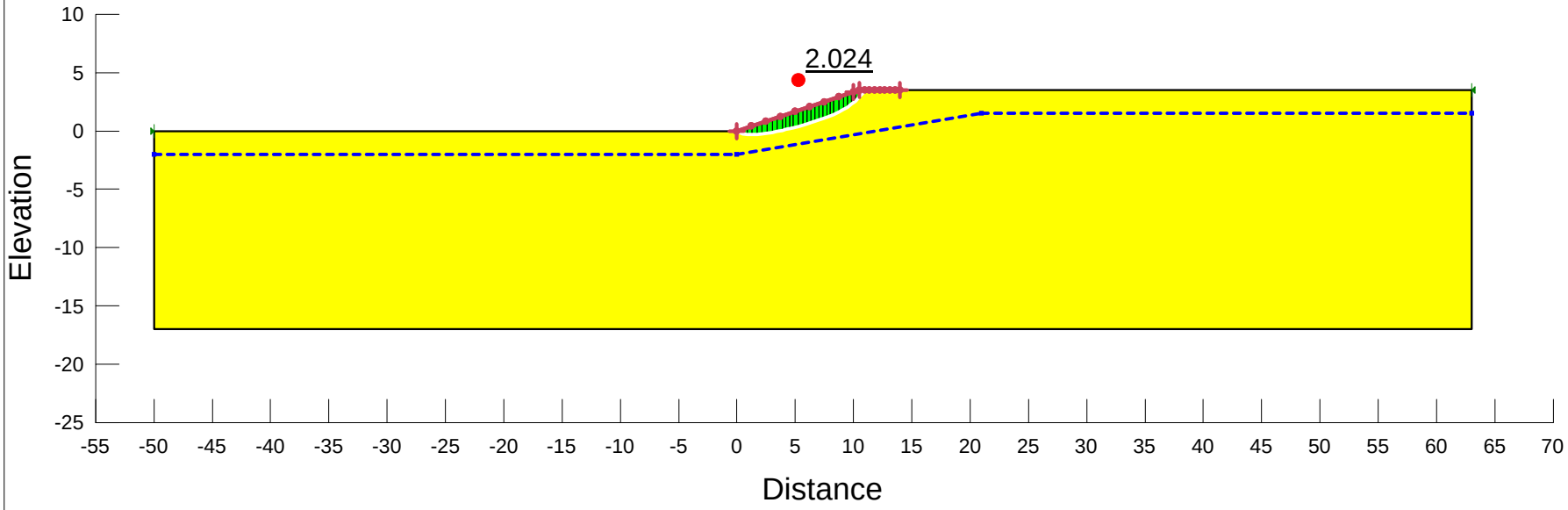
Horizontal Seismic Coefficient: 0.12

3.5m Cut Slope (3H:1V)
Global Failure
High Groundwater Case



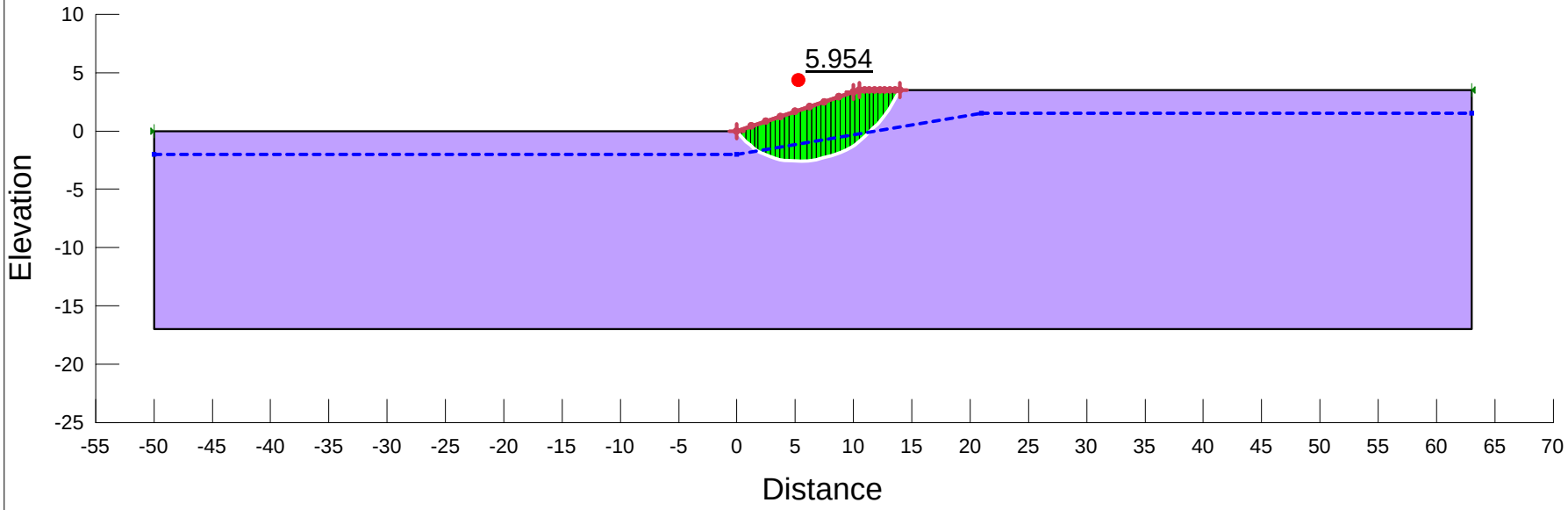

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

3.5m Cut Slope (3H:1V)
Scarp Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

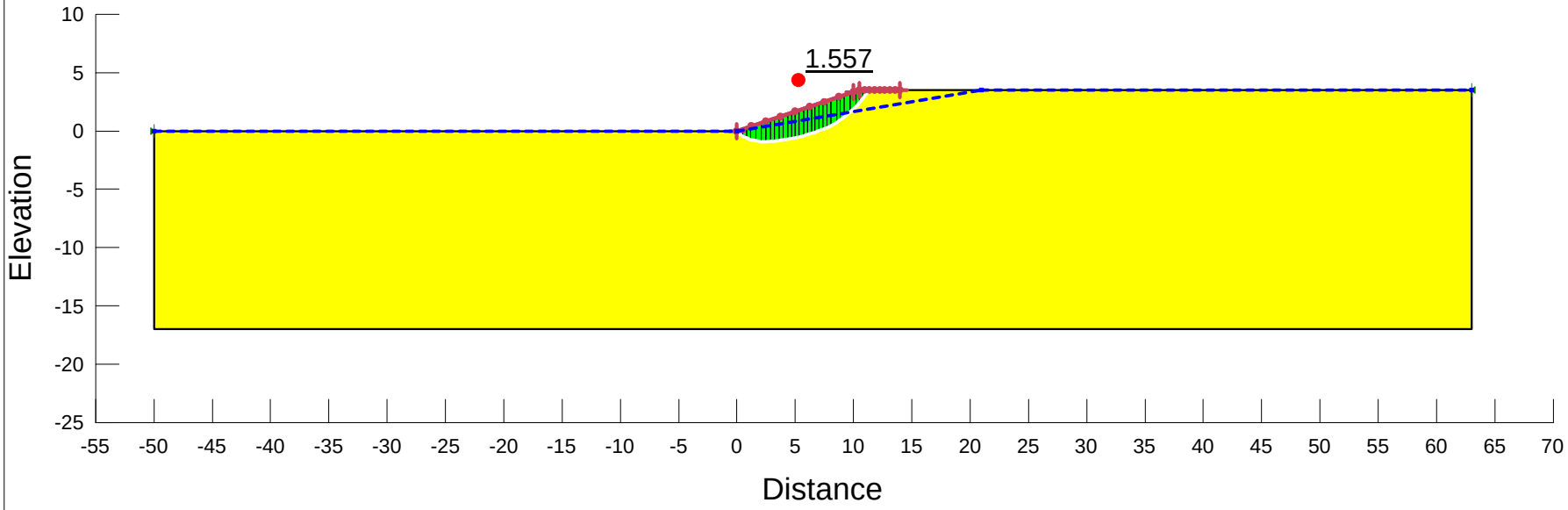
3.5m Cut Slope (3H:1V)
Scarp Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |

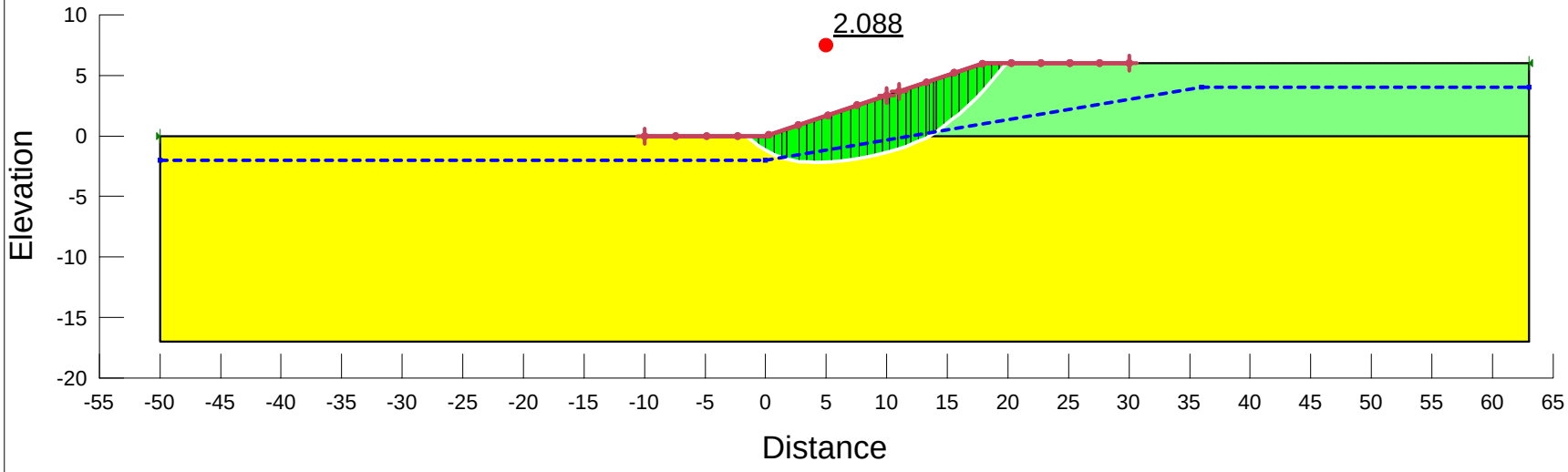
Horizontal Seismic Coefficient: 0.12

3.5m Cut Slope (3H:1V)
Scarp Failure
High Groundwater Case



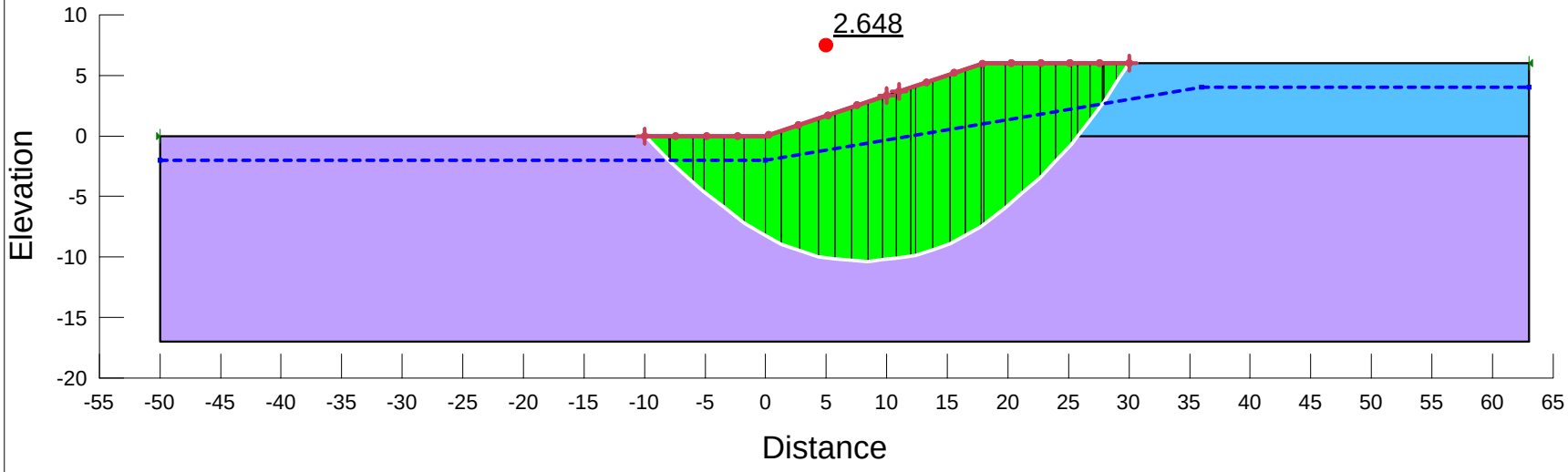

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

6.0m Fill Slope (3H:1V)
Global Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

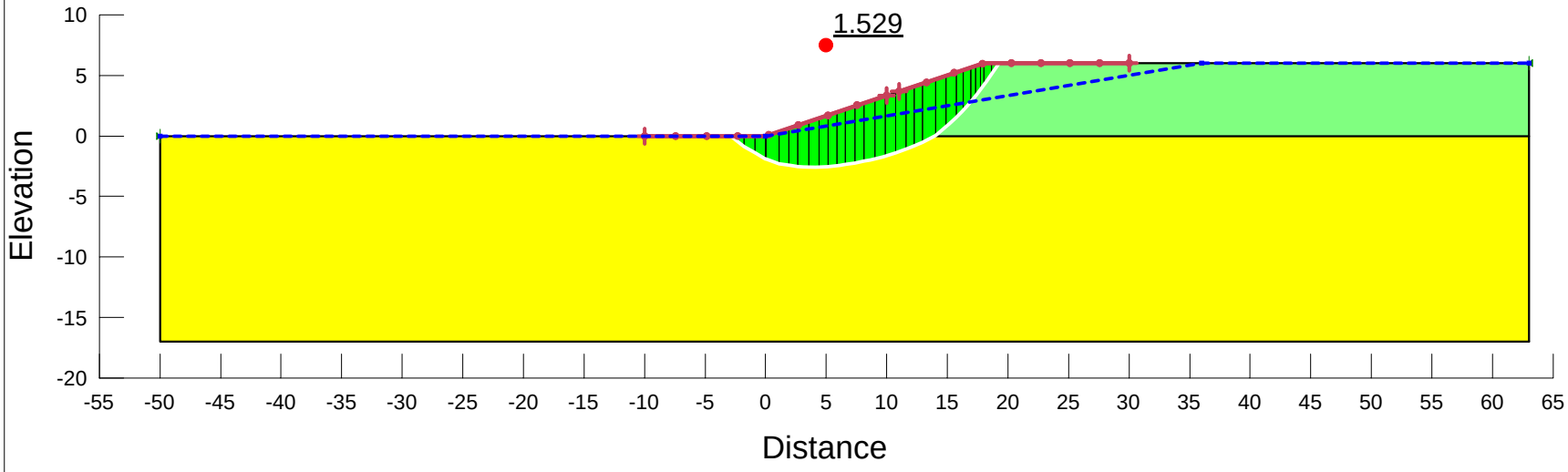
6.0m Fill Slope (3H:1V)
Global Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |
| | Engineered Fill (EQ Undrained) | Undrained (Phi=0) | 18.5 | 100 | 1 |

