Swindon Kennels Bridge

Hepple

Ground Investigation Report

Issue Date:

17 August 2021

Report Number:

20031-01

Client:

Northumberland County Council

Revision:

A

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Report Ref	Prepared by	Date	Reviewed by	Date
21070-01	S Jones BSc FGS	17/08/21	A Coverdale BSc MSc CGeol FGS	17/08/21

Contents

1. Introduction

1.1 Commission

Coast Consulting Engineers Ltd (Coast) was commissioned by Northumberland County Council (NCC) to carry out a Ground Investigation at Swindon Kennels Bridge, Hepple, Northumberland. A site location plan is presented as Drawing No. 21070-01 in Appendix A.

1.2 Proposals

It is understood that NCC propose to repair an existing bridge that crosses Grasslees Burn, details of which are shown on NCC Drawing 'Existing General Arrangements', Ref. HB187325/B/C180/01/01, a copy of which is included in Appendix A.

1.3 Objectives

The objectives of the investigation were as follows:

- Provide information on ground conditions.
- Carry out in-situ testing and sampling.
- Carry out geotechnical laboratory analysis.
- Assess options for piling a new proposed bridge abutment.

This report presents the factual information available during this appraisal, interpretation of the data obtained and recommendations with respect to future construction.

1.4 Information Sources

No previous ground investigation information was available.

1.5 Limitations

This report has been prepared for NCC and their appointed agents only and should not be relied upon by any third party without the written permission of Coast. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors do not owe them any Duty of Care or Skill.

2. Site Details and Scope of Works

2.1 Site Description

The site is Swindon Kennels Bridge which is located c.1.2km SW of the village of Hepple in Northumberland.

National Grid Reference: 397333, 599684

The bridge is a single span concrete structure, comprising a simply supported concrete encased filler beam deck, carried by masonry abutments. It carries the C180 over Grasslees Burn, a tributary of the River Coquet.

Swindon Kennels Bridge has been identified as understrength and there is also evidence of rotation of the abutments. The main proposed works are to remove the existing deck, and replace it with a deck of adequate capacity. This reconstruction also involves installing piled abutments behind the existing abutments,

2.2 Scope of Ground Investigation

The following scope of fieldwork and laboratory analysis was undertaken:

- Drilling of 2 No. cable percussion boreholes to depths of 15.5m.
- Rotary follow on drilling in each of the cable percussion boreholes, terminating at 18.0-20.95m depth.
- In-site testing comprising Standard Penetration Tests (SPTs).
- Obtaining soil samples for laboratory analysis.
- Installation of 2 No. groundwater monitoring standpipes.
- Geotechnical testing of soils, including water soluble sulphate, soil pH, Atterberg Limits, particle size distribution.
- Contamination testing of Made Ground comprising a suites of metals, metalloids, non-metals, Polyaromatic hydrocarbons (PAH) and asbestos.

The fieldwork was undertaken between the 19-23 July 2021.

A plan showing the location of the exploratory holes is included as Drawing No. 21070-02 in Appendix A and copies of the exploratory hole logs are provided in Appendix B.

Geotechnical testing was performed at a UKAS accredited laboratory and in accordance with the procedures defined by BS1377:1990 “Methods of Test for Soils for Civil Engineering Purposes”. Similarly, chemical analysis of soils was performed at an MCERTS and UKAS accredited laboratory. Copies of the laboratory test results are included in Appendix C.

3. Ground Conditions

3.1 Published Geological Information

British Geological Survey Map, 1:50,000 scale Sheet 8 Elsdon, records the site to be underlain by alluvial deposits. The underlying bedrock is Carboniferous Fell Sandstone.

3.2 Summary of Borehole Logs

Depth Range to Base of Strata	Material Type
Min - Max Depth 1.0m – 1.2m	Made Ground: Tarmac 0.2-0.25m thick, overlying grey slightly sandy gravel of fine to coarse limestone and shale.
Min -Max Depth 4.5m	Cohesive alluvium recorded in BH01 only: soft orange brown very sandy slightly gravelly clay.
Min – Max Depth 18.0-20.95 – 3.20m	Granular alluvium: Loose fine sand recorded to 10m depth in both BHs, underlain by medium dense to dense very sandy gravel or gravelly sand to base of borehole. Sandstone cobbles/boulders recorded at c.15.5m depth, preventing progress of cable percussion boreholes.

3.3 Soil Properties

3.3.1 Upper Loose Sand and Very Sandy Clay (Up to 10m Depth)

SPT N values were corrected to N60 values based on the energy ratio of the testing equipment, recording values in the range between 1 and 13 with an average of 7.

Very sandy clay was logged in BH01 between 1.2-4.5m, but laboratory testing confirmed a sample to be non-plastic. In addition, particle size distribution (PSD) recorded the soils as a slightly clayey sand. It is considered that although these materials have cohesion due to some clay content, their predominant constituent is sand.

PSD tests confirmed the sand to be predominantly fine to medium grading.

Water soluble sulphate and soil pH tests on 3 samples of these soils ranged from 21mg/l to 74mg/l with pH of 7.6 to 8.4.

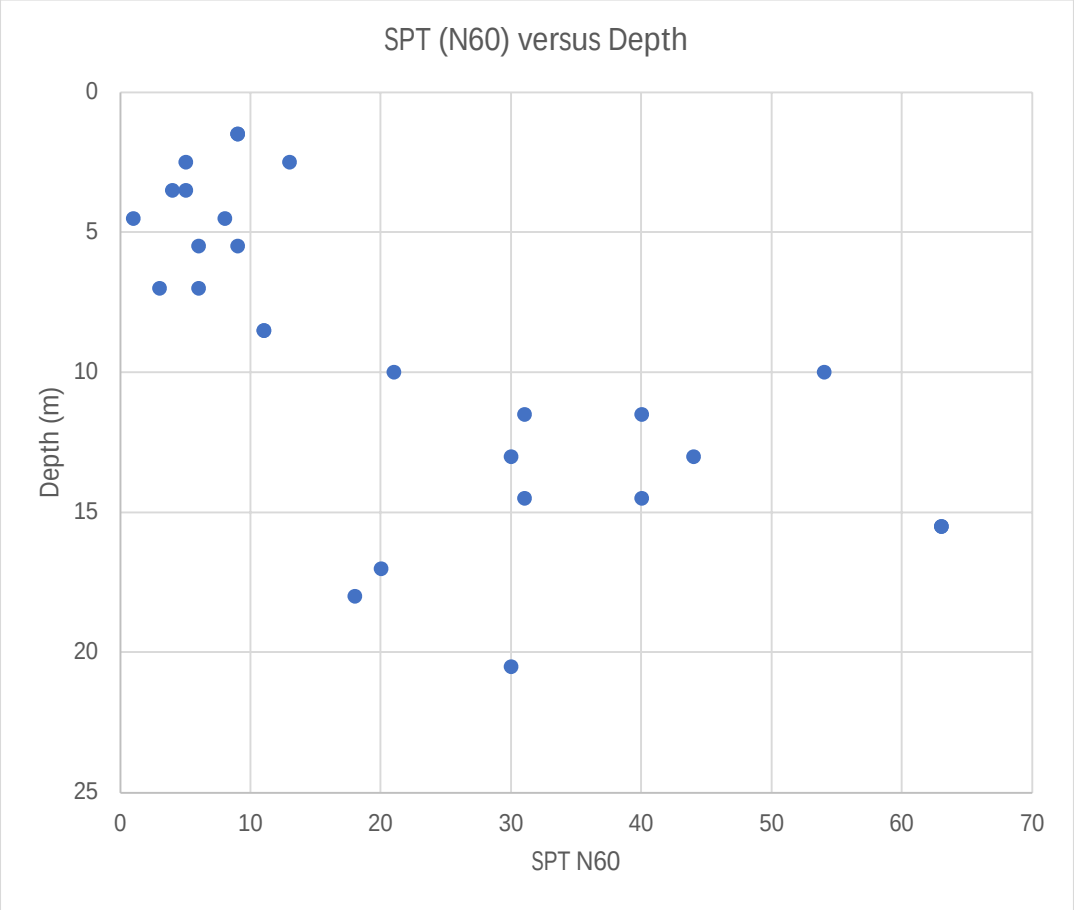
3.3.2 Lower Medium Dense to Dense Sand and Gravel (10-20m Depth)

A PSD at 11.5m confirmed the soils to be predominately medium sand grade, with approximately 30% of the soils comprising coarse sand to coarse gravel. A PSD test at 13m confirmed the soils to be well graded between medium sand and medium gravel.

SPT N values were corrected to N60 values based on the energy ratio of the testing equipment, recording values in the range between 18 and 63 with an average of 37.

Water soluble sulphate and soil pH tests on 2 samples of these soils ranged from 45mg/l to 106mg/l with pH of 8.0 and 8.4.

A graph of SPT N60 versus depth is provided below.



3.4 Groundwater Observations

Exploratory Hole	Depth (m)	Borehole observation	Stratum
BH01	9.0m	Rose to 6.8m after 20mins	Loose sand
BH02	6.0m	Rose to 3.0m after 20mins	Loose sand

Subsequent groundwater monitoring visits record groundwater in the range 2.5-2.6m depth. The river level was recorded at 2.96m below the bridge, indicating that the groundwater levels are in close continuity with the river level.

3.5 Contamination – Visual and Olfactory

No visual or olfactory evidence of contamination was identified at the site.

3.6 Obstructions

Cobbles/boulders were noted at around 15.5m depth in both boreholes.

4. Contamination Assessment

4.1 Contamination Risk Assessment

Two samples of made ground were submitted for a broad suite of determinands comprising heavy metals and non-metals, speciated polyaromatic hydrocarbons and asbestos.

The assessment involves the screening of the measured concentrations of contaminants of concern obtained during the investigations against published generic assessment criteria (GAC) values which are representative of a 'minimal' or 'tolerable' risk to human health. The assessment criteria adopted are the LQM/CIEH Suitable for Use Levels (S4ULs) for Human Health Risk Assessment (Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3279; All rights reserved). Where no S4UL is available, reference is made to other relevant standards as appropriate.

Based on the current and proposed end use, GACs for a public open space near residential housing have been adopted. The soil organic matter content was calculated to be 6%, based on the average TOC concentration. A summary assessment table of all chemical results and GACs is provided in Appendix C.

4.1.1 Heavy Metals & Non-Metals

No parameters exceeded the relevant GAC values.

4.1.2 Polycyclic Aromatic Hydrocarbons (PAH)

Several PAH species were recorded to be elevated:

Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(123cd)pyrene, Benzo(b)fluoranthene, Chrysene, Benzo(a)anthracene.

It is considered that these elevated results represent tarmac fragments entrained within the samples of made ground.

4.1.3 Total Petroleum Hydrocarbons (TPH)

TPH was recorded at values between 6324 and 7063mg/kg.

4.1.4 Asbestos Containing Materials (ACMs)

No asbestos was recorded.

4.2 Waste Disposal

The presence of PAH and TPH above 1000mg/kg in the made ground suggests that the materials would be classified as Hazardous Waste for off-site disposal. However, we note that the elevated levels are likely to represent the present of tarmac fragments. Subject to careful removal of the road surfacing, the underlying made ground could be segregated and re-tested prior to disposal to confirm its classification.

5. Geotechnical Assessment

It is understood that NCC are proposing to install new piled abutments and bridge deck at Swindon Kennels Bridge. Loading information for the abutments has been provided by NCC to enable a preliminary assessment of piling options.

5.1 Piled Foundations

The following pile loads have been provided by NCC:

Maximum Vertical Load on each abutment (Nominal) = 928.5kN and it is assumed that 3 piles will be used per abutment. No allowance has been made for bending moments which require consideration as part of the detailed design.

Preliminary piling calculations have been carried out using the following criteria:

Calculation Method	EC7 Design Approach 1, Combinations 1 and 2. Design factors: EN 1997-1:2004-A.3.3
Geology	Upper 0-10m of loose sand and soft clay has been ignored in the calculation i.e. no shaft frictional support included. This is due to the low value SPT results and presence of soft clay which suggests the potential for excessive settlement. Lower 10-20m comprises medium dense to dense sand and gravel and has been considered for both end bearing and shaft friction. Ground Water Levels c.2.5m bgl.
Soil Parameters	Unit weight: 20 kN/m^3 Effective cohesion, c' = 0 kPa Effective angle of friction, phi' = 34 degrees phi' derived from SPT values based on design N60 value of 25

Preliminary piling calculations have been carried out based on both precast driven piles and bored piles using continuous flight auger (CFA) methods. The calculations use skin friction and end bearing resistance to derive a piling depth. Note that specialist piling contractors use their own preferred methods of calculation and therefore the figures provided below are indicative only.

Driven Piles (Square Section)

Width	Pile Load	Pile Depth	Notes
300mm	310kN	11m	3 piles per abutment
300mm	465kN	12m	2 piles per abutment

CFA Piles (Bored Pile using Continuous Flight Auger)

Diameter	Pile Load	Pile Depth	Notes
300mm	310kN	12m	3 piles per abutment
	465kN	16m	2 piles per abutment
450mm	310kN	11m	3 piles per abutment
	465kN	11m	2 piles per abutment
600mm	310kN	11m	3 piles per abutment
	465kN	11m	2 piles per abutment

It is apparent from the calculations that loads are predominantly supported by end bearing which is achieved very rapidly on encountering the medium dense to dense sand and gravel from c.10m depth.

5.2 Concrete

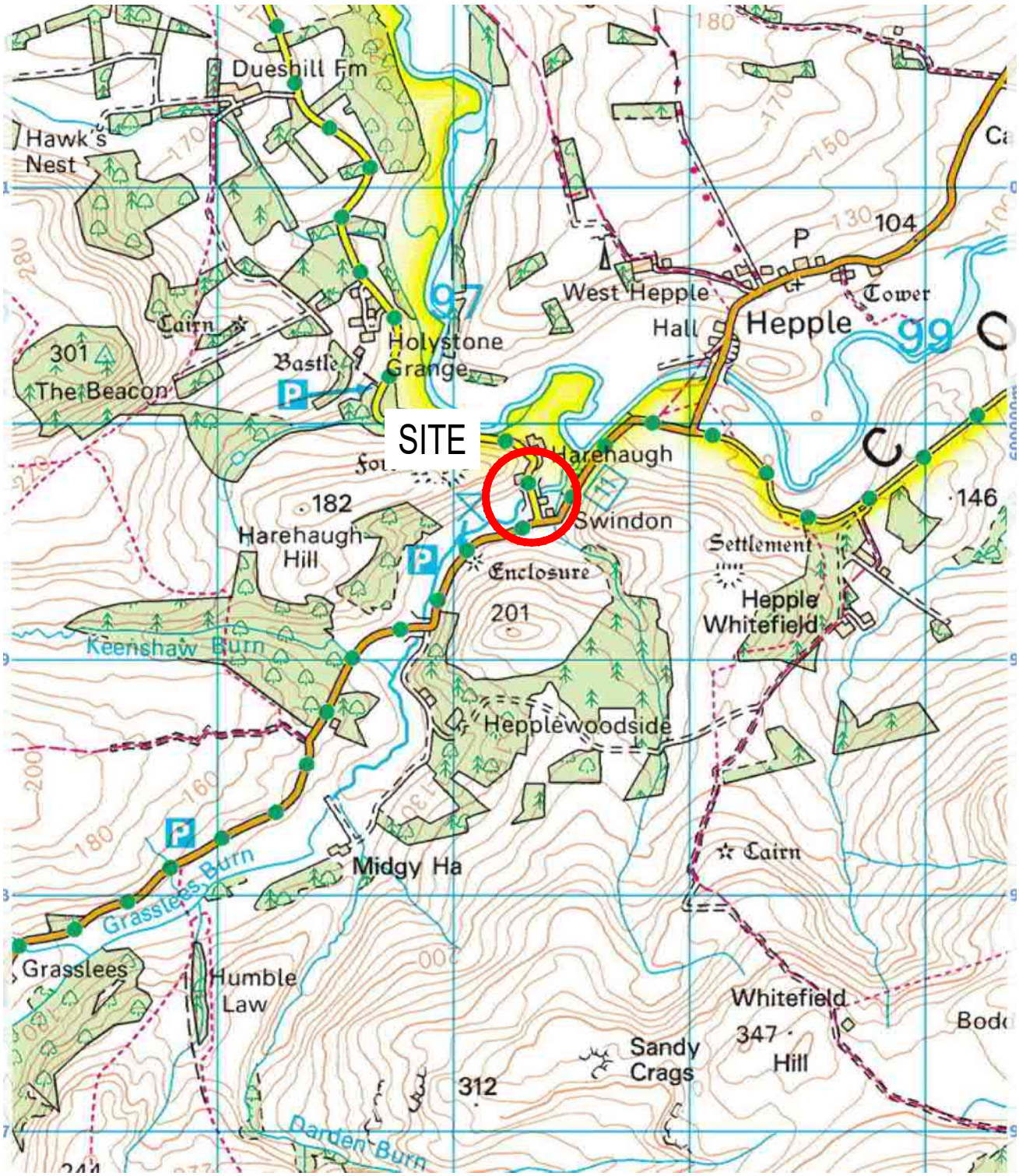
The results from 2 samples of made ground and 5 samples of natural ground record pH in the range 7.6-8.4 and water soluble sulphate in the range 21-162mg/l.

The results equate to a design sulphate class of DS-1 and ACEC class of AC-1 for concrete in accordance with BRE Special Digest 1, 2005, 3rd Edition.

Appendix A – Figures

A4 | A | B | C | D

1 | 2 | 3 | 4



Issue	Date	Description	By	Chkd	Appd
P1	05/08/21	Preliminary Issue	SJ	AC	PL

Client
Northumberland County Council

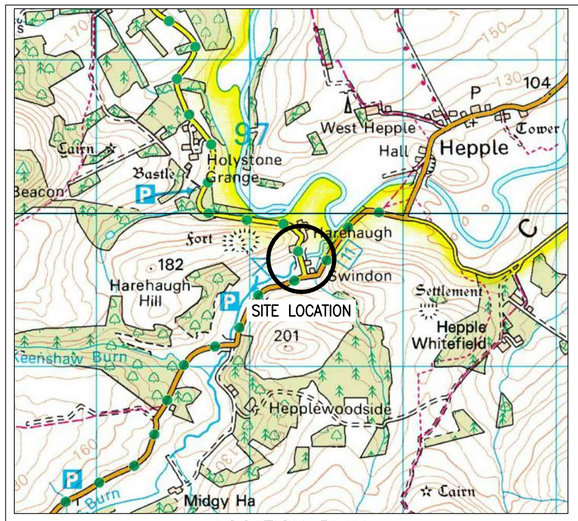
Project
Swindon Kennels Bridge, Hepple

Drawing Title
Site Location Plan

Job No	Drawing No	Issue	Scale at A4
21070	01	P1	1:25,000

COAST CONSULTING ENGINEERS
7 Silverton Court, Northumberland Business Park, NE23 7RY
0191 5977879

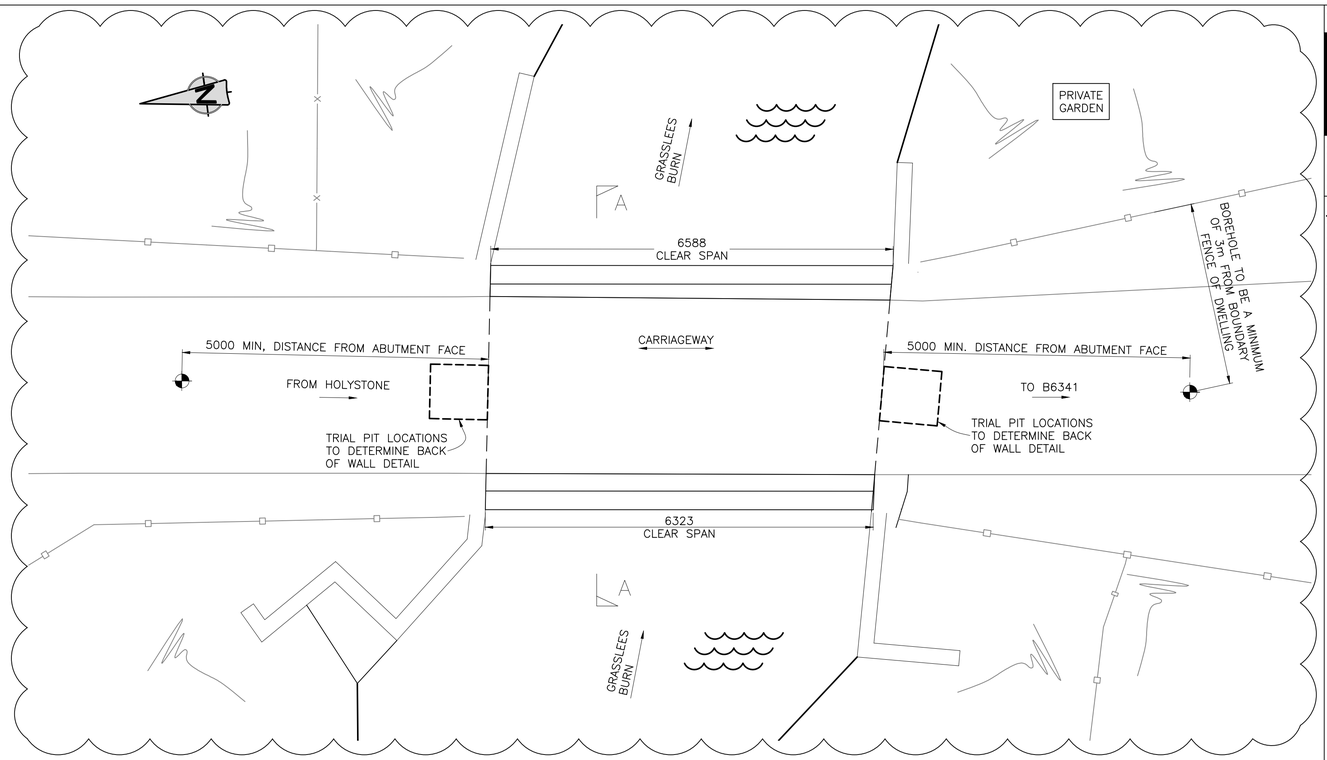
Do not scale



LOCATION PLAN

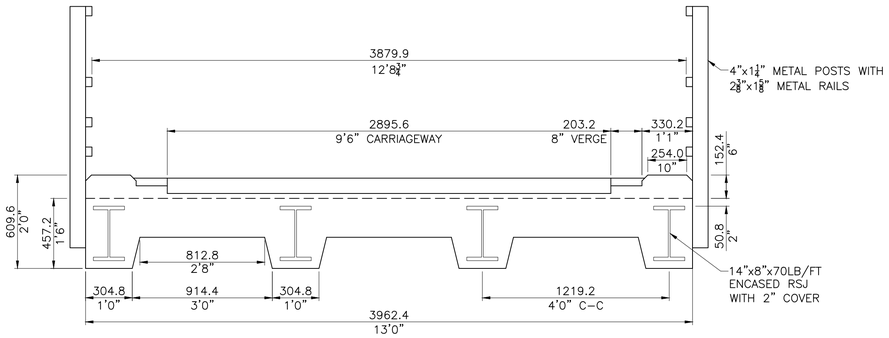
SCALE 1:20,000

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARDS / RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION.
RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO DESIGNERS RISK ASSESSMENT.
CONSTRUCTION: 1. NOISE AND DUST GENERATED BY WORKS.
ENVIRONMENTAL: 1. RUN OFF FROM CORING AND BOREHOLE WORKS SHALL NOT ENTER THE WATERCOURSE.
MAINTENANCE: 1. THERE ARE NO EXCEPTIONAL RISKS.
FOR INFORMATION RELATING TO MAINTENANCE SEE THE HEALTH AND SAFETY FILE.
IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.



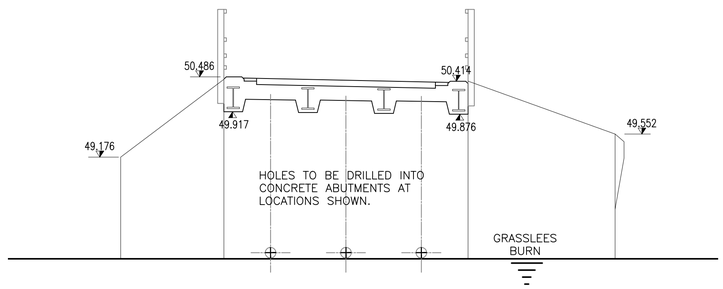
PLAN (A)

SCALE 1:50



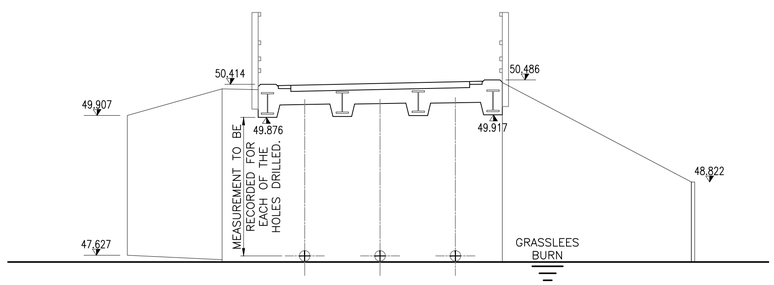
CROSS SECTION A-A

SCALE 1:20



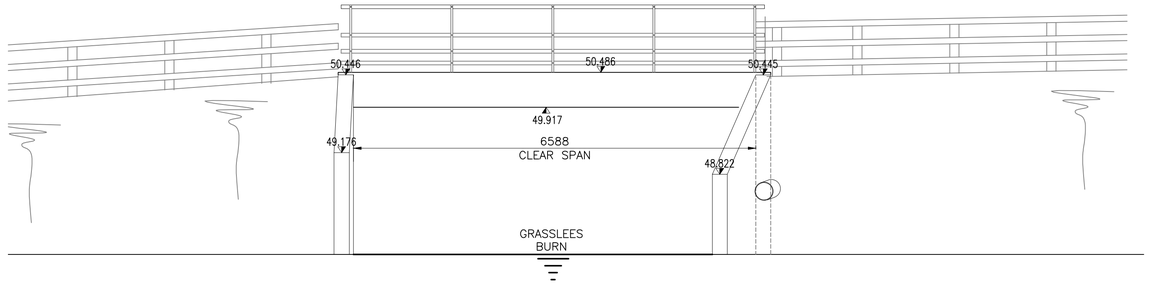
ELEVATION ON SOUTH ABUTMENT

SCALE 1:50



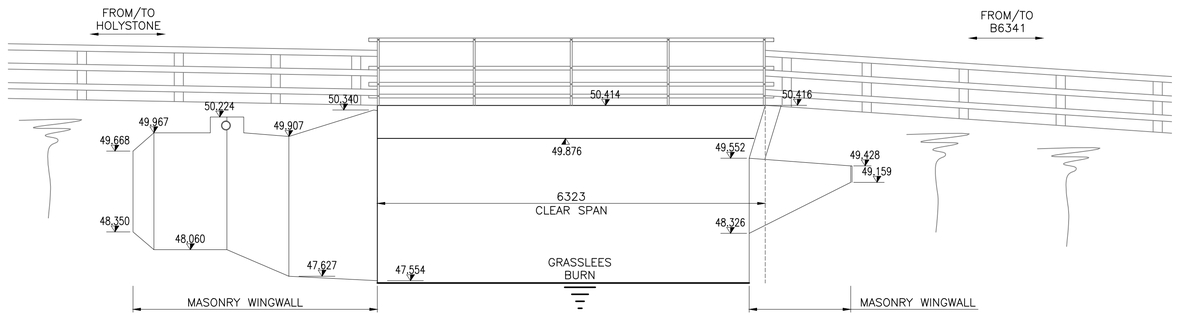
ELEVATION ON NOTTH ABUTMENT

SCALE 1:50



EAST ELEVATION (DOWNSTREAM)

SCALE 1:50



WEST ELEVATION (UPSTREAM)

SCALE 1:50

Contract Drawing No.: 1 | Drawing Size: A1

Northumberland County Council

NOTES:

1. **GENERAL**
1.1. ALL DIMENSIONS IN [mm] UNLESS STATED OTHERWISE.
1.2. ALL LEVELS IN [m] IN REFERENCE TO GPS CO-ORDINATE SYSTEM.
2. **EXISTING STRUCTURE**
2.1. SWINDON KENNELS BRIDGE CARRIES THE C180 OVER THE GRASSLEES BURN. THE BRIDGE COMPRISES A SINGLE 6.78m SQUARE SPAN, ENCASED BEAM DECK ON MASONRY ABUTMENTS.

KEY

- DENOTES LOCATION OF PROPOSED BOREHOLES
- DENOTES LOCATION OF PROPOSED DRILL HOLES IN EACH ABUTMENT, TO BE TAKEN AS CLOSE TO THE WATER LEVEL (ON THE DAY) AS IS POSSIBLE, AND A MEASUREMENT TO BE RECORDED FOR EACH HOLE FROM THE SOFFIT OF THE BRIDGE. =
- DENOTES TRIAL PIT LOCATION

Revision:	By:	Chk.:	App.:	Date:	Rev.:
GENERAL REVISION.	PF	JLR	PTS	DEC'20	A

Drawing Status: **PRELIMINARY**

Client:
NORTHUMBERLAND COUNTY COUNCIL
COUNTY HALL, MORPETH
NORTHUMBERLAND, NE61 2EF

Job Title: **SWINDON KENNELS**

Drawing Title: **EXISTING GENERAL ARRANGEMENT**

Scale(s): AS SHOWN

Northumberland County Council
Technical Services

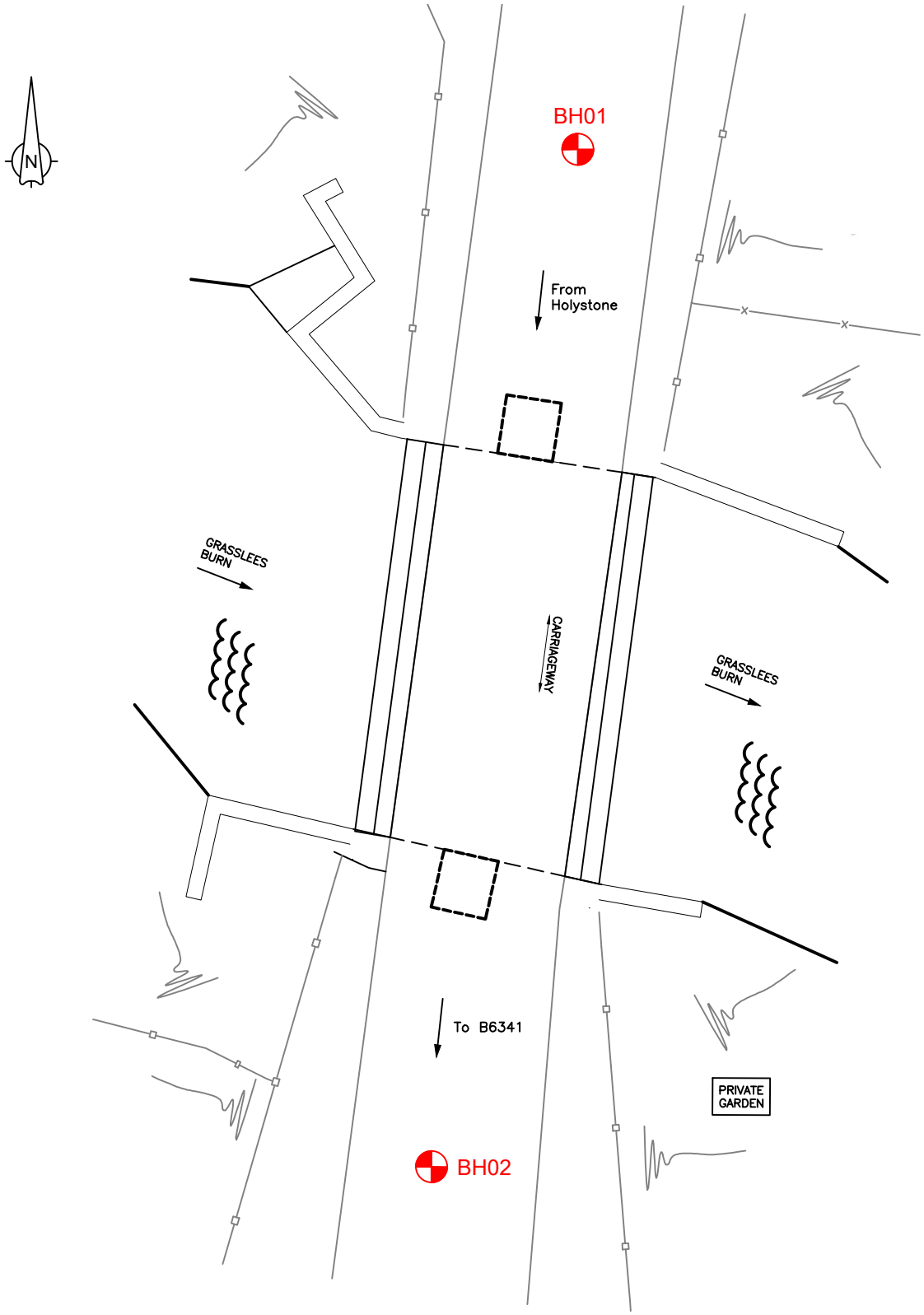
Drawn:	Date:	Checked:	Passed:
JT	Oct'19	MDW	JLR

Drawing Number: HB187325/B/C180/01/01 | Revision: A

Oracle Number: HB187325

Last Saved By: Peter Fulham

File Path: S:\Highways\PROJECT\18\HB18 Bridges Structural Maintenance\HB187325 Swindon Kennels\Drawings\WORKING\HB187325-00-C180-00-01-A SWINDON KENNELS EXISTING GENERAL ARRANGEMENT



Issue	Date	Description	By	Chkd	Appd
P1	05/08/21	Preliminary Issue	SHJ	AC	PL

Client
Northumberland County Council

Project
Swindon Kennels Bridge, Hepple

Drawing Title
Exploratory Hole Location Plan

Job No	Drawing No	Issue	Scale at A4
21070	02	P1	1:100

COAST CONSULTING ENGINEERS
7 Silverton Court, Northumberland Business Park, NE23 7RY
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Do not scale

Appendix B –
Exploratory Hole Logs

SOLMEK
12-16 Yarm Road
Stockton on Tees
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info@solmek.com

Cable Percussive with Rotary Core Follow-on Log

Scale 1:75 Sheet 1 of 2

BH01

Contract no:	S210703	**Site:**	Swindon Kennels, Northumberland	**Driller:**	RD Drilling Ltd
				Plant used:	Cable Percussive/MI3
				Started:	20/07/2021
Client:	Northumberland County Council			**Ended:**	20/07/2021
Method:	Cable Percussive with Rotary follow-on			**Backfilled:**	23/07/2021

GL (AOD):	
Easting:	
Northing:	
Logged:	KW
Status:	FINAL

Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results
0.25		MADE GROUND: Tarmac.			
		MADE GROUND: Grey slightly sandy gravel fill. Gravel is fine to coarse subangular limestone.	0.25 - 1.00	B	
			1.00	D	
1.20		Soft consistency orangish brown very sandy slightly gravelly low strength CLAY. Sand is fine to medium. Gravel is subangular medium to coarse of sandstone.	1.50 - 1.95	SPT (S)	N=7 (2,2/1,1,2,3)
			1.50 - 1.95	B	
			1.50 - 2.00	D	
			2.00	D	
			2.50 - 2.95	SPT (S)	N=4 (1,1/0,1,1,2)
			2.50 - 2.95	B	
			2.50 - 3.00	D	
			3.00	D	
			3.50 - 3.95	SPT (S)	N=4 (1,0/0,1,2,1)
			3.50 - 3.95	B	
			3.50 - 4.00	D	
			4.00	D	
4.50		Loose dark brown SAND. Sand is fine.	4.50 - 4.95	SPT (S)	N=6 (1,1/2,1,1,2)
			4.50 - 4.95	B	
			4.50 - 5.00	D	
			5.00	D	
			5.50 - 5.95	SPT (S)	N=5 (1,0/0,2,1,2)
			5.50 - 5.95	B	
			5.50 - 6.00	D	
			6.00	D	
		7.00-8.50m: band of very loose SAND.	7.00 - 7.45	SPT (S)	N=2 (1,1/0,0,0,2)
			7.00 - 7.45	B	
			7.00 - 7.50	D	
			8.00	D	
			8.50 - 8.95	SPT (S)	N=9 (1,1/2,2,2,3)
			8.50 - 8.95	B	
			8.50 - 9.00	D	
			9.00	D	
10.00		Dense brown very sandy GRAVEL. Sand is medium to coarse. Gravel is fine to coarse subrounded to rounded of sandstone.	10.00 - 10.45	SPT (C)	N=43 (6,8/8,10,10,15)
			10.00 - 10.50	B	
			11.00	D	
			11.50 - 11.95	SPT (C)	N=32 (5,5/4,7,9,12)
			11.50 - 12.00	B	
			12.00	D	
			13.00 - 13.45	SPT (C)	N=35 (6,6/5,8,11,11)
			13.00 - 13.50	B	
			14.00	D	
		14.50-14.95m: Band of medium dense GRAVEL	14.50 - 14.95	SPT (C)	N=25 (4,5/5,6,6,8)
			14.50 - 15.00	B	
			15.00	D	

Hole Diameter

Depth Base (m)	Diameter (mm)
15.50	150
20.95	102

Casing Depths

Depth Base (m)	Diameter (mm)
15.50	150
20.95	102

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Groundwater encountered at 9.00m.
3. Rotary borehole follow-on from 15.50m.
4. 100% Flush returns recorded.

Chiselling

From (m)	To (m)	Time (hr)
15.50	15.82	00:30

Ground Water

Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
9.00	7.50		20	6.80

SOLMEK
12-16 Yarm Road
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01642 607083
info@solmek.com

Cable Percussive with Rotary Core Follow-on Log

Scale 1:75 Sheet 2 of 2

BH01

Contract no:	S210703	**Site:**	Swindon Kennels, Northumberland	**Driller:**	RD Drilling Ltd
				Plant used:	Cable Percussