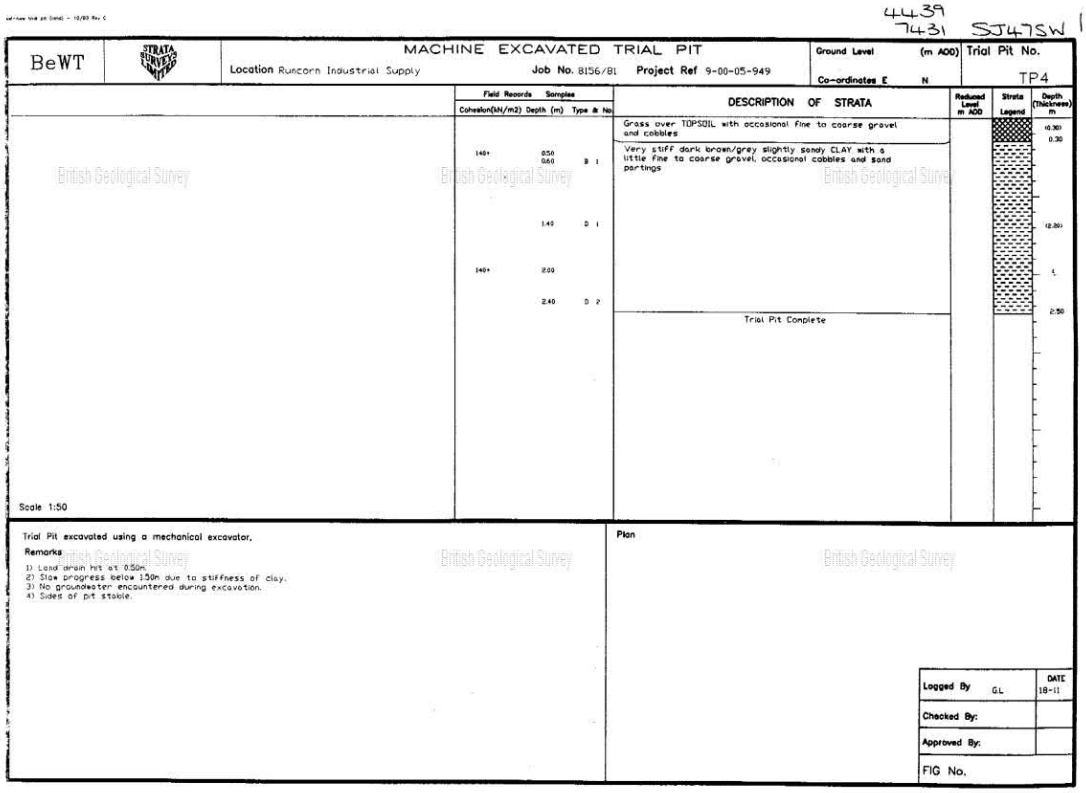

4439 7431 SJ47SW 118

BeWT | STRATA SURVEYS LTD

MACHINE EXCAVATED TRIAL PIT

Location Runcorn Industrial Supply | Job No. 8156/81 | Project Ref 9-00-05-949 | Ground Level (m AOD) | Co-ordinates E N | Trial Pit No. TP4

| Field Records Cohesion(kN/m2) | Depth (m) | Samples Type & No. | DESCRIPTION OF STRATA | Reduced Level m AOD | Strata Legend | Depth (Thickness) m |
|---|---|---|---|---|---|---|
| | | | Grass over TOPSOIL with occasional fine to coarse gravel and cobbles | | | (0.30) 0.30 |
| 140+ | 0.50 0.60 | B 1 | Very stiff dark brown/grey slightly sandy CLAY with a little fine to coarse gravel, occasional cobbles and sand partings | | | |
| | 1.40 | D 1 | | | | (2.20) 1. |
| 140+ | 2.00 | | | | | |
| | 2.40 | D 2 | | | | 2.50 |
| | | | Trial Pit Complete | | | |

Scale 1:50

Trial Pit excavated using a mechanical excavator.

Remarks

1) Land drain hit at 0.50m.
2) Slow progress below 1.50m due to stiffness of clay.
3) No groundwater encountered during excavation.
4) Sides of pit stable.

Plan

Logged By GL | DATE 18-11

Checked By:

Approved By:

FIG No.

**SJ47SW118**

# ALLIED EXPLORATION & GEOTECHNICS LTD

SJ47SW133

## BOREHOLE RECORD

Status:- FINAL
Date:- 07/03/96

Project: NMCS2 Communications System in Cheshire - MS2 Cantilever Sites - M56

BOREHOLE No: BH-02 133

Client: The Highways Agency

Location: 54/6 +70B SJ48832 73060 SJ47SW

Method & Equipment: Cable Percussion using a Pilcon Wayfarer 1500

Ground Level(m(AOD)): 7.18

Date: 15-12-95

Sheet: 1 of 2

| SAMPLES & TESTS | | | Water | STRATA | | | | Instrument Backfill |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No | Test Result | | Reduced Level | Legend | Depth (Thickness) | DESCRIPTION | |
| | | | | 6.08 | | (1.10) 1.10 | (1) MADE GROUND (Topsoil and hardcore fill). | |
| 1.10-1.50 | B1 | | | | | | MADE GROUND (Loose grey brown gravelly medium to coarse sand with some to many pockets of firm grey and red brown sandy clay with occasional gravel. Gravel is fine to medium occasionally coarse angular to subrounded and consists of sandstone, limestone and basalt. Occasional rootlets). | |
| 1.50-1.95 | CB2 | N7 | | | | | | |
| 2.00-2.40 | B3 | | | | | (1.60) | | |
| 2.50-2.95 | CB4 | N25 | | 4.48 | | 2.70 | | |
| | | | | | | | Medium dense orange brown gravelly coarse SAND with occasional pockets of firm thinly laminated clay. Gravel is fine to medium subangular to rounded and consists of sandstone, basalt and quartzite. (Fluvio-glacial) | |
| 3.50-3.95 | CB5 | N11 | | | | (1.40) | | |
| | | | | 3.08 | | 4.10 | | |
| 4.10-4.50 | B6 | | | | | | Stiff occasionally thinly laminated red brown sandy CLAY with occasional to some gravel and occasional lenses of orange brown coarse sand. Gravel is fine to medium subangular to subrounded and consists of sandstone and basalt. (Glacial Till) | |
| 4.50-4.95 | U7 | (45) | | | | (0.90) | | |
| | | | | 2.18 | | 5.00 | | |
| 5.00 | J8 | | | | | (0.50) | Firm thinly laminated brown CLAY with occasional thin laminae of brown fine sand and silt. (Glacio-lacustrine) | |
| | | | | 1.68 | | 5.50 | | |
| 5.50-5.95 | SJ9 | 50 for 275mm | | | | | Very dense red brown silty fine SAND. (Fluvio-glacial) | |
| 6.30-6.70 | B10 | | | | | | | |
| 7.00-7.45 | SJ11 | 50 for 210mm | | | | (3.00) | | |
| 7.80-8.10 | B12 | | | | | | | |

| Boring Progress and Water Observations | | | | | |
|---|---|---|---|---|---|
| Date | | Depth | Casing | Casing Dia | Water Depth |
| 15/12/95 | | 0.00 | 0.00 | | |
| 15/12/95 | | 8.50 | 8.50 | 150mm | 5.10 |
| 18/12/95 | | 8.50 | 8.50 | 150mm | 4.30 |
| 18/12/95 | | 15.00 | 15.00 | 150mm | 3.60 |

| Chiselling | | | Water Added | |
|---|---|---|---|---|
| From | To | Hours | From | To |
| | | | 5.00 | 8.50 |

GENERAL REMARKS

1) Description derived from driller's daily report.
2) Inspection pit dug prior to drilling (1.0 x 1.0 x 1.2m).

All dimensions in metres
Scale 1:50

For Explanation of Symbols and Abbreviations see Key Sheets

Checked By: AC

Logged By: A. Latimer

Contract No. 1568

Date Printed:- 08/03/96

Form AEG21/2

**SJ47SW133**

**ALLIED EXPLORATION & GEOTECHNICS LTD**

**BOREHOLE RECORD**

Status:- **FINAL** Date:- 07/03/96

Project: NMCS2 Communications System In Cheshire - MS2 Cantilever Sites - M56

BOREHOLE No: BH-03

Client: The Highways Agency

Location: SJ 4650 7345 53/7 +60B SJ47SW / 14

Method & Equipment: Cable Percussion using a Pilcon Wayfarer 1500

Ground Level(m(AOD)): 7.64

Date: 18-12-95

Sheet: 1 of 2

| SAMPLES & TESTS | | | Water | STRATA | | | | | Instrument / Backfill |
|---|---|---|---|---|---|---|---|---|---|
| Depth | Type No | Test Result | | Reduced Level | Legend | Depth (Thickness) | | DESCRIPTION | |
| | | | | 7.34 | | (0.30) | 0.30 | (1) TOPSOIL. | |
| 0.80-1.20 | B1 | | | | | (1.20) | | MADE GROUND (Yellow brown and grey brown silty fine to medium sand. Occasional rootlets). | |
| 1.50-1.95 | SJ2 | N5 | | 6.14 | | | 1.50 | | |
| 1.51-1.90 | B3 | | | | | (0.50) | | Soft occasionally thinly laminated brown CLAY with occasional lenses of orange brown coarse sand. (Glacio-lacustrine) | |
| 2.50-2.95 | U4 | (67) | | 5.64 | | | 2.00 | Firm to stiff brown sandy CLAY with some gravel. Gravel is fine to medium subangular to subrounded and consists of sandstone and basalt. (Glacial Till) | |
| 3.00 | J5 | | | | | | | | |
| 3.01-3.40 | B6 | | | | | | | | |
| 3.50-3.95 | U7 | (55) | | | | | | | |
| 4.00 | J8 | | | | | | | | |
| 4.01-4.40 | B9 | | | | | | | | |
| 4.50-4.95 | U10 | (60) | | | | (5.30) | | | |
| 5.00 | J11 | | | | | | | | |
| 5.10-5.50 | B12 | | | | | | | | |
| 5.50-5.95 | U13 | (70) | | | | | | | |
| 6.00 | J14 | | | | | | | | |
| 6.40-6.80 | B15 | | | | | | | | |
| 7.00-7.45 | U16 | (100) | | 0.34 | | | 7.30 | | |
| 7.30-7.60 | B18 | | | 0.14 | | (0.20) | 7.50 | Red brown slightly clayey fine to medium SAND with occasional pockets and bands of soft thinly laminated clay. (Fluvio-glacial) | |
| 7.50 | J17 | | | | | | | (As sheet 2 of 2) | |
| 7.60-7.90 | SJ19 | 50 for 56mm | | | | | | | |
| 7.61-7.90 | B20 | | | | | (1.00) | | | |

| Boring Progress and Water Observations | | | | | | Chiselling | | | Water Added | | GENERAL REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | Depth | Casing | Casing Dia | Water Depth | From | To | Hours | From | To | |
| 18.12.95 | | 0.00 | 0.00 | | | 7.90 | 8.20 | 0.75 | 7.30 | 9.00 | 1) Description derived from driller's daily report. |
| 18.12.95 | | 2.00 | 1.65 | 150mm | dry | 8.30 | 8.50 | 0.50 | | | |
| 19.12.95 | | 2.00 | 1.65 | 150mm | dry | 8.50 | 8.80 | 1.00 | | | |
| 19.12.95 | | 9.00 | 9.00 | 150mm | 8.30 | | | | | | |

All dimensions in metres Scale 1:50

For Explanation of Symbols and Abbreviations see Key Sheets

[redacted]

Logged By: A. Latimer

Contract No. 1568

Date Printed:- 08/03/96

Form AEG21/2

**SJ47SW134_1**

**ALLIED EXPLORATION & GEOTECHNICS LTD**

**BOREHOLE RECORD**

Status:- **FINAL** Date:- 07/03/96

Project: NMCS2 Communications System in Cheshire - MS2 Cantilever Sites - M56

BOREHOLE No: BH-03 134

Client: The Highways Agency

Location: 53/7 +60B SJ47SW

Method & Equipment: Cable Percussion using a Pilcon Wayfarer 1500

Ground Level(m(AOD)): 7.64

Date: 18-12-95

Sheet: 2 of 2

| SAMPLES & TESTS | | | Water | STRATA | | | | Instrument backfill |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No | Test Result | | Reduced Level | Legend | Depth (Thickness) | DESCRIPTION | |
| | | | | | | | Very dense slightly medium to coarse sandy fine to coarse subangular GRAVEL with some cobbles. Gravel and cobbles consist of sandstone and basalt. (Fluvio-glacial) | |
| | | | | -0.86 | | 8.50 | | |
| 8.50-8.70 | SJ21 | 50 for 53mm | | | | (0.50) | | |
| 8.70-8.90 | B22 | | | | | | Grey and red brown medium grained poorly cemented slightly weathered SANDSTONE weak. (Bunter Sandstone) | |
| 8.90-9.00 | C23 | 50 for 47mm | | -1.36 | | 9.00 | | |
| | | | | | | | Borehole complete at 9.00m BGL. | |

| Boring Progress and Water Observations | | | | | | Chiselling | | | Water Added | | GENERAL REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | | Depth | Casing | Casing Dia | Water Depth | From | To | Hours | From | To | |
| 18.12.95 | | 0.00 | 0.00 | | | 7.90 | 8.20 | 0.75 | 7.30 | 9.00 | 1) Description derived from driller's daily report. |
| 18.12.95 | | 2.00 | 1.65 | 150mm | dry | 8.30 | 8.50 | 0.50 | | | |
| 19.12.95 | | 2.00 | 1.65 | 150mm | dry | 8.50 | 8.80 | 1.00 | | | |
| 19.12.95 | | 9.00 | 9.00 | 150mm | 8.30 | | | | | | |

All dimensions in metres Scale 1:50

For Explanation of Symbols and Abbreviations see Key Sheets

[redacted]

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Contract No. 1568

Date Printed:- 08/03/96

Form AEG21/2

**SJ47SW134_2**

**ALLIED EXPLORATION & GEOTECHNICS LTD**

**BOREHOLE RECORD**

Status:- **FINAL** Date:- 07/03/96

Project: NMCS2 Communications System in Cheshire - MS2 Cantilever Sites - M56

BOREHOLE No: BH-04

Client: The Highways Agency

Location: SJ 4715 7354 53/5 +55A SJ47SW/135

Method & Equipment: Percussion/Rotary using a Pilcon Wayfarer 1500

Ground Level(m(AOD)): 7.99

Date: 13-12-95

Sheet: 1 of 1

| SAMPLES & TESTS | | | Water | STRATA | | | | Instru-ment backfill |
|---|---|---|---|---|---|---|---|---|
| Depth | Type No | Test Result | | Reduced Level | Legend | Depth (Thick-ness) | DESCRIPTION | |
| 0.20-0.60 | B1 | | | | | (0.70) | MADE GROUND (Brown silty topsoil with occasional medium to coarse subangular limestone gravel). | |
| | | | | 7.29 | | 0.70 | | |
| 0.80-1.20 | B2 | | | | | | Stiff extremely closely fissured red brown sandy CLAY with occasional gravel and occasional lenses of sand. Gravel is fine subangular to subrounded and consists of sandstone, basalt and quartzite. Occasional shell fragments. (Glacial Till) | |
| 1.55-2.00 | U3 | (100) | | | | (2.50) | | |
| 2.10 | J4 | | | | | | | |
| 2.30 | J5 | | | | | | | |
| 2.55-3.00 | U6 | (110) | | | | | | |
| 3.10 | J7 | | | 4.79 | | 3.20 | | |
| 3.20 | J8 | | | | | (0.50) | Dense red brown clayey fine to medium SAND with some pockets (<100mm) of soft sandy clay. (Completely Weathered Bunter Sandstone) | |
| 3.21-3.60 | B10 | | | | | | | |
| 3.30-3.75 | SJ9 | N57 | | 4.29 | | 3.70 | | |
| 3.80 | J11 | 50 for | | | | (0.30) | Red brown medium grained poorly cemented slightly weathered SANDSTONE weak. (Bunter Sandstone) | |
| 4.00 | SJ12 | 30mm | | 3.99 | | 4.00 | | |
| | | | | | | | Boring complete at 4.00m - continued by rotary coring | |

**Boring Progress and Water Observations**

| Date | | Depth | Casing | Casing Dia | Water Depth |
|---|---|---|---|---|---|
| 13/12/95 | | 0.00 | 0.00 | | |
| 13/12/95 | | 4.00 | 4.00 | 150mm | dry |

**Chiselling**

| From | To | Hours |
|---|---|---|
| 3.80 | 4.00 | 1.00 |

**Water Added**

| From | To |
|---|---|
| 3.70 | 4.00 |

**GENERAL REMARKS**

1) Inspection pit dug prior to drilling (1.0 x 1.0 x 1.2m).

All dimensions in metres Scale 1:50

For Explanation of Symbols and Abbreviations see Key Sheets

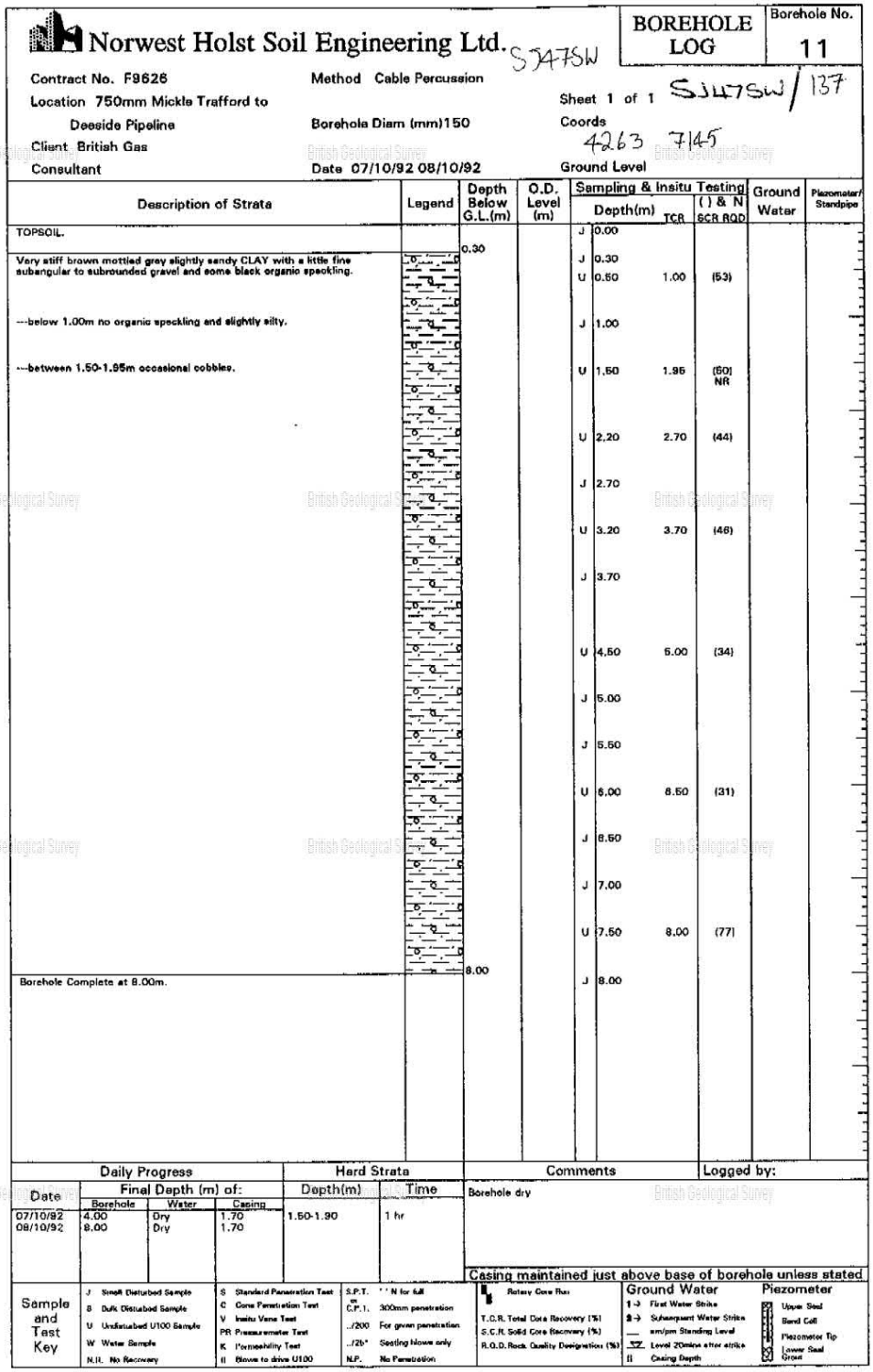
[redacted] Logged By: . Latimer

Contract No. 1568

Date Printed:- 08/03/96

Form AEG21/2

**SJ47SW135**



Norwest Holst Soil Engineering Ltd. SJ47SW

BOREHOLE LOG — Borehole No. 11

Contract No. F9626
Location 750mm Mickle Trafford to Deeside Pipeline
Client British Gas
Consultant
Method Cable Percussion
Borehole Diam (mm)150
Date 07/10/92 08/10/92
Sheet 1 of 1 SJ47SW/137
Coords 4263 7145
Ground Level

| Description of Strata | Legend | Depth Below G.L.(m) | O.D. Level (m) | Sampling & Insitu Testing Depth(m) | TCR | ( ) & N SCR RQD | Ground Water | Piezometer/ Standpipe |
|---|---|---|---|---|---|---|---|---|
| TOPSOIL. | | | | J 0.00 | | | | |
| | | 0.30 | | J 0.30 | | | | |
| Very stiff brown mottled grey slightly sandy CLAY with a little fine subangular to subrounded gravel and some black organic speckling. | | | | U 0.50 | 1.00 | (53) | | |
| ---below 1.00m no organic speckling and slightly silty. | | | | J 1.00 | | | | |
| ---between 1.50-1.95m occasional cobbles. | | | | U 1.50 | 1.95 | (50) NR | | |
| | | | | U 2.20 | 2.70 | (44) | | |
| | | | | J 2.70 | | | | |
| | | | | U 3.20 | 3.70 | (46) | | |
| | | | | J 3.70 | | | | |
| | | | | U 4.50 | 5.00 | (34) | | |
| | | | | J 5.00 | | | | |
| | | | | J 5.50 | | | | |
| | | | | U 6.00 | 6.50 | (31) | | |
| | | | | J 6.50 | | | | |
| | | | | J 7.00 | | | | |
| | | | | U 7.50 | 8.00 | (77) | | |
| | | 8.00 | | J 8.00 | | | | |
| Borehole Complete at 8.00m. | | | | | | | | |

Daily Progress

| Date | Final Depth (m) of: Borehole | Water | Casing |
|---|---|---|---|
| 07/10/92 | 4.00 | Dry | 1.70 |
| 08/10/92 | 8.00 | Dry | 1.70 |

Hard Strata

| Depth(m) | Time |
|---|---|
| 1.50-1.90 | 1 hr |

Comments: Borehole dry

Logged by:

Casing maintained just above base of borehole unless stated

Sample and Test Key

J Small Disturbed Sample; B Bulk Disturbed Sample; U Undisturbed U100 Sample; W Water Sample; N.R. No Recovery
S Standard Penetration Test; C Core Penetration Test; V Insitu Vane Test; PR Pressuremeter Test; K Permeability Test; ll Blows to drive U100
S.P.T. ** N for full 300mm penetration; C.P.T. ../200 For given penetration; ../2b* Seating blows only; N.P. No Penetration
Rotary Core Run; T.C.R. Total Core Recovery (%); S.C.R. Solid Core Recovery (%); R.Q.D. Rock Quality Designation (%)
Ground Water: 1→ First Water Strike; 2→ Subsequent Water Strike; ___ am/pm Standing Level; ▽ Level 20mins after strike; ll Casing Depth
Piezometer: Upper Seal; Sand Cell; Piezometer Tip; Lower Seal Grout

SJ47SW137

## Norwest Holst Soil Engineering Ltd.

SJ47SW

**BOREHOLE LOG** Borehole No. 12

SJ47SW/138

Contract No. F9626 Method Cable Percussion Sheet 1 of 1

Location 750mm Mickle Trafford to Deeside Pipeline Borehole Diam (mm) 150 Coords 4260 7145

Client British Gas

Consultant Date 07/10/92 07/10/92 Ground Level

| Description of Strata | Legend | Depth Below G.L.(m) | O.D. Level (m) | Sampling & Insitu Testing Depth(m) | | | Ground Water | Piezometer / Standpipe |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ( ) & N SCR RQD | | |
| TOPSOIL | | | | J 0.00 | | | | |
| | | 0.40 | | J 0.40 | | | | |
| Very stiff brown slightly sandy CLAY with some fine to coarse subangular gravel. | | | | U 0.50 | 1.00 | (88) | | |
| | | | | J 1.00 | | | | |
| | | | | U 1.50 | 2.00 | (47) | | |
| ---below 2.00m subrounded gravel | | | | J 2.00 | | | | |
| | | | | U 2.50 | 3.00 | (49) | | |
| ---below 3.00m some grey fissures | | | | J 3.00 | | | | |
| | | | | U 3.50 | 4.00 | (38) | | |
| | | 4.00 | | J 4.00 | | | | |
| Stiff brown CLAY with a little fine subrounded gravel. | | | | U 4.50 | 5.00 | (33) | | |
| | | | | J 5.00 | | | | |
| | | | | J 5.50 | | | | |
| | | | | U 6.00 | 6.50 | (30) | | |
| | | | | J 6.50 | | | | |
| | | | | J 7.00 | | | | |
| | | | | U 7.50 | 8.00 | (62) | | |
| | | 8.00 | | J 8.00 | | | | |
| Borehole Complete at 8.00m. | | | | | | | | |

| Daily Progress | | | | Hard Strata | | Comments | Logged by: |
|---|---|---|---|---|---|---|---|
| Date | Final Depth (m) of: Borehole | Water | Casing | Depth(m) | Time | Borehole dry. | |
| 07/10/92 | 8.00 | Dry | 1.70 | | | | |

Casing maintained just above base of borehole unless stated

**Sample and Test Key**

J Small Disturbed Sample; B Bulk Disturbed Sample; U Undisturbed U100 Sample; W Water Sample; N.R. No Recovery

S Standard Penetration Test; C Core Penetration Test; V Insitu Vane Test; PR Pressuremeter Test; K Permeability Test; 0 Blows to drive U100

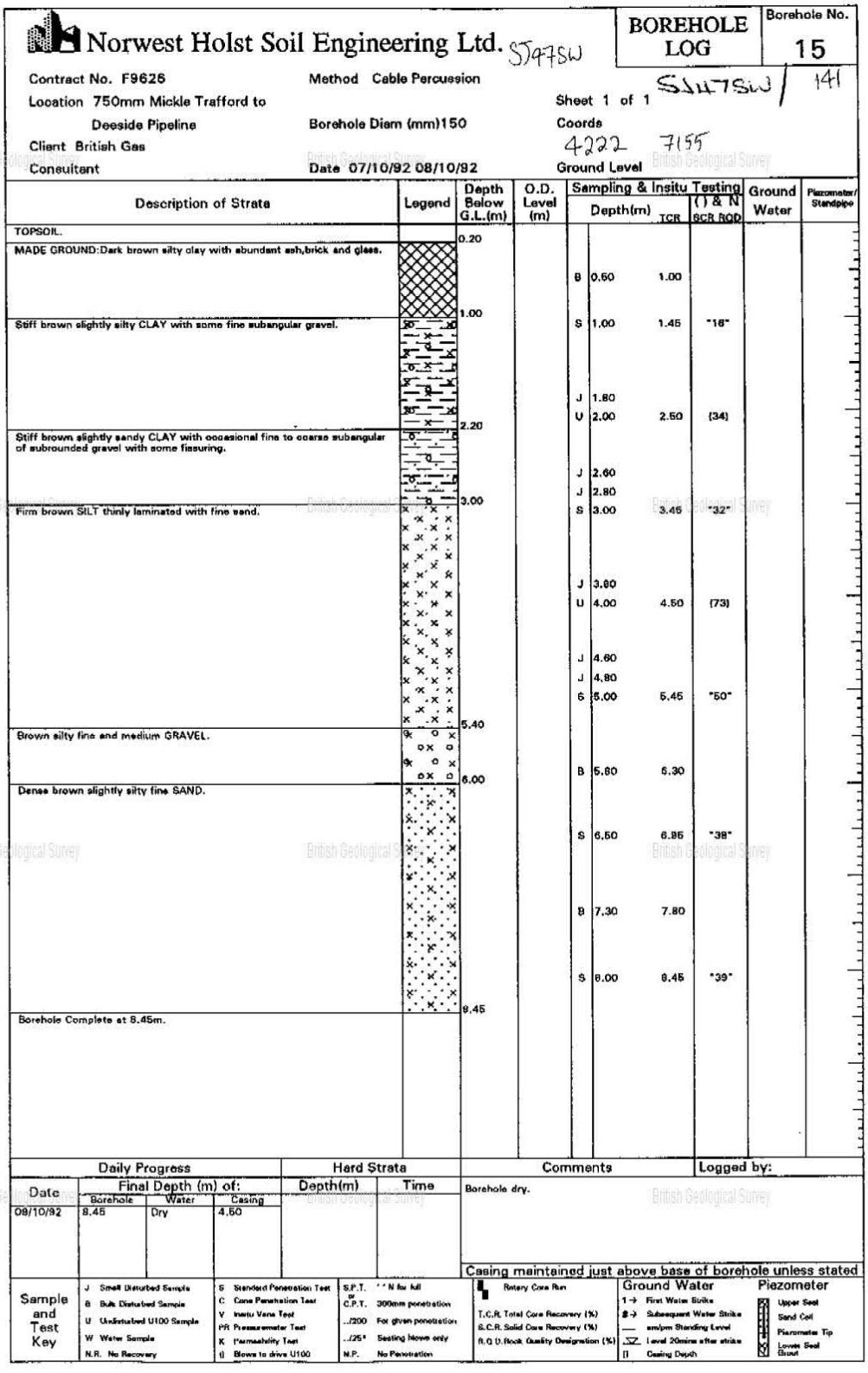
S.P.T. N for full C.P.T. 300mm penetration; /200 For given penetration; /25* Seating blows only; N.P. No Penetration

Rotary Core Run; T.C.R. Total Core Recovery (%); S.C.R. Solid Core Recovery (%); R.Q.D. Rock Quality Designation (%)

Ground Water: 1→ First Water Strike; ⧗→ Subsequent Water Strike; am/pm Standing Level; ▽ Level 20mins after strike; [] Casing Depth

Piezometer: Upper Seal; Sand Cell; Piezometer Tip; Lower Seal Grout

**SJ47SW138**



Norwest Holst Soil Engineering Ltd. SJ47SW

BOREHOLE LOG — Borehole No. 15

SJ47SW / 141

Contract No. F9626 — Method Cable Percussion — Sheet 1 of 1

Location 750mm Mickle Trafford to Deeside Pipeline — Borehole Diam (mm)150 — Coords 4222 7155

Client British Gas

Consultant — Date 07/10/92 08/10/92 — Ground Level

| Description of Strata | Legend | Depth Below G.L.(m) | O.D. Level (m) | Sampling & Insitu Testing Depth(m) | | | ( ) & N SCR RQD | Ground Water | Piezometer/ Standpipe |
|---|---|---|---|---|---|---|---|---|---|
| TOPSOIL. | | 0.20 | | | | | | | |
| MADE GROUND:Dark brown silty clay with abundant ash,brick and glass. | | | | B | 0.50 | 1.00 | | | |
| Stiff brown slightly silty CLAY with some fine subangular gravel. | | 1.00 | | S | 1.00 | 1.45 | "18" | | |
| | | | | J | 1.80 | | | | |
| | | 2.20 | | U | 2.00 | 2.50 | (34) | | |
| Stiff brown slightly sandy CLAY with occasional fine to coarse subangular of subrounded gravel with some fissuring. | | | | J | 2.60 | | | | |
| | | | | J | 2.80 | | | | |
| | | 3.00 | | S | 3.00 | 3.45 | "32" | | |
| Firm brown SILT thinly laminated with fine sand. | | | | J | 3.80 | | | | |
| | | | | U | 4.00 | 4.50 | (73) | | |
| | | | | J | 4.60 | | | | |
| | | | | J | 4.80 | | | | |
| | | | | S | 5.00 | 5.45 | "50" | | |
| | | 5.40 | | | | | | | |
| Brown silty fine and medium GRAVEL. | | 6.00 | | B | 5.80 | 6.30 | | | |
| Dense brown slightly silty fine SAND. | | | | S | 6.50 | 6.95 | "38" | | |
| | | | | B | 7.30 | 7.80 | | | |
| | | | | S | 8.00 | 8.45 | "39" | | |
| | | 8.45 | | | | | | | |
| Borehole Complete at 8.45m. | | | | | | | | | |

Daily Progress

| Date | Final Depth (m) of: Borehole | Water | Casing |
|---|---|---|---|
| 09/10/92 | 8.45 | Dry | 4.60 |

Hard Strata: Depth(m) / Time

Comments: Borehole dry.

Logged by:

Casing maintained just above base of borehole unless stated

Sample and Test Key

J Small Disturbed Sample; B Bulk Disturbed Sample; U Undisturbed U100 Sample; W Water Sample; N.R. No Recovery

S Standard Penetration Test; C Cone Penetration Test; V Insitu Vane Test; PR Pressuremeter Test; K Permeability Test; () Blows to drive U100

S.P.T. or C.P.T. " " N for full 300mm penetration; ../200 For given penetration; ../25* Seating blows only; N.P. No Penetration

Rotary Core Run; T.C.R. Total Core Recovery (%); S.C.R. Solid Core Recovery (%); R.Q.D. Rock Quality Designation (%)

Ground Water: 1→ First Water Strike; 2→ Subsequent Water Strike; — am/pm Standing Level; ▽Z Level 20mins after strike; [] Casing Depth

Piezometer: Upper Seal; Sand Cell; Piezometer Tip; Lower Seal; Grout

**SJ47SW141**

SCHEME Gowy Marshes — BH No. 1

Location — Depth 17.0m

Job No. 0175 — Data Sheet 1

No. 1 of 2

CHESHIRE COUNTY COUNCIL
DEPT. OF HIGHWAYS & TRANSPORTATION
ENGINEERING SERVICES LABORATORY
BACKFORD HALL, NR CHESTER

SJ47/70A SJ47SW/179

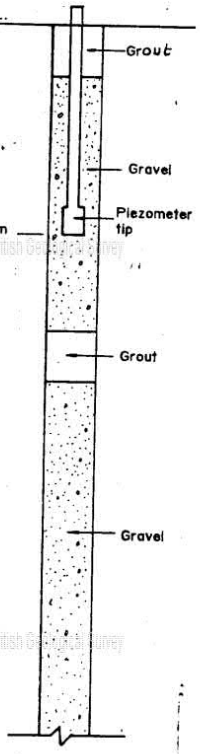
Scale 1:100

BH 1

G.L. 4.70m A.O.D.

| DESCRIPTION OF STRATA | (m) | Coefficient of Permeability Cm/Sec | Loss on Ignition % | N |
|---|---|---|---|---|
| Stiff grey weathered silty clay | 0 | | | 50 sat |
| Fawn clayey sand with thin layers of medium fine sand | S.L. | | | |
| Black amorphous peat with thin layers of rotted stems and wood, becoming fibrous locally, localised concentrations of broken shell | 1 | $1.16 \times 10^{-6}$ | 25 | 103 |
| | 2 | $1.13 \times 10^{-4}$ | 31 | 209 |
| | 3 | $6.70 \times 10^{-5}$ | 50 | 359 |
| | | $6.68 \times 10^{-5}$ | 63 | 373 |
| | 4 | $8.83 \times 10^{-6}$ | 2 | sat |
| Silty sand | | | | 19 |
| Stiff brown silty sandy clay till with fine to med gravel | 5 | $2.97 \times 10^{-7}$ | | 18 37/19 |
| | 6 | $5.67 \times 10^{-8}$ | | 19 |
| | 7 | | | 19 43/19 |
| | 8 | $2.67 \times 10^{-6}$ | | 23 |
| Firm brown silty clay | 9 | | | 23 |
| | 10 | | | 33 |
| | 11 | | | 32 |
| | 12 | | | |
| Medium fine sand | 13 | | | sat G1 |
| | 14 | | | |

DETAILS OF INSTALLATION




| GROUNDWATER | C | D | W | SL | |
|---|---|---|---|---|---|
| 2.11.83 am | 3.9 | 3.9 | 3.9 | 3.8 | After 15minutes |
| 2.11.83 pm | 7.8 | 8.0 | - | NIL | Sealed off by liners |
| 3.11.83 pm | 7.5 | 13.0 | 13.0 | 4.1 | After 30 minutes |
| 4.12.83 am | 12.0 | 13.0 | - | 0.55 | Overnight |
| 4.12.83 pm | 15.0 | 17.0 | - | NIL | Sealed off by liners |

| DEPTH (m) | SO3 | pH |
|---|---|---|
| | | |

For Grading, Compaction, Consolidation & Triaxial Curves
See attached sheets

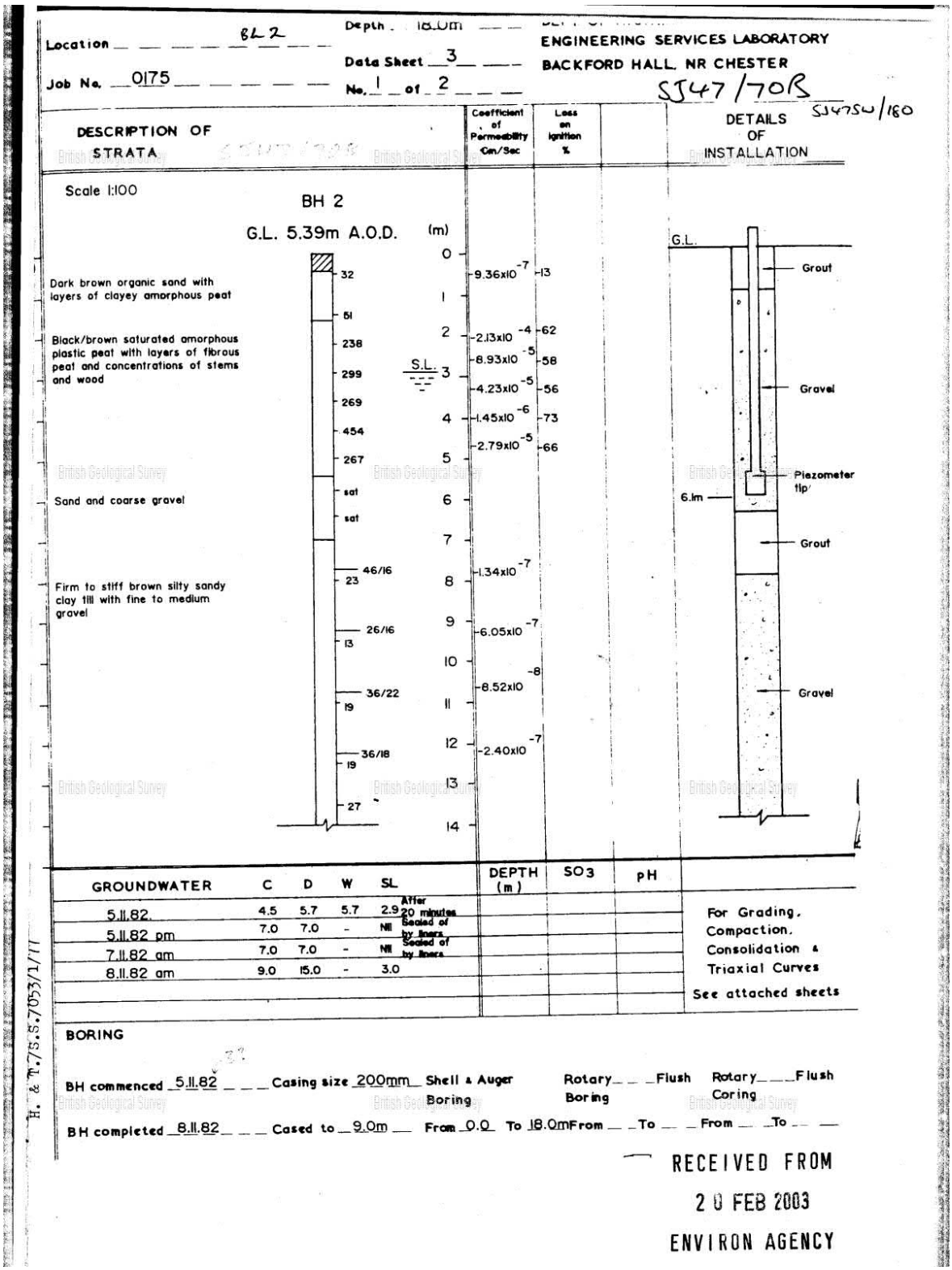
BORING

BH commenced 1.11.83 — Casing size 200mm — Shell & Auger Boring — Rotary — Flush Boring — Rotary — Flush Coring

BH completed 5.11.83 — Cased to 15.0m — From 0.0 To 17.0m — From — To — From — To

RECEIVED FROM
2 0 FEB 2003
ENVIRON AGENCY

SJ47SW179



Location BL2 Depth 18.0m

Job No. 0175 Data Sheet 3 No. 1 of 2

ENGINEERING SERVICES LABORATORY
BACKFORD HALL, NR CHESTER

SJ47/70R SJ47SW/180

DESCRIPTION OF STRATA

Coefficient of Permeability Cm/Sec

Loss on Ignition %

DETAILS OF INSTALLATION

Scale 1:100

BH 2

G.L. 5.39m A.O.D.

(m)

Dark brown organic sand with layers of clayey amorphous peat

Black/brown saturated amorphous plastic peat with layers of fibrous peat and concentrations of stems and wood

Sand and coarse gravel

Firm to stiff brown silty sandy clay till with fine to medium gravel

| | |
|---|---|
| 0 | |
| 1 | 9.36x10⁻⁷ |
| 2 | 2.13x10⁻⁴ |
| S.L 3 | 8.93x10⁻⁵ |
| | 4.23x10⁻⁵ |
| 4 | 1.45x10⁻⁶ |
| 5 | 2.79x10⁻⁵ |
| 6 | |
| 7 | |
| 8 | 1.34x10⁻⁷ |
| 9 | 6.05x10⁻⁷ |
| 10 | |
| 11 | 8.52x10⁻⁸ |
| 12 | 2.40x10⁻⁷ |
| 13 | |
| 14 | |

| | |
|---|---|
| 32 | 13 |
| 51 | |
| 238 | 62 |
| 299 | 58 |
| 269 | 56 |
| 454 | 73 |
| 267 | 66 |
| sat | |
| sat | |
| 46/16 | |
| 23 | |
| 26/16 | |
| 13 | |
| 36/22 | |
| 19 | |
| 36/18 | |
| 19 | |
| 27 | |

DETAILS OF INSTALLATION: G.L., Grout, Gravel, Piezometer tip, 6.1m, Grout, Gravel

| GROUNDWATER | C | D | W | SL | DEPTH (m) | SO3 | pH |
|---|---|---|---|---|---|---|---|
| 5.11.82. | 4.5 | 5.7 | 5.7 | 2.9 After 20 minutes | | | |
| 5.11.82 pm | 7.0 | 7.0 | - | Nil Sealed of by liners | | | |
| 7.11.82 am | 7.0 | 7.0 | - | Nil Sealed of by liners | | | |
| 8.11.82 am | 9.0 | 15.0 | - | 3.0 | | | |

For Grading, Compaction, Consolidation & Triaxial Curves See attached sheets

BORING

BH commenced 5.11.82 Casing size 200mm Shell & Auger Boring Rotary Flush Boring Rotary Flush Coring

BH completed 8.11.82 Cased to 9.0m From 0.0 To 18.0m From To From To

H. & T./S.S./053/1/11

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**SJ47SW180**

STRATA SURVEYS LTD.,
Telephone: 0606 84 4637 Fax: 0606 84 6657

Borehole Number : 5A
Sheet 1 of 1.

Job Number : 6104 Location : Golf Course, Northop
Client : B.M.P.

Dia. & Drilling Methods light cable percussion 150mm diameter

325471
367959

| Description of Strata | Red. Level | Legend | Thick -ness | Depth m | Sample Depths | Sample Types | N Value | Cu | ø | Water Level | Pie -zo | Daily Prog. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 98.00 | | | 0.00 | | | | | | | | |
| TOPSOIL | 97.80 | | (0.20) | 0.20 | | | | | | | | |
| Soft to firm brown soily CLAY | 97.30 | | (0.50) | 0.70 | | | | | | | | |
| Firm grey/brown very silty CLAY | | | (1.70) | | | | | | | | | |
| | 95.60 | | | 2.40 | | | | | | | | |
| Brown damp clayey medium SAND and GRAVEL | 95.30 | | (0.30) | 2.70 | | | | | | | | |
| Firm to stiff brown gravelly CLAY. (Boulder Clay) | | | (0.80) | | | | | | | ▽ tsl | | |
| | 94.50 | | | 3.50 | | | | | | | | |
| Stiff brown gravelly CLAY. (Boulder Clay) | | | (0.90) | | | | | | | | | |
| | 93.60 | | | 4.40 | | | | | | ▼ | | |
| Brown wet clayey medium SAND AND GRAVEL. | | | (0.40) | | | | | | | | | |
| | 93.20 | | | 4.80 | | | | | | | | |
| Fine to coarse SAND and GRAVEL. Blowing slightly. | | | (0.70) | | | | | | | | | |
| | 92.50 | | | 5.50 | | | | | | | | 30/8 |
| Borehole Completed | | | | | | | | | | | | |

General Remarks :
Water struck at 4.4m rising to 3.2m after 20 minutes. 3 hours to conduct falling head test. Blowing back slightly at 4.8m.
Drillers descriptions only.

Dates : 30/8/91
Driller : T.A.M.
Engineer: A.M.

**SJ26NE1464**

## Osiris Seaway Ltd
SITE INVESTIGATION DIVISION

TRIAL PIT No. 8
REPORT No. D86136

LOCATION A55, GATEWAY SERVICES, CLWYD
Client SHELL UK OIL LIMITED

Ground Level 93.58m O.D.
Coordinates 327759 366850

Method/Dimensions of Pit
Excavated using a backacting JCB 3CX with 0.8m bucket to a depth of 2.70m.

Pit Commenced 1/7/86
Pit Completed 1/7/86

Ground Water observations are given at end of log

Remarks
No water encountered.
Pit walls stable.

Scale 1: 25

| Description of Strata | Depth (m) | Reduced Level | Legend | Ref. No. | Type | Depth (m) From | Depth (m) To | Field Notes |
|---|---|---|---|---|---|---|---|---|
| Dark brown organic clayey silty SAND with rootlets (TOPSOIL). | 0.30 | 93.28 | | | | | | |
| Firm to stiff orange brown gravelly very sandy silty CLAY. | | | | 1 | CBR | 0.35 | 0.60 | |
| | | | | 2 | D | 0.60 | | |
| Red brown f.m. SAND. | 1.10 | 92.48 | | 3 | CBR | 1.15 | 1.40 | |
| | 1.40 | 92.18 | | 4 | D | 1.40 | | |
| Stiff dark brown sandy silty CLAY with gravel and cobbles of sandstone and siltstone. | | | | 5 | B | 2.00 | | |
| | 2.70 | 90.88 | | | | | | |

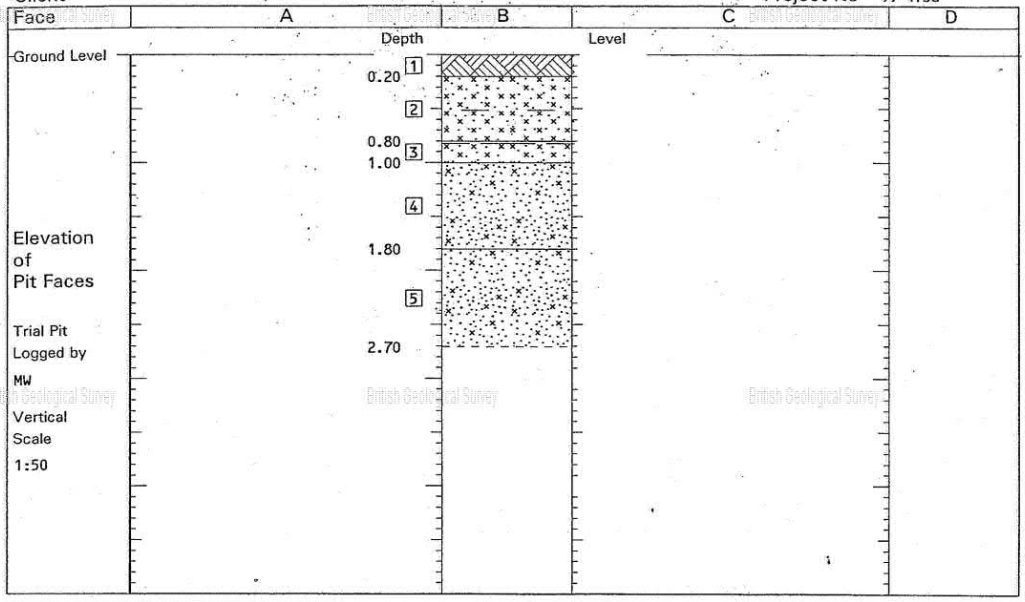
Key: **SAMPLES:** U=Undisturbed. B=Bulk Disturbed. D=Disturbed. P=Piston. W=Water.
Inclination of U Sample from vertical given in Notes. R=Refer to text or explanatory data sheet.
CBR=Undisturbed California Bearing Ratio Test sample.
f = fine. m = medium. c = coarse.

**SJ26NE1483**

# TRIAL PIT RECORD

Project CHESTER ROAD EAST | Engineer VERYARDS LTD. | Trial Pit TP15 | Coordinates

Client | Project No 99-1738




| Samples and Tests | | | Strata | | | |
|---|---|---|---|---|---|---|
| Depth | Type | Strength kN/m2 | Face B Depth | Stratum Number | Description | Geological Classification |
| | | | 0.20 | 1 | Grass over dark brown sandy silty clayey TOPSOIL with rootlets | |
| 0.40 | B | | 0.80 | 2 | Firm brown clayey fine sandy SILT with occasional rootlets. Occasional pockets, <90mm, of sandy silty clay. | |
| 0.90<br>0.90 | JV<br>V | 50,58<br>62.0 | 1.00 | 3 | Firm grey mottled orange-brown very clayey fine sandy SILT. | |
| 1.20 | B | | 1.80 | 4 | Pale brown silty fine and medium SAND. Locally slightly clayey. | |
| 2.00 | B | | 2.70 | 5 | Brownish-grey silty fine and medium SAND with occasional shells and shell fragments | |

| Excavation | | | | Dimensions | Groundwater |
|---|---|---|---|---|---|
| Date Excavated | 06/12/99 | Date Backfilled | 06/12/99 | B = 0.60<br>A C = 2.40<br>D | 1.50m Damp<br>2.30m Seepage |
| Plant | JCB 3CX | | | | |
| Shoring | NONE | | | | |
| Stability | | | | | |

Remarks Pit sides collapsing below 0.9m.

geotechnics

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.

**SJ36NW604**

## BOREHOLE RECORD - Cable Percussion

Sheet 1 of 2

Project M56 Junction 14 Drainage Remedial Work  Engineer Atkins  **Borehole BH101**

Coordinates E346481.25 N274647. National Grid

Client Highways Agency  Project No PN030329

| Sampling | | | | Properties | | | Strata | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample Type | Depth Cased | Depth to Water | Strength kN/m² | W % | SPT N | Description | Depth | Legend | Level OD |
| | | | | | | | | G.L. | | 7.96 |
| 0.30 | J | | | | | | MADE GROUND: Firm brown slightly sandy clayey topsoil wiht many rootlets. | 0.30 | | 7.66 |
| 0.50 - 1.00 | B | | | | | | Firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium. | | | |
| 1.20 - 1.65 | U(28) | | | | | | | | | |
| 1.70 | J | | | | | | | | | |
| 2.00 - 2.45 | SJB | | | | | 15 | From 2.00m occasional shell fragments. | | | |
| 2.50 | J | | | | | | Firm brown locally thinly laminated CLAY/SILT wth occasional bands of fine brown sand. | 2.50 | | 5.46 |
| 3.00 - 3.45 | U(93) | | | | | | | | | |
| 3.50 | J | | | | | | | 3.50 | | 4.46 |
| | | | | | | | Medium dense brown slightly silty slightly gravelly fine to medium SAND. Gravel is subrounded and fine. | | | |
| 4.00 - 4.45 | SJB | 3.00 | 3.80 | | | 35 | | | | |
| 5.00 - 5.45 | SJB | 4.50 | 1.00 | | | 16 | | | | |
| 6.00 - 6.45 | SJB | 6.00 | 2.00 | | | 17 | From 6.00m some coarse sand. | | | |
| 7.50 - 7.95 | SJB | 7.50 | 1.50 | | | 27 | | 8.00 | | -.04 |

| Boring | | | | Progress | | | | Groundwater | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Dia | Technique | Crew | Depth of Hole | Depth Cased | Depth to Water | am (A) pm (P) Date | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 1.20 | 500x500 | Inspection Pit | AW | Start 0.00 | | | 20/02/04 | 4.00 | 3.00 | 3.80 | | Slow inflow |
| 12.50 | 150 | Cable Percussion | AW | 12.50 End | 12.00 | 3.00 | A20/02/04 P20/02/04 20/02/04 | | | | | |

Remarks Inspection pit excavated to 1.20m. 19mm piezometer installed tip at 4.00m, seal 12.50-4.50m, filter 4.50-3.50m, seal 3.50-2.50m, concrete 0.50m-GL, flush cover fitted.

geotechnics

Logged by: AG  Symbols and abbreviations are explained on the accompanying key.  All linear dimensions are in metres.  Scale: 1:50

**SJ47SE56**

## BOREHOLE RECORD - Cable Percussion

Sheet 1 of 2

Project M56 Junction 14 Drainage Remedial Work  Engineer Atkins  **Borehole BH102**

Coordinates E346372.52 N374636. National Grid

Client Highways Agency  Project No PN030329

| Sampling | | | | Properties | | | Strata | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample Type | Depth Cased | Depth to Water | Strength kN/m² | W % | SPT N | Description | Depth | Legend | Level OD |
| | | | | | | | MADE GROUND: Tarmac. | G.L. | | 7.92 |
| 0.30 | J | | | | | | | 0.30 | | 7.62 |
| 0.50 - 1.00 | B | | | | | | MADE GROUND: Grey locally red brown very sandy gravel. Gravel is subangular to subrounded fine to coarse including sandstone. (SUB-BASE). | 0.80 | | 7.12 |
| 1.00 | J | | | | | | MADE GROUND: Red brown very sandy gravel. Gravel is subangular to subrounded fine to coarse of sandstone (SUB-BASE). | | | |
| 1.20 - 1.65 | SJB | | | | | 8 | | | | |
| 2.00 - 2.45 | SJB | 1.50 | | | | 19 | Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium. | 2.20 | | 5.72 |
| 2.50 | J | | | | | | | | | |
| 3.00 - 3.45 | U(100) | 3.00 | DRY | | | | | | | |
| 3.50 | J | | | | | | Medium dense brown slightly clayey fine to medium SAND. | 3.50 | | 4.42 |
| 4.00 - 4.45 | SJB | 4.00 | 2.50 | | | 13 | | | | |
| 5.00 - 5.45 | SJB | 4.50 | 3.00 | | | 40 | Dense brown slightly silty gravelly fine to medium SAND. Gravel is subangular and fine. | 5.00 | | 2.92 |
| 6.00 - 6.45 | SJB | 6.00 | 3.50 | | | 20 | Medium dense brown slightly gravelly fine to medium SAND. Gravel is subanglar to subrounded fine to medium. Occasional shell fragments. | 6.00 | | 1.92 |
| 7.50 - 7.95 | SJB | 7.50 | 1.80 | | | 20 | | | | |
| | | | | | | | | 8.00 | | -.08 |

| Boring | | | | Progress | | | | Groundwater | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Dia | Technique | Crew | Depth of Hole | Depth Cased | Depth to Water | am (A) pm (P) Date | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 1.20 | 500x500 | Inspection Pit | AW | Start 0.00 | | | 13/02/04 | 3.50 | 3.00 | 2.50 | | Fast inflow |
| 12.00 | 150 | Cable Percussion | AW | 12.00 | 11.50 | 2.00 | P13/02/04 | | | | | |
| | | | | End | | | A14/02/04 | | | | | |
| | | | | | | | 14/02/04 | | | | | |

Remarks Inspection pit excavated to 1.20m. 19mm piezometer installed tip at 5.00m, seal 12.00-6.00m, filter 6.00-4.00m, seal 4.00-3.00m, backfill 3.00-0.50m, tarmac 0.50m-GL, flush cover fitted.

geotechnics

Logged by: AG  Symbols and abbreviations are explained on the accompanying key.  All linear dimensions are in metres.  Scale: 1:50

**SJ47SE57**

## BOREHOLE RECORD - Cable Percussion

Sheet 1 of 2

Project M56 Junction 14 Drainage Remedial Work | Engineer Atkins | Borehole BH103

Coordinates E346473.80 N374695. National Grid

Client Highways Agency | Project No PN030329

### Sampling

| Depth | Sample Type | Depth Cased | Depth to Water |
|---|---|---|---|
| 0.30 | J | | |
| 0.50 - 1.00 | B | | |
| 1.20 - 1.65 | SJB | | |
| 2.00 - 2.45 | U(47) | 1.50 | |
| 2.50 | J | | |
| 3.00 - 3.45 | SJB | 3.00 | |
| 4.00 - 4.45 | U(100) | 3.00 | |
| 4.50 | J | | |
| 5.00 - 5.45 | SJB | 4.50 | 4.00 |
| 6.00 - 6.45 | SJB | 6.00 | 2.00 |
| 7.50 - 7.95 | SJB | 3.50 | |

### Properties

| Strength kN/m² | W % | SPT N |
|---|---|---|
| | | 12 |
| | | 24 |
| | | 17 |
| | | 11 |
| | | 17 |

### Strata

| Description | Depth | Legend | Level OD |
|---|---|---|---|
| | G.L. | | 8.09 |
| MADE GROUND: Soft brown clayey topsoil with many rootlets. | 0.30 | | 7.79 |
| Firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded and fine. | | | |
| From 2.50m occasional fissures with grey silt infill. | 3.00 | | 5.09 |
| Medium dense orange brown fine to medium SAND. | 3.20 | | 4.89 |
| Firm to stiff brown very sandy CLAY. | | | |
| Medium dense brown silty fine to medium SAND with occasional shell fragments. | 4.50 | | 3.59 |
| | 8.00 | | .09 |

### Boring

| Depth | Dia | Technique | Crew |
|---|---|---|---|
| 1.20 | 500x500 | Inspection Pit | AW |
| 12.50 | 150 | Cable Percussion | AW |

### Progress

| Depth of Hole | Depth Cased | Depth to Water | am (A) pm (P) Date |
|---|---|---|---|
| Start 0.00 | | | 18/02/04 |
| 12.50 End | 12.00 | 3.00 | A18/02/04 P18/02/04 |
| | | | 18/02/04 |

### Groundwater

| Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
|---|---|---|---|---|
| 4.50 | 4.50 | 4.00 | | Slow inflow |

Remarks: Inspection pit excavated to 1.20m. 19mm piezometer installed tip at 6.00m, seal 12.50-6.50m, filter 6.50-4.50m, seal 4.50-3.50m, backfill 3.50m-GL, tarmac 0.50m-GL, flush cover fitted.

geotechnics

Logged by: AG

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.

Scale: 1:50

**SJ47SE58**

## BOREHOLE RECORD - Cable Percussion

Sheet 1 of 2

Project M56 Junction 14 Drainage Remedial Work | Engineer Atkins | **Borehole BH104**

Coordinates E346528.29 N374720. National Grid

Client Highways Agency | Project No PN030329

### Sampling / Properties / Strata

| Depth | Sample Type | Depth Cased | Depth to Water | Strength kN/m² | W % | SPT N | Description | Depth | Legend | Level OD |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | G.L. | | 7.59 |
| 0.20 | J | | | | | | MADE GROUND: Topsoil. (**) | 0.20 | | 7.39 |
| 0.50 - 1.00 | B | | | | | | Firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium. Occasional shell fragments. | | | |
| 1.20 - 1.65 | SJB | | | | | 10 | | | | |
| 2.00 - 2.45 | U(40) | 1.50 | | | | | | | | |
| 2.50 | J | | | | | | | | | |
| 3.00 - 3.45 | SJB | 3.00 | | | | 22 | From 3.00m becoming stiff. | | | |
| 4.00 - 4.45 | U(50) | | | | | | | | | |
| 4.50 | J | | | | | | | | | |
| 5.00 - 5.45 | SJB | 4.50 | | | | 16 | From 5.00m occasional lenses of orange brown fine to medium sand. | | | |
| | | | | | | | | 6.00 | | 1.59 |
| 6.00 - 6.45 | SJB | 6.00 | 5.70 | | | 14 | Firm brown sandy CLAY with many lenses/bands of orange brown sand. | | | |
| 7.00 | J | | | | | | | 7.00 | | 0.59 |
| | | | | | | | Very soft to soft grey locally black slightly sandy CLAY. | | | |
| 7.50 - 7.95 | U(100) | 7.50 | DRY | | | | | 7.40 | | 0.19 |
| | | | | | | | Firm to stiff brown sandy CLAY. | | | |
| 8.00 | J | | | | | | | 8.00 | | -.41 |

### Boring / Progress / Groundwater

| Boring Depth | Dia | Technique | Crew | Progress Depth of Hole | Depth Cased | Depth to Water | am (A) pm (P) Date | Groundwater Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.20 | 500x500 | Inspection Pit | AW | Start 0.00 | | | 19/02/04 | 6.00 | 6.00 | 5.70 | 7.50 | Slow inflow |
| 11.00 | 150 | Cable Percussion | AW | 11.00 End | 10.50 | 3.00 | A19/02/04 P19/02/04 19/02/04 | 8.50 | 7.50 | 7.50 | 7.50 | Slow inflow |

Remarks: Inspection pit excavated to 1.20m. 19mm piezometer installed tip at 6.50m, seal 11.00-7.00m, filter 7.00-5.00m, seal 5.00-4.00m, backfill 4.00-0.50m, concrete 0.50m-GL, flush cover fitted. (**denotes drillers description).

geotechnics

Logged by: AG | Symbols and abbreviations are explained on the accompanying key. | All linear dimensions are in metres. | Scale: 1:50

**SJ47SE59**

## BOREHOLE RECORD - Cable Percussion

Sheet 1 of 2

Project M56 Junction 14 Drainage Remedial Work | Engineer Atkins | Borehole BH105

Coordinates E346609.25 N374757. National Grid

Client Highways Agency | Project No PN030329

| Sampling | | | | Properties | | | Strata | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Sample Type | Depth Cased | Depth to Water | Strength kN/m² | W % | SPT N | Description | Depth | Legend | Level OD |
| | | | | | | | | G.L. | | 6.98 |
| 0.20 | J | | | | | | MADE GROUND: Tarmac. | 0.10 | | 6.88 |
| 0.50 - 1.00 | B | | | | | | MADE GROUND: Grey brown gravel. Gravel is subangular fine to coarse including sandstone and concrete (SUB-BASE). | 0.50 | | 6.48 |
| | | | | | | | MADE GROUND: Red brown sandy gravel. Gravel is subangular fine to coarse of sandstone (SUB-BASE). | 0.90 | | 6.08 |
| 1.50 | J | | | | | | Firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded and fine. Occasional lenses of orange brown fine sand. | | | |
| 1.50 - 1.95 | SJB | 1.50 | | | | 9 | | | | |
| 2.50 - 2.95 | U(51) | 1.50 | | | | | | | | |
| 3.00 | J | | | | | | | | | |
| 3.50 - 3.95 | SJB | 3.00 | | | | 16 | At 3.50m locally stiff and thinly laminated. | | | |
| 4.50 - 4.95 | U(40) | 4.50 | | | | | | | | |
| 5.00 | J | | | | | | | | | |
| 5.50 - 5.95 | SJB | 4.50 | | | | 13 | | | | |
| 6.50 - 6.95 | U(49) | 6.00 | | | | | | | | |
| 7.00 | J | | | | | | From 7.00m becoming very gravelly. | | | |
| | | | | | | | | 7.50 | | -0.52 |
| 7.50 - 7.95 | SJB | 7.50 | | | | 27 | Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium. Occasional shell fragments. | | | |
| | | | | | | | | 8.00 | | -1.02 |

| Boring | | | | Progress | | | | Groundwater | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Dia | Technique | Crew | Depth of Hole | Depth Cased | Depth to Water | am (A) pm (P) Date | Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
| 1.20<br>12.50 | 500x500<br>150 | Inspection Pit<br>Cable Percussion | AW<br>AW | Start 0.00<br>12.50 End | 12.00 | 3.00 | 14/02/04<br>P14/02/04<br>A15/02/04<br>15/02/04 | 9.00 | 9.00 | 7.50 | | Fast inflow |

Remarks: Inspection pit excavated to 1.20m. 19mm piezometer installed at 10.50m, filter 12.50-9.00m, seal 9.00-8.00m, backfill 8.00-0.50m, tarmac 0.50m-GL, flush cover fitted.

geotechnics

Logged by: AG | Symbols and abbreviations are explained on the accompanying key. | All linear dimensions are in metres. | Scale: 1:50

**SJ47SE60**

## BOREHOLE RECORD - Cable Percussion

Sheet 1 of 2

Project M56 Junction 14 Drainage Remedial Work | Engineer Atkins | **Borehole BH106**

Coordinates E346661.68 N374785. National Grid

Client Highways Agency | Project No PN030329

### Sampling

| Depth | Sample Type | Depth Cased | Depth to Water |
|---|---|---|---|
| 0.30 | J | | |
| 0.50 - 1.00 | B | | |
| 1.00 | J | | |
| 1.50 - 1.95 | U(20) | 1.50 | |
| 1.50 - 2.00 | B | | |
| 2.50 - 2.95 | SJB | 1.50 | |
| 3.50 - 3.95 | U(51) | 3.00 | |
| 4.00 | J | | |
| 4.50 - 4.95 | SJB | 4.50 | |
| 5.50 - 5.95 | U(63) | 4.50 | |
| 6.00 | J | | |
| 6.50 - 6.95 | SJB | 6.00 | |
| 7.50 - 7.95 | U(71) | 7.50 | |
| 8.00 | J | | |

### Properties

| Strength kN/m² | W % | SPT N |
|---|---|---|
| | | 16 |
| | | 21 |
| | | 18 |

### Strata

| Description | Depth | Legend | Level OD |
|---|---|---|---|
| | G.L. | | 6.88 |
| MADE GROUND: Tarmac. | 0.20 | | 6.68 |
| MADE GROUND: Grey locally black gravel. Gravel is subangular fine to coarse (SUB-BASE). | 0.60 | | 6.28 |
| MADE GROUND: Grey locally red brown gravel. Gravel is subangular fine to coarse of sandstone (SUB-BASE). | 1.00 | | 5.88 |
| Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded and fine. Occasional shell fragments. | | | |
| From 2.50m occasional lenses of orange brown fine sand. | | | |
| | 4.50 | | 2.38 |
| Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium | | | |
| | 6.00 | | 0.88 |
| Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium. | | | |
| | 8.00 | | -1.12 |

### Boring

| Depth | Dia | Technique | Crew |
|---|---|---|---|
| 1.20 | 500x500 | Inspection Pit | AW |
| 12.50 | 150 | Cable Percussion | AW |

### Progress

| Depth of Hole | Depth Cased | Depth to Water | am (A) pm (P) | Date |
|---|---|---|---|---|
| Start 0.00 | | | | 16/02/04 |
| 12.50 End | 12.00 | DRY | A | 16/02/04 |
| | | | P | 16/02/04 |
| | | | | 16/02/04 |

### Groundwater

| Depth Struck | Depth Cased | Depth after 20 mins | Depth Sealed | Remarks on Groundwater |
|---|---|---|---|---|
| 11.00 | 10.50 | 4.90 | | Fast inflow |

**Remarks** Inspection pit excavated to 1.20m. 19mm piezometer installed tip at 11.50m, filter 12.50-11.00m, seal 11.00-10.00m, backfill 10.00-0.50m, tarmac 0.50m-Gl, flush cover fitted.

geotechnics

Logged by: AG

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.

Scale: 1:50

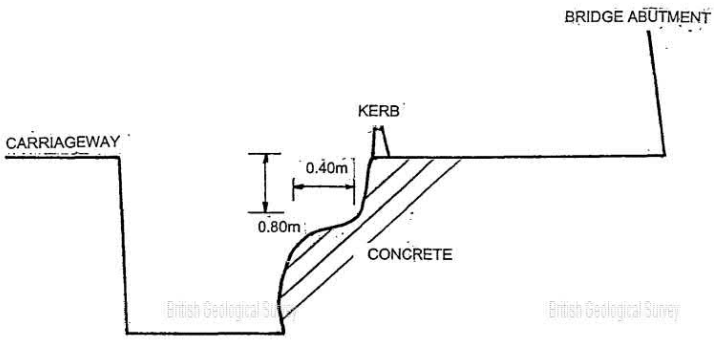
**SJ47SE61**

# TRIAL PIT RECORD

Project M56 Junction 14 Drainage Remedial Work  Engineer Atkins  **Trial Pit TP102**

Coordinates E346553.06 N374727. National Grid

Client Highways Agency  Project No PN030329

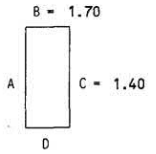



Trial Pit Logged by AG

| Samples and Tests | | | Strata | | | |
|---|---|---|---|---|---|---|
| Depth | Type | Strength kN/m2 | Face B Depth | Stratum Number | Description | Geological Classification |
| | | | 0.40 | 1 | MADE GROUND: Tarmac. | MADE GROUND |
| | | | 0.70 | 2 | MADE GROUND: Grey slightly sandy gravel. Gravel is angular to subangular fine to coarse. | SUB BASE |
| | | | 1.30 | 3 | MADE GROUND: Red brown slightly clayey slightly sandy gravel. Gravel is subangular fine to coarse. | SUB BASE |
| | | | 1.60 | 4 | Firm becoming stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded and fine. | |

| Excavation | | | |
|---|---|---|---|
| Date Excavated | 14/02/04 | Date Backfilled | 14/02/04 |
| Plant | JCB 3CX | | |
| Shoring | None | | |
| Stability | Stable | | |

Dimensions




Groundwater: None encountered

Remarks Concrete encountered at 0.80m depth, extending 0.40m into trial pit.

geotechnics

Symbols and abbreviations are explained on the accompanying key. All linear dimensions are in metres.

**SJ47SE63**

# Window Sampler Hole Log

Soil Mechanics

| | | | | | |
|---|---|---|---|---|---|
| Drilled RT<br>Logged DAS<br>Checked NH | Start 26/03/2010<br>End 26/03/2010 | Equipment, Methods and Remarks<br>Competitor 130<br>Hand Dug Inspection Pit to 1.20m. Windowless Sampling to 5.00m. | Depth from | to | Diameter / Casing Depth |
| | | | | | |

Ground Level +4.70 mOD
Coordinates E 347294.54
National Grid N 376030.83
Chainage

| Samples and Tests | | | | | Strata | | | |
|---|---|---|---|---|---|---|---|---|
| Depth | Type & No | Records | Date Casing | Time Water | Description | Depth, Level (Thickness) | Legend | Backfill/ Instruments |
| | | | | | Grass onto dark brown slightly sandy clayey TOPSOIL. | 0.20 +4.50 | | |
| | | | | | Firm brown mottled grey orange and red slightly sandy CLAY with occasional pockets (50mm) of fine sand. | (0.70) | | |
| | | | | | Firm grey mottled orange brown slightly sandy silty CLAY. Sand is fine. | 0.90 +3.80 | | |
| | | | | | 1.50 m Becoming grey | (1.05) | | |
| | | | | | Firm spongy black and red brown fibrous PEAT with frequent wood fragments. Strong organic odour. | 1.95 +2.75 | | |
| | | | | | | (3.05) | | |
| | | | | | EXPLORATORY HOLE ENDS AT 5.00 m | 5.00 -0.30 | | SP |

| Depth | Type & No | Records | Date Casing | Time Water |
|---|---|---|---|---|

Groundwater Entries

| No. | Struck (m) | Post strike behaviour |
|---|---|---|
| 1 | 3.00 | - |

Depth sealed (m) -

Depth Related Remarks *
From to (m)

Chiselling Depths (m) Time Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1:50
(c) ESGL www.esgl.co.uk 408.24 26/08/2010 12:19:18

Project Ince Marshes
Project No. F0604-10
Carried out for Entec UK Ltd

Borehole DP2
Sheet 1 of 1

**SJ47NE96**

# DRILLING LOG

LOG NUMBER 3 271

**DRAGON DRILLING (WATER & ENERGY) LIMITED**
**BRICKFIELD LANE**
**RUTHIN**
**LL15 2TN**
**TEL: 01824 707777**

SITE: CH2 4BW JOB REFERENCE: 538 SITE BH NUMBER: 1 BGS No: SN15/312 GRID REF: SJ41447128 DATE: 25/11/2015

| OPERATION | SIZE (MM) | FROM DEPTH (M) | TO DEPTH (M) | TOTAL |
|---|---|---|---|---|
| Set up | | | | 1 |
| | | | | |
| Symmetrix drilling | 198 | GL | 3 | 3 |
| | | | | |
| Open hole drilling | 168 | 3 | 30 | 27 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

| DEPTH (M) | DESCRIPTION |
|---|---|
| 0 - 3 | Sandy soil |
| 3 - 30 | Sandstone |
| | |
| | Water strike 12m |
| | Water Strike 20m |
| | |
| | |
| | |
| | |
| | |

| PREDICTED DEPTH (M) | ACTUAL DEPTH (M) | WATER STRIKE (MBGL) | LITRES PER MINUTE | SLOTTED (M) | PLAIN (M) | END CAP | STONE (MBGL) | BENTONITE (MBGL) |
|---|---|---|---|---|---|---|---|---|
| 30 | 30 | 12 + 20 | 50 | 21 | 9 | Ycs | 6 - 30 | GL - 6 |

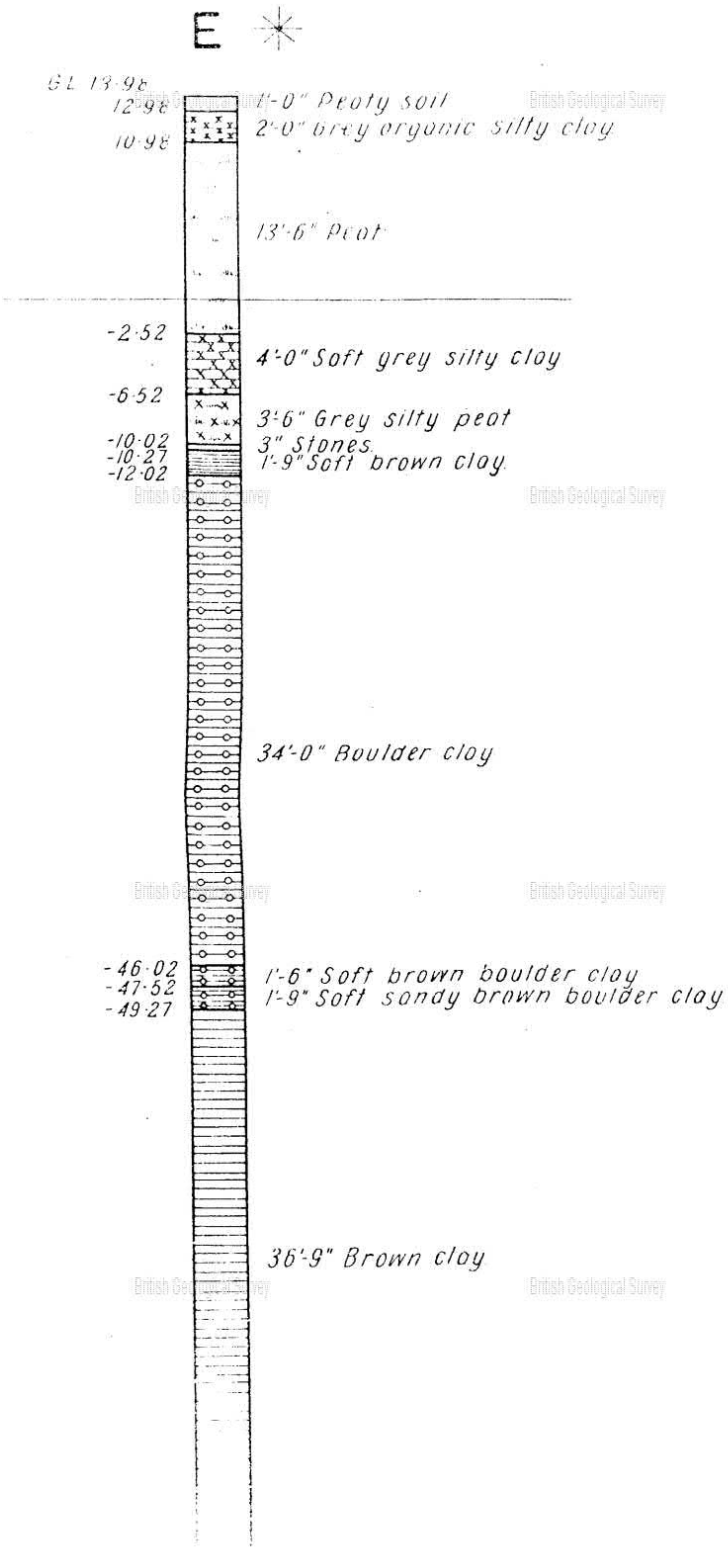
| MATERIAL & DEPTH (M) |
|---|
| |
| Solid casing 113mm GL - 9 |
| Bentonite GL – 6 |
| Slotted 113mm casing 9 - 30 |
| 6mm gravel 6 - 30 |

DRILLING FOR: Domestic water supply

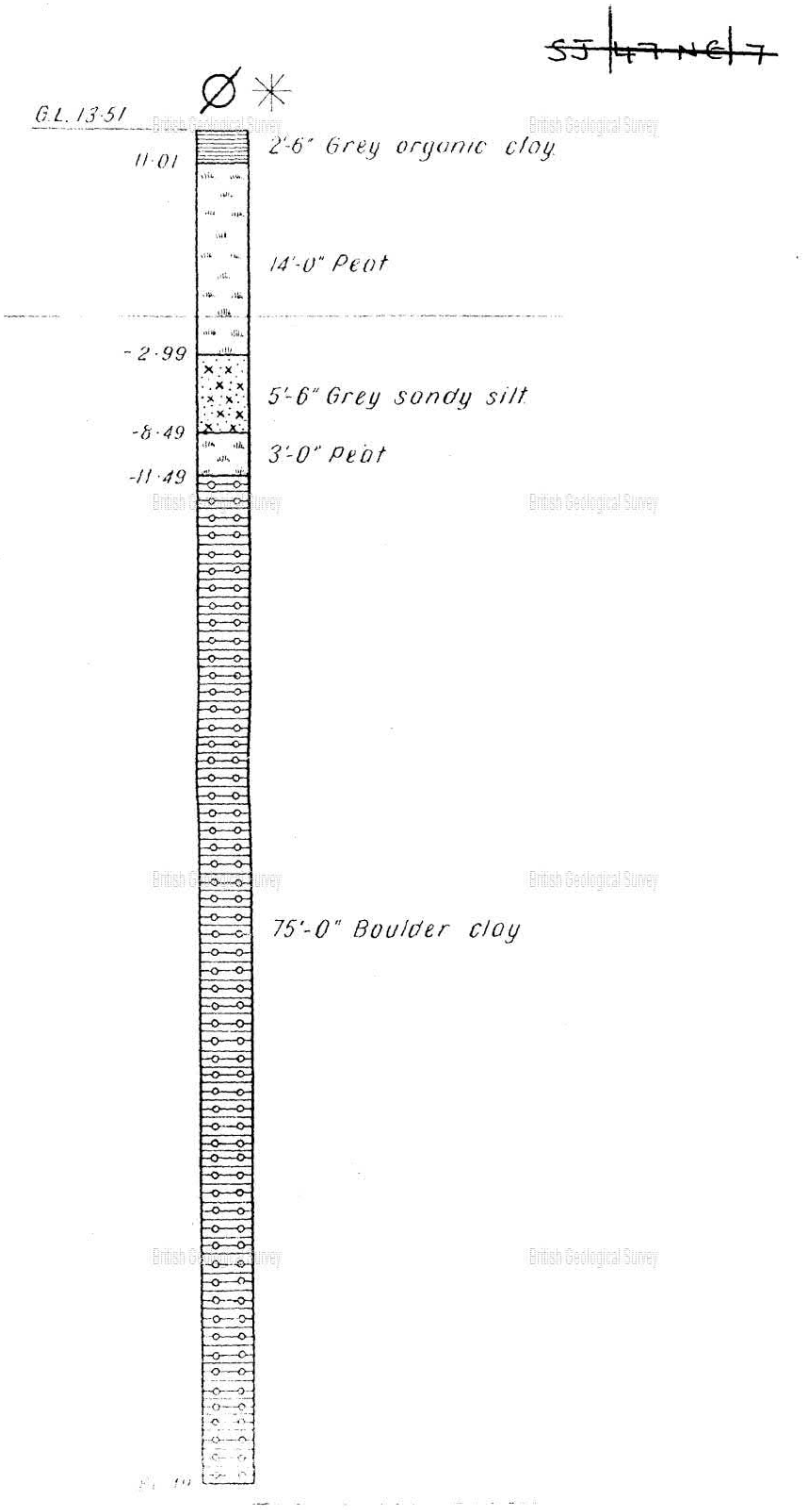
NAME: MARK BATHO (LEAD DRILLER)

**SJ47SW303**

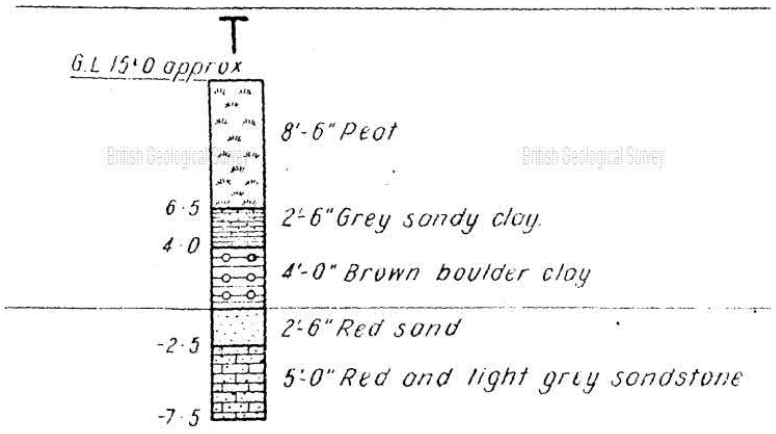
~~SJ47NE/7~~



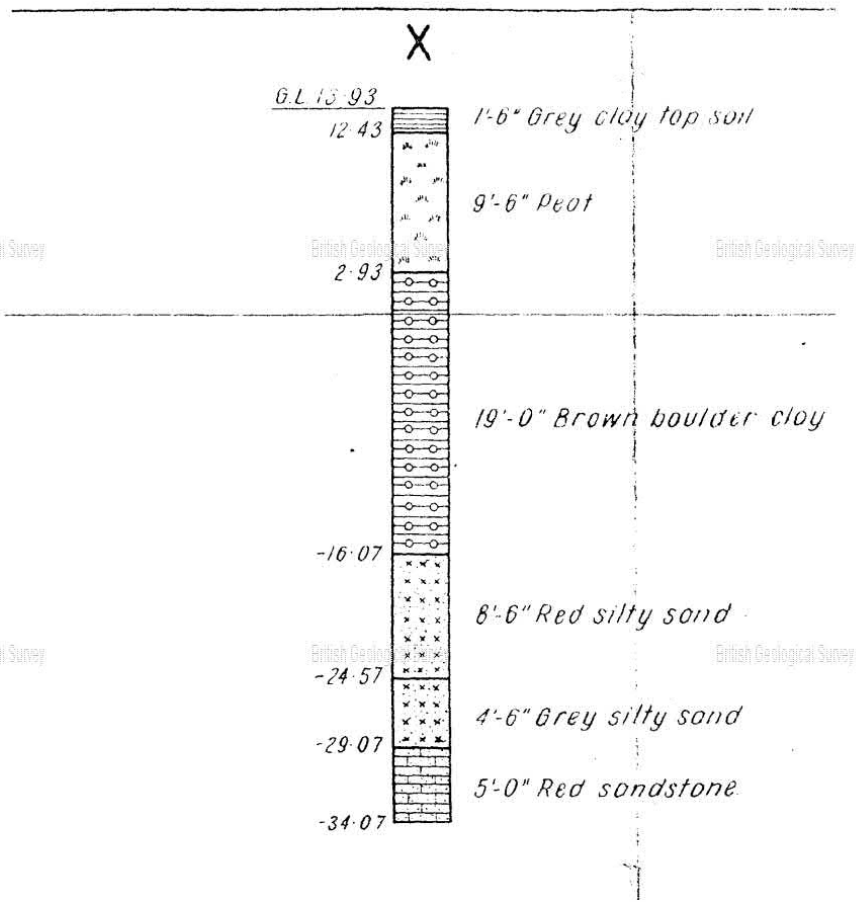

# SJ47NE105




**SJ47NE119**




**SJ47NE124**




**SJ47NE128**

## APPENDIX B – SUMMARY DATA OF GATHERED BOREHOLES

The following tables summarize the borehole data obtained from the interpretation of their logs, as collected from the BGS website (Appendix A).

**Id:** working identifier colored according to the availability of water-table elevation data (cyan: yes, yellow no data, thus, likely but not sure, dry well).

**BGS_ref** and **BGS_id**: two codes identifying the borehole according to BGS identifiers.

**Chainage**: distance in meters from the starting point

**Elevation**: ground elevation a.s.l. of the borehole read on the 10 m DTM and verified on the 2 m DSM.

**Easting**, **Northing**: coordinates according to the British National Datum and Grid (OSGB 1936, EPSG 27700) They have been obtained by georeferencing each borehole in the GIS, so they do not necessarily correspond to official coordinates in the BGS database. The expected difference should be within a meter or so.

**Depth**: bottom depth of the boring, converted in meters if given in yards or feet.

**Abs depth**: elevation a.s.l. (ground elevation minus total depth)

**Water level**: depth in meters of the water-table, where provided.

**Litho/depth** (1 to 4): up to four stratigraphic/lithologic units (description and depth), as interpretable in the log.

**Bedrock true depth**: absolute elevation with respect to mean sea level.

**Distance**: shortest distance in meters of the borehole from the pipeline route.

**Bearing**: direction of the shortest path to go from the pipeline route to the borehole.

presence of water in the BH

dry BH or no data

| ROUTE OPTION 5A | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| id | BGS_ref | BGS_id | Chainage | Elevation (from DTM) | Easting | Northing | Depth | Abs depth | Water level (depth) | litho1 | depth1 | litho2 | depth2 | litho3 | depth3 | litho4 | depth4 | bedrock true depth | Distance (from pipeline) | Bearing (toward borehole) |
| 1 | SJ47NW25 | 163383 | 1045 | 17.5 | 344991.3433 | 375512.499 | 152.40 | -134.90 | 10? | red stony clay | 1.52 | fine to coarse even grained sandstone with scattered quarzite pebbles | 152.40 | | | | | 15.98 | 94.00 | W |
| 72 | SJ47NW24 | 163382 | 1650 | 11.2 | 344690.6495 | 375020.234 | 152.40 | -141.20 | 14.50 | drift | 1.52 | hard sandstone with quarzite pebbles (first pebbles at 60.96, very abundant from 91.44) | 152.40 | | | | | 9.68 | 440.00 | WSW |
| 2 | SJ47SE18 | 163547 | 1850 | 11.8 | 345201.5974 | 374581.7104 | 2.20 | 9.60 | | very stiff slightly sandy clay with some gravel and sand | 2.20 | | | | | \ | | | 220.00 | SE |
| 3 | SJ47SW118 | 163698 | 2600 | 14.4 | 344390.7111 | 374311.8905 | 2.50 | 11.90 | | very stiff lightly sandy clay, with a little fine to coarse gravel | 2.50 | | | | | | | | 75.00 | W |
| 4 | SJ47SW14 | 163588 | 2790 | 11.6 | 344270.8821 | 374081.1917 | 152.40 | -140.80 | 11.70 | brown clay (soil?) | 0.76 | sandstone with marl beds below 33.5 m | 152.40 | | | | | 10.84 | 230.00 | W |
| 5 | SJ47SW135 | 163715 | 3450 | 11.5 | 344715.7365 | 373545.7144 | 4.00 | 7.50 | | stiff fissured sandy clay, with occasional gravel and sand (glacial till) | 3.20 | dense fine to medium sand wth some clay (completely weathered Bunter Sandstone) | 3.70 | weak poorly cemented Bunter Sandstone | 4.00 | | | 7.80 | 44.00 | NE |
| 6 | SJ47SW134 | 163714 | 3840 | 11.7 | 344549.8044 | 373447.9739 | 7.50 | 4.20 | 8.30 | made groud, silty fine to medium sand | 1.50 | soft clay with some coarse sand (glacio-lacustrine, down to 2.0m), and firm to stiff sandy clay with some gravel (glacial till, down to 7.50m) | 7.50 | sandy to coarse gravel with some cobbles | 8.50 | weak, weathered, sandstone Bunter Sandstone? | 9.00 | 3.20 | 93.00 | NNW |
| 7 | SJ47SW16 | 163590 | 3945 | 6.8 | 344489.6037 | 373282.5975 | 125.00 | -118.20 | 4.10 | Brown sand | 1.07 | Clay, boulder clay, sandy clay with pebbles | 10.00 | Sandstone, red marl at 55 m and bh bottom | 125.00 | | | -3.20 | 28.00 | SE |
| 8 | SJ47SW133 | 163713 | 4745 | 6 | 343832.3917 | 373061.8972 | 8.00 | -2.00 | 3.60 | made soil, medium to coarse sand with occasional fine to medium gravel | 2.70 | medium dense coarse sand, with occasional laminated clay (fluvio-glacial) | 4.10 | stiff sandy clay (glacial till up to 5m) and firm clay with some sand and silt (glacio lacustrine up to 5.50) | 5.50 | very dense silty fine sand (fluvio-glacial) | 8.00 | | 54.00 | NNW |
| 9 | SJ47SW78 | 163658 | 5070 | 5 | 343449.7167 | 372899.3778 | 5.70 | -0.70 | 0.20 | very soft fibrous peat | 5.70 | | | | | | | | 143.00 | WNW |
| 10 | SJ47SW180 | 163760 | 5145 | 4.5 | 343680.9884 | 372761.3481 | 14.00 | -9.50 | 3.00 | organic sand and clayey peat | 1.70 | peat | 5.30 | sand and coarse gravel | 6.90 | firm to stiff silty sandy clay till with fine to medium gravel | 14.00 | | 117.00 | ESE |
| 11 | SJ47SW179 | 163759 | 5445 | 4.7 | 343580.1758 | 372412.1274 | 14.00 | -9.30 | 0.55 | silty clay and clayey sand | 1.00 | peat, locally fibrous and with localized broken shells | 4.20 | silty sand, stiff sandy clay with some gravel, firm silty clay, medium fine sand | 14.00 | | | | 158 | ESE |
| 12 | SJ47SW137 | 163717 | 5810 | 23.7 | 342629.801 | 371452.0888 | 8.00 | 15.70 | | very stiff slightly sandy clay, with some fine gravel and some organic speakling | 8.00 | | | | | | | | 111.00 | W |
| 13 | SJ47SW138 | 163718 | 5815 | 23.7 | 342600.0362 | 371452.5051 | 8.00 | 15.70 | | very stiff slightly sandy clay, with some coarse gravel | 4.00 | stiff clay with little fine gravel | 8.00 | | | | | | 141.00 | WNW |
| 14 | SJ47SW3 | 163577 | 7430 | 28.4 | 342200.235 | 371011.5379 | 19.81 | 8.59 | 14.30 | clay (5.94) and sand (6.89) | 6.89 | soft sandstone | 8.23 | clay | 11.58 | hard to mild sand | 19.81 | | 255.00 | SSW |
| 15 | SJ47SW141 | 163721 | 7500 | 24.4 | 342219.3732 | 371552.1031 | 9.45 | 14.95 | | made ground, with silty clay | 1.00 | stiff silty and sandy clay, with fine to coarse gravel | 3.00 | firm laminated silt (up to 5.40m), fine and medium gravel (up to 6m) and dense silty fine sand (down to 9.45) | 9.45 | | | | 280.00 | NNE |
| 16 | SJ47SW303 | 19916607 | 8200 | 14 | 341439.9027 | 371281.8384 | 30.00 | -16.00 | 20.00 | sandy soil | 3.00 | sandstone | 30.00 | | | | | 11.00 | 221.00 | SW |
| 17 | SJ37SE33 | 157192 | 9830 | 19.2 | 339954.9492 | 371123.9837 | 7.92 | 11.28 | | firm to stiff silty clay with some sand | 1.30 | dense, fine to medium sand | 7.92 | | | | | | 12.00 | NW |
| 18 | SJ37SE32 | 157191 | 9865 | 24.1 | 339896.8013 | 371164.4913 | 8.69 | 15.41 | | sand with occasional pieces of clay and gravel | 7.62 | weak to medium hard fine grained sandstone | 8.69 | | | | | 16.48 | 73.00 | NW |

| ROUTE OPTION 5A | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| id | BGS_ref | BGS_id | Chainage | Elevation (from DTM) | Easting | Northing | Depth | Abs depth | Water level (depth) | litho1 | depth1 | litho2 | depth2 | litho3 | depth3 | litho4 | depth4 | bedrock true depth | Distance (from pipeline) | Bearing (toward borehole) |
| 19 | SJ37SE34 | 157193 | 9880 | 10.2 | 339953.6251 | 370970.1868 | 6.55 | 3.65 | 9.00 | silty sandy clay, sand and some gravel | 2.29 | sand and sandstone gravel (weathered sandstone) | 4.57 | weak to medium hard fine grained sandstone | 6.55 | | | 7.91 | 128.00 | SE |
| 20 | SJ37SE6 | 157165 | 12230 | 31.3 | 337919.8198 | 370712.5014 | 106.68 | -75.38 | | boulder clay with sand and gravel pastings | 22.86 | soft Red Sandstone | 27.43 | hard Red Sandstone | 106.68 | | | 8.44 | 376.00 | NW |
| 21 | SJ36NE8 | 155885 | 15890 | 4.9 | 335700.1715 | 368401.5651 | 120.00 | -115.10 | rflowing at t | sand and clay | 60.00 | soft sandstone | 120.00 | | | | | -55.10 | 80.00 | ESE |
| | SJ36NE160 | 156037 | 16050 | 5.1 | 336316.2 | 367843.9 | 128.02 | -122.92 | | drift | 21.34 | sandstone | 128.02 | | | | | -16.24 | 879.00 | ESE |
| | SJ36NW6 | 156059 | 16430 | 4.3 | 334889.13 | 368272.01 | 421.00 | -416.70 | | sea sand | 13.11 | sand and gravel, boulder clay from 22.4 | 24.20 | Red sandstone, Upper coal measures | 421.00 | | | -19.90 | 548.00 | WNW |
| 22 | SJ36NW22 | 156075 | 16870 | 5.1 | 334839.599 | 367772.6947 | 91.44 | -86.34 | 2.40 | alluvial sands and gravels | 31.40 | clay, sandstones with marls pockets | 91.44 | | | | | -26.30 | 365.00 | NW |
| 23 | SJ36NW23 | 156076 | 17750 | 5.2 | 334400.2024 | 367102.3748 | 166.73 | -161.53 | | sand gravel and clay | 30.48 | stiff clay (30.48-53.64), sandy clay, sand and gravel | 117.35 | sandstone and marls | 166.73 | | | -112.15 | 400.00 | NW |
| 24 | SJ36NW29 | 156082 | 18170 | 5.4 | 334660.2541 | 366301.5386 | 51.82 | -46.42 | | sand gravel and clay | 50.90 | sand and sandstone | 51.82 | | | | | -45.50 | 332.00 | SE |
| 25 | SJ36NW13 | 156066 | 19670 | 4.9 | 333379.076 | 366701.5094 | 92.68 | -87.78 | | sandstone, siltstone and mudstone, with coal seams | 72.90 | Banded siltstone (Linstey), fireclay and dolerite boulders (Blue metal), hard | 92.68 | | | Old borehole Drift not differentiated | | 4.90 | 165.00 | NE |
| 26 | SJ36NW169 | 156292 | 19740 | 5 | 333310.167 | 366741.3404 | 166.42 | -161.42 | | sand and gravel | 47.55 | coal | 166.42 | | | Old borehole Drift not differentiated | | -42.55 | 141.00 | NE |
| 27 | SJ36NW398 | 156521 | 20290 | 5.3 | 332920.3255 | 367131.333 | 6.00 | -0.70 | 1.80 | firm sandy clay and clayey sand | 2.45 | soft clayey peat | 3.70 | silty clay and silty sand | 5.30 | stiff silty clay with pebbles | 6.00 | | 105.00 | ENE |
| 28 | SJ36NW397 | 156520 | 20300 | 5.5 | 332869.618 | 367171.7367 | 20.50 | -15.00 | 1.70 | clay and silt (firm to soft) | 3.00 | soft peat | 4.25 | silty and stoney clay, with silty sand | 8.50 | stiff silty clay with pebbles | 20.50 | | 175.00 | NE |
| 29 | SJ36NW266 | 156389 | 21060 | 5.3 | 332710.0649 | 367412.1358 | 9.30 | -4.00 | 3.00 | silt, clay and sand | 2.44 | Firm peat (2.44-3.20) and silty clay with band of peat | 5.79 | silty and stoney clay, (and sand and gravel 7.16-7.80) | 9.30 | | | | 67.00 | NE |
| 30 | SJ36NW604 | 15988283 | 21570 | 4.7 | 332260.803 | 367751.6876 | 2.70 | 2.00 | 2.30 | firm clayey fine sandy silt | 1.00 | silty fine and medium sand, with occasional shell fragments | 2.70 | | | | | | 201.00 | N |
| 31 | SJ36NW246 | 156369 | 22000 | 7.5 | 331820.2571 | 367531.669 | 11.10 | -3.60 | | stiff to very soft brown clay (with rock fragments 0.4-3.8 and 6.3-9.0) | 11.10 | | | | | | | | 153.00 | NW |
| 32 | SJ36NW475 | 156598 | 22195 | 13.5 | 331700.1905 | 367402.2719 | 7.92 | 5.58 | | drift | 7.92 | | | | | | | | 47.00 | N |
| 33 | SJ36NW19 | 156072 | 22230 | 14.5 | 331650.1567 | 367402.1445 | 71.53 | -57.03 | | alternation of fireclay, sandstone,black slag, metal and coal | 60.66 | alternation of fireclay, sandstone and purple metal | 71.53 | | | | | 14.50 | 60.00 | NW |
| 34 | SJ36NW215 | 156338 | 22820 | 30.3 | 331290.4718 | 366991.6174 | 92.35 | -62.05 | | coal | 92.35 | | | | | | | 30.30 | 99.00 | SE |
| 36 | SJ36NW45/33 | 156147 | 23820 | 52 | 330480.3228 | 367041.811 | 9.45 | 42.55 | | clay with sand layers. Boulder clay at bottom | 9.45 | | | | | | | | 116.00 | NE |
| 35 | SJ36NW45/31 | 156145 | 23840 | 53.4 | 330450.2685 | 367021.5567 | 10.36 | 43.04 | | clay with sand layers, gravel 9-9.45 m | 10.36 | | | | | | | | 85.00 | NE |

| ROUTE OPTION 5A | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| id | BGS_ref | BGS_id | Chainage | Elevation (from DTM) | Easting | Northing | Depth | Abs depth | Water level (depth) | litho1 | depth1 | litho2 | depth2 | litho3 | depth3 | litho4 | depth4 | bedrock true depth | Distance (from pipeline) | Bearing (toward borehole) |
| 38 | SJ36NW45/18 | 156132 | 23950 | 72.2 | 330389.9876 | 366791.2592 | 4.57 | 67.63 | | sand and boulders | 4.57 | | | | | | | | 105.00 | SE |
| 37 | SJ36NW45/15 | 156129 | 23960 | 75 | 330350.0226 | 366831.0993 | 75.83 | -0.83 | | sand, boulders, clay and gravel, with 6 soils | 75.83 | | | | | | | | 49.00 | SE |
| 39 | SJ36NW45/12 | 156126 | 24025 | 65 | 330290.3728 | 366912.15 | 75.83 | -10.83 | | sand, boulders, clay and gravel, with 6 soils | 75.83 | | | | | | | | 30.00 | NE |
| 40 | SJ36NW69 | 156184 | 24030 | 68.5 | 330240.1975 | 366872.3295 | 10.00 | 58.50 | 2.00 | Stiff to very stiff silty/sandy clay, bands of sands, with occasional stones and pieces of coal (prevailing sands 1.9-5.7 and 9-10) | 10.00 | | | | | | | | 32.00 | SW |
| 41 | SJ36NW45/13 | 156127 | 24050 | 71.5 | 330229.5818 | 366881.9882 | 75.83 | -4.33 | | sand, boulders, clay and gravel, with 6 soils | 75.83 | | | | | | | | 32.00 | SW |
| 42 | SJ36NW45/14 | 156128 | 24195 | 76.4 | 330140.4012 | 366891.5047 | 75.83 | 0.57 | | sand, boulders, clay and gravel, with 6 soils | 75.83 | | | | | | | | 6.00 | SE |
| 44 | SJ36NW45/6 | 156120 | 24270 | 81.5 | 330069.6799 | 366831.2969 | 84.12 | -2.62 | | sand, clay, gravel and boulders, with 9 soils | 84.12 | | | | | | | | 55.00 | SW |
| 45 | SJ26NE21 | 146990 | 25370 | 78.6 | 329139.2351 | 367031.6148 | 12.20 | 66.40 | 2.30 | compact to very stiff clayey sand to sandy clay with stone inclusions | 10.00 | red sandstone | 12.20 | | | | | 68.60 | 32.00 | NW |
| 46 | SJ26NE745 | 147721 | 26290 | 96 | 328450.0675 | 366241.5595 | 30.75 | 65.25 | 11.00 | Boulder clay | 2.00 | Mudstone, siltstone | 30.75 | | | | | 94.00 | 238.00 | SW |
| 47 | SJ26NE744/A | 147719 | 26320 | 92 | 328429.8937 | 366321.7484 | 18.00 | 74.00 | | Boulder clay | 1.30 | sandstone, mudstone, siltstone, coal bands | 18.00 | | | | | 90.70 | 202.00 | SW |
| 48 | SJ26NE31 | 147000 | 26580 | 91.1 | 328249.3984 | 366461.757 | 15.30 | 75.80 | | Glacial till: mainly clay, red-brown due to alteration down to 8 m | 8.80 | Glacial: very clayey gravel or sand | 14.80 | Mudstone (coal measures | 15.30 | | | 76.30 | 238.00 | SW |
| 49 | SJ26NE22 | 146991 | 26950 | 92.6 | 327979.8453 | 366671.8567 | 9.00 | 83.60 | 4.40 | Firm to very stiff, brown, locally loose, sandy to silty clay with stone inclusions from -2.4 m | 7.10 | stiff gray shaly clay with ore stained fissures | 9.00 | | | | | | 235.00 | SW |
| 58 | SJ26NE732 | 147707 | 27020 | 93 | 327929.2702 | 366721.769 | 15.00 | 78.00 | | Clay to boulder clay, brown to yellow | 2.50 | sandstone, mudstone, siltstone, some coal | 15.00 | | | | | 90.50 | 225.00 | SW |
| 50 | SJ26NE731 | 147706 | 27120 | 93.1 | 327870.5598 | 366781.3054 | 17.00 | 76.10 | t 6.0 m and r | Clay (gravel (2.5-2.9), soft to hard | 4.70 | Siltstone, sandstone, mudstone | 17.00 | | | | | 88.40 | 210.00 | SW |
| 51 | SJ26NE730 | 147705 | 27140 | 93.1 | 327840.2449 | 366801.5767 | 22.00 | 71.10 | | Sand, boulder clay, sandstone (3.8-4.7) | 4.70 | clay sandy brown | 8.10 | Mudstone | 22.00 | | | 85.00 | 210.00 | SW |
| 56 | SJ26NE1483 | 15628155 | 27250 | 95 | 327759.4909 | 366851.911 | 2.70 | 92.30 | | firm to stiff gravelly sandy silty clay | 1.10 | sand | 1.40 | stiff sandy silty clay, with gravel of sandstone and siltstone | 2.70 | | | | 215.00 | SW |
| 52 | SJ26NE725 | 147700 | 27420 | 93.2 | 327608.5898 | 366971.8653 | 15.70 | 77.50 | | Boulder clay, firm, silty, locally sandy, | 7.00 | Grey mudstone and siltstone | 15.70 | | | | | 86.20 | 202.00 | SW |
| 55 | SJ26NE723 | 147698 | 27430 | 90.2 | 327630.1014 | 367002.1629 | 10.00 | 80.20 | | Boulder clay, firm, silty, locally sandy, | 7.00 | Gravel, clayey | 8.90 | Grey mudstone and siltstone | 10.00 | | | 81.30 | 166.00 | SW |
| 57 | SJ26NE728 | 147703 | 27430 | 91 | 327570.4171 | 367021.6043 | 22.00 | 69.00 | | Boulder clay, shale | 3.00 | Mudstone, siltstone, sandstone | 22.00 | | | | | 88.00 | 184.00 | SW |
| 53 | SJ26NE727 | 147702 | 27500 | 90 | 327530.4519 | 367061.4447 | 15.10 | 74.90 | sian water at | Mudstone-siltstone, local coal | 11.60 | Sandstone (anche 10.5-10.8) | 15.10 | | | | | 90.00 | 174.00 | SW |
| 54 | SJ26NE1317 | 148296 | 27840 | 93.9 | 327369.0996 | 367232.4046 | 189.71 | -95.81 | | Clay (gravel 6.85-8.28) | 12.85 | Fireclay, sandstone (very hard), shale | 54.86 | Shale, light rock with band of metal | 110.05 | Banded siltstone (Linstey), dolerite boulders (Blue metal) and coal (hard to very hard) | 189.71 | 81.05 | 126.00 | SW |

| ROUTE OPTION 5A | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| id | BGS_ref | BGS_id | Chainage | Elevation (from DTM) | Easting | Northing | Depth | Abs depth | Water level (depth) | litho1 | depth1 | litho2 | depth2 | litho3 | depth3 | litho4 | depth4 | bedrock true depth | Distance (from pipeline) | Bearing (toward borehole) |
| 59 | SJ26NE1 | 146963 | 28000 | 92.8 | 327260.9664 | 367572.1518 | 136.00 | -43.20 | | clay | 11.90 | mostly coal | 136.00 | | | | | 80.90 | 195.00 | NNE |
| 60 | SJ26NE27 | 146996 | 29065 | 91.3 | 326310.0934 | 367642.5074 | 13.60 | 77.70 | | Glacial till-Diamicton clay red-brown, pebbly | 6.30 | Glacial sand and gravel | 13.10 | Mudstone (coal measures | 13.60 | | | 78.20 | 28.00 | N |
| 61 | SJ26NE1464 | 15044499 | 29850 | 98 | 325470.0697 | 367951.9659 | 5.50 | 92.50 | 3.20 | soft to firm silty clay | 2.40 | clayey medium sand and gravel | 2.70 | firm to stiff gravelly clay (Boulder Clay) | 4.40 | fine to coarse clayely sand and gravel | 5.50 | | 236.00 | WSW |
| 62 | SJ26NE44 | 147013 | 29880 | 96.8 | 325490.607 | 368001.2978 | 5.00 | 91.80 | 2.10 | Glacial till: firm to stiff brown sandy to silty clay with some fine gravel | 3.30 | brown sand grading downward to sandy gravel | 5.00 | | | | | | 198.00 | WSW |
| 63 | SJ26NE26 | 146995 | 30370 | 101.1 | 325589.6789 | 368521.7395 | 17.10 | 84.00 | | Glacial till-Diamicton clay and sand, pebbly | 17.10 | | | | | | | | 22.00 | WSW |
| 64 | SJ27SW249 | 151390 | 32580 | 69.6 | 324950.1185 | 370570.0267 | 11.20 | 58.40 | | Clay and sand with abundant pebbels | 5.40 | Clayey sand to sands | 9.50 | Clayey sands and gravel to firm boulder clay | 11.20 | | | | 42.00 | WSW |
| 65 | SJ27SW437 | 151586 | 32990 | 49.7 | 324990.3611 | 371082.1945 | 12.19 | 37.51 | | clay with stones (soft) | 12.19 | | | | | | | | 225.00 | NW |
| 99 | SJ27SW3 | 151107 | 32500 | 74.1 | 324680 | 370361.78 | 21.34 | 52.76 | 5.50 | clay and sand | 12.31 | sand and gravel | 21.34 | | | | | 48.10 | 375.00 | WSW |
| 100 | SJ27SE177 | 150914 | 33010 | 56.8 | 325450.1 | 370721.76 | 17.10 | 39.70 | | Brown clayey sand with some pebbles | 5.00 | Boulder clay with lenses of clayey sand and gravel | 17.10 | | | | | 33.80 | 358.00 | SE |
| 101 | SJ27SW436 | 151585 | 33050 | 42.8 | 324990 | 371201.8 | 15.24 | 27.56 | | Red clay with stones | 15.24 | | | | | | | 22.80 | 309.00 | NW |
| 24 | SJ36NW29 | 156082 | 18170 | 5.4 | 334660.2541 | 366301.5386 | 51.82 | -46.42 | | sand gravel and clay | 50.90 | sand and sandstone | 51.82 | | | | | -45.50 | 332.00 | SE |
| 43 | SJ36NW45/5 | 156119 | | 74.7 | 330180.2275 | 366841.7427 | 84.12 | -9.42 | | sand, clay, gravel and boulders, with 9 soils | 84.12 | | | | | | | | | |
| 69 | SJ47NE124 | 20292741 | | 7.7 | 346246.1162 | 376293.2629 | 6.89 | 0.81 | | peat | 2.59 | sandy clay (<3,35) and Boulder Clay | 4.57 | red sand | 5.33 | Red sandstone | 6.89 | 2.37 | | |
| 70 | SJ47NE128 | 20292745 | | 6.5 | 346341.5668 | 376200.135 | 14.36 | -7.86 | | peat | 3.35 | Boulder clay | 9.14 | red and gray silty sand | 13.11 | Red sandstone | 14.36 | -6.61 | | |
| 67 | SJ47NE15 | 163281 | | 8.6 | 345790.907 | 376502.238 | 100.50 | -91.90 | | made ground | 3.50 | fluvioglacial sand and gravel | 10.00 | Triassic sandstone (P-T) | 100.50 | | | -1.40 | | |
| 68 | SJ47NE16 | 163282 | | 10.9 | 346060.2043 | 376422.3891 | 17.00 | -6.10 | | brown alluvial clay | 4.50 | fluvioglacial sand | 6.00 | Triassic sandstone | 17.00 | | | 4.90 | | |
| 66 | SJ47NE2 | 163246 | | 14.1 | 345360.0542 | 376501.6522 | 18.29 | -4.19 | | drift on Bunter Sandstone | 18.29 | | | | | | | 9.10 | | |
| 90 | SJ47NE91 | 163357 | | 4.7 | 346916.7456 | 376649.3126 | 12.10 | -7.40 | | soft silty clay and clayeay silt, with soft fibrous peat levels (1.80-2.90 and 9.10-10.80) | 2.90 | loose fine to medium sand | 12.10 | | | | | | | |
| 71 | SJ47NW20 | 163378 | | 10.2 | 344409.8516 | 375012.5057 | 45.72 | -35.52 | | rather hard sandstones, even grained with scattered quarzite pebbles | 45.72 | | | | | | | 10.20 | | |
| 74 | SJ47SE21 | 163550 | | 10.8 | 345172.3853 | 374007.816 | 5.75 | 5.05 | 4.00 | stiff sandy clay with some fine to medium gravel | 3.75 | highly weathered sandstone | 5.00 | medium grained slightly weathered sandstone, weak | 5.75 | | | 7.05 | | |
| | SJ36NE12 | 155889 | 12750 | 25.4 | 338769.961 | 369411.768 | 60.9 | -35.5 | 21.3 | Brown clay | 20.10 | soft sandstone | 27.4 | hard sandstone | 60.9 | | | 4.4 | 907.00 | SE |

**Figure B-0-1 – Option 5A**

| SOUTHERN ROUTE A | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| id | BGS_ref | BGS_id | Chainage | Elev. (from DTM) | Easting | Northing | Depth | Abs depth | Water level (depth) | litho1 | depth1 | litho2 | depth 2 | litho3 | depth 3 | litho4 | depth 4 | bedrock elev. | Distance (from pipeline) | Bearing (toward borehole) |
| 71 | SJ47NW20 | 163378 | 0 | 10.2 | 344409.9 | 375012.506 | 45.72 | -35.52 | | rather hard sandstones, even grained with scattered quarzite pebbles | 45.72 | | | | | | | 10.2 | 127 | w |
| 72 | SJ47NW24 | 163382 | 5 | 11.2 | 344690.6 | 375020.234 | 152.40 | -141.20 | 14.50 | drift | 1.52 | hard sandstone with quarzite pebbles (first pebbles at 60.96, very abundant from 91.44) | 152.40 | | | | | 9.68 | 154 | E |
| 2 | SJ47SE18 | 163547 | 1020 | 11.8 | 345201.6 | 374581.71 | 2.20 | 9.60 | | very stiff slightly sandy clay with some gravel and sand | 2.20 | | | | | | | | 185 | NE |
| 73 | SJ47SE22 | 163551 | 1460 | 10.6 | 345654.1 | 374261.565 | 7.80 | 2.80 | 4.85 | made soil medium dense, occasianally coarse gravel | 2.30 | firm to stiff sandy clay with occasional gravel (sandstone, basalt and quarzite), below c. 7.0m very stiff | 7.80 | | | | | | 246 | SE |
| 75 | SJ47SE19 | 163548 | 1770 | 13.1 | 345789.4 | 374721.403 | 1.60 | 11.50 | | very stiff slightly sandy clay with some gravel and sand | 1.60 | | | | | | | | 112 | NW |
| 84 | SJ47SE23 | 163552 | 2070 | 13.1 | 346143.9 | 374661.83 | 7.90 | 5.20 | | stiff sandy clay with occasional gravel (sandstone and quarzite) | 1.70 | loose silty fine sand, fluvio-glacial | 3.80 | medium dense fine to medium sand, fluvio-glacial | 7.90 | | | | 92 | SE |
| 80 | SJ47SE57 | 18118094 | 2260 | 8 | 346372.2 | 374638.001 | 8.00 | | 2.50 | made ground, very sandy gravel | 2.20 | stiff sandy gravelly clay (<3.50m) and medium dense clayely fine to medium sand (<5m) | 5.00 | dense and medium dense gravelly fine to medium sand | 8.00 | | | | 211 | SE |
| 81 | SJ47SE58 | 18118096 | 2270 | 8 | 346473 | 374696.608 | 8.00 | | 4.00 | firm to stiff sandy gravelly clay (medium dense sand at 3-3.20 m) | 4.50 | medium dense fine to medium sand | 8.00 | | | | | | 238 | SE |
| 76 | SJ47NE42 | 163308 | 2425 | 15.5 | 346238.9 | 375009.93 | 2.50 | 13.00 | | sandy clay with some medium gravel | 2.50 | | | | | | | | 100 | WNW |
| 87 | SJ47NE105 | 20292722 | 3370 | 4.5 | 346821.4 | 375730.923 | 27.40 | -22.90 | | organic silty soil | 0.90 | peat | 5.00 | soft silty clay and silty peat | 10.00 | Boulder Clay (10 to 15.60) and brown clay (15.60 to 27.40) | 27.40 | -25.00 | 72 | WNW |
| 88 | SJ47NE119 | 20292736 | 3475 | 3.8 | 346809.8 | 375850.713 | 30.33 | -26.53 | | soil (0.7m) and peat | 4.88 | sandy silt | 6.55 | peat | 7.45 | Boulder Clay | 30.33 | -30.00 | 116 | WNW |
| 89 | SJ47NE21 | 163287 | 3950 | 5.3 | 346599.9 | 376029.754 | 85.00 | -79.70 | | fill and silty clay (alluvium) | 3.00 | peat | 5.00 | soft clay (glacial till or alluvium) | 18.50 | Triassic sandstone | 85.00 | -13.20 | 232 | SW |
| 83 | SJ47SE59 | 18118097 | | 7.2 | 346529 | 374722.047 | 8.00 | | 7.50 | firm sandy gravely clay (lenses of fine to mediium sand below 5m) | 6.00 | sany clay with lenses of sand (firm at 6-7m, very soft to soft at 7-7.40m, firm to stiff 7.4-8m) | 8.00 | | | | | | | |
| 86 | SJ47SE60 | 18118099 | | 7 | 346607.6 | 374758.435 | 8.00 | | 7.50 | made ground, fine to coarse gavel and sandy gravel | 0.90 | firm slightly sandy and gravelly clay, occasional lenses of sand, stiff at 3.5m, from 7m very gravelly | 8.00 | | | | | | | |
| 85 | SJ47SE61 | 18118101 | | 7 | 346660.4 | 374786.772 | 8.00 | | 4.90 | made ground, fine to coarse gravel | 1.00 | stiff slightly sandy and gravelly clay, with occasional lenses of fine sand | 8.00 | | | | | | | |
| 79 | SJ47SE63 | 18118107 | | 7 | 346552.9 | 374728.81 | 1.60 | | | made ground, sligtly sandy and clayey fine to coarse gravel | 1.30 | firm to stiff slightly sandy and gravelly clay | 1.60 | | | | | | | |

**Figure B-0-2 – Southern route A**

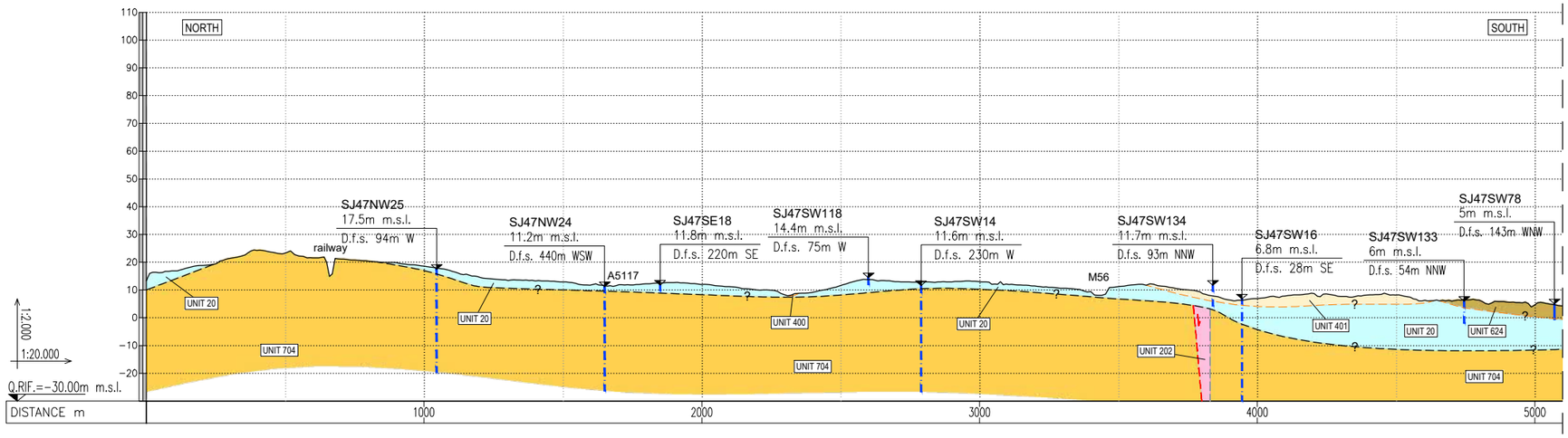
| SOUTHERN ROUTE B | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| id | BGS_ref | BGS_id | Chainage | Elevation (from DTM) | Lon | Lat | Easting | Northing | BH depth | Abs elev. | Water level (depth) | litho1 | depth1 | litho2 | depth2 | litho3 | depth3 | litho4 | depth4 | bedrock elev. | Distance (from pipeline) | Bearing (toward borehole) |
| 71 | SJ47NW20 | 163378 | 0 | 10.2 | -2.83498 | 53.26917 | 344409.8516 | 375012.5057 | 45.72 | -35.52 | | rather hard sandstones, even grained with scattered quarzite pebbles | 45.72 | | | | | | | 10.2 | 118 | W |
| 72 | SJ47NW24 | 163382 | 5 | 11.2 | -2.83077 | 53.26927 | 344690.6495 | 375020.234 | 152.40 | -141.20 | 14.50 | drift | 1.52 | hard sandstone with quarzite pebbles (from 60.96, very abundant from 91.44) | 152.40 | | | | | 9.68 | 164 | E |
| 3 | SJ47SW118 | 163698 | 500 | 14.4 | -2.83514 | 53.26288 | 344390.7111 | 374311.8905 | 2.50 | 11.90 | | very stiff lightly sandy clay, with a little fine to coarse gravel | 2.50 | | | | | | | | 280 | SW |
| 2 | SJ47SE18 | 163547 | 1050 | 11.8 | -2.82303 | 53.26539 | 345201.5974 | 374581.7104 | 2.20 | 9.60 | | very stiff slightly sandy clay with some gravel and sand | 2.20 | | | | | | | | 230 | NNE |
| 73 | SJ47SE22 | 163551 | 1700 | 10.6 | -2.81619 | 53.26255 | 345654.1212 | 374261.5645 | 7.80 | 2.80 | 4.85 | made soil medium dense, occasionally coarse gravel | 2.30 | firm to stiff sandy clay with occasional gravel (sandstone, basalt and quarzite), below ca. 7.0m very stiff | 7.80 | | | | | | 101 | NNW |
| 82 | SJ47SE56 | 18118090 | 2570 | 7.9 | -2.80386 | 53.26612 | 346481.3801 | 374648.6277 | 8.00 | -0.10 | 3.80 | firm sandy slightly gravelly (fine to medium) clay, occasional shell fragments | 2.50 | firm laminated clay-silt, occasional bands of fine sand | 3.50 | medium dense silty slightly gravelly fine to medium sand | 8.00 | | | | 279 | NNW |
| 77 | SJ47SE20 | 163549 | 3360 | 3.9 | -2.79748 | 53.26898 | 346909.9833 | 374962.2712 | 3.10 | 0.80 | | firm fibrous peat with wood fragments (up to trunk size) | 1.20 | very soft peaty clay | 2.20 | very stiff sandy clay, with a little gravel | 3.10 | | | | 200 | NW |
| 78 | SJ47NE43 | 163309 | 3700 | 4.1 | -2.79106 | 53.27153 | 347341.4846 | 375241.781 | 3.30 | 0.80 | 0.80 | fibrous peat | 2.20 | soft sandy peaty clay, with some sand band | 2.40 | stiff sandy clay with occasional sand bars | 3.30 | Boulder Clay (10 - 15.6) and brown clay (15.6 - 27.4) | 27.40 | | 213 | ENE |
| 87 | SJ47NE105 | 20292722 | 4310 | 4.5 | -2.79894 | 53.27588 | 346821.4289 | 375730.9232 | 27.40 | -22.90 | | organic silty soil | 0.90 | peat | 5.00 | soft silty clay and silty peat | 10.00 | Boulder Clay | 30.33 | | 142 | WNW |
| 88 | SJ47NE119 | 20292736 | 4450 | 3.8 | -2.79913 | 53.27695 | 346809.8363 | 375850.7131 | 30.33 | -26.53 | | soil (0.7m) and peat | 4.88 | sandy silt | 6.55 | peat | 7.45 | | | | 172 | W |
| 91 | SJ47NE96 | 18642025 | 4550 | 3.9 | -2.79187 | 53.27864 | 347296.4024 | 376032.6521 | 5.00 | -1.10 | 3.00 | Firm slightly sandy clay, with some pockets of fine sand | 1.95 | firm spongy fibrous peat, with frequent wood fragment | 5.00 | | | Triassic sandstone | 85.00 | -13.20 | 340 | E |
| 89 | SJ47NE21 | 163287 | 4900 | 5.3 | -2.80231 | 53.27854 | 346599.8819 | 376029.754 | 85.00 | -79.70 | | fill and silty clay (alluvium) | 3.00 | peat | 5.00 | soft clay (glacial till or alluvium) | 18.50 | Triassic sandstone | 85.00 | -13.20 | 250 | SW |

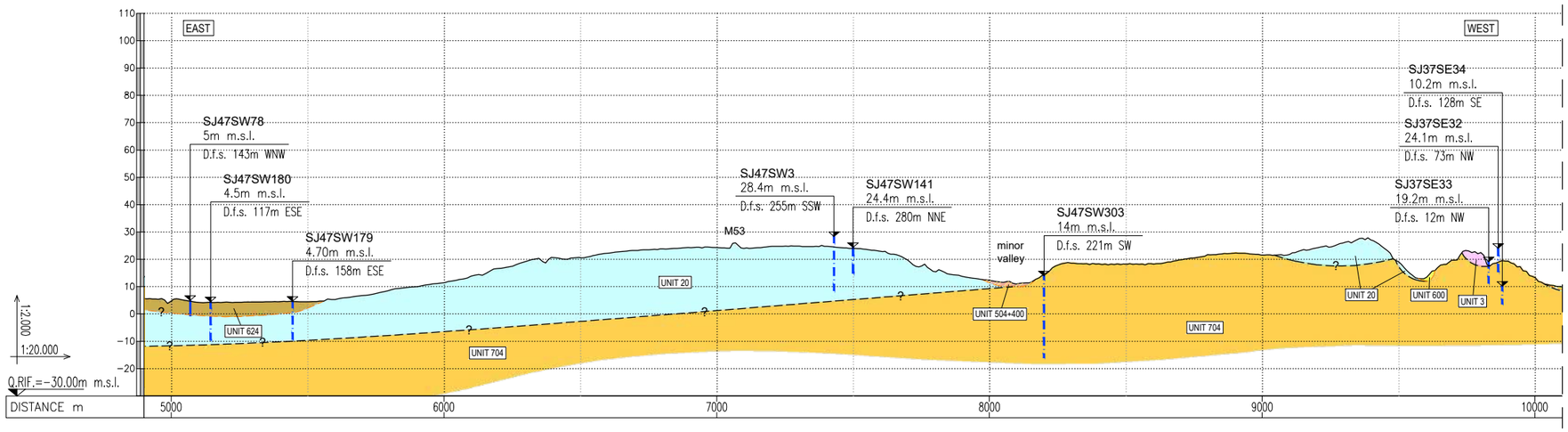
**Figure B-0-3 – Southern route B**

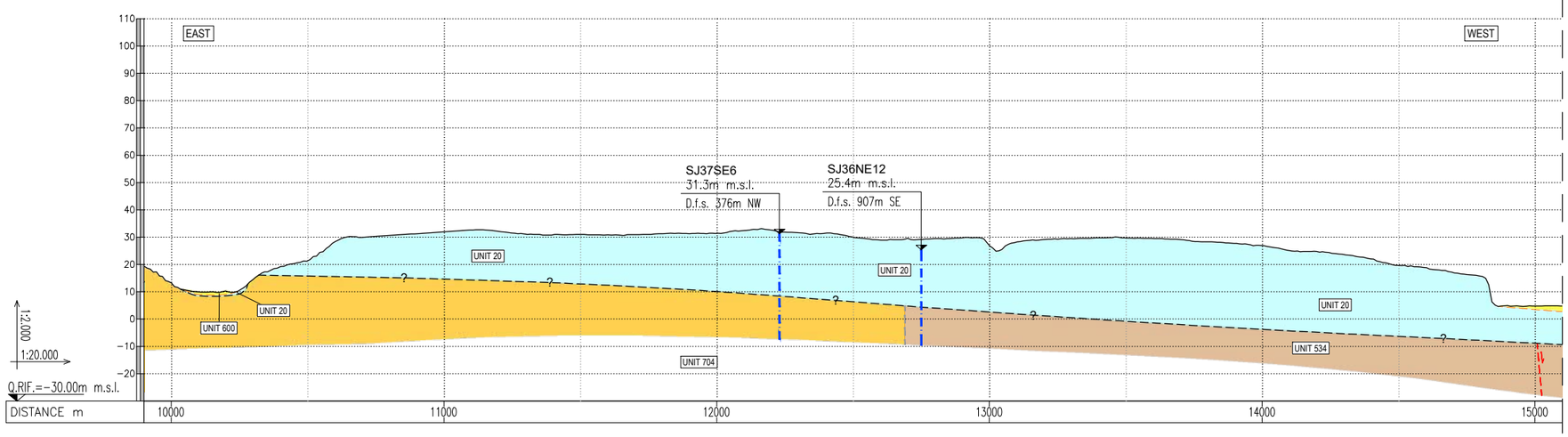
# APPENDIX C – GEOLOGICAL PROFILES

APPENDIX C - PLATE 01

Geological profiles - Option 5A




NOTES:

* Fault dip angles are unknown. For present scope, sub-vertical normal faults, with constant dip angle, are shown in the profiles

** Due to lack of data the lithological contact has been assumed as vertical

*** Geologic contact depths might vary considerably, being poorly constrainable due to the lack of sufficient borehole control. Please refer to the discussion in the main text

## GEOLOGICAL UNITS

- 400 — Holocene: floodplain alluvium: variable sediment of mud, sand and gravel with some peat in places
- 600 — Holocene: Tidal flat deposits (shorelines): clay, silt and sand
- 3 — Quaternary (Devensian): outwash glacio-fluvial deposits (ice age): sand and gravel
- 20 — Quaternary (Devensian): glacial till deposits (ice age): diamicton (unsorted sediment with gravel in a fine mud matrix)
- 624 — Quaternary: lacustrine-palustrine organic accumulations: peat
- 424 — Quaternary: Subaerial fan and downslope deposits: unsorted mud sediment (clay, silt) with sand and gravel clasts
- 401 — Quaternary: wind blown deposits, often forming dunes: sand
- 504 — Quaternary: alluvial fan deposits: sand and gravel
- 513 — Quaternary: lacustrine deposits: clay and silt
- 1000 — Quaternary: undifferentiated continental deposits
- 20+3 — Undifferentiated deposits of Unit 20 and Unit 3
- 504+400 — Undifferentiated deposits of Unit 504 and Unit 400

## BEDROCK UNITS

- 202 — Triassic: Wilmslow sandstone Fm., fluvial-lacustrine, marine deposits in hot climate: sandstone
- 534 — Early Triassic: Kinnerton sandstone Fm., fluvial-lacustrine deposits in hot deserts: sandstone
- 704 — Triassic (Olenekian): Chester Fm., river setting: sandstone pebbly
- 934 — Carboniferous (Westphalian) – Etruria Fm., continental coastal deposits (fluvial): sandstone
- 236 — Carboniferous (Westphalian) – Etruria Fm., continental coastal deposits (fluvial): mudstone, sandstone, conglomerate
- 953 — Carboniferous (Bolsovian) – Hollin Rock Fm. continental coastal deposits (swamps, estuaries and deltas): sandstone
- 842 — Carboniferous (Duckmantian-Bolsovian) – Pennine Middle Coal Measures Formation, continental coastal deposits (swamps, estuaries and deltas): sandstone
- 555 — Carboniferous (Duckmantian-Bolsovian) – Pennine Middle Coal Measures Fm., continental coastal deposits (swamps, estuaries and deltas): mudstone, siltstone, sandstone
- 833 — Carboniferous (Langsettian) – Pennine Lower Coal Measures Fm., continental coastal deposits (swamps, estuaries and deltas): sandstone
- 222 — Carboniferous (Langsettian) – Pennine Lower Coal Measures Fm., continental coastal deposits (swamps, estuaries and deltas): mudstone, siltstone, sandstone
- 505 — Carboniferous (Langsettian) – Gwespyr Sandstone Fm., continental coastal deposits (swamps, estuaries and deltas): sandstone, argillaceous rocks
- 630 — Carboniferous (Yeadonian) – Bowland Shale Fm., open sea pelagic deposits: mudstone

normal fault (*)

Lithological contac (**)

contanct between bedrock and quaternary deposit (***)

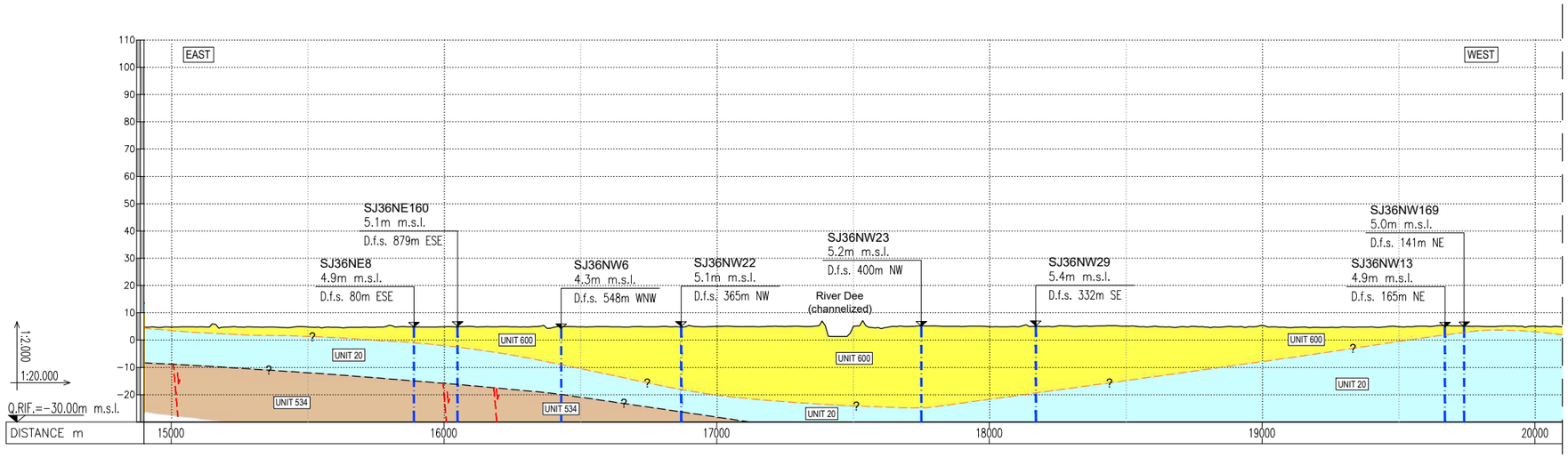
contanct between quaternary and holocenic deposit (***)

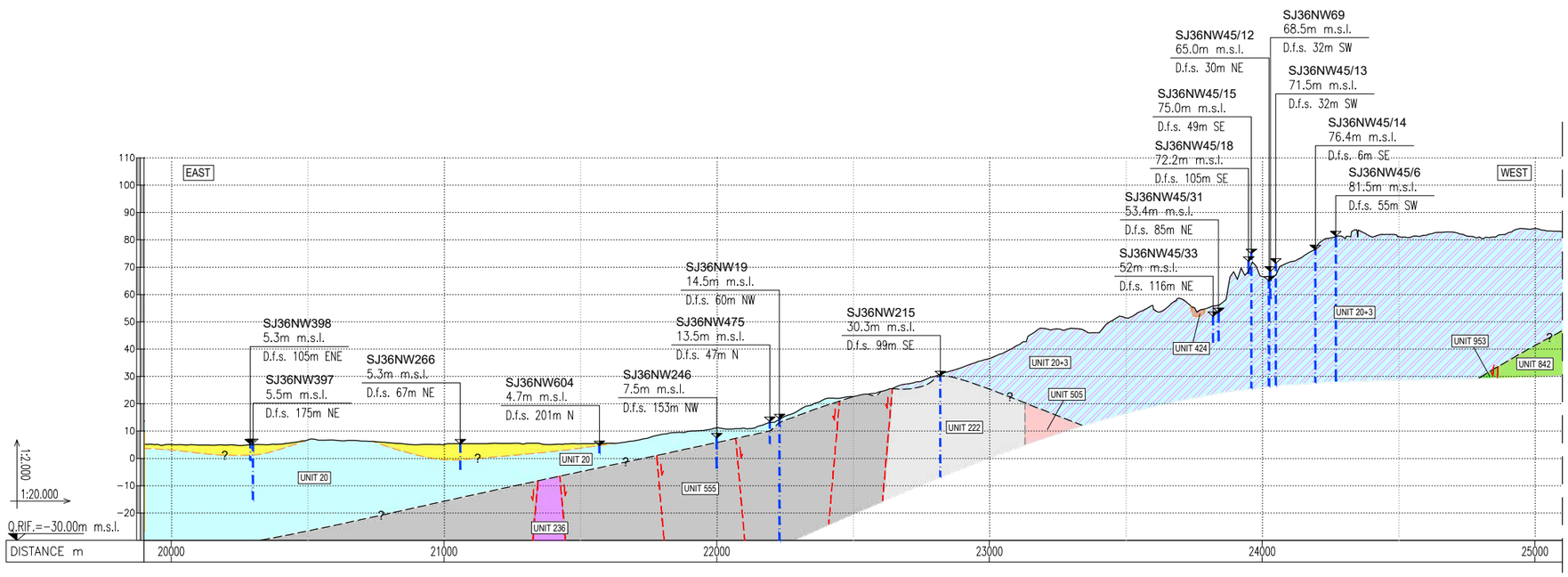
SJ47NW25
17.5m m.s.l.
D.f.s. 94m E

BOREHOLE NAME
GROUND ELEVATION
DISTANCE FROM PIPELINE

APPENDIX C - PLATE 02

Geological profiles - Option 5A




NOTES:

* Fault dip angles are unknown. For present scope, sub-vertical normal faults, with constant dip angle, are shown in the profiles

** Due to lack of data the lithological contact has been assumed as vertical

*** Geologic contact depths might vary considerably, being poorly constrainable due to the lack of sufficient borehole control. Please refer to the discussion in the main text

## GEOLOGICAL UNITS

- 400 — Holocene: floodplain alluvium: variable sediment of mud, sand and gravel with some peat in places
- 600 — Holocene: Tidal flat deposits (shorelines): clay, silt and sand
- 3 — Quaternary (Devensian): outwash glacio-fluvial deposits (ice age): sand and gravel
- 20 — Quaternary (Devensian): glacial till deposits (ice age): diamicton (unsorted sediment with gravel in a fine mud matrix)
- 624 — Quaternary: lacustrine-palustrine organic accumulations: peat
- 424 — Quaternary: Subaerial fan and downslope deposits: unsorted mud sediment (clay, silt) with sand and gravel clasts
- 401 — Quaternary: wind blown deposits, often forming dunes: sand
- 504 — Quaternary: alluvial fan deposits: sand and gravel
- 513 — Quaternary: lacustrine deposits: clay and silt
- 1000 — Quaternary: undifferentiated continental deposits
- 20+3 — Undifferentiated deposits of Unit 20 and Unit 3
- 504+400 — Undifferentiated deposits of Unit 504 and Unit 400

## BEDROCK UNITS

- 202 — Triassic: Wilmslow sandstone Fm., fluvial-lacustrine, marine deposits in hot climate: sandstone
- 534 — Early Triassic: Kinnerton sandstone Fm., fluvial-lacustrine deposits in hot deserts: sandstone
- 704 — Triassic (Olenekian): Chester Fm., river setting: sandstone pebbly
- 934 — Carboniferous (Westphalian) – Etruria Fm., continental coastal deposits (fluvial): sandstone
- 236 — Carboniferous (Westphalian) – Etruria Fm., continental coastal deposits (fluvial): mudstone, sandstone, conglomerate
- 953 — Carboniferous (Bolsovian) – Hollin Rock Fm. continental coastal deposits (swamps, estuaries and deltas): sandstone
- 842 — Carboniferous (Duckmantian-Bolsovian) – Pennine Middle Coal Measures Formation, continental coastal deposits (swamps, estuaries and deltas): sandstone
- 555 — Carboniferous (Duckmantian-Bolsovian) – Pennine Middle Coal Measures Fm., continental coastal deposits (swamps, estuaries and deltas): mudstone, siltstone, sandstone
- 833 — Carboniferous (Langsettian) – Pennine Lower Coal Measures Fm., continental coastal deposits (swamps, estuaries and deltas): sandstone
- 222 — Carboniferous (Langsettian) – Pennine Lower Coal Measures Fm., continental coastal deposits (swamps, estuaries and deltas): mudstone, siltstone, sandstone
- 505 — Carboniferous (Langsettian) – Gwespyr Sandstone Fm., continental coastal deposits (swamps, estuaries and deltas): sandstone, argillaceous rocks
- 630 — Carboniferous (Yeadonian) – Bowland Shale Fm., open sea pelagic deposits: mudstone

normal fault (*)

Lithological contac (**)

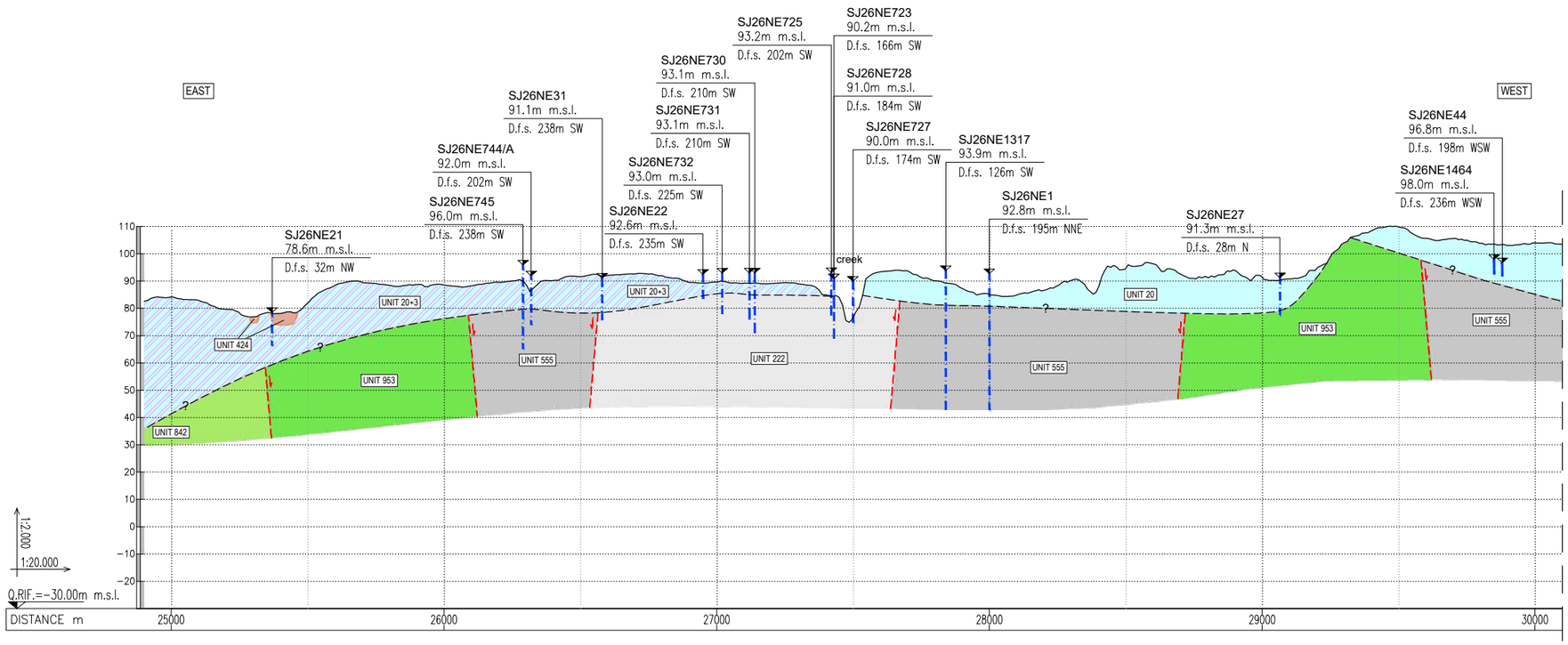
contanct between bedrock and quaternary deposit (***)

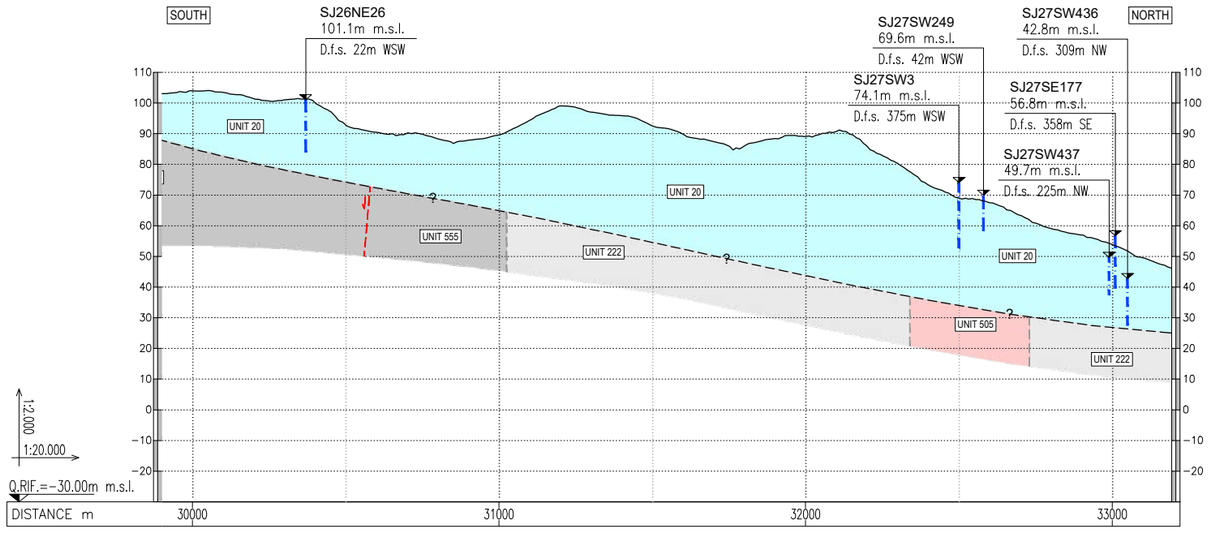
contanct between quaternary and holocenic deposit (***)

SJ47NW25 — BOREHOLE NAME
17.5m m.s.l. — GROUND ELEVATION
D.f.s. 94m E — DISTANCE FROM PIPELINE

APPENDIX C - PLATE 03

## Geological profiles - Option 5A

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### BEDROCK UNITS

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normal fault (*)

Lithological contac (**)

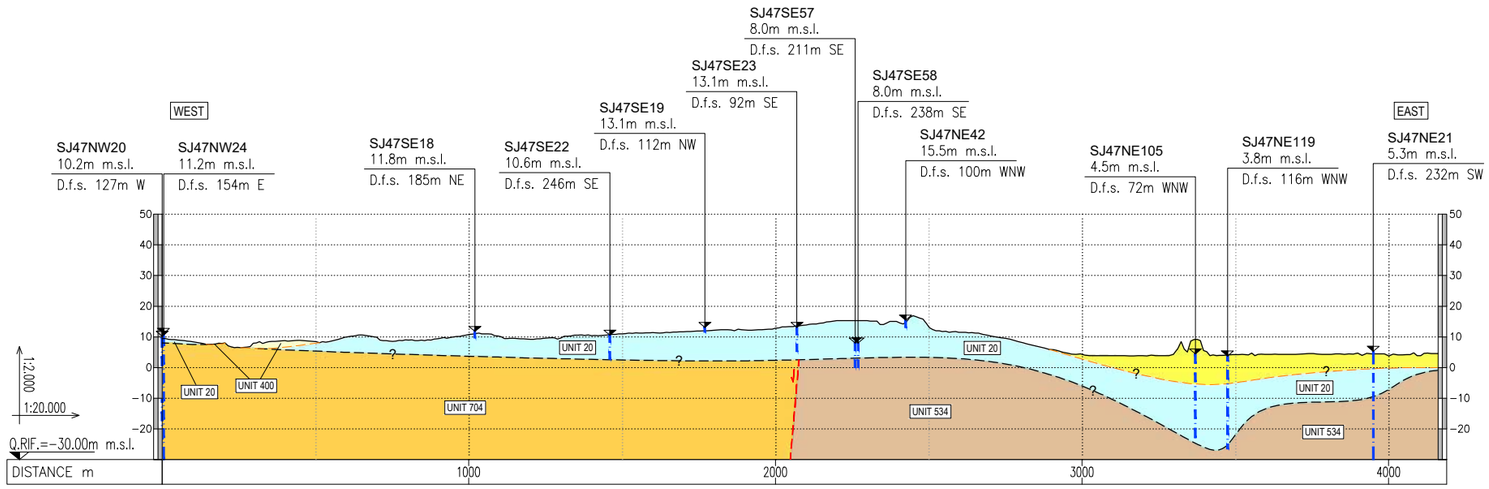
contanct between bedrock and quaternary deposit (***)

contanct between quaternary and holocenic deposit (***)

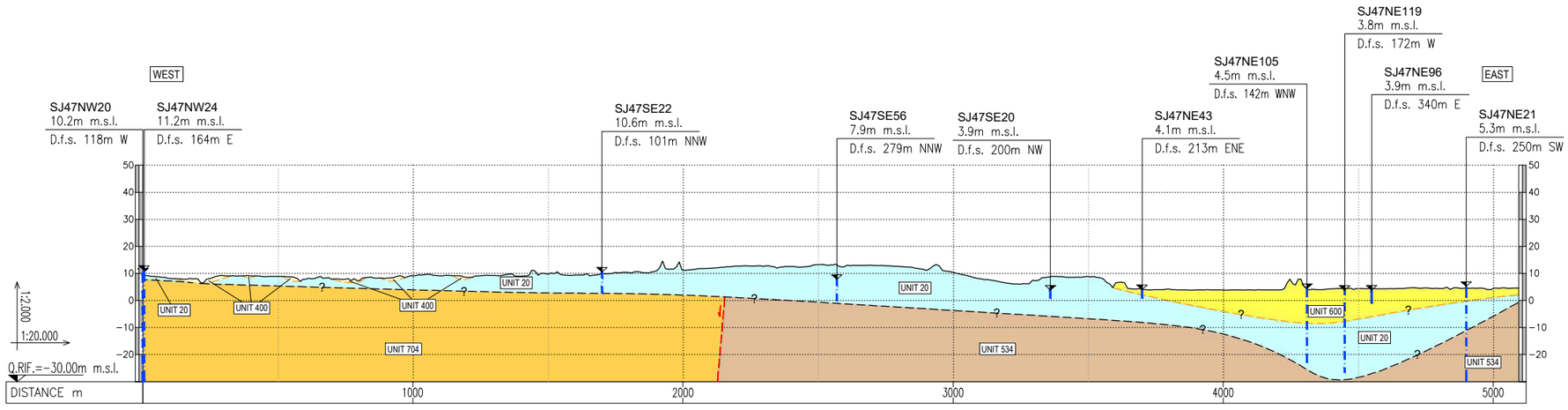
SJ47NW25 — BOREHOLE NAME
17.5m m.s.l. — GROUND ELEVATION
D.f.s. 94m E — DISTANCE FROM PIPELINE

APPENDIX C - PLATE 04

Geological profile - Southern route A




Geological profile - Southern route B

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normal fault (*)

Lithological contac (**)

contanct between bedrock and quaternary deposit (***)

contanct between quaternary and holocenic deposit (***)

SJ47NW25
17.5m m.s.l.
D.f.s. 94m E

BOREHOLE NAME
GROUND ELEVATION
DISTANCE FROM PIPELINE

# APPENDIX D – COAL AUTHORITY REPORTS

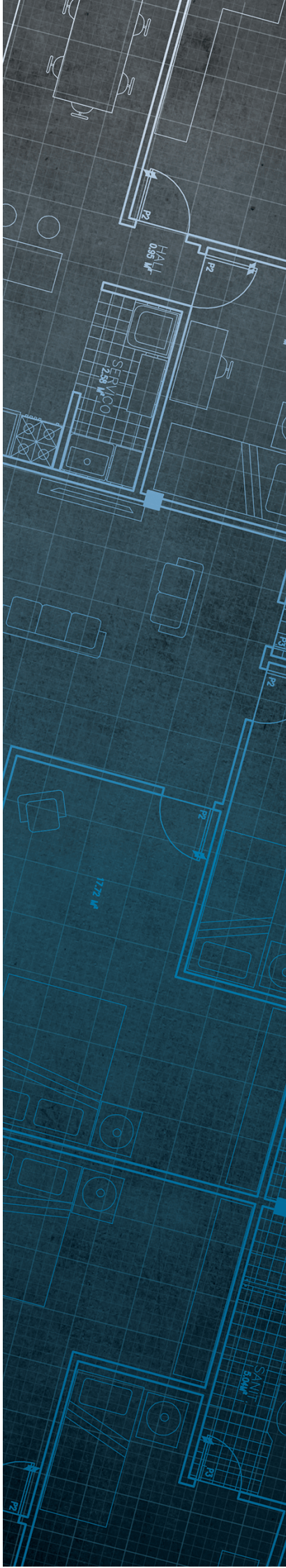
The Coal Authority

# Consultants

## Coal Mining Report

Liverpool Bay Ccs
Flintshire

| | |
|---|---|
| Date of enquiry: | **7 May 2021** |
| Date enquiry received: | **7 May 2021** |
| Issue date: | **7 May 2021** |
| Our reference: | **51002524473001** |
| Your reference: | **Liverpool Bay G&G Desk Study 1** |



# Consultants
# Coal Mining Report

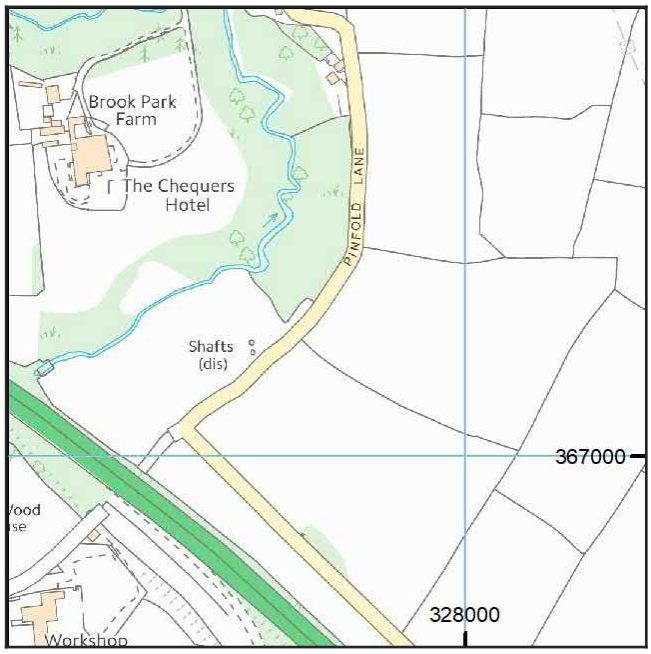
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

**Client name**

ENI ENGINEERING

**Enquiry address**

Liverpool Bay Ccs
Flintshire




Approximate position of property



**How to contact us**

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

[redacted]

@coalauthority
/company/the-coal-authority
/thecoalauthority
/thecoalauthority

# Section 1 – Mining activity and geology

## Past underground mining

| Colliery | Seam | Mineral | Coal Authority reference | Depth (m) | Direction to working | Dipping rate of seam worked (degrees) | Dipped direction of seam worked | Extraction thickness (cm) | Year last mined |
|---|---|---|---|---|---|---|---|---|---|
| unnamed | PREMIER (LOWER FOOT) | Coal | 3CQN | 6 | Beneath Property | 11.0 | South-East | 120 | 1937 |
| unnamed | HALF YARD / QUEEN | Coal | 3CRW | 12 | Beneath Property | 11.0 | South-East | 50 | 1939 |
| unnamed | QUEEN (BYCHTON 2 YD) | Coal | 3CRW | 12 | Beneath Property | 11.0 | South-East | 50 | 1939 |
| unnamed | HALF YARD / QUEEN | Coal | 3CRX | 12 | Beneath Property | 11.0 | South-East | 50 | 1927 |
| unnamed | QUEEN (BYCHTON 2 YD) | Coal | 3CRX | 12 | Beneath Property | 11.0 | South-East | 50 | 1927 |
| unnamed | PREMIER (LOWER FOOT) | Coal | 3CQM | 14 | Beneath Property | 14.0 | East | 140 | 1949 |
| unnamed | PREMIER (LOWER FOOT) | Coal | 3CR7 | 26 | South-West | 14.0 | East | 140 | 1949 |
| unnamed | HOLLIN | Coal | 37YM | 58 | Beneath Property | 4.0 | South | 180 | 1914 |
| unnamed | PREMIER (LOWER FOOT) | Coal | 3CRB | 68 | South-East | 8.1 | East | 130 | 1906 |
| unnamed | MAIN | Coal | 7H1P | 91 | Beneath Property | 10.3 | South | 250 | 1845 |
| unnamed | HOLLIN | Coal | 37YO | 99 | Beneath Property | 8.0 | South | 180 | 1914 |
| unnamed | MAIN | Coal | 37WS | 106 | South-West | 10.3 | South | 250 | 1845 |
| unnamed | MAIN | Coal | 37W7 | 107 | Beneath Property | 8.0 | South | 200 | 1800 |
| unnamed | MAIN | Coal | 37WX | 111 | Beneath Property | 8.1 | South-East | 250 | 1886 |
| unnamed | HOLLIN | Coal | 37YP | 114 | Beneath Property | 8.0 | South | 180 | 1800 |
| unnamed | HOLLIN | Coal | 7906 | 121 | Beneath Property | 8.1 | South-East | 180 | 1886 |
| unnamed | MAIN | Coal | 37WT | 124 | Beneath Property | 4.0 | South | 250 | 1914 |
| unnamed | MAIN | Coal | 7H1O | 128 | Beneath Property | 10.3 | South | 250 | 1845 |
| unnamed | YARD | Coal | 37T9 | 153 | South | 8.1 | East | 90 | 1906 |
| unnamed | HOLLIN | Coal | 37YK | 170 | South | 5.7 | East | 180 | 1920 |

| Colliery | Seam | Mineral | Coal Authority reference | Depth (m) | Direction to working | Dipping rate of seam worked (degrees) | Dipped direction of seam worked | Extraction thickness (cm) | Year last mined |
|---|---|---|---|---|---|---|---|---|---|
| unnamed | PREMIER (LOWER FOOT) | Coal | 3CRA | 182 | South | 8.1 | East | 130 | 1906 |
| unnamed | MAIN | Coal | 7H1S | 198 | South | 11.3 | East | 200 | 1909 |
| unnamed | MAIN | Coal | 7H1T | 213 | South-West | 11.3 | East | 200 | 1914 |
| unnamed | HOLLIN | Coal | 37YL | 214 | South | 8.0 | East | 180 | 1903 |
| unnamed | PREMIER (LOWER FOOT) | Coal | 3CQP | 302 | South-West | 12.5 | East | 140 | 1897 |

## Probable unrecorded shallow workings

None.

## Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

## Mine entries

| Entry type | Reference | Grid reference | Treatment description | Mineral | Conveyancing details |
|---|---|---|---|---|---|
| Shaft | 326367-040 | 326685 367701 | | Coal | |
| Shaft | 326367-041 | 326721 367641 | | Coal | |
| Shaft | 326367-042 | 326969 367637 | | Coal | |
| Adit | 327366-235 | 327856 366901 | | Coal | |
| Shaft | 327366-236 | 327869 366871 | | Coal | |
| Shaft | 327367-043 | 327023 367627 | Mine entry treated under Permit 8903, by Drillquest Limited under the supervision of Robert E Fry & Associates Limited acting on behalf of Anwyl Construction Company Limited. The shaft was located following the removal of surface waste material. The location works confirmed that the mine entry was filled to ground level with no visible surface voiding with the site investigations also demonstrating that rock material lay at shallow depth (approx. 2.5m) which could be used for the support of a reinforced concrete cap and therefore the drilling and grouting of the shaft was not undertaken. A 6.2m x 6.2m concrete cap was the constructed comprising a minimum 450mm thick reinforced concrete slab containing 2 layers of 40mm diameter bars at 100mm centres in both directions at the top and bottom of the slab | Coal | |
| Shaft | 327367-044 | 327048 367642 | Mine entry treated under Permit 8903, by Drillquest Limited under the supervision of Robert E Fry & Associates Limited acting on behalf of Anwyl Construction Company Limited. The shaft was located following the removal of surface waste material. The location works confirmed that the mine entry was filled to ground level with no visible surface voiding with the site investigations also demonstrating that rock material lay at shallow depth (approx. 2.5m) which could be used for the support of a reinforced concrete cap and therefore the drilling and grouting of the shaft was not undertaken. A 6.2m x 6.2m concrete cap was the constructed comprising a minimum 450mm thick reinforced concrete slab containing 2 layers of 40mm diameter bars at 100mm centres in both directions at the top and bottom of the slab. | Coal | |
| Adit | 327367-048 | 327737 367118 | The adit was filled to an unknown specification pre 1968 with a surface settlement crater filled in February 1969. | Coal | |

| Entry type | Reference | Grid reference | Treatment description | Mineral | Conveyancing details |
|---|---|---|---|---|---|
| Adit | 327367-049 | 327751 367133 | The adit was filled to an unknown specification pre 1968 with a surface settlement crater filled in February 1969. | Coal | |
| Adit | 327367-050 | 327803 367168 | | Coal | |
| Shaft | 327367-051 | 327868 367175 | | Coal | |
| Adit | 327367-052 | 327809 367098 | | Coal | |
| Adit | 327367-053 | 327801 367079 | | Coal | |
| Adit | 327367-234 | 327797 367156 | | Coal | |
| Shaft | 327367-358 | 327012 367636 | Mine entry treated under Permit 8903, by Drillquest Limited under the supervision of Robert E Fry & Associates Limited acting on behalf of Anwyl Construction Company Limited. The shaft was located following the removal of surface waste material. The location works confirmed that the mine entry was filled to ground level with no visible surface voiding with the site investigations also demonstrating that rock material lay at shallow depth (approx. 2.5m) which could be used for the support of a reinforced concrete cap and therefore the drilling and grouting of the shaft was not undertaken. A 6.2m x 6.2m concrete cap was the constructed comprising a minimum 450mm thick reinforced concrete slab containing 2 layers of 40mm diameter bars at 100mm centres in both directions at the top and bottom of the slab. | Coal | |
| Shaft | 328366-179 | 328576 366489 | | Coal | |
| Shaft | 328366-223 | 328487 366599 | | Coal | |
| Shaft | 328366-224 | 328689 366626 | | Coal | |
| Shaft | 329367-062 | 329363 367202 | | Coal | |
| Shaft | 329367-063 | 329444 367019 | | Coal | |
| Shaft | 329367-268 | 329246 367039 | | Coal | |
| Shaft | 329367-269 | 329286 367029 | | Coal | |

## Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

| | | |
|---|---|---|
| 12970 | 3384 | 13434 |
| NW741 | 10867 | 6281 |
| 13433 | R328 | 11222 |

Our records show we have more plans than those shown above which could affect the enquiry boundary.

**Please contact us on 0345 762 6848** to determine the exact abandoned mine plans you require based on your needs.

## Outcrops

| Seam name | Mineral | Seam workable | Distance to outcrop (m) | Direction to outcrop | Bearing of outcrop |
|---|---|---|---|---|---|
| MAIN | Coal | Yes | Within | N/A | 257 |

## Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Faults under or close to the property recorded.

## Opencast mines

Please refer to the “Summary of findings” map (on separate sheet) for details of any opencast areas within 500 metres of the enquiry boundary.

## Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

# Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

### Site investigations

| Distance to site investigation (m) | Direction |
|---|---|
| 48.4 | East |

See Section 4 for further information.

### Remediated sites

None recorded within 50 metres of the enquiry boundary.

### Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

### Mine gas

None recorded within 500 metres of the enquiry boundary.

### Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

# Section 3 – Licensing and future mining activity

### Future underground mining
None recorded.

### Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

### Court orders
None recorded.

### Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

### Withdrawal of support notices
The property is in an area where a notice to withdraw support was given in 1944.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

### Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

# Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

### Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

### Site investigations

The site is within an area of previous interest. It is close to where the Coal Authority has received information relating to past site investigations.

The site requires further investigation and may influence how you approach your risk assessment.

**For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.**

# Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

### Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

### Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

### Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

### Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

### Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

### Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

### Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

### Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

### Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

### Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

### Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

### Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

### Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

### Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

### Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

### Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

### Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

### Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

### Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

### Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The Coal Authority

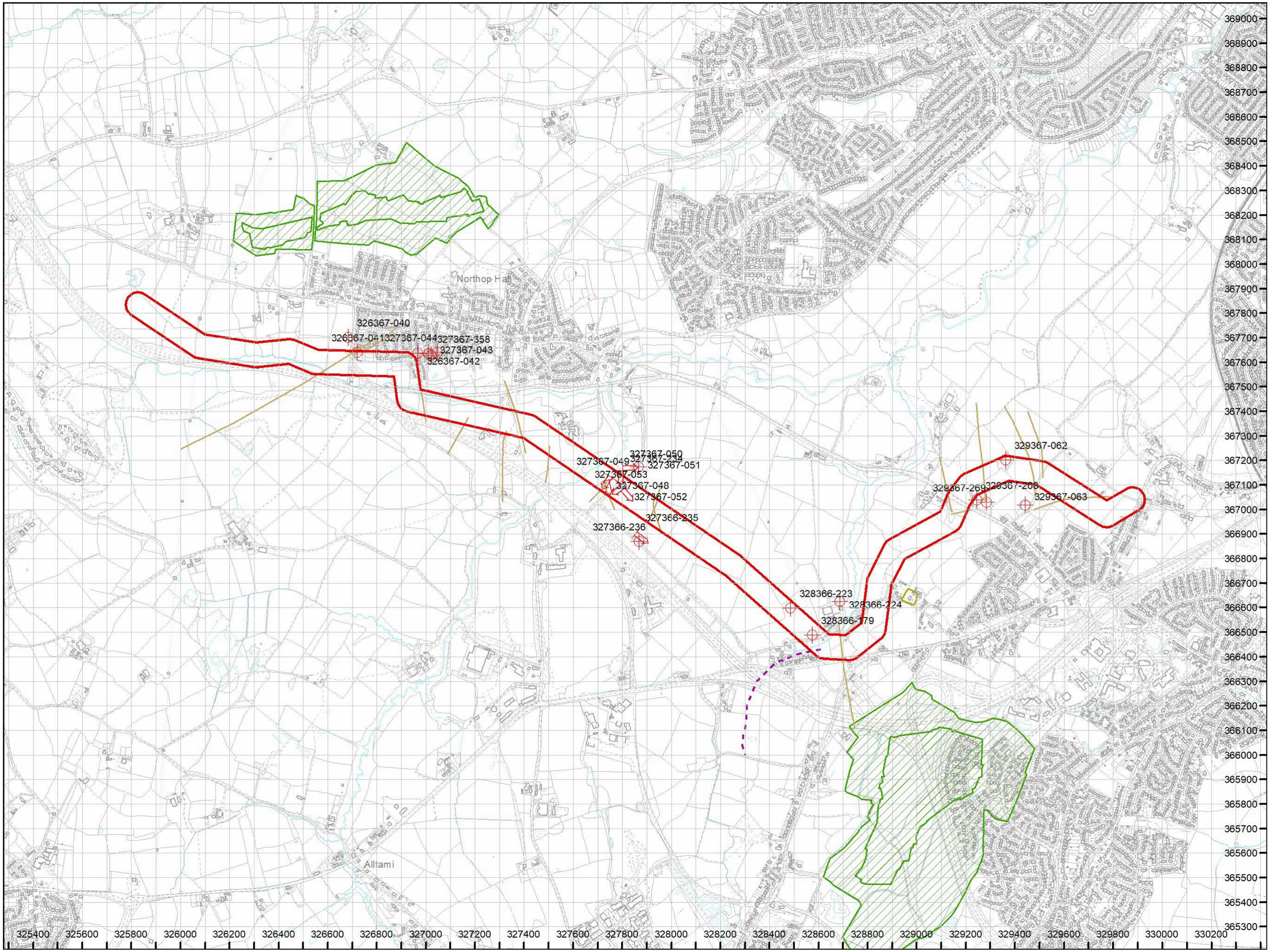
# Summary of findings



The map highlights any specific surface or subsurface features within or near to the boundary of the site.

## Key

- Approximate position of the enquiry boundary shown
- Disused mine shaft
- Disused adit
- Outcrop (Conjectured)
- Geological faults
- Unlicensed opencast site
- Site investigations




**How to contact us**
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www.groundstability.com

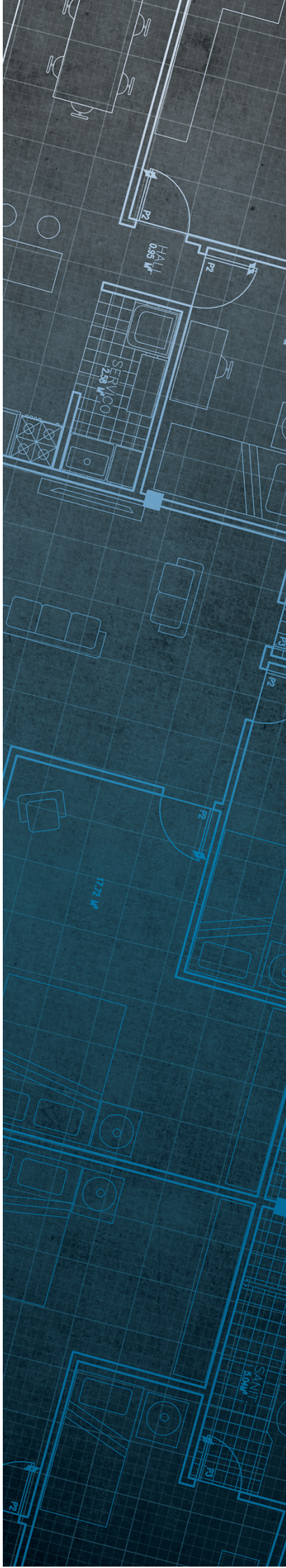
The Coal Authority

# Consultants

## Coal Mining Report

Liverpool Bay Ccs
Cheshire

| | |
|---|---|
| Date of enquiry: | 5 May 2021 |
| Date enquiry received: | 5 May 2021 |
| Issue date: | 6 May 2021 |
| Our reference: | 51002513967001 |
| Your reference: | Liverpool Bay G&G Desk Study 1 |



# Consultants

## Coal Mining Report

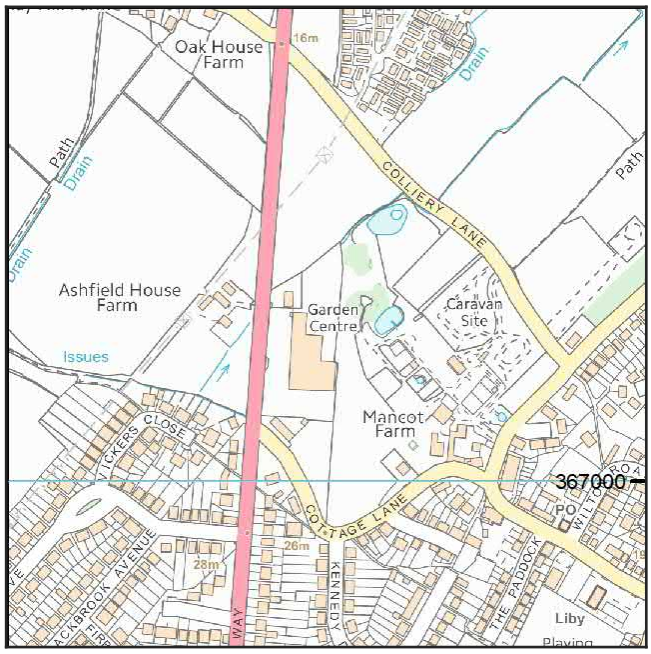
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

**Client name**

ENI ENGINEERING

**Enquiry address**

Liverpool Bay Ccs
Cheshire




Approximate position of property



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200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

[redacted]

@coalauthority
/company/the-coal-authority
/thecoalauthority
/thecoalauthority

# Section 1 – Mining activity and geology

## Past underground mining

| Colliery | Seam | Mineral | Coal Authority reference | Depth (m) | Direction to working | Dipping rate of seam worked (degrees) | Dipped direction of seam worked | Extraction thickness (cm) | Year last mined |
|---|---|---|---|---|---|---|---|---|---|
| unnamed | BRASSEY | Coal | 37SR | 41 | Beneath Property | 11.3 | East | 200 | 1870 |
| unnamed | MAIN | Coal | 37WQ | 53 | Beneath Property | 15.0 | East | 200 | 1876 |
| unnamed | MAIN | Coal | 7H1K | 70 | Beneath Property | 15.0 | East | 200 | 1876 |
| unnamed | MAIN | Coal | 7NX5 | 73 | South | 15.0 | East | 200 | 1895 |
| unnamed | PREMIER (LOWER FOOT) | Coal | 3CQW | 138 | North-West | 15.0 | North-East | 120 | 1913 |

## Probable unrecorded shallow workings

Yes.

## Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

## Mine entries

| Entry type | Reference | Grid reference | Treatment description | Mineral | Conveyancing details |
|---|---|---|---|---|---|
| Shaft | 331366-009 | 331287 366990 | The shaft was filled to an unknown specification by the NCB in 1951. The fill was drilled and grouted with 182 tons in May 1975 followed by inserting a 9m x 9m x 1.5m thick reinforced concrete plug at Rockhead some 6m below ground level. | Coal | |
| Shaft | 331367-005 | 331649 367405 | | Coal | |
| Shaft | 331367-006 | 331646 367399 | | Coal | |
| Shaft | 331367-036 | 331675 367392 | This entry was filled to an unknown specification in July 1951. | Coal | |
| Shaft | 331367-046 | 331824 367263 | | Coal | |
| Shaft | 331367-047 | 331843 367272 | | Coal | |
| Shaft | 331367-057 | 331353 367392 | This shaft is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that shaft has been partially or totally removed. | Coal | |
| Shaft | 331367-058 | 331372 367327 | This shaft is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that shaft has been partially or totally removed. | Coal | |
| Shaft | 331367-059 | 331391 367315 | This shaft is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that shaft has been partially or totally removed. | Coal | |
| Shaft | 331367-060 | 331391 367426 | This shaft is located in an area that has been worked by opencast mining operations. There are no details of any treatment but it is likely that shaft has been partially or totally removed. | Coal | |

## Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

| | | |
|---|---|---|
| 16138 | NW1531 | 0 |
| PO0 | 543 | |

**Please contact us on 0345 762 6848** to determine the exact abandoned mine plans you require based on your needs.

## Outcrops

| Seam name | Mineral | Seam workable | Distance to outcrop (m) | Direction to outcrop | Bearing of outcrop |
|---|---|---|---|---|---|
| BRASSEY | Coal | Yes | Within | N/A | 161 |
| MAIN | Coal | Yes | Within | N/A | 150 |

## Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Faults under or close to the property recorded.

## Opencast mines

Please refer to the “Summary of findings” map (on separate sheet) for details of any opencast areas within 500 metres of the enquiry boundary.

## Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

# Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

## Site investigations

| Distance to site investigation (m) | Direction |
|---|---|
| Within | N/A |

See Section 4 for further information.

## Remediated sites

| Distance to site remediation (m) | Direction |
|---|---|
| Within | N/A |

See Section 4 for further information.

## Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

## Mine gas

None recorded within 500 metres of the enquiry boundary.

## Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

# Section 3 – Licensing and future mining activity

### Future underground mining
None recorded.

### Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

### Court orders
None recorded.

### Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

### Withdrawal of support notices
The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

### Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

# Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

### Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

### Site investigations

The site is within an area of previous interest. It is close to where the Coal Authority has received information relating to past site investigations.

The site requires further investigation and may influence how you approach your risk assessment.

### Remediated sites

The site is within an area of previous interest. It is close to where the Coal Authority has investigated and where necessary remediated mine entries and/or shallow coal mine workings following specific reported hazards.

The site requires further investigation and may influence your risk assessment. We recommend that you order the Coal Authority **Surface Hazards Incident Report**, which will include more information about the hazard.

**For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.**

# Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

### Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

### Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

### Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

### Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

### Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

### Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

### Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

### Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

### Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

### Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

### Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

### Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

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### Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

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Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

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### Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

### Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

### Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

### Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The Coal Authority

# Summary of findings



The map highlights any specific surface or subsurface features within or near to the boundary of the site.

## Key

- Approximate position of the enquiry boundary shown
- Disused mine shaft
- Outcrop (Proven)
- Outcrop (Conjectured)
- Geological faults
- Unlicensed opencast site
- Site investigations
- Remediated sites


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# Annex E

GENERAL LIMITATIONS

# REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

## GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

## PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

**Coverage:** *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

# REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

## INTRUSIVE INVESTIGATION REPORTS

**Coverage:** *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

**9.** The investigation has been undertaken to provide information concerning either:

- **i.** The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- **ii.** Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

**10.** The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

**11.** For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

**12.** For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

**13.** The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

**14.** The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

**15.** The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

**16.** The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated

with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

## EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

## DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

**24.** The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

**25.** Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

## GEOTECHNICAL DESIGN REPORT (GDR)

**26.** The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

## MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

**27.** These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

**28.** The data is presented and will be compared with assessment criteria.

# Annex F

CIRIA C552

# RISK APPRAISAL

## RISK APPRAISAL METHODOLOGY

The CSM identifies potential contaminants, receptors and exposure pathways that may be present based on the selected end use (i.e. Residential, Commercial or Public Open Space etc).

The identification of potential "contaminant linkages" is a key aspect of the evaluation of potentially contaminated land. An approach based on the UK CIRIA report C552 (Contaminated Land Risk Assessment: A Guide to Good Practice, 2001) has been adopted within this report. For each of the contaminant linkages, an estimate is made of;

- The potential severity of the risk; and
- The likelihood of the risk occurring.

Table 1 presents the classification of the severity of the risk:

TABLE 1 SEVERITY OF RISK

| | |
|---|---|
| Severe | Acute risks to human health;<br>Major pollution of controlled waters (watercourses or groundwater) |
| Medium | Chronic (long-term) risk to human health;<br>Pollution of sensitive controlled waters (surface waters or aquifers) |
| Mild | Pollution of non-sensitive water resources. |
| Minor | Requirement for protective equipment during site works to mitigate health effects;<br>Damage to non-sensitive ecosystems or species |

The probability of the risk occurring is classified by criteria given in Table 2.

TABLE 2 PROBABILITY OF RISK OCCURRING

| | |
|---|---|
| High Likelihood | Contaminant linkage may be present, and risk is almost certain to occur in the long term, or there is evidence of harm to the receptor. |
| Likely | Contaminant linkage may be present, and it is probable that the risk will occur over the long term. |
| Low Likelihood | Contaminant linkage may be present and there is a possibility of the risk occurring, although there is no certainty that it will do so. |
| Unlikely | Contaminant linkage may be present but the circumstances under which harm would occur are improbable. |

An overall evaluation of the level of risk is gained from a comparison of the severity and probability as presented in Table 3.

TABLE 3 COMPARISON OF SEVERITY AND PROBABILITY

| | | **Severity** | | | |
|---|---|---|---|---|---|
| | | Severe | Medium | Mild | Minor |
| **Probability** | High Likelihood | Very high risk | High risk | Moderate risk | Moderate / low risk |
| | Likely | High risk | Moderate risk | Moderate/ low risk | Low risk |
| | Low Likelihood | Moderate risk | Moderate/ low risk | Low risk | Very low risk |
| | Unlikely | Moderate / low risk | Low risk | Very low risk | Very low risk |

Table 4 then provides a description of the typical consequences and potential actions required following each risk definition.

TABLE 4 QUALITATIVE RISK ASSESSMENT - CLASSIFICATION OF CONSEQUENCE

| **Classification** | **Definition** |
|---|---|
| Very High Risk | Severe harm to a receptor may already be occurring, or a high likelihood severe harm will arise to a receptor, unless immediate remedial works / mitigation measures are undertaken. |
| High Risk | Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken. Remedial works may be required in the short-term, but likely to be required over the long-term. |
| Moderate Risk | Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Some remedial works may be required in the long-term. |
| Moderate / Low Risk | Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as mild.<br>Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent. |
| Low Risk | Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild. |
| Very Low Risk | Low likelihood that harm could arise to a receptor. Such harm is unlikely to be any worse than mild. |

It should be noted that the identification of potential contaminant linkages does not indicate that they are significant. The risk to ground workers during any redevelopment has not been assessed as part of these works. It is recommended that a task specific risk assessment, which may include stipulations with regards to appropriate work control procedures and personal protective equipment (PPE), is completed prior to any future construction works.

# Annex G

## CONSULTEE RESPONSES SUMMARY

| Statutory Body | Topic | Comments |
|---|---|---|
| **Planning Inspectorate** | Contaminated Soil Leading to Effects on Human Health (Operation) | Assuming that any contamination is addressed during construction, the matter can be scoped out. |
| | Contaminants Reaching Controlled Water Receptors (Operation) | Contaminants reaching Controlled Water Receptors to be assessed. |
| | Study Area for Impacts on Lands and Soils | Detail to be provided on the buffer zone selected for the study area and how this accurately captures any potential effects from the Proposed Development. |
| | Possible Old Coal Mining Works | Assessment of any risk associated with coal mining structures / voids that would be affected by the Proposed Development is required. |
| | Remediation Strategy | A minimum of an outline proposed remediation strategy would need to be produced to demonstrate the feasibility of the remediation of the proposed development. |
| | Baseline Data Gathering | Target Agricultural Land Classification Surveys are proposed. As such rationale behind any targeted surveys should be clearly outlined. |
| | Mineral Safeguarding | An assessment of effects on all mineral safeguarding Areas affected by the Proposed Development should be undertaken including those identified by Flintshire County Council. |
| | Disposal of Excavated Materials | Details on any effects of material excavation associated with the Proposed Development should be undertaken. |
| **Public Health England (PHE)** | Water | PHE suggests that assessments of potential impacts on human health should be undertaken, which should identify and consider all routes by which emissions may lead to population exposure, including any potential impacts on groundwater and surface water, and consideration of potential impacts on recreational users. |
| | Land Quality | PHE would expect details of any hazardous contamination present on site to be present within a Site Condition Report with an associated Risk Assessment. All public health impacts associated with ground contamination should be assessed in accordance with the Environment Agency publication on Land Contamination: Risk Management, which would include the assessment of potential impacts on nearby receptors, and any control and mitigation measures. |
| | Waste | PHE suggest that any waste associated with the Proposed Development is handled in compliance with the Waste Hierarchy, with any due care given to the assessment of implications, wider environmental and public health impacts of different waste disposal options, including disposal routes, transport methods, waste delivery and acceptance procedures both on and off site. |
| **Natural Resources Wales** | Potential Sources of Contamination | NRW suggests assessment of the following additional sources of contamination are required for the Proposed Development:<br>• Oil/fuel/diesel leakage from heavy construction equipment<br>Possible water quality degradation associated with the use of chemicals such as bentonite as part of the environmental mitigation/management of the Proposed Development, and from any sediment impacts associated with storm runoff. |
| | Materials and Waste | • Any contaminated materials revealed on site should be moved (on or off site) in consultation with NRW;<br>• The location of historic Landfills should be checked prior to works;<br>Any facilities for the storage of oils, fuels or chemicals should be sited on impervious bases and surrounded by impervious bund walls. The bunded |

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| | | compound should be 110% of the capacity of the tank with all filling points, gauges, vents and sight glasses located within the bund. Associated pipework should be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets should be detailed to discharge downwards into the bund, refuelling should be supervised at all times and preferably on an impermeable surface. |
| | Hydrology | Construction Phase<br>• Further details on dewatering is needed, including any impacts on potential eco systems. NRW suggest a Dewatering Management Plan is drafted to include details on groundwater management and monitoring. This should also include assessment on any private water supplies that might be affected by the Proposed Development.<br>Operational Phase<br>NRW believe that the Proposed Development needs further assessment of potential long-term effects such as the potential change in surface water regime as a result of the Proposed Development, due to the pipeline acting as a preferential pathway. This could lead to implications for groundwater and potential ecosystems. The impacts of the Proposed Development on soil (notable compaction due to heavy plant use) also needs further assessment. |
| **Coal Authority** | Coal Risk | A Coal Mining Risk Assessment or similar report should be undertaken where sections of the Proposed Development fall within the Development High Risk Area as defined by the Coal Authority. |
| **Natural England** | Land and Soil | • Assessment on how any soils will be temporarily and/or permanently disturbed/damaged as part of the Proposed Development including if any 'Best and Most Versatile' (BMV) land is affected;<br>• Appropriate soil surveys to be undertaken to cover the full extent of the study area if no information is readily available. Surveys should ideally cover one auger boring per hectare supported by pits dug in each main soul type to confirm physical characteristics of the full depth of soul resource<br>• Assessment to detail how any adverse impacts on agricultural land and soils can be avoided/mitigated, and demonstration on how soils will be sustainably managed during construction and operation of the Proposed Development. Preparation of the Construction Environmental Management Plan (CEMP) is welcomed to outline specific details;<br>• Development of a methodology and assessment of whether soils are in a suitable condition to be handled; and<br>Assessment of the effect on land drainage, agricultural access and water supplies, including other agricultural land in the vicinity. |
| **Flintshire Council** | Land and Soil | • FCC Contamination Officer is satisfied that the scoping report has identified that land contamination will be a particular concern associated with the Proposed Development however due consideration must be given to the difference in policy between England and Wales. Contamination in Wales should be delt with in accordance with the Welsh Government Contaminated Land Statutory Guidance, Planning Wales (edition 11, 2021), the Contaminated Land (Wales) Regulations 2001 and any other local council plans that may be available.<br>• Assessment of gas, vapour, groundwater monitoring and landfills should be undertaken for the Proposed Development with attention to the former MOD munitions factory in Deeside and lead mines in particular.<br>Engagement with FCC's Contamination Officer during the progress of the Proposed Development would be welcomed. |
| | Mineral Safeguarding | • The Flint AGI possible site locations are within a Mineral Safeguarding Area, Flint AGI (B) and Flint AGI (C) sit atop superficial glaciofluvial sand and gravel which would effectively be sterilised if either route option selected. Flint AGI (A) is there preferred route option of FCC as this would not affect a mineral resource. If either Flint AGI (B) or Flint AGI (C) are selected, then evidence would need to be provided outlining why the Proposed Development is of overriding importance and if prior extraction should be considered. Policy MIN8 or EN23 of |

| | | |
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| | | the Flintshire Unitary Development Plan would also need to be considered if Flint AGI (B) or Flint AGI (C) were selected.<br>Other areas along the Proposed Development are situated within existing or potential Mineral Safeguarding Areas and therefore sections of the Proposed Development within this area would need to demonstrate compliance with the Mineral Safeguarding Policy. |
| **Environment Agency** | Permitting | Environmental Permitting may be required during construction works, which may include abstraction licences or Regulatory Positions Statements required such as 'temporary dewatering from excavations to surface water'. Early engagement with the EA is recommended |
| | Water Quality and Groundwater | Any development along a watercourse could be subject to a Water Framework Directive (WFD) Assessment.<br>The 'Environment Agency's Approach to Groundwater Protection' should be given due consideration during progress of the Proposed Development. |
| | Contaminated Land and Waste | Due to the potential for contamination on site it is recommended that the following guidance is followed during any further assessment and the assessment is carried out by a suitably qualified professional in accordance with British Standard (BS) 10175 (2001) Code of Practice:<br>Guidance on Land Contamination Risk Management (LCRM), with future assessments including a Preliminary Risk Assessment, a Site Investigation Scheme, and Options Appraisal and Remediations Strategy and a Verification Plan;<br>• EA's Guiding Principles for Land Contamination;<br>• National Quality Mark Scheme for Land Contamination Management; and<br>• Any other relevant guidance listed on the Government's Contaminated Land website.<br>Any waste on site should be handled in accordance with the CL:AIRE Definition of Waste (Development Industry Code of Practice (version 2), with all contaminated materials adequately characterised both chemically and physically (in accordance with BS EN 14899:2005), with the permitting status of any proposed on-site operations made clear. If any waste is to be taken off-site then it must be subject to management legislation which includes the following:<br>• Duty of Care Regulations 1991;<br>• Hazardous Water (England and Wales) Regulations 2005;<br>• Environmental Permitting (England and Wales) Regulations 2016; and<br>The Waster (England and Wales) Regulations 2011. |
| **Chester West and Chester Council** | Contamination | As sections of the Proposed Development are located within previously developed areas, contamination risks should be suitably assessed, with consideration given to the assessment of any preferential pathways of contamination as a result of the Proposed Development.<br>A methodology of the handling of excavated materials should be included within any further assessment. |
| **Canal & River Trust (C&RT)** | Geology, Land Contamination and Soils | Any Contamination Risk Assessment should consider the canal network as a sensitive receptor<br>Potential Contaminations Pathways should be updated to include potential contamination of waterways from wind blow and the creation of dust and debris from construction activity<br>Any Assessment of ground conditions should consider the structural integrity of the canal as set out in the National Planning Policy Framework (NPPF)<br>If the Proposed Development is to cross the canal network then the depth of the pipeline would need to be agreed with the C&RT to ensure structural integrity of the canal network, along with agreement on the construction technique and method of works. Any works would have to be carried out in accordance with the Canal & River Trust Code of Practice. |
| | Water Resource and Flood Risk | Water capture, treatment and disposure should be adequately assessed as part of the Proposed Development, especially where in close proximity to the canal |

| | | |
|---|---|---|
| | | corridor or any watercourse which interacts with the canal. This assessment should also consider potential spillage or run-off directly into the canal during construction works.<br>Silt discharge into the canal (or associated watercourses) would not be favourable, mechanisms to prevent and mitigation any silt discharge should be detailed within further assessment.<br>Any water abstraction would need formal consent from the C&RT. |

# Annex H

## GEOLOGICAL SUMMARY

It should be noted that this annex was produced at a point in time during the development of the Basic Design of the DCO Proposed Development. Therefore, the design information presented herein may be different to the final Basic Design which is described in **Chapter 3 – Description of the DCO Proposed Development (Volume II)**. However, this annex remains applicable to informing the Environmental Impact Assessment and any associated limitation or assumptions are discussed in the respective Environmental Statement Chapter and Appendix.

# 1 GEOLOGICAL SUMMARY

## 1.1 PUBLISHED GEOLOGY AND BGS BOREHOLES

A geological strata key is included at as Table 1-1 and an overview of each sections superficial and bedrock geology is provided after.

**Table 1-1 - Geological Key**

| Key | | | | | |
|---|---|---|---|---|---|
| **Superficial** | | **Bedrock** | | | |
| | Glacial Till (Secondary Undifferentiated Aquifer) | | Chester Sandstone Formation (Principal Aquifer) | | Gwespyr Sandstone (Secondary A Aquifer) |
| | Glaciofluvial Deposits (Secondary A Aquifer) | | Kinnerton Sandstone Formation (Principal Aquifer) | | Bowland Shale (Secondary Undifferentiated Aquifer) |
| | Tidal Flats Deposits (Secondary Undifferentiated Aquifer) | | Wilmslow Sandstone (Principal Aquifer) | | Hollin Rock (Secondary A Aquifer) |
| | Head Deposits (Secondary Undifferentiated Aquifer) | | Etruria Formation Mudstone, Sandstone and Conglomerate (Secondary A Aquifer) | | Cefn Mawr Limestone (Principal Aquifer) |
| | Peat (Secondary Undifferentiated Aquifer) | | Pennine Middle Coal Measures (Secondary A Aquifer) | | Loggerheads Limestone (Principal Aquifer) |
| | Alluvial Fav Deposits (Secondary A Aquifer) | | Pennine Lower Coal Measures (Secondary A Aquifer) | | Llanarmon Limestone (Principal Aquifer) |

## Section 1

**Insert 1-1 - Superficial Geology**


**Insert 1-2 - Bedrock Geology**

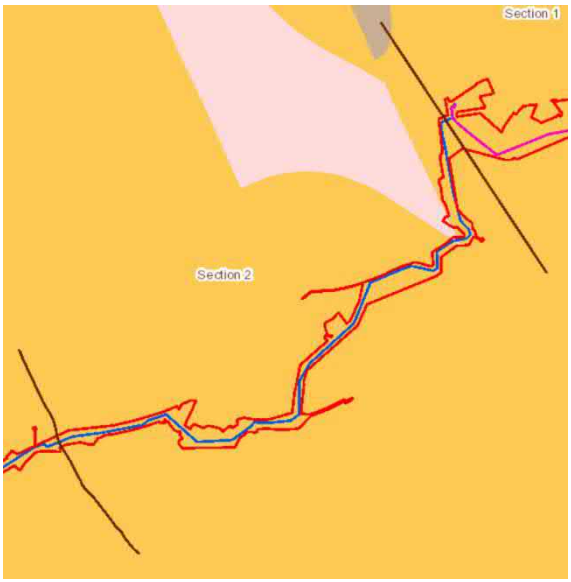

## Boreholes for Section 1

| BGS Ref: | Location | Log |
|---|---|---|
| SJ47SE23 | **NGR:** 346146E, 374659N North of M56 | Made Ground to 0.4m. Glacial Till to 1.7m. Fluvio-Glacial Deposits to 11.90m. Glacial Till to 15m. No groundwater encountered within this borehole. |
| SJ47SE19 | **NGR:** 345790E, 375020N North of the A5117 | Topsoil to 0.40m. Sandy Clay to 1.60m. No groundwater encountered within this excavation. |
| SJ47NW24 | **NGR:** 344690E, 374720N North of M56 | Drift deposits to 1.52m. Hard sandstone to 152.40m. Water Leve at 14.50m. |
| SJ47NW19 | **NGR:** 344440E, 375480N North of M56 | Sandy clay and pebbles to 0.61m. Sandstone to 49.07. Conglomerates and sandstone to 82.75m. Marl and sandstone to 97.38m. Sandstone to 142.10m. Water Level at 7.31m. |
| SJ47NE91 | **NGR:** 346920E, 376650N North of Marsh Lane | Soft silty clay and clayey silt with soft fibrous peat to 2.90m. Sand 12.10m. No groundwater encountered within this borehole. |
| SJ47NE42 | **NGR:** 346240E, 375010N North of A5117 | Sandy clay with some gravel to 2.50m. No groundwater encountered within this borehole. |
| SJ47NE79 | **NGR:** 347020E, 376740N North of Marsh Lane | Disturbed ground to 0.17m. silt and clay with peat and occasional wood fragments to 8.70m. No groundwater encountered within this borehole. |
| SJ47NE105 | **NGR:** 346822E, 375730N North-east of Elton | Organic Silty Soil to 0.90m. Peat to 5m. Soft silty clay and silty peat to 10m. Boulder clay to 27.40m No groundwater encountered within this borehole. |
| SJ47NE119 | **NGR:** 346810E, 375850N North-east of Elton | Soil and peat to 4.88m. Sandy silt to 6.55m. Peat to 7.45m. Boulder Clay to 30.33m. |
| SJ47NE141 | **NGR:** 346895E, 375967N North-east of Elton | Topsoil to 0.15m. Clay to 0.66m. Peat to 4.30. Sandy silt to 8.50m. Peat to 9.50m. Silty sand to 12.55m. Boulder clay to 14.70m. Clayey silt to 21.10m. Silty clay to 24.55m. Boulder clay to 29.09m. Laminated silts to 36.55m. Clayey sandy silt to 44.05m. Silty sand to 51.70m. Sandstone to 117.10m. No groundwater encountered within this borehole. |
| SJ47NE142 | **NGR:** 346944E, 375978N North-east of Elton | Clay to 1.30m. Fibrous peat to 1.60m. Clay to 7.50m. Fibrous peat to 10.50m. Sand to 12.30m. Clay to 19.50m. Silt to 22.10m. Clay 34.50m. Glacial Till to 39m. Clay 40m. Groundwater encountered at 2.50m |

## Section 2

**Insert 1-3 - Superficial Geology**


**Insert 1-4 - Bedrock Geology**




## Boreholes for Section 2

| | | |
|---|---|---|
| SJ47SW118 | **NGR:** 344390E, 374310N<br>South of Thornton-le-Moors | Topsoil to 0.30m Very stiff clay to 2.90m.<br>No groundwater encountered within this borehole. |
| SJ47SW135 | **NGR:** 344715E, 373545N,<br>South of the M56, east of Thornton Green Lane | Made Ground to 1m. Glacial Till to 3.20m. Weathered Bunter Sandstone to 3.70m. Bunter Sandstone to 4m.<br>No groundwater encountered within this borehole. |
| SJ47SW16 | **NGR:** 344490E, 373280N,<br>South of the M56, west of Thornton Green Lane | Topsoil to 0.46m, sand and clay to 10m, sandstone to 53.3m, Red Marl to 54.56m, Sandstone to 121.31m, Hard Red Marl to 124.9m.<br>Water encountered at 4.10m. |
| SJ47SW133 | **NGR:** 343832E, 373060N,<br>North of the M56 | Made Ground to 2.70m. Sand with laminated clay to 4.10m. Clay to 5.50m. Sand to 15m.<br>Water encountered at 3.60m. |
| SJ47SW180 | **NGR:** 343680E, 372760N<br>South of the M56, within Gowy Marshes | Amorphous peat to 5.50m. Sand and gravel to 7.0m. Firm to stiff clay to 16.0m. Firm clay to 18.0m<br>Water encountered at 3m. |
| SJ47SW137 | **NGR:** 342630E, 371450N<br>East of the M53 | Topsoil to 0.30m. Very stiff clay to 8.0m<br>No groundwater encountered within this borehole. |
| SJ47SW303 | **NGR:** 341440E, 371280N<br>East of the M53, along Croughton Road Caughall. | Topsoil to 3m. Sandstone to 30m.<br>Water strikes 12m and 20m. Groundwater Level at 20m. |

## Section 3

**Insert 1-5 - Superficial Geology**


**Insert 1-6 - Bedrock Geology**

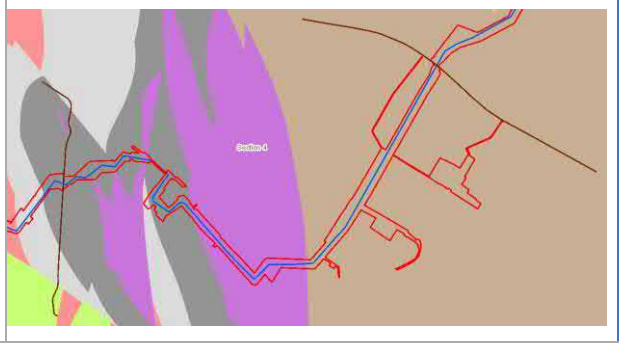

## Boreholes for Section 3

| BGS Ref: | Location | Log |
|---|---|---|
| SJ37SE33 | **NGR:** 339954E, 371122N<br>Along the A41 | Topsoil to 0.30m. Sandy Clay to 1.3m. Sand to 7.9m.<br>No water encountered within the borehole. |
| SJ37SE6 | **NGR:** 337920,370710<br>Mollington Farm | Boulder Clay with sand to 22.86m. Sandstone to 27.43m. Pebbly soft red sandstone to 47.24m. Hard red sandstone to 106.68m.<br>No water encountered within the borehole. |

## Section 4

**Insert 1-7 - Superficial Geology**

**Insert 1-8 - Bedrock Geology**



## Boreholes for Section 4

| BGS Ref: | Location: | Log: |
|---|---|---|
| SJ36NE8 | **NGR**: 335700E, 368400N Northeast of Colliery Lane, southwest of Deeside. | Sand and clay to 60m. Soft Sandstone to 120m. Water overflowing at the surface at a gallon per minute |
| SJ36NW19 | **NGR**: 331650E, 367400N Northeast of Colliery Lane, southwest of Deeside. | Topsoil to 7.2m. Pennine Coal Measures to 147.84m. No water encountered within the borehole. |
| SJ36NW475 | **NGR**: 331700E, 367400N Northeast of Colliery Lane, southwest of Deeside. | Superficial Drift deposits to 7.9m. Coal Measures to 8.71m. No water encountered within the borehole. |

## Section 5

| Insert 1-9 - Superficial Geology | Insert 1-10 - Bedrock Geology |
|---|---|
|  |  |

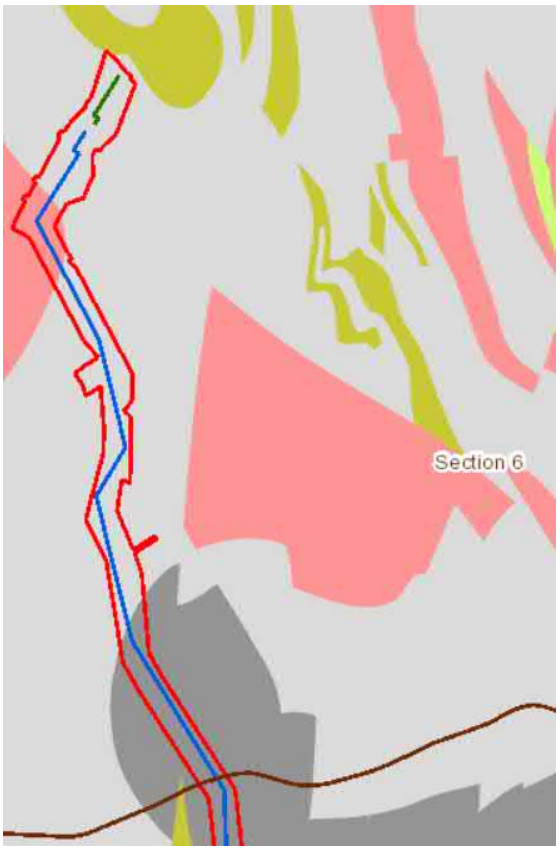
## Boreholes for Section 5

| BGS Ref: | Location: | Log: |
|---|---|---|
| SJ36NW45/14 | **NGR**: 330140E, 366890 NA494, south of Church Lane | Sand, boulders, clay and gravel with soils to 75.83m. No groundwater encountered within the Borehole |
| SJ36NW45/12 | **NGR**: 330140E, 366890 N A494, south of Church Lane | Sand, boulders, clay and gravel with soils to 75.83m. No groundwater encountered within the Borehole |
| SJ36NW45/15 | **NGR**: 330140E, 366890 N A494, south of Church Lane | Sand, boulders, clay and gravel with soils to 75.83m. No groundwater encountered within the Borehole |
| SJ36NW45/6 | **NGR**: 330140E, 366890 N A494, south of Church Lane | Sand, clay, gravel and boulders with soils to 84.12m. No groundwater encountered within the Borehole |
| SJ26NE27 | **NGR**: 326310E, 367640 N East of the A55, Northwest of Northop Halll | Glacial Till to 6.30m. Glacial sand and gravel to 13.10m. Mudstone (as part of the coal measures) to 13.60m. No groundwater encountered within the Borehole |
| SJ26NE21 | **NGR**: 329140E, 367030N Holywell Road, South of Castle Hill Farm. | Fill material present to 0.50m. Sand and gravel to 3.90m. Stiff to very stiff clay to 5.20m. First to very stiff clay to 7.30m. Clay with sandstone to 10.0m. Sandstone to 12.20m. Groundwater Encountered at 2.30m. |
| SJ26NE32 | **NGR**: 329150E, 367010N Holywell Road, South of Castle Hill Farm. | Glacial Till to 11.90m. Sandstone (as part of the Coal Measures) to 12.1m. |

## Section 6

**Insert 1-11 - Superficial Geology**


**Insert 1-12 - Bedrock Geology**




## Boreholes for Section 6

| BGS Ref: | Location: | Log: |
|---|---|---|
| SJ26NE26 | **NGR**: 325590E, 368520N Along Connah's Quay Road (B5126) | Till and Glacial Sands and Gravel to 17.1m. Borehole abandoned due to obstruction. |

# Annex I

## SITE WALKOVER

It should be noted that this annex was produced at a point in time during the development of the Basic Design of the DCO Proposed Development. Therefore, the design information presented herein may be different to the final Basic Design which is described in **Chapter 3 – Description of the DCO Proposed Development (Volume II).** However, this annex remains applicable to informing the Environmental Impact Assessment and any associated limitation or assumptions are discussed in the respective Environmental Statement Chapter and Appendix.

Site Walkover – Selected Areas
Ground & Water
29 November 2021

**HyNet CO2 Pipeline: Section 1 Proposed AGI→ CF Fertilisers UK Ltd**

Site is located at CF Fertilisers UK Ltd and comprises a lorry park to the south, a small concrete surfaced storage area to in the northeast and two car parks; 'Car Park Pass C' a disused car park located in the northwest and 'CF Staff Car Park' located in the centre of the site and used by CF personnel, their visitors and those holding authorisation to park from CF (according to signage). The land surrounding the parking areas comprises overgrown vegetation including brambles, shrubs and semi and mature trees. A series of drainage channels are located on site and along the western site boundary. Additionally, a small plastic lined pond is located in the northeastern corner of the site.

Open access to CF Staff car park with crash guard barriers at its entrance. Ground cover is composed of asphalt, which appears to be in good condition (painted bays with no potholes observed). At time of walkover the car park was approximately 60% full in capacity.

Access to Car Park Pass C is temporarily blocked by a large concrete block. A drain is culverted below the access to this car park and metal fencing is located on either side of the access road to prevent vehicles entering drain. Ground cover is composed of asphalt. At the time of the walkover the car park was empty and ground condition difficult to observe due to thick ice.

Open access to the lorry park with a small portacabin identified as a 'dispatch office', allowing access to the wider site, located at the eastern limit of the site boundary. The lorry park contains a sheeting gantry and associated electrical station, a storage area (approx. 17no. drums stored on wooden pallets (contents and capacity unknown), tonne bags of aggregate, wooden planks, metal structures likely use at gantry), 2no. portaloos, several grit bins and a Veolia general waste bin. Wooded area was observed along the southern perimeter of the lorry park, beyond heras and concrete pillar and metal fencing. Ground cover is composed of asphalt, which appears to be in good condition (painted bays with speed ramps and no potholes observed).

There is restricted access to the small concrete surfaced storage area located in the northeast of the site and at the time of the walkover the surveyors were unable to access this area (access to this area requires full induction to be given by CF Fertilisers Ltd). However, surveyors were able to view this area at a distance, from the wooded northern perimeter. The storage area is enclosed by concrete post and metal wire fencing and is occupied by several shipping containers and grit bins, an old trailer, a raised concrete slab, wooden pallets and a drain (indicated by reeds).

The vegetated banks along the drains are generally overgrown and very minimal litter was observed. The onsite drains fed the offsite drainage channel, located to the west, which was observed to flow towards the north. However, no flow was observed at the drain to the east of the site. Additionally, the drain located alongside the access road presented an obvious iridescent sheen indicating hydrocarbon impact.

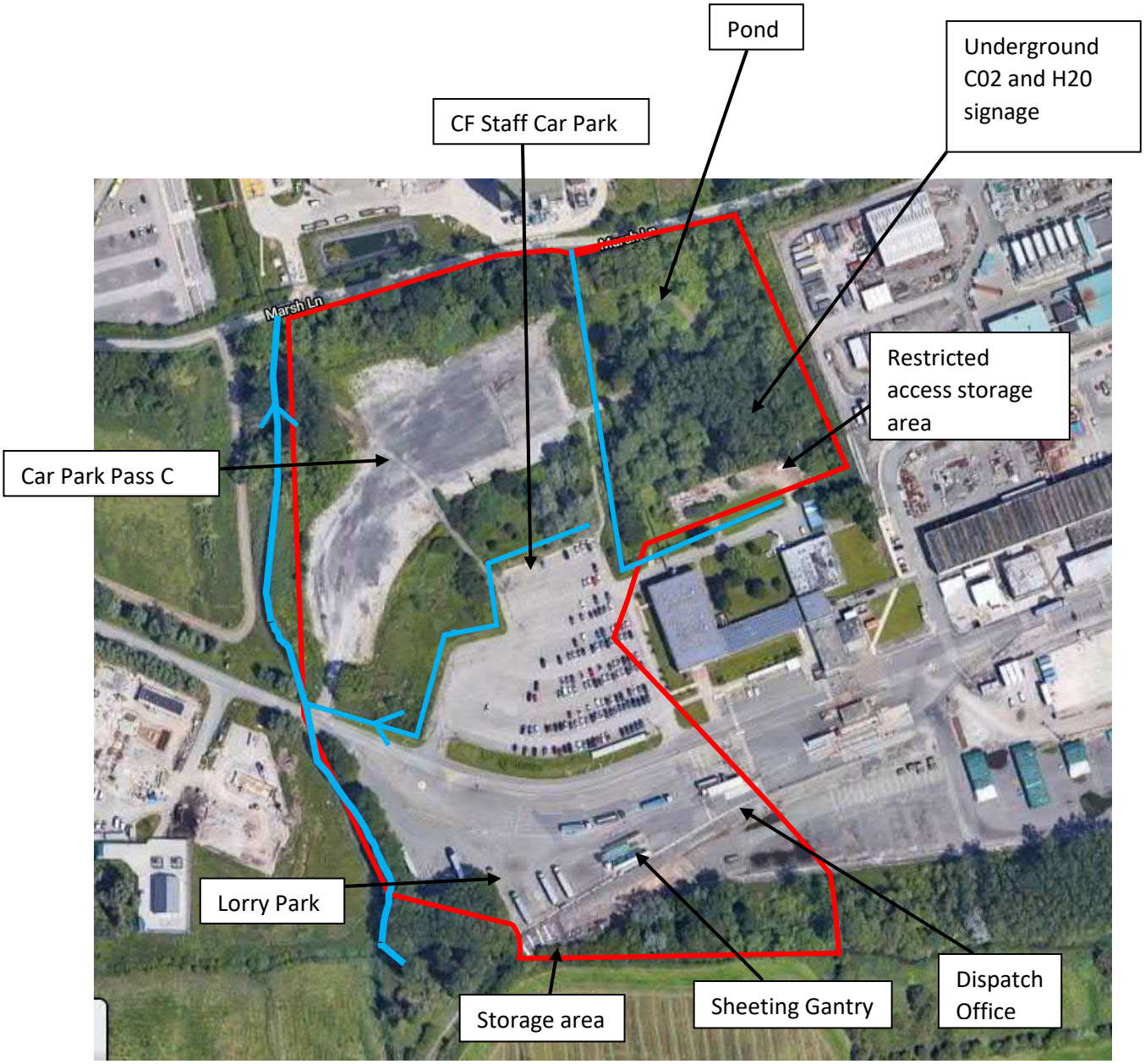
Ground levels across the site were generally flat, with hummocky, uneven ground confined to the areas of overgrown vegetation.

Housekeeping on site generally very good with minimal litter and designated bins for waste observed. Although, plastic piping, chapter 8 barriers and dumped concrete bollards and slabs were observed at Car Park Pass C. Additionally a wheelbarrow and tyre were observed at the pond in the northeast of the site.

In the heavily wooded northeastern corner of the site, signage for underground carbon dioxide and water pipelines was observed.

Site Walkover – Selected Areas
Ground & Water
29 November 2021

**HyNet CO2 Pipeline: Section 1 Proposed AGI→ CF Fertilisers UK Ltd**




Red – approximate site boundary

Blue – drains (arrow in direction of flow)

Site Walkover – Selected Areas
Ground & Water
29 November 2021

**Hynet North West: Former Thornton Green Landfill**

Due to herd of cattle the site was not entered. Instead, the following observations were taken from the access gate along Thornton Green Lane;

- Site comprises pastureland, grazed by domestic cattle.
- Site is access via gate at Thornton Green Lane, opposite the Thornton Manor Nursing Home.
- Surrounding land use is agricultural, with a nursing home and a residential building located within 100m of the site to the southwest, both accessed via Thornton Green Lane.
- An area of woodland and the M56 motorway bound the southern and eastern limits of the site (respectively).
- An unnamed drainage channel runs adjacent to the western site boundary. The banks are heavily vegetated and wooded. Channel orientated approximately northeast – southwest. No water was observed in the channel.
- Site is irregular in shape and the topography appears to be slightly elevated in the centre, sloping gently east and west (towards the M56 and drainage channel, respectively).
- A heras fenced area, with Fugro signage indicating 'site investigation' was observed, although no materials / equipment was enclosed within the structure.
- Site boundaries consisted of vegetation (hedgerows, shrubs and mature trees) wooden fencing and wooden post and barbed wire fencing.
- There was no evidence of fly-tipping and no built structures on site.
- An overhead power line trending north – south, over centre of the site was observed. One pylon located within the red line boundary.
- Three grid interceptor located along Thornton Green Lane.
- 

**Hynet North West: Former Spring Farm Landfill**

- Site contains arable land (no evidence indicating pastureland).
- Site is accessed via a gate at Thornton Green Lane.
- Surrounding land use is agricultural with neighbouring farms and few residential buildings.
- Wood Farm and Spring Farm are located within 100m of the site to the east and south (respectively).
- The M56 motorway is located immediately adjacent to the northwestern site boundary.
- An unnamed drainage channel runs adjacent to the western site boundary, orientated approximately northwest – southeast. Where the drainage channel is culverted beneath the motorway the banks are constructed of concrete slabs. However, away from the motorway, the banks are unsupported, and the natural clay superficial deposits are observed. During the walkover the channel contained very shallow water, which appeared to flow north (fast flowing). No evidence of litter or sheen / odour at drainage channel.
- A pond containing very shallow water is located along the southern site boundary. Does not appear to be lined.
- Two heras fenced areas, without signage were observed; one adjacent to Thornton Green Lane and the other at the western limits of the site. All materials and equipment relating to ground drilling were observed at these locations including metal casing, wooden pallets, wooden core boxes, 5no. IBCs (Intermediate Bulk Containers), bentonite and gravel bags, casing stand etc. Additionally, an installed monitoring point with a blue metal cover (top hat) was identified at the western limit within the heras fenced area.
- Site boundaries consisted of vegetation (hedgerows, shrubs and mature trees) and wooden fencing.
- Topography slopes gently to the southwest from the northeast, with the eastern portion of the site lying generally flat.
- There was no evidence of fly-tipping, no built structures and no overhead power lines on site.

Area 4 A (land parcel 2385)

The River Gowy flows north along the western boundary of the site and is fast flowing. The northern boundary along the motorway is lined by wooden fencing. A wooded area runs east-west through the centre of the site and is enclosed with a wooden post and barbed wire fence. The southernmost drain of the site had a frozen surface and the water level was high, almost at ground level (approximately 0.2m bgl). A concrete drainage channel is orientated north-south cutting through the centre of the site (where the site width narrows). It is approximately 4m wide. The water had no flow and appeared stopped by a concrete bank at the northern end. There was vegetation growing around the banks of the drainage channel and it was giving off an odour. A small amount of scattered plastic from the motorway was seen across the site. There were no built structures other than the drainage channels visible on maps, no evidence of fly-tipping and no overhead power lines.

Area 4 B (land parcel 10975)

Accessed via footbridge from Site 4A (parcel 2385). Site boundaries consisted of wooden fencing and wooden post and barbed wire fencing. The river Gowy flows fast in a northerly direction and is located along the northeastern site boundary. To the northeast the land consisted of grass fields used for cattle grazing. To the southwest were ploughed fields and a field of planted trees. The Mill Brook was observed from a distance as the banks were vegetated. In the centre of the site was a sinuous depression (approximately 0.3m bgl) orientated north-south. There was no evidence of fly-tipping, no built structures and no overhead power lines.