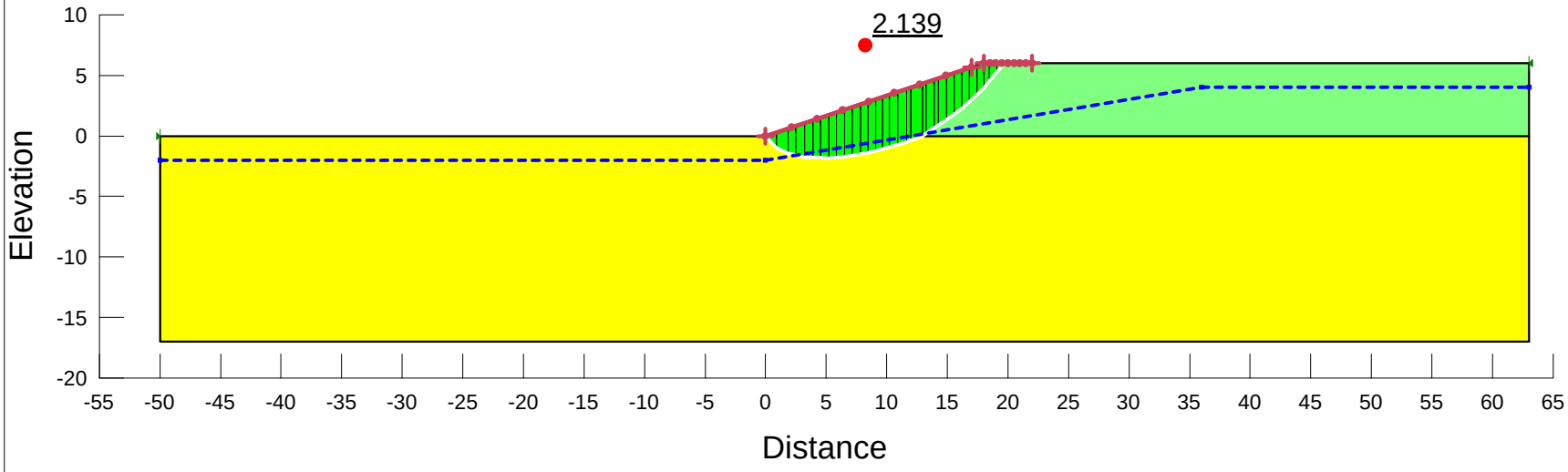
Horizontal Seismic Coefficient: 0.12

6.0m Fill Slope (3H:1V)
Global Failure
High Groundwater Case



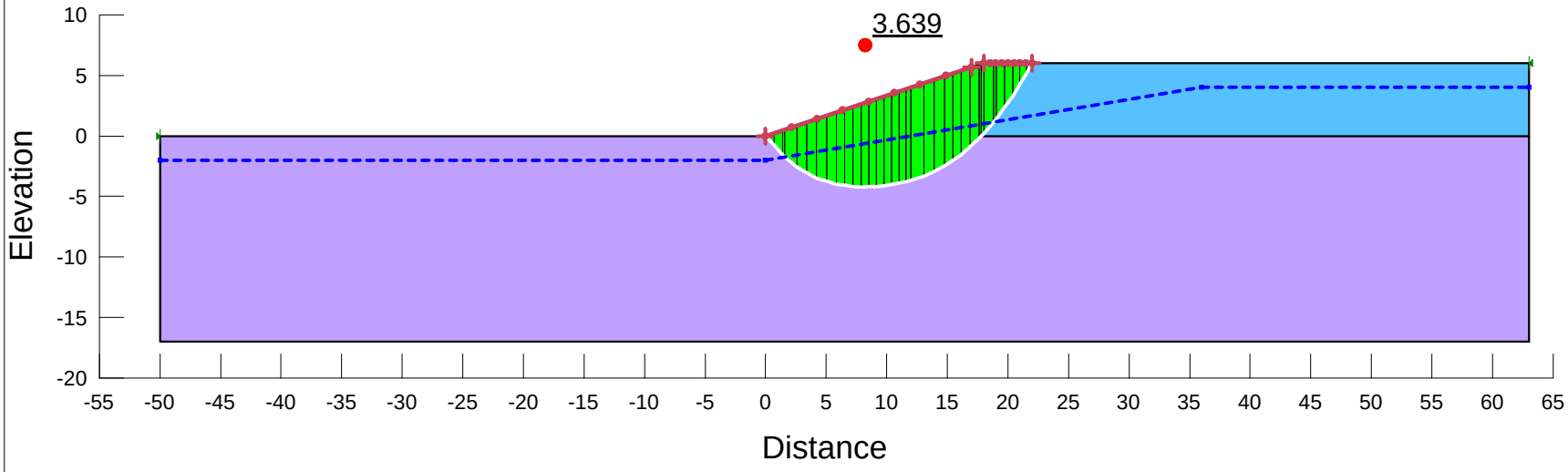

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

6.0m Fill Slope (3H:1V)
Scarp Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

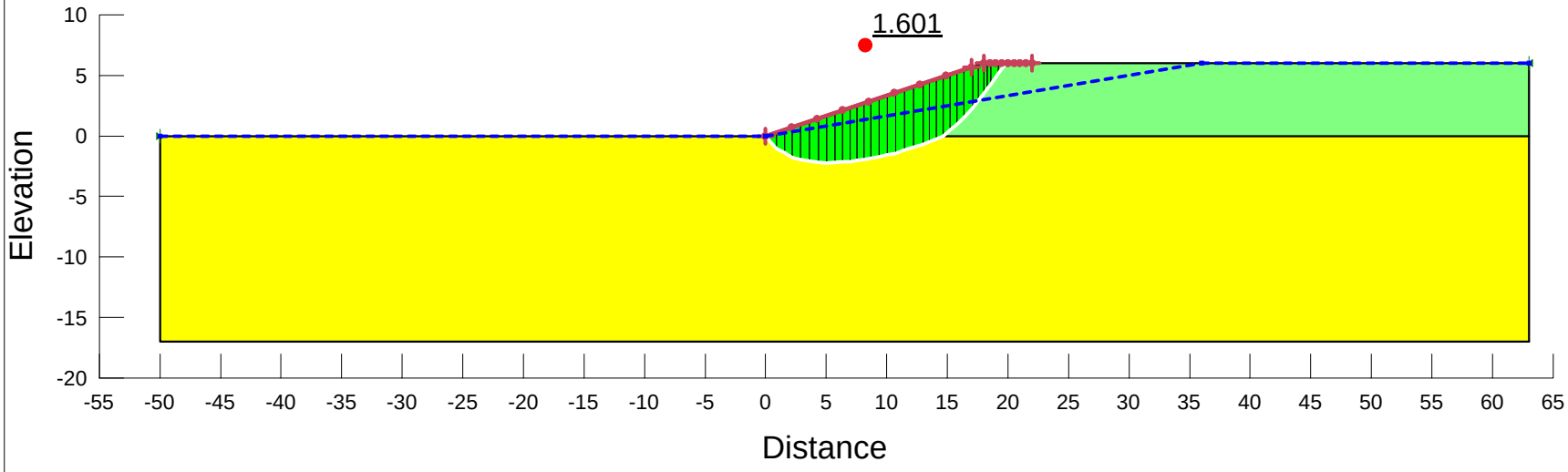
6.0m Fill Slope (3H:1V)
Scarp Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |
| | Engineered Fill (EQ Undrained) | Undrained (Phi=0) | 18.5 | 100 | 1 |

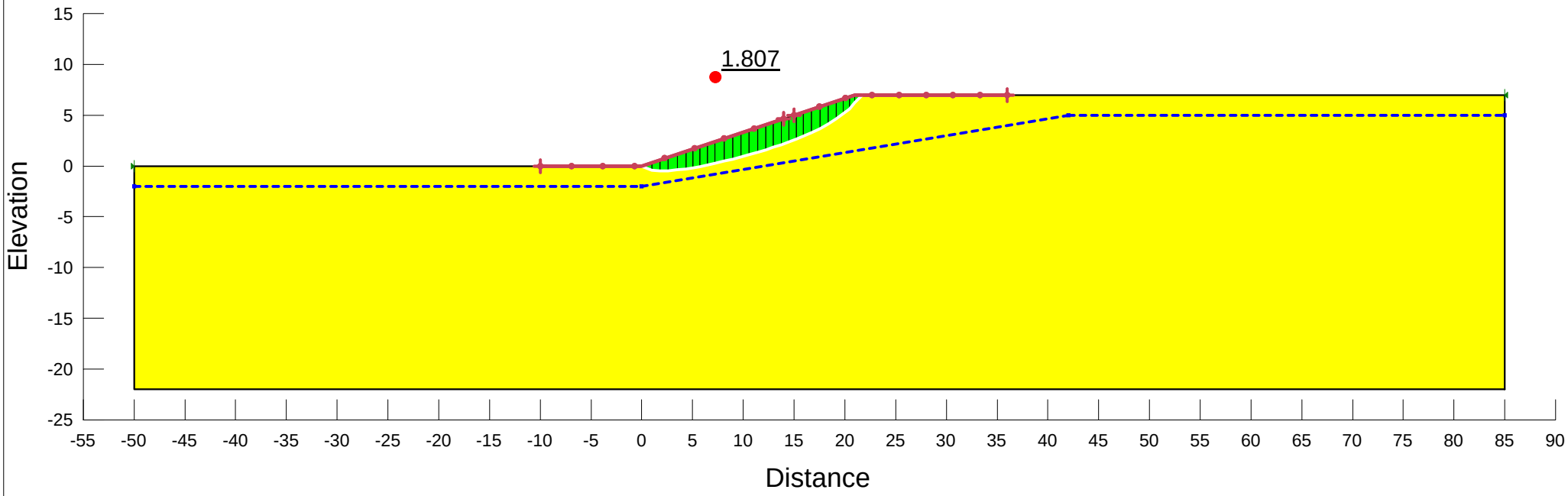
Horizontal Seismic Coefficient: 0.12

6.0m Fill Slope (3H:1V)
Scarp Failure
High Groundwater Case



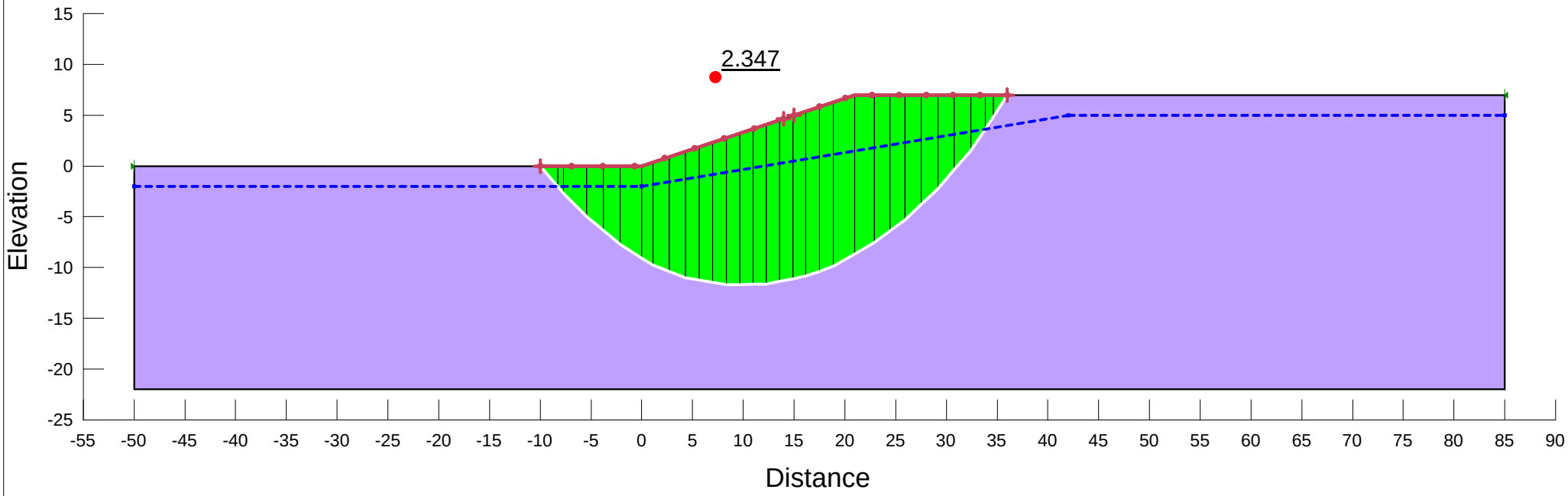

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

7.0m Cut Slope (3H:1V)
Global Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

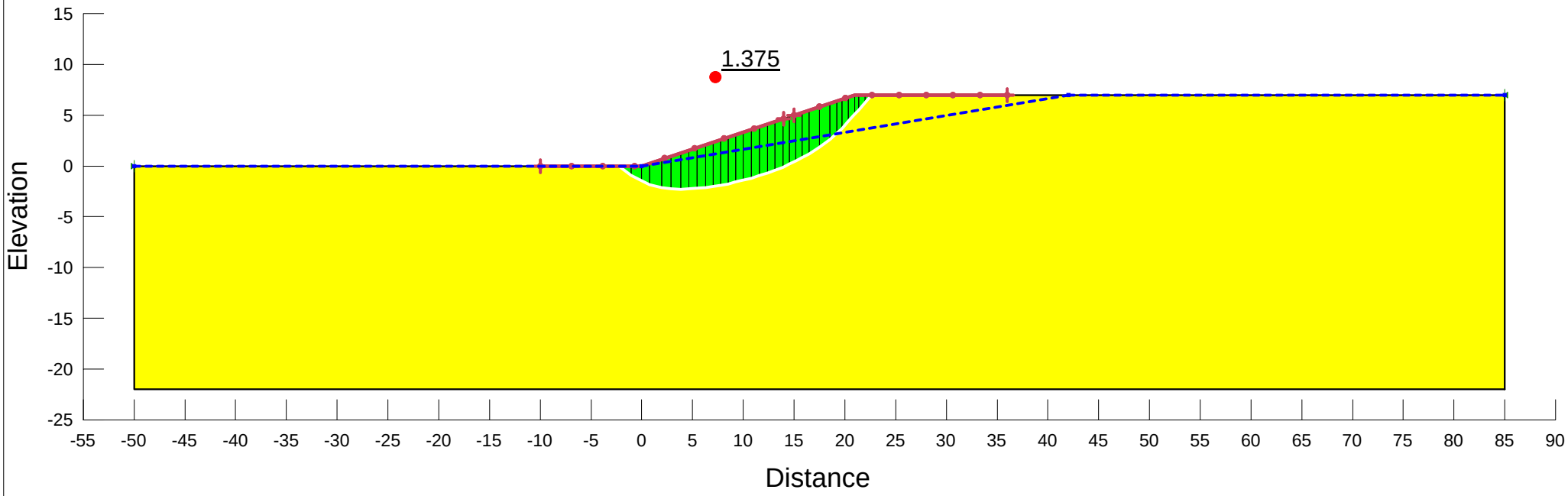
7.0m Cut Slope (3H:1V)
Global Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |

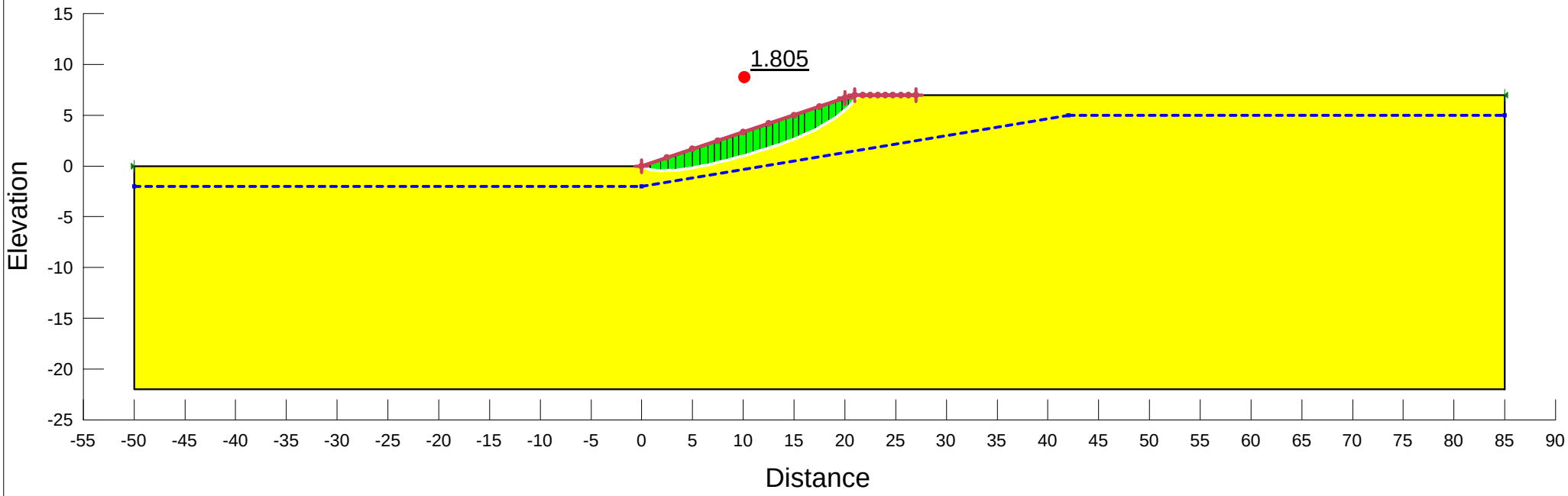
Horizontal Seismic Coefficient: 0.12

7.0m Cut Slope (3H:1V)
Global Failure
High Groundwater Case



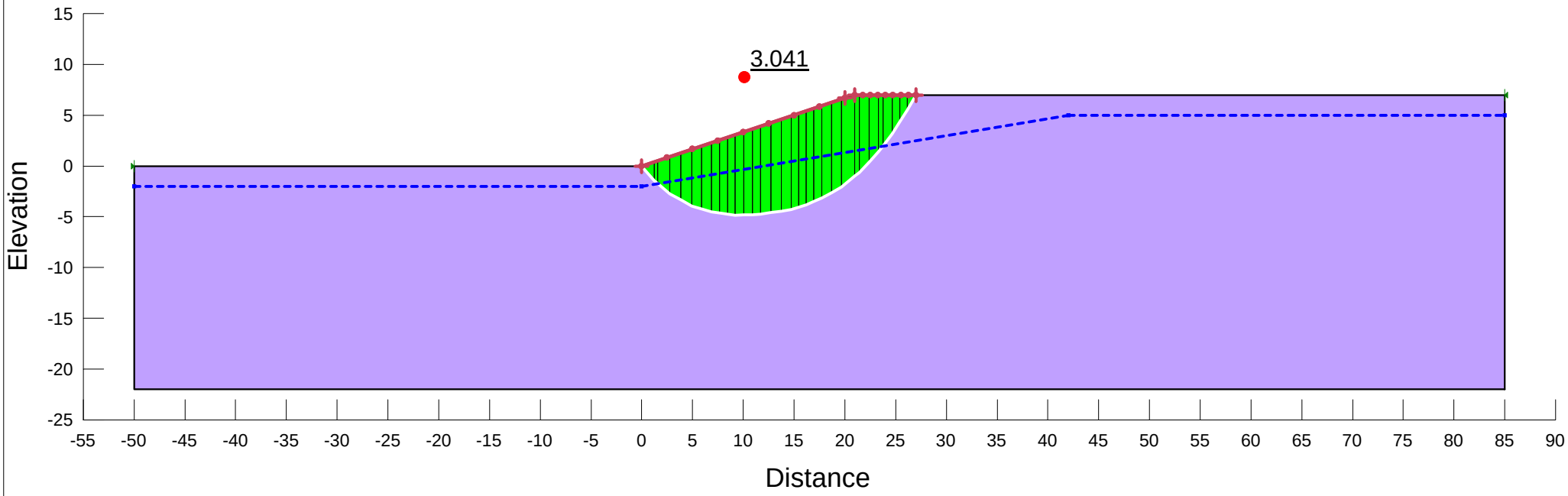

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

7.0m Cut Slope (3H:1V)
Scarp Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

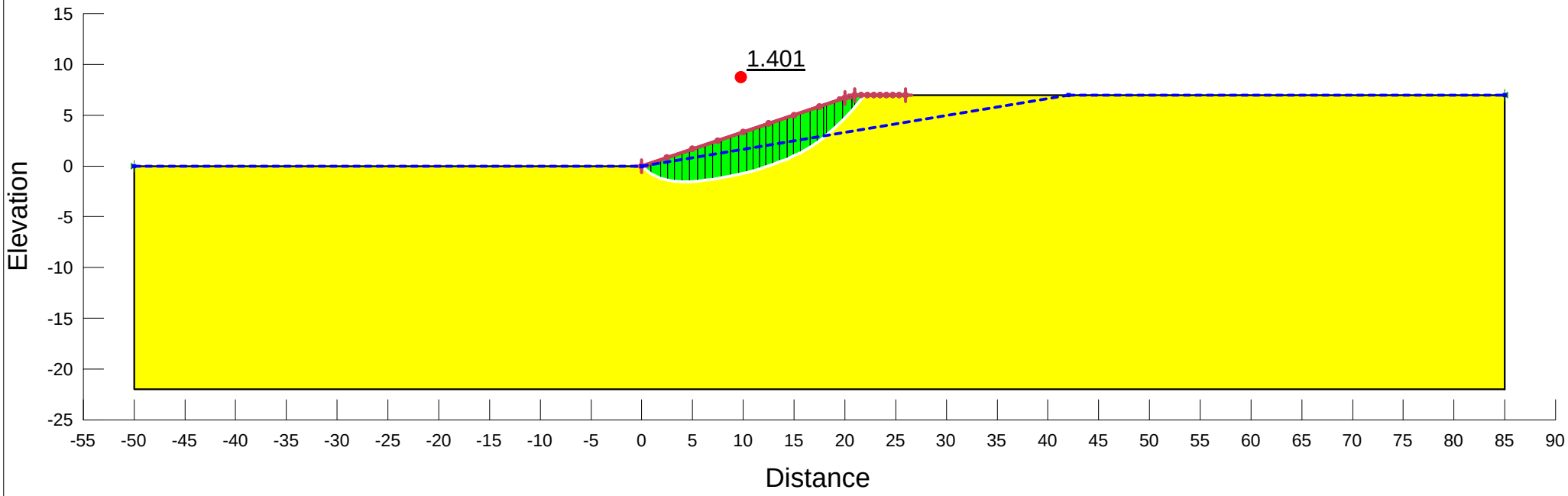
7.0m Cut Slope (3H:1V)
Scarp Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |

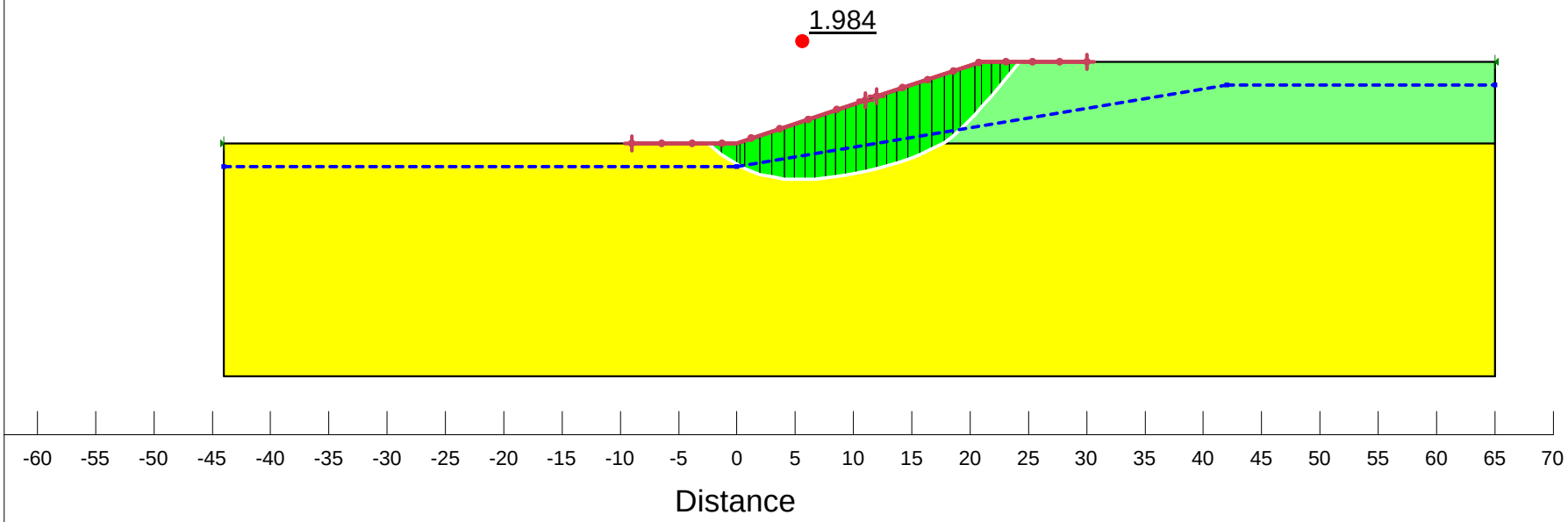
Horizontal Seismic Coefficient: 0.12

7.0m Cut Slope (3H:1V)
Scarp Failure
High Groundwater Case



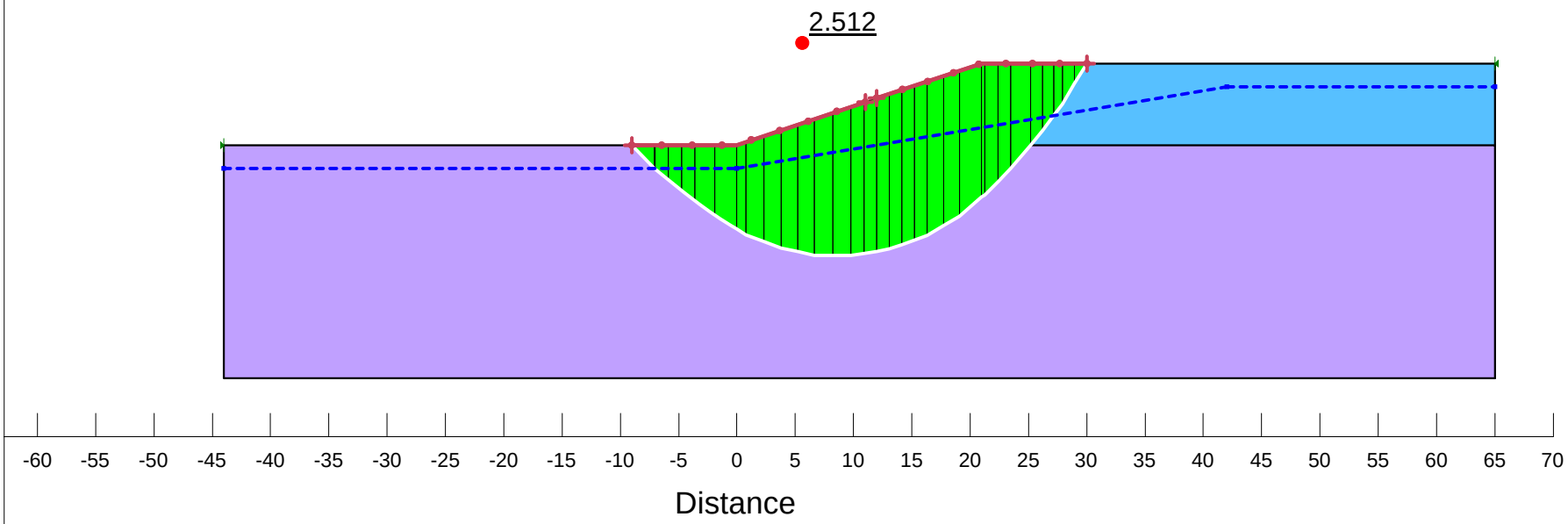

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

7.0m Fill Slope (3H:1V)
Global Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

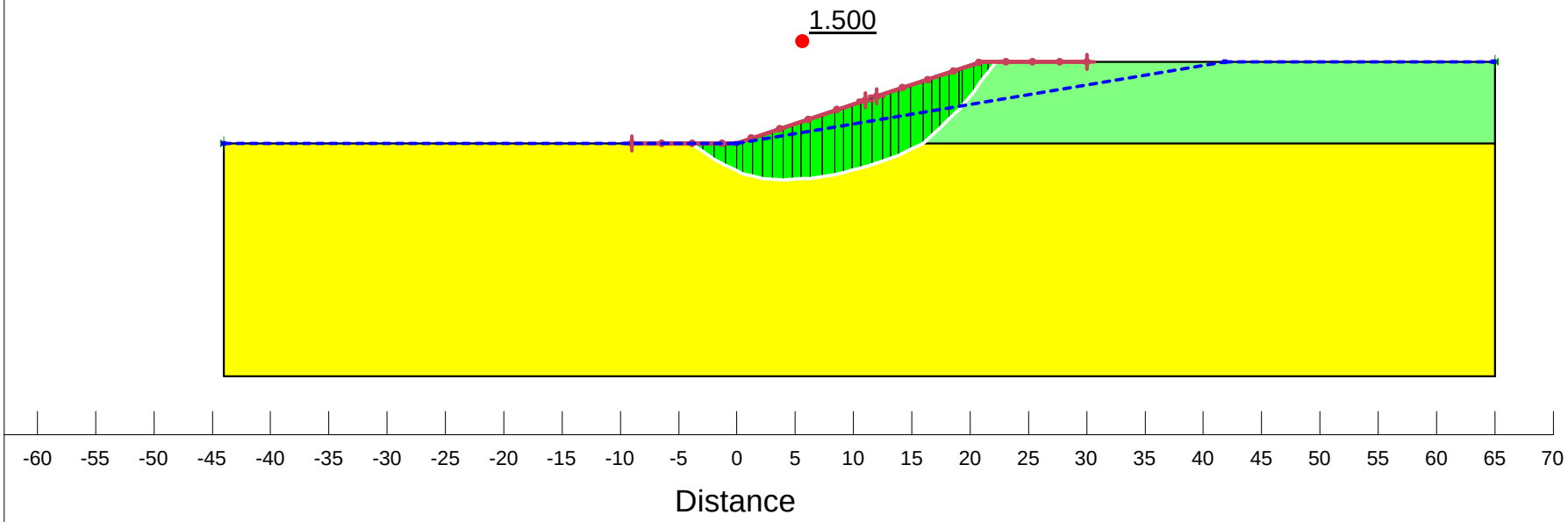
7.0m Fill Slope (3H:1V)
Global Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |
| | Engineered Fill (EQ Undrained) | Undrained (Phi=0) | 18.5 | 100 | 1 |

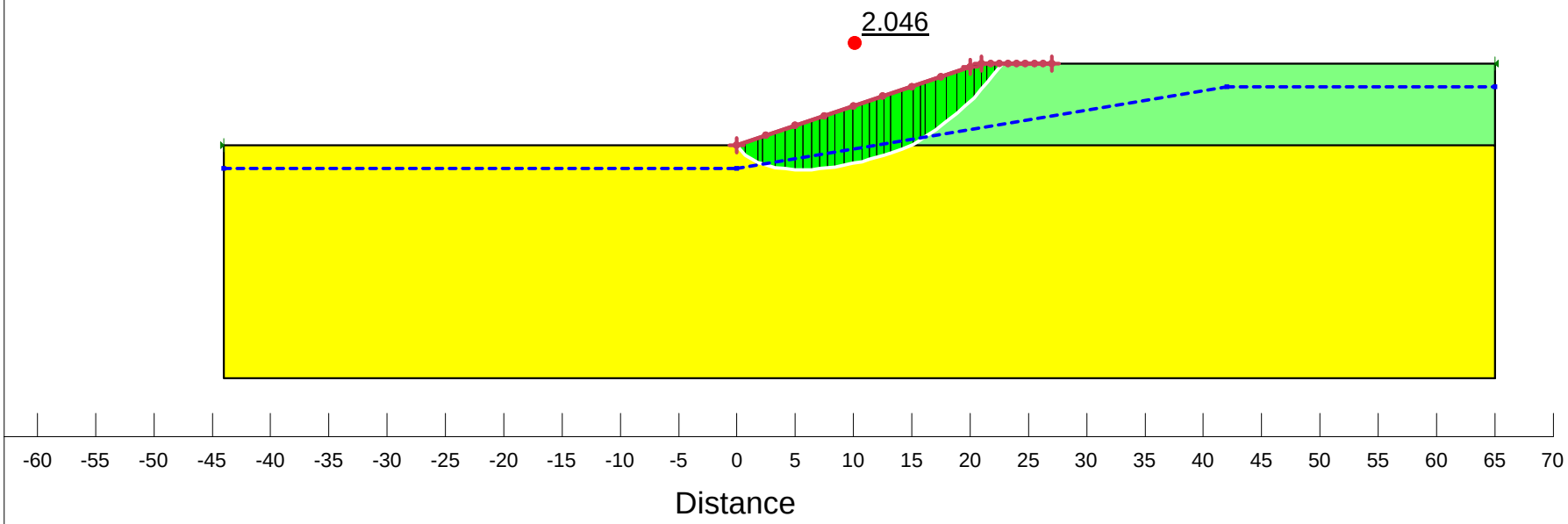
Horizontal Seismic Coefficient: 0.12

7.0m Fill Slope (3H:1V)
Global Failure
High Groundwater Case



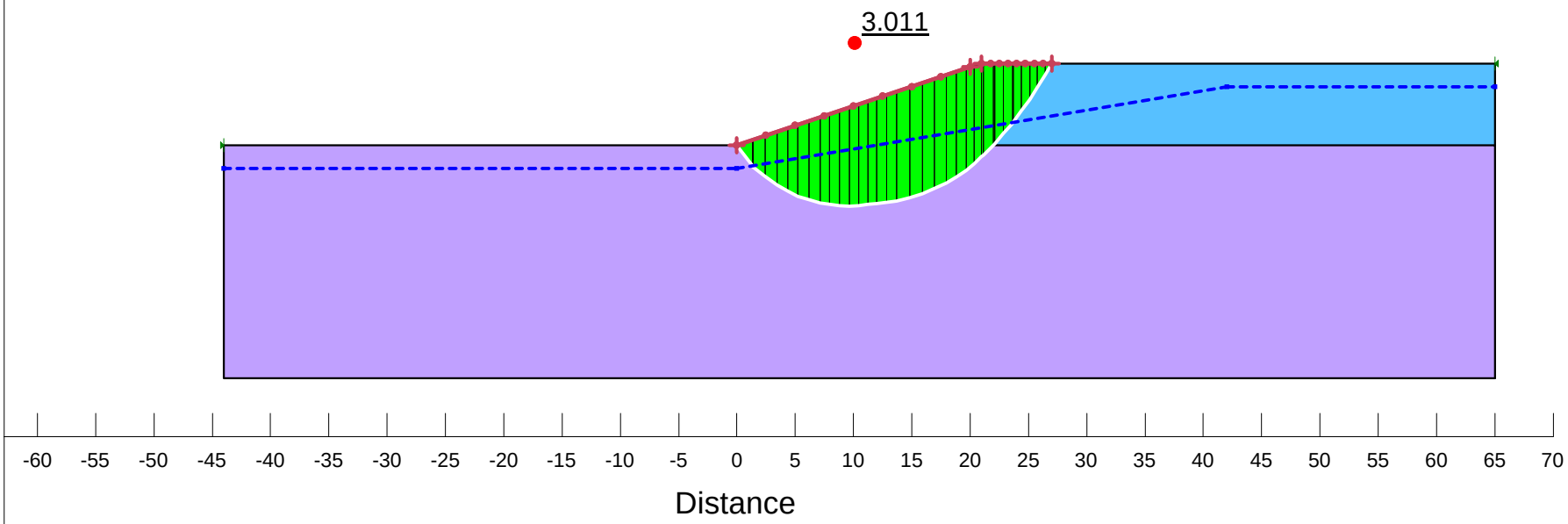

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

7.0m Fill Slope (3H:1V)
Scarp Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

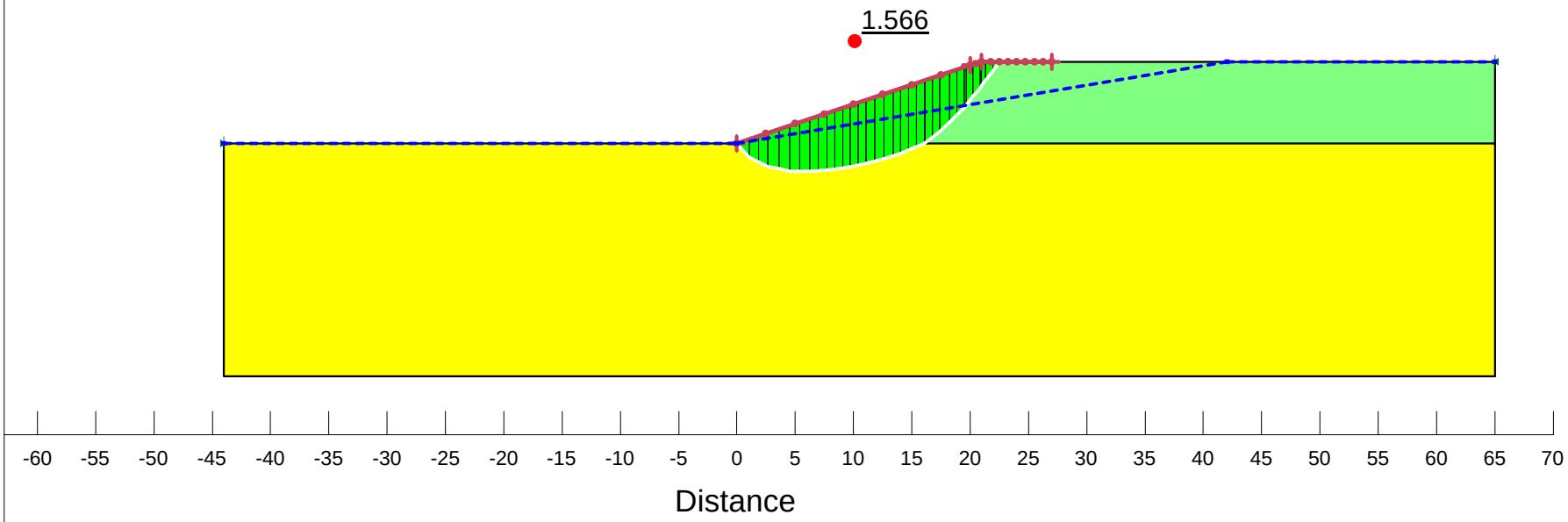
7.0m Fill Slope (3H:1V)
Scarp Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |
| | Engineered Fill (EQ Undrained) | Undrained (Phi=0) | 18.5 | 100 | 1 |

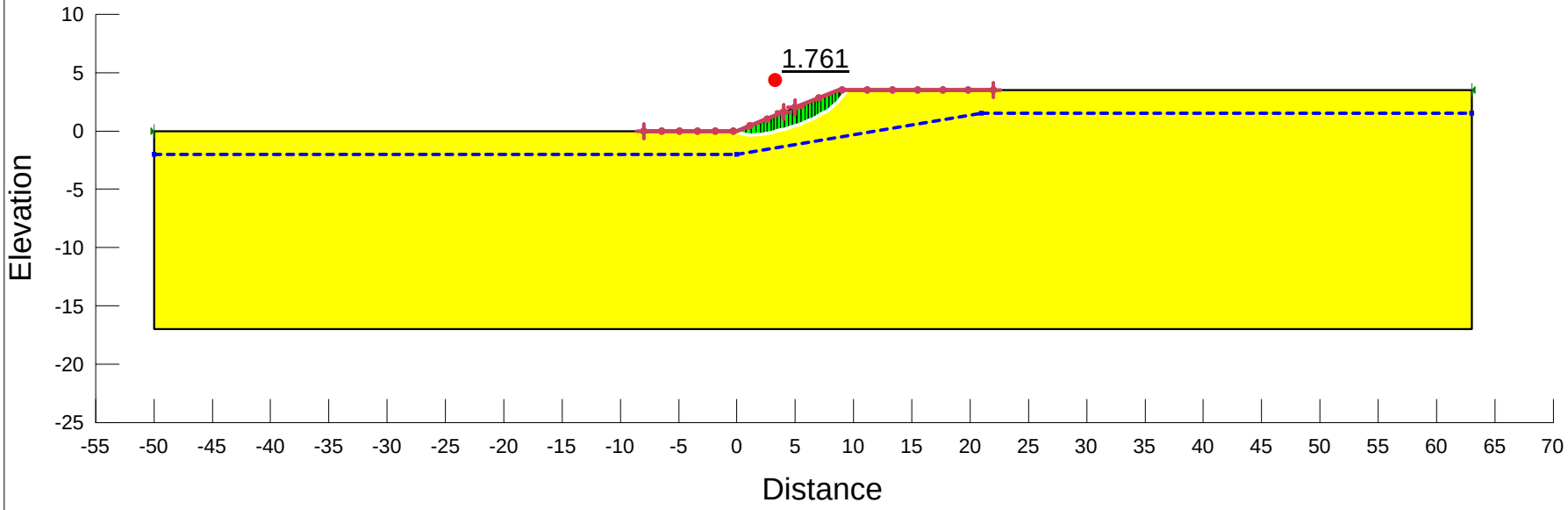
Horizontal Seismic Coefficient: 0.12

7.0m Fill Slope (3H:1V)
Scarp Failure
High Groundwater Case



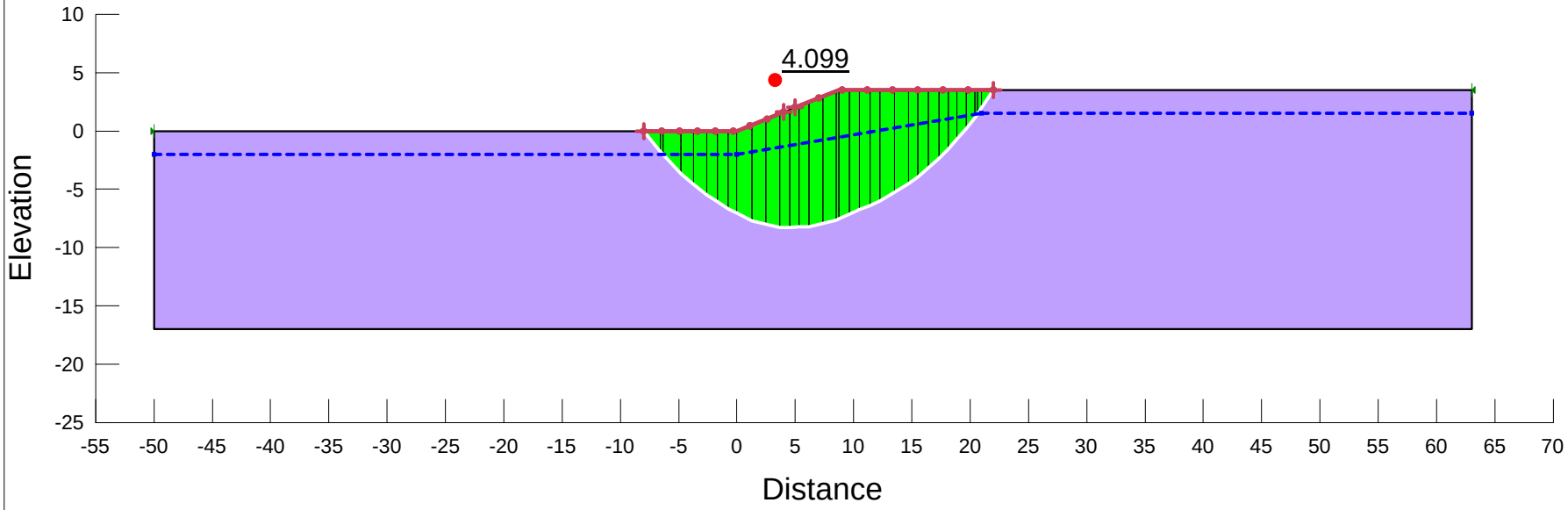

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

3.5m Cut Slope (2.5H:1V)
Global Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

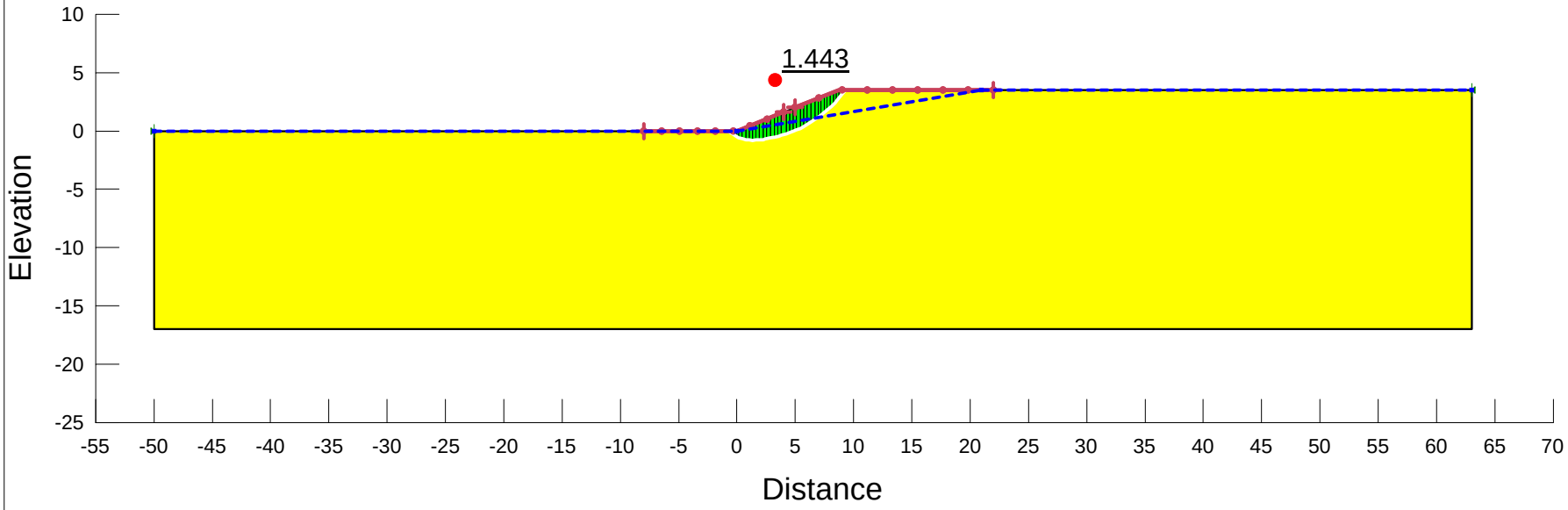
3.5m Cut Slope (2.5H:1V)
Global Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |

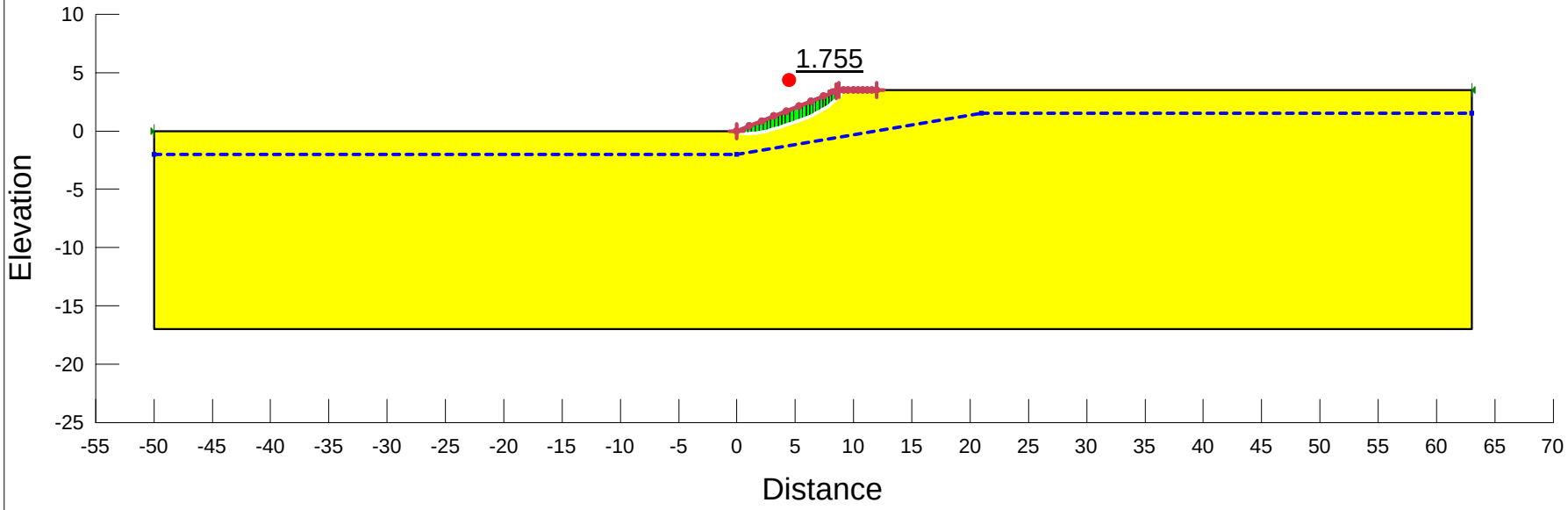
Horizontal Seismic Coefficient: 0.12

3.5m Cut Slope (2.5H:1V)
Global Failure
High Groundwater Case



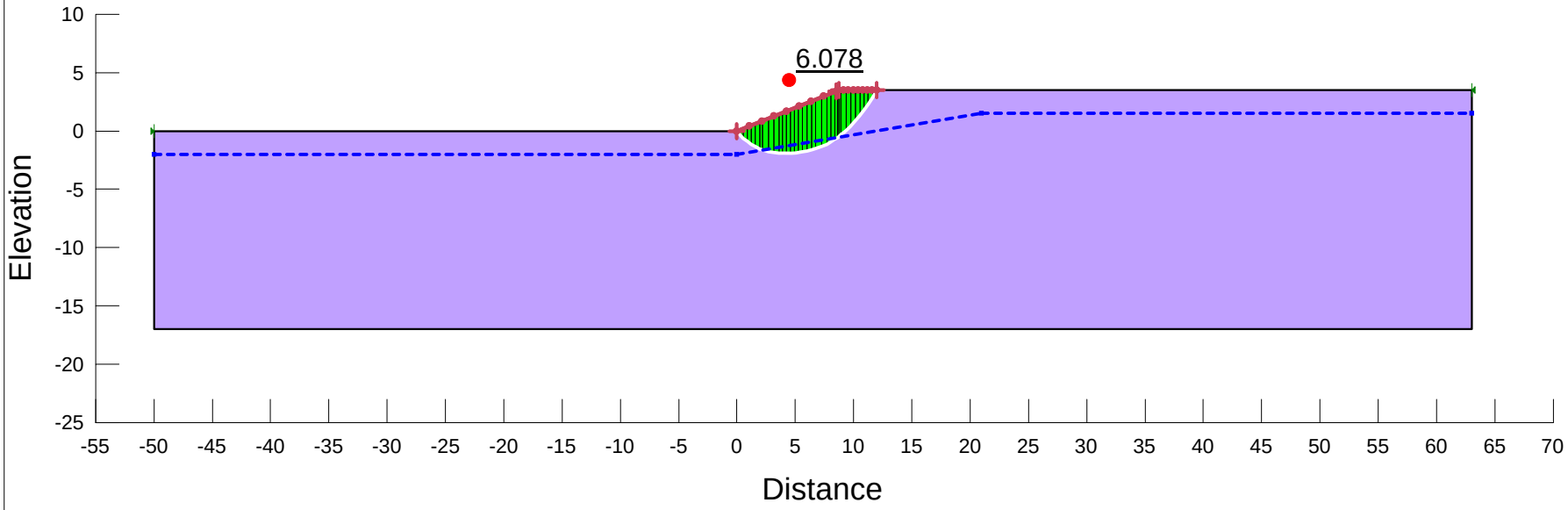

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

3.5m Cut Slope (2.5H:1V)
Scarp Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

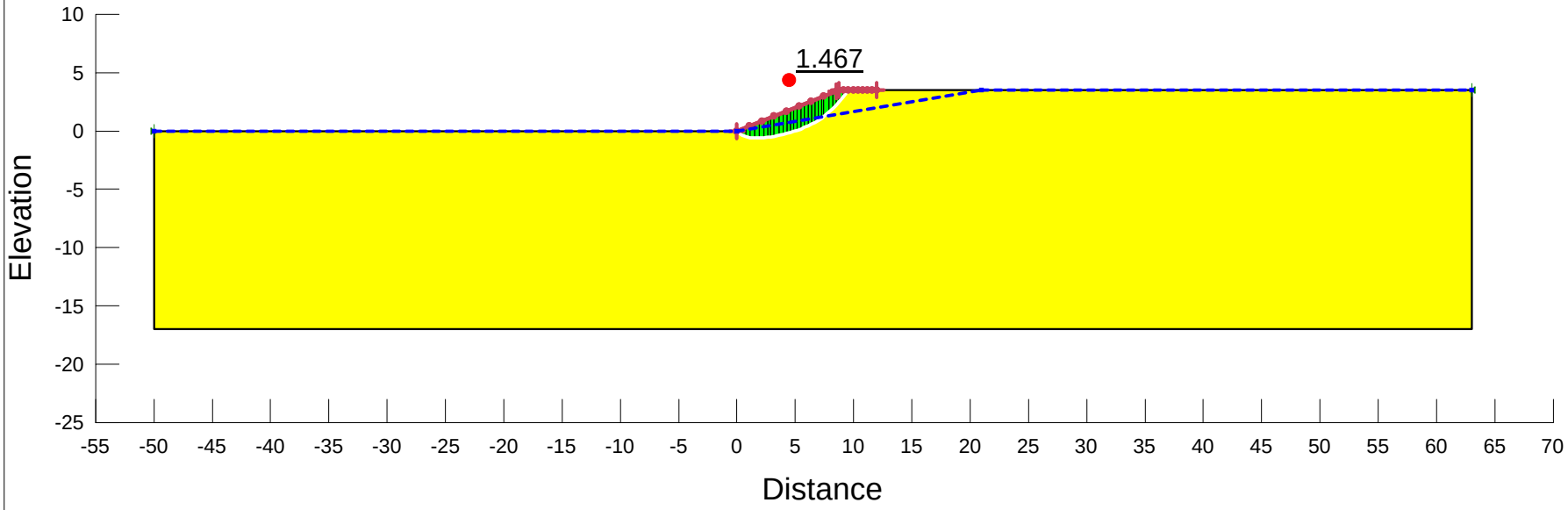
3.5m Cut Slope (2.5H:1V)
Scarp Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |

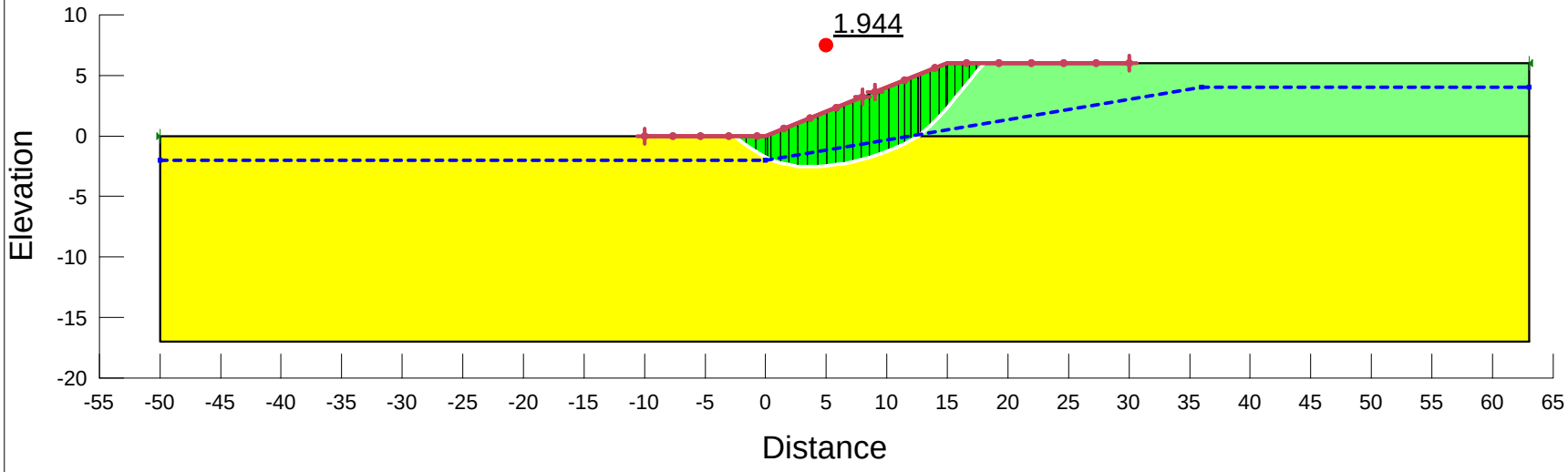
Horizontal Seismic Coefficient: 0.12

3.5m Cut Slope (2.5H:1V)
Scarp Failure
High Groundwater Case



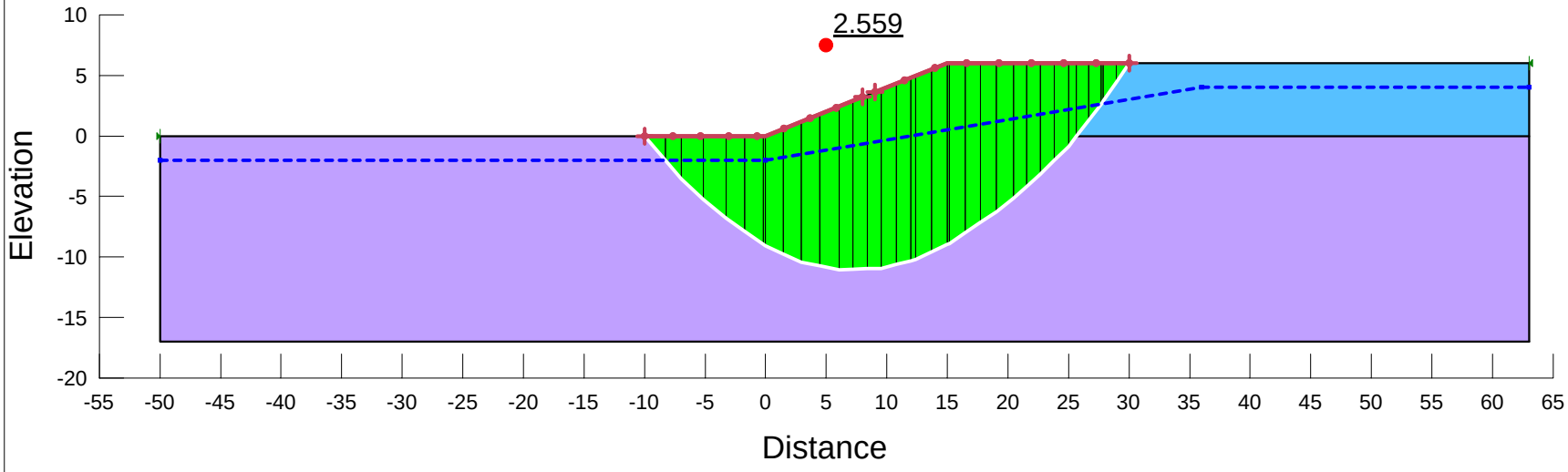

| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

6.0m Fill Slope (2.5H:1V)
Global Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

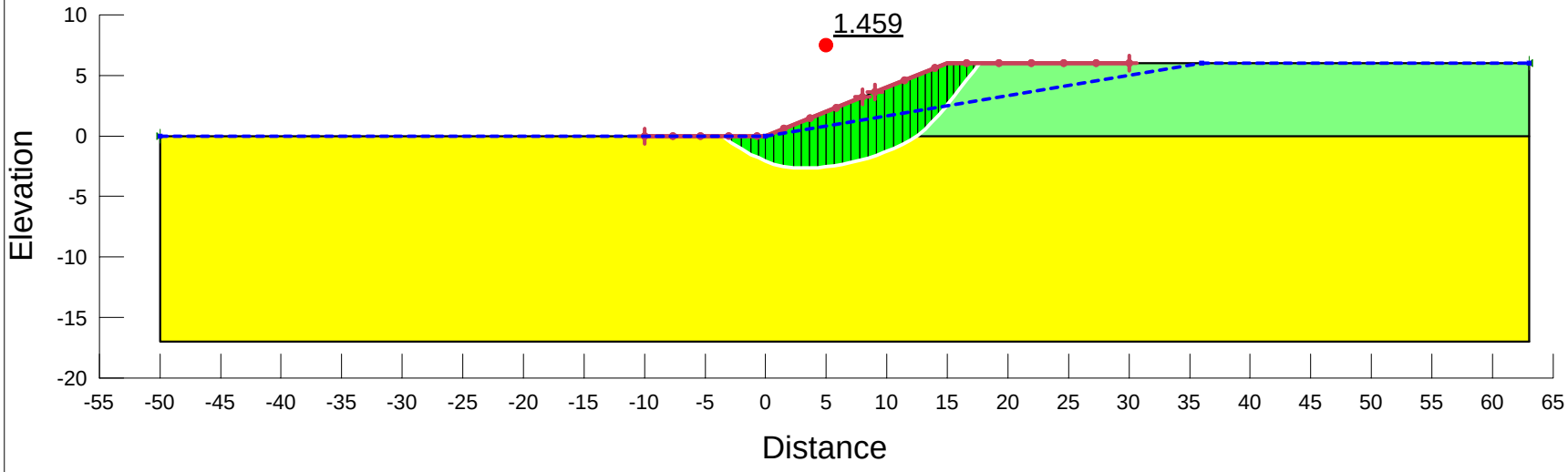
6.0m Fill Slope (2.5H:1V)
Global Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |
| | Engineered Fill (EQ Undrained) | Undrained (Phi=0) | 18.5 | 100 | 1 |

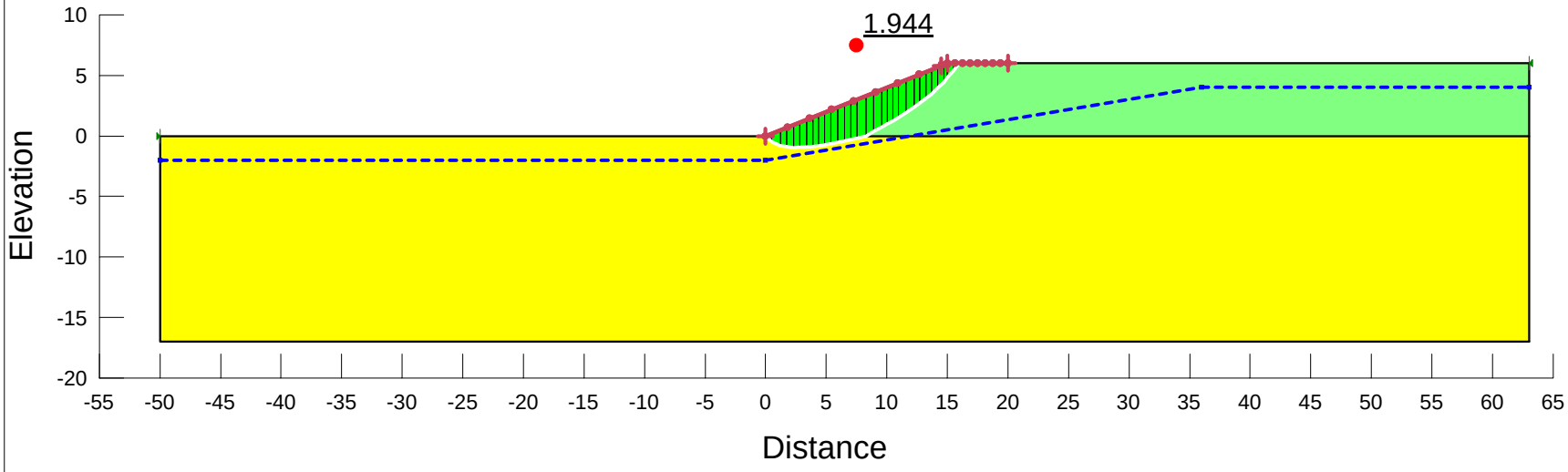
Horizontal Seismic Coefficient: 0.12

6.0m Fill Slope (2.5H:1V)
Global Failure
High Groundwater Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

6.0m Fill Slope (2.5H:1V)
Scarp Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
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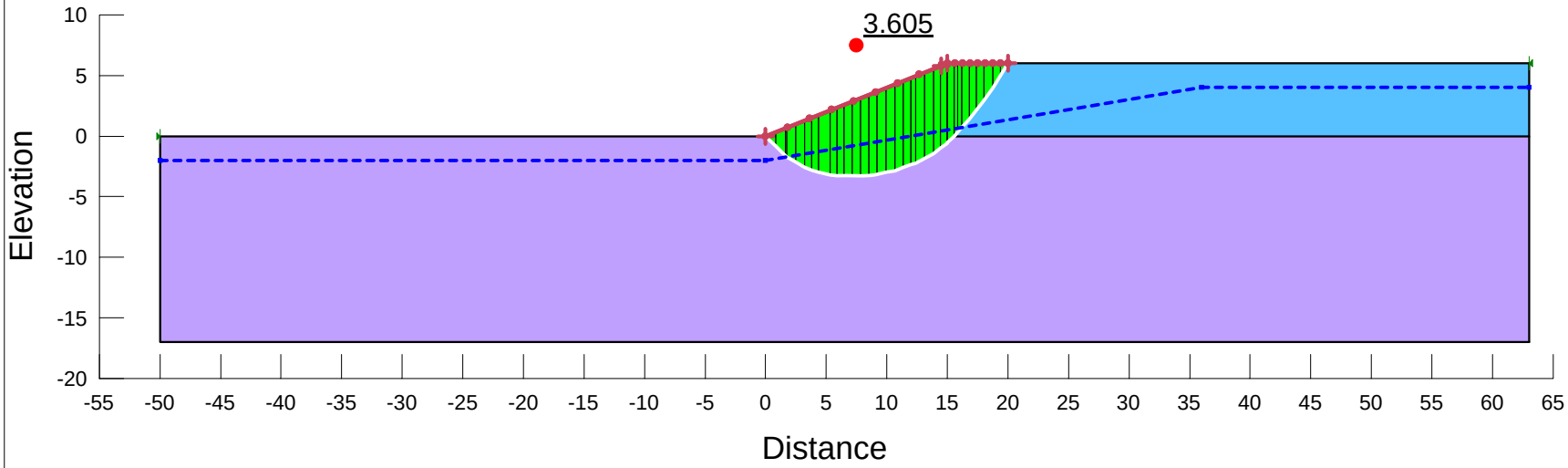
6.0m Fill Slope (2.5H:1V)
Scarp Failure
Seismic Case

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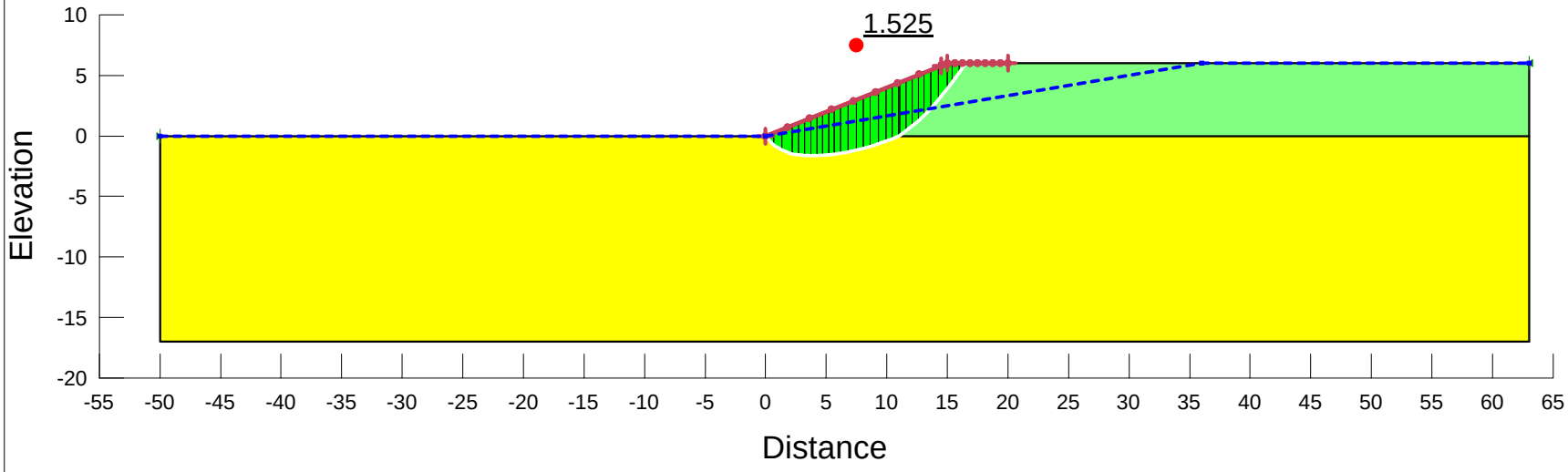
Horizontal Seismic Coefficient: 0.12

6.0m Fill Slope (2.5H:1V)
Scarp Failure
High Groundwater Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
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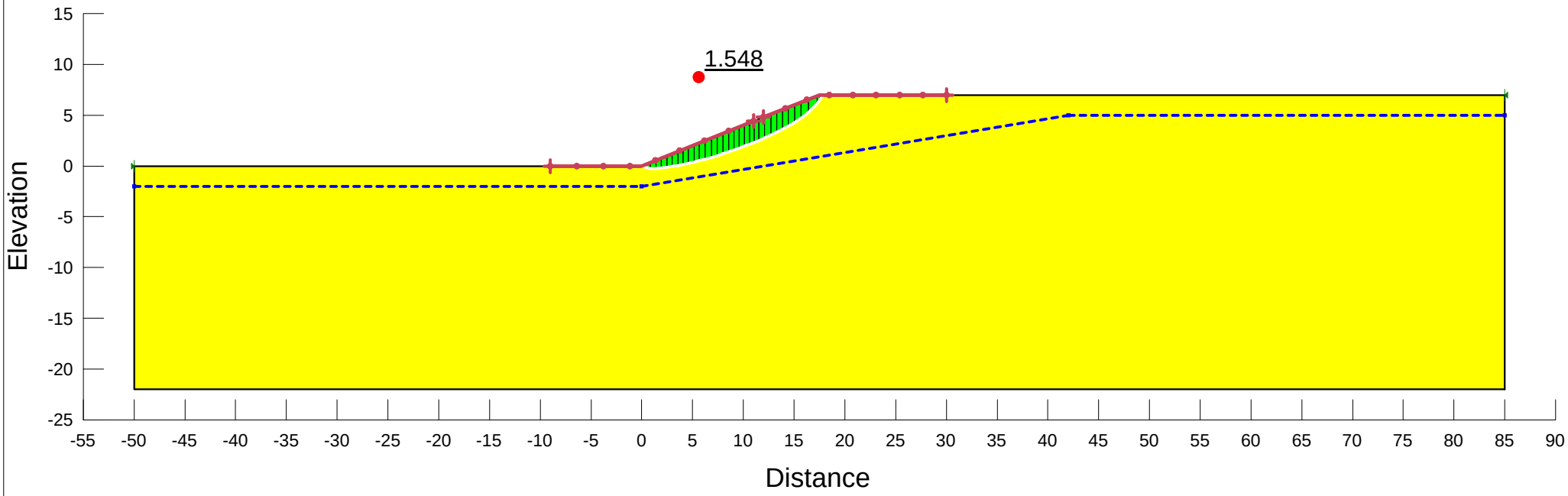
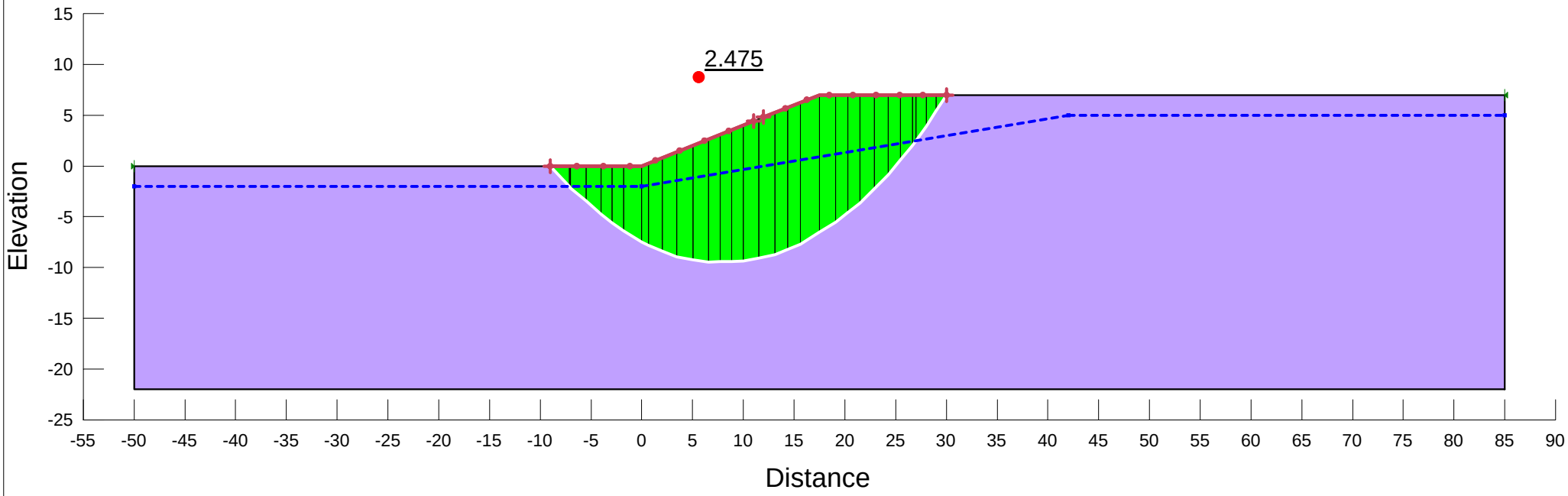
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

7.0m Cut Slope (2.5H:1V)
Global Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

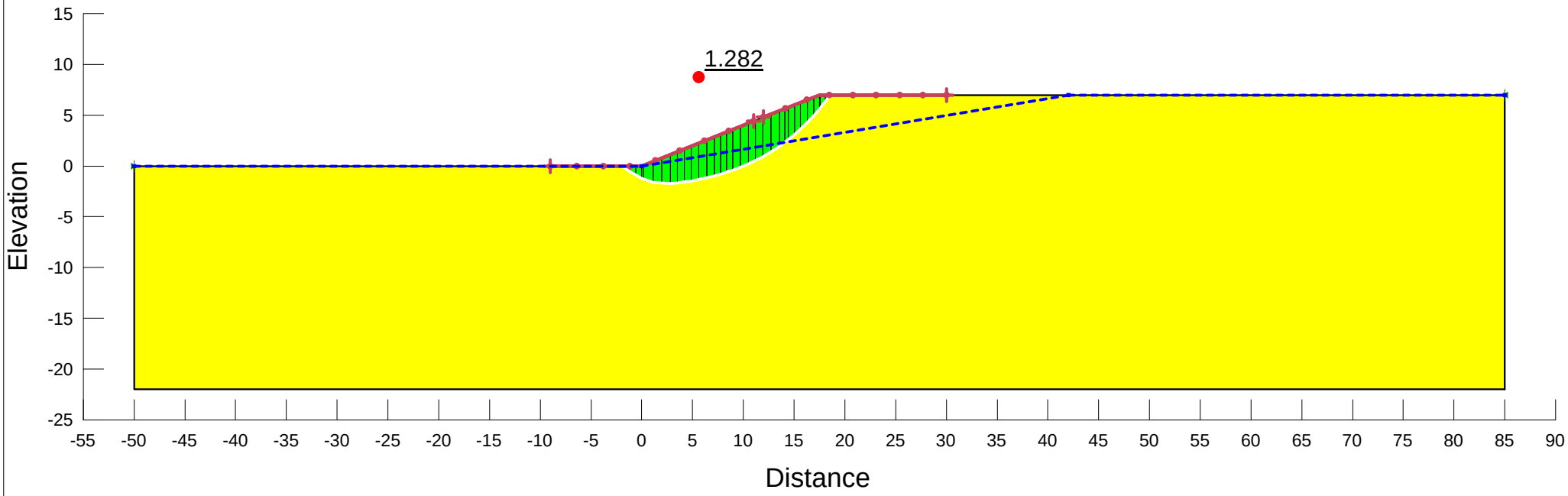
7.0m Cut Slope (2.5H:1V)
Global Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
|---|---|---|---|---|---|
| | CW to Residual SAVF (EQ Undrained) | Undrained (Phi=0) | 17 | 75 | 1 |

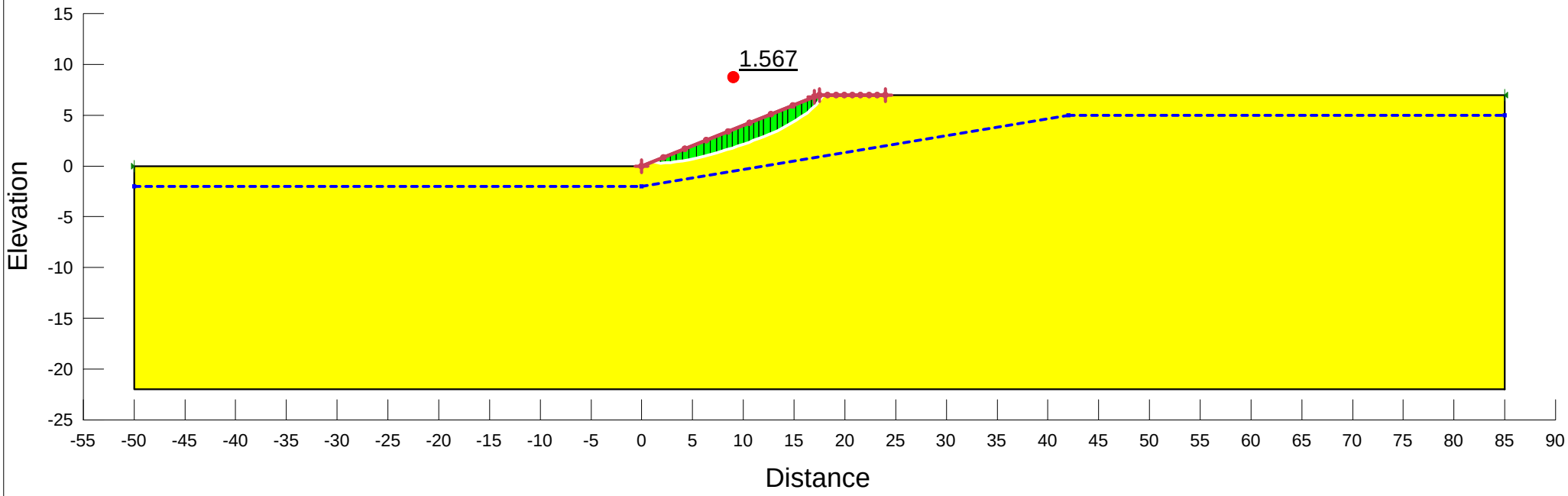
Horizontal Seismic Coefficient: 0.12

7.0m Cut Slope (2.5H:1V)
Global Failure
High Groundwater Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |

7.0m Cut Slope (2.5H:1V)
Scarp Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
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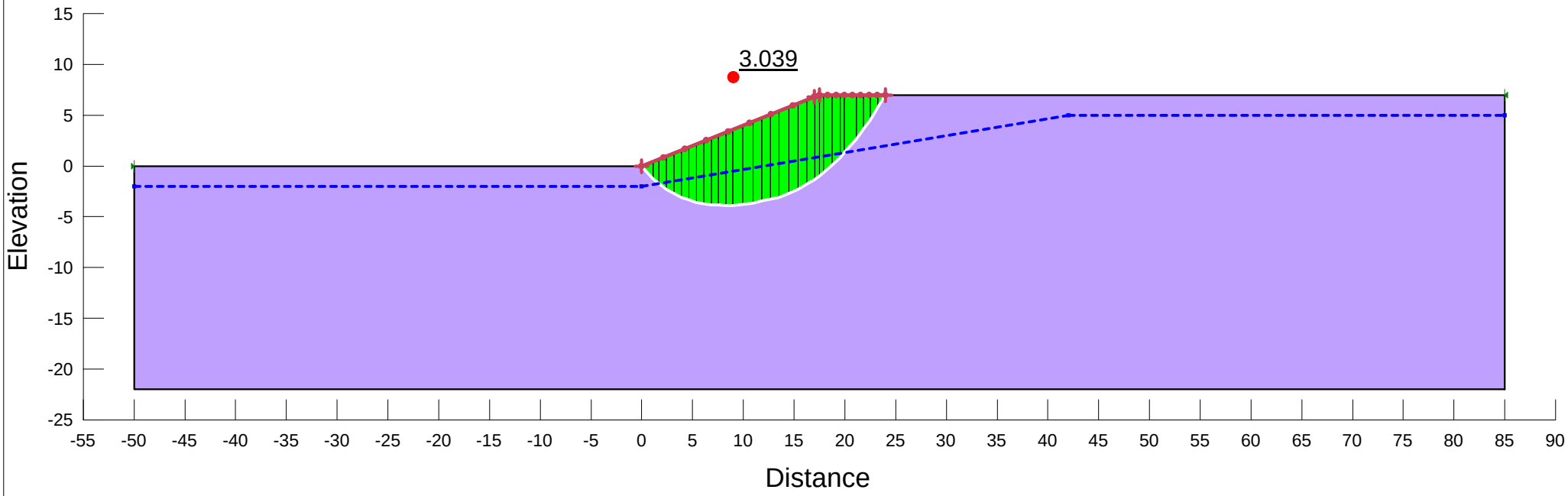
7.0m Cut Slope (2.5H:1V)
Scarp Failure
Seismic Case

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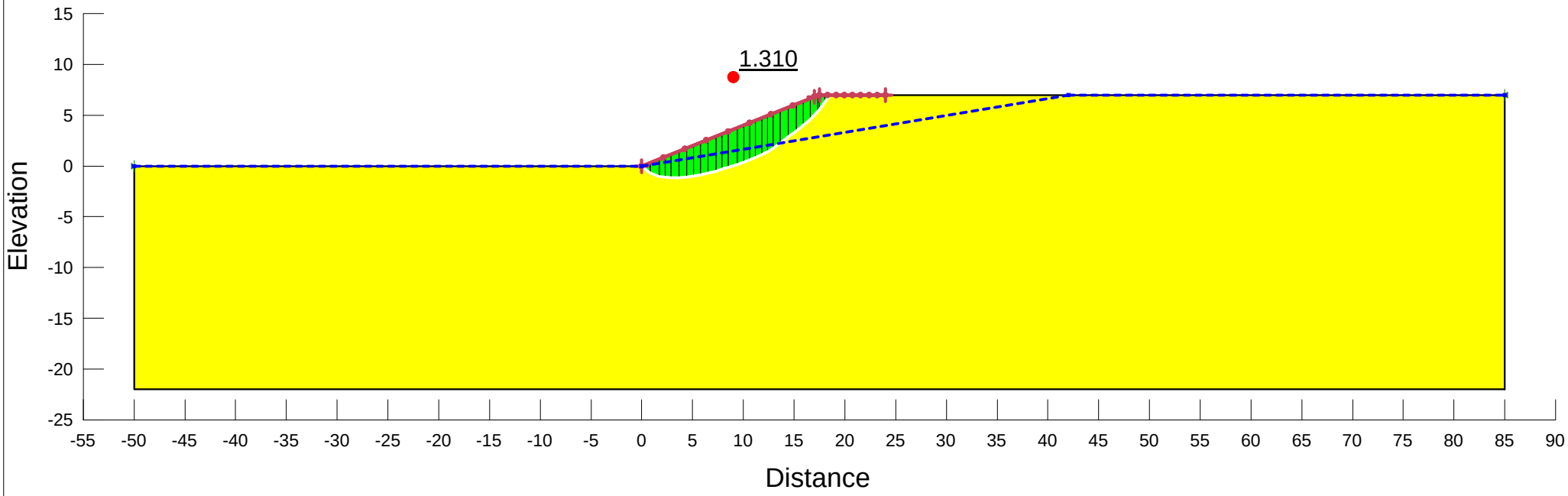
7.0m Cut Slope (2.5H:1V)
Scarp Failure
High Groundwater Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
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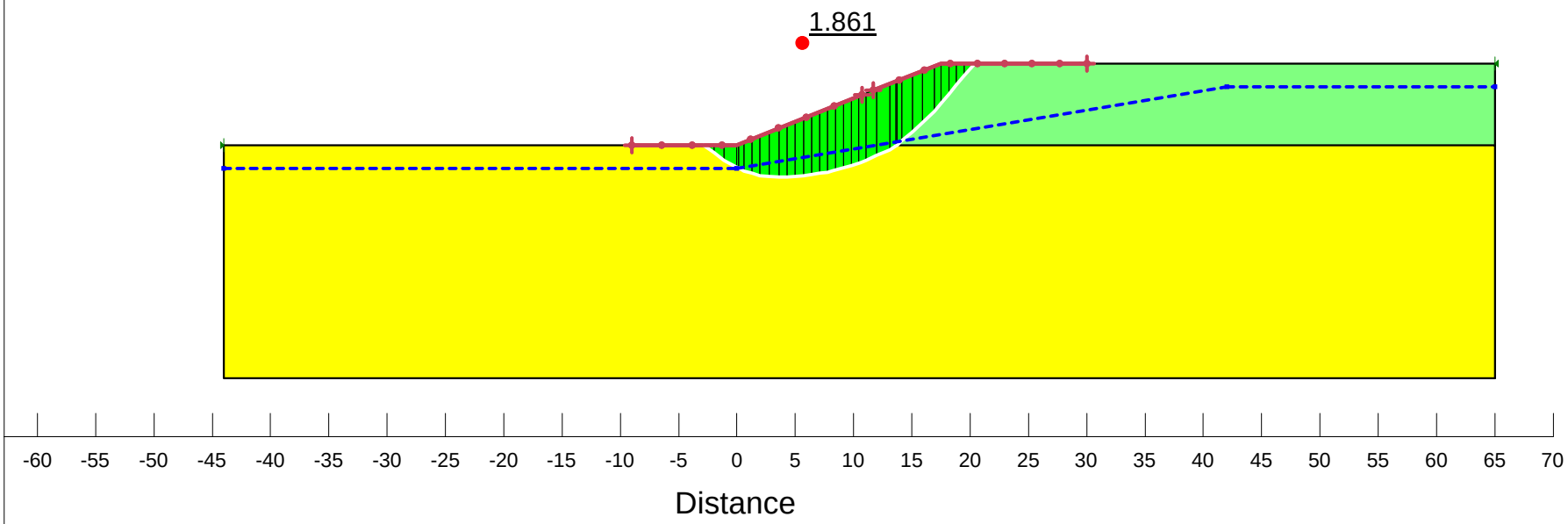
7.0m Fill Slope (2.5H:1V)
Global Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
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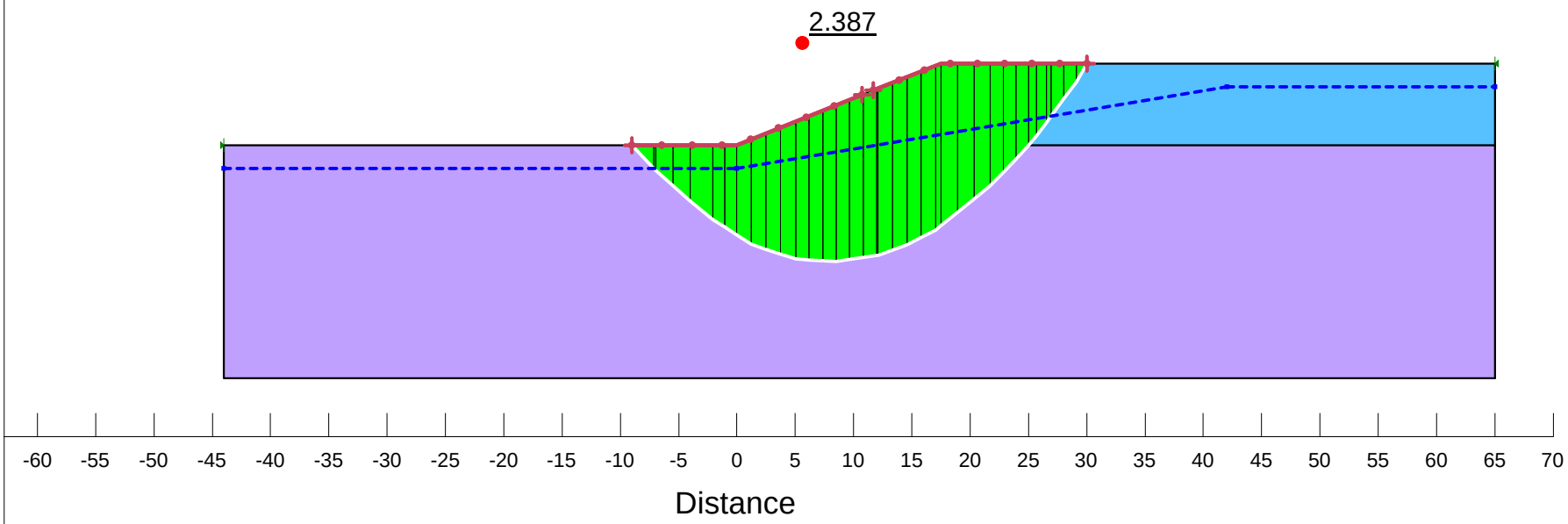
7.0m Fill Slope (2.5H:1V)
Global Failure
Seismic Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Total Cohesion (kPa) | Piezometric Line |
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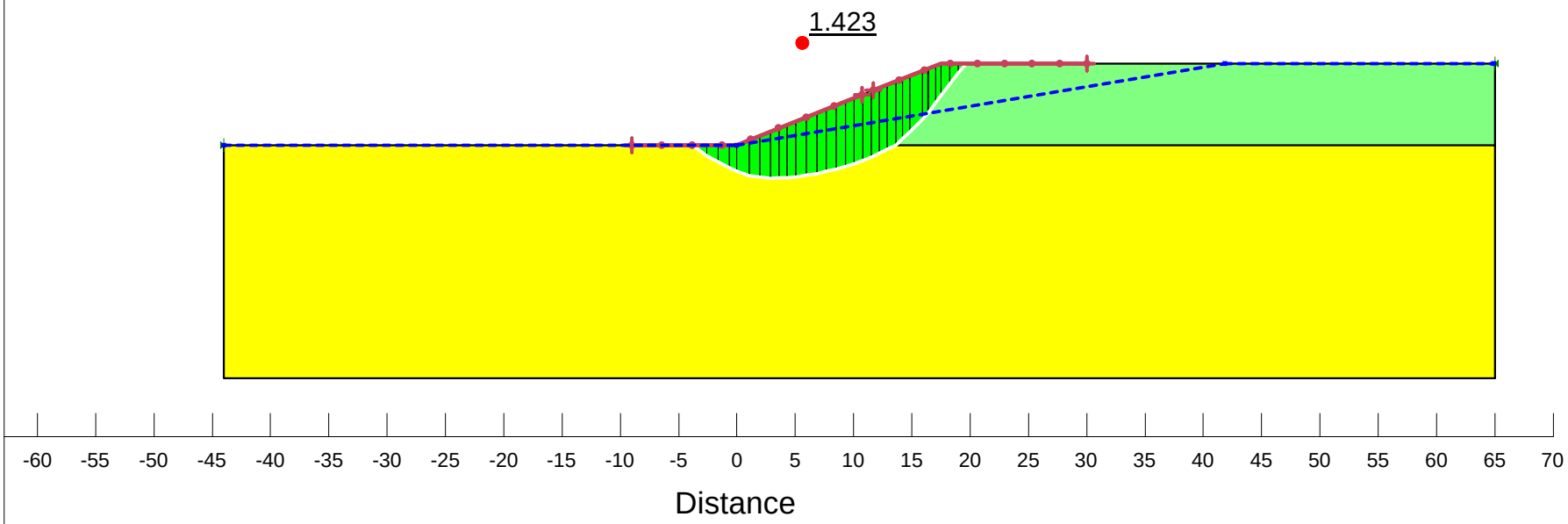
Horizontal Seismic Coefficient: 0.12

7.0m Fill Slope (2.5H:1V)
Global Failure
High Groundwater Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
|---|---|---|---|---|---|---|---|
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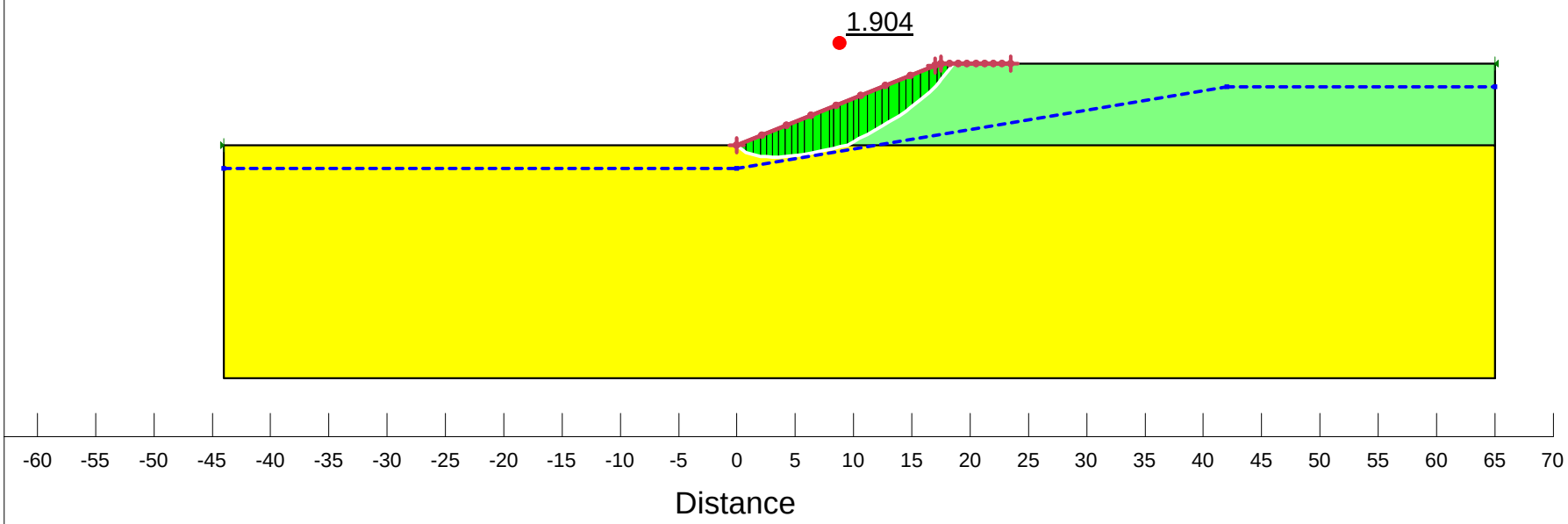
7.0m Fill Slope (2.5H:1V)
Scarp Failure
Static Case




| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
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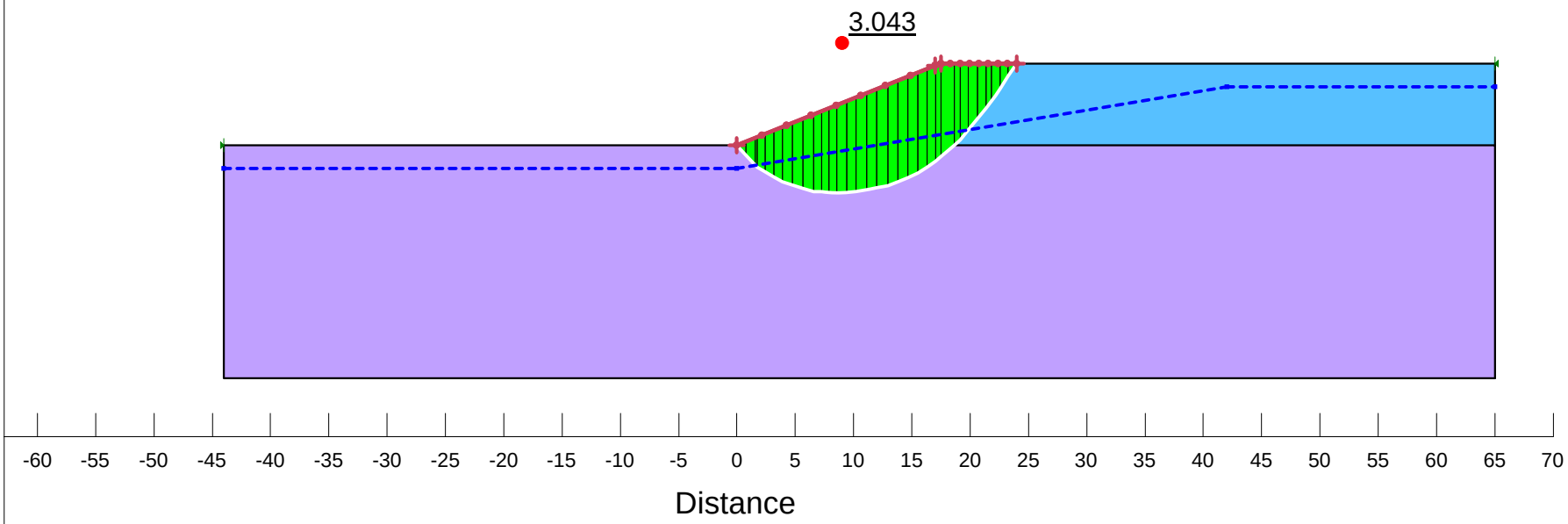
Scarp Failure
Seismic Case

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Horizontal Seismic Coefficient: 0.12

7.0m Fill Slope (2.5H:1V)
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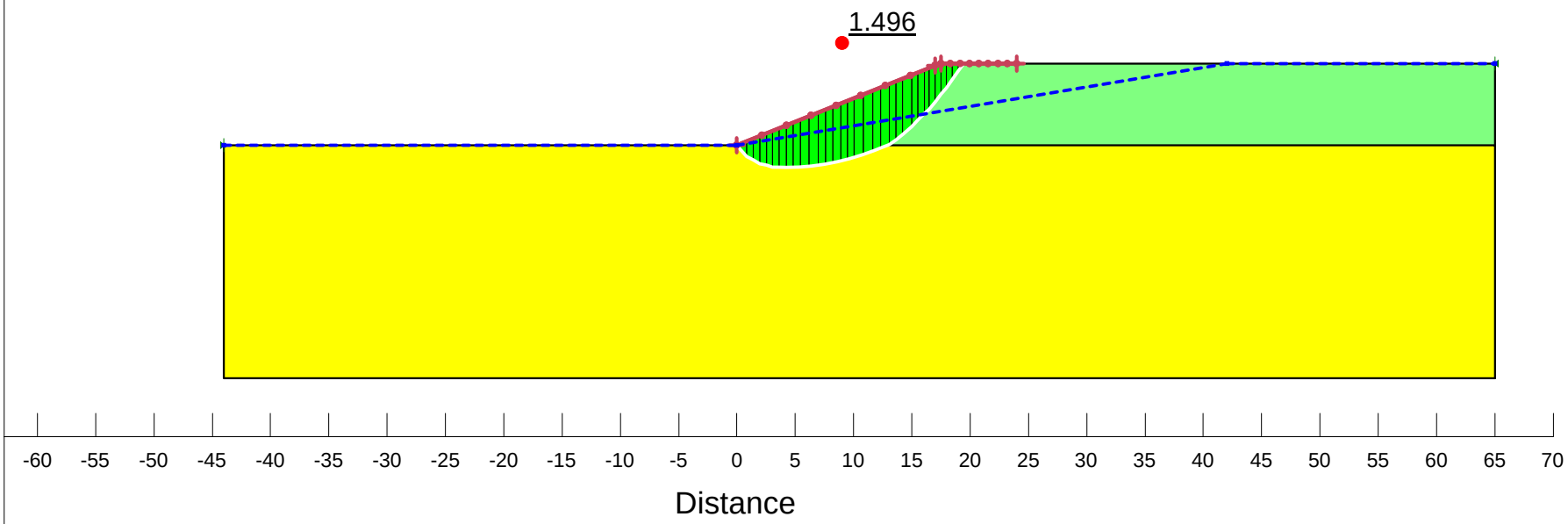


| Color | Name | Slope Stability Material Model | Unit Weight (kN/m³) | Effective Cohesion (kPa) | Effective Friction Angle (°) | Phi-B (°) | Piezometric Line |
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| | CW to Residual SAVF (Drained) | Mohr-Coulomb | 17 | 2 | 26 | 0 | 1 |
| | Engineered Fill (Drained) | Mohr-Coulomb | 18.5 | 5 | 32 | 0 | 1 |

# Appendix P – Soil Reactivity

**Soil Reactivity Classification - AS 2870-2011**

*Following methodology in BRANZ 2008 Study SR120A*

| | | | | |
|---|---|---|---|---|
| Soil suction change - SURFACE | Δu | 1.2 | pF | (as per recommendations in BRANZ) |
| Depth of soil suction change | Hs | 1.5 | m | (as per recommendations in BRANZ) |
| Depth of cracked zone | Hcr | 0.75 | m | (0.5 Hs, as per recommendations in BRANZ) |
| Soil suction change - Hcr depth | Δu,Hcr | 0.6 | pF | (using linear between surface and Hcr) |
| Alpha factor | α | 1.78 | | (within uncracked zone) |
| Shrinkage Index | Ips | **2.73** | % | |
| Surface movement cracked zone | ys1 | 18 | mm | |
| Surface movement uncracked zone | ys2 | 11 | mm | |
| Total surface movement | **ys** | **29** | **mm** | **Class: M** |
| | ys/Ips: | 10.7 | | |

| **Test:** | **TP03 0.25m** | **TP04 2m** | **TP05 2.1m** | **TP06 1.8m** | **TP08 2.3m** | **TP10 1.5m** | **TP14 1.7m** | **TP17 2.2m** | **TP19 0.25m** | **TP25 0.7m** | **TP29 1.8m** | **TP31 0.6m** | **TP32 0.7m** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| LL % | **104** | **83** | **75** | **68** | **74** | **74** | **97** | **77** | **79** | **83** | **82** | **66** | **109** |
| PI % | **62** | **32** | **25** | **24** | **38** | **41** | **51** | **29** | **45** | **46** | **55** | **33** | **76** |
| LS % | **22** | **21** | **18** | **16** | **18** | **19** | **21** | **16** | **20** | **20** | **23** | **14** | **26** |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| **Estimated Shrinkage Index (%)** | | | | | | | | | | | | | |
| Is,LL | 3.34 | 2.82 | 2.62 | 2.45 | 2.60 | 2.60 | 3.17 | 2.67 | 2.72 | 2.82 | 2.79 | 2.40 | 3.46 |
| Is,PI | 3.16 | 2.29 | 2.09 | 2.06 | 2.47 | 2.55 | 2.84 | 2.20 | 2.67 | 2.70 | 2.96 | 2.32 | 3.57 |
| Is,LS | 3.02 | 2.93 | 2.64 | 2.44 | 2.64 | 2.73 | 2.93 | 2.44 | 2.83 | 2.83 | 3.12 | 2.25 | 3.41 |
| | | | | | | | | | | | | | |
| **Range of ys values** | | | | | | | | | | | | | |
| | 36 | 30 | 28 | 26 | 28 | 28 | 34 | 29 | 29 | 30 | 30 | 26 | 37 |
| | 34 | 25 | 22 | 22 | 26 | 27 | 31 | 24 | 29 | 29 | 32 | 25 | 38 |
| | 32 | 31 | 28 | 26 | 28 | 29 | 31 | 26 | 30 | 30 | 34 | 24 | 37 |

| | | |
|---|---|---|
| Min | **22** | mm: M |
| LQ | **26** | mm: M |
| Mean | **29** | mm: M |
| Median | **29** | mm: M |
| UQ | **31** | mm: M |
| Max | **38** | mm: M |

**TABLE 2.3**

**CLASSIFICATION BY CHARACTERISTIC SURFACE MOVEMENT ($y_s$)**

| Characteristic surface movement ($y_s$) mm | Site classification in accordance with Table 2.1 |
|---|---|
| $0 < y_s \leq 20$ | S |
| $20 < y_s \leq 40$ | M |
| $40 < y_s \leq 60$ | H1 |
| $60 < y_s \leq 75$ | H2 |
| $y_s > 75$ | E |

| Limits | Class S | Class M |
|---|---|---|
| Max LL | 44 | 119 |
| Max PI | 17 | 81 |
| Max LS | 9.8 | 29 |

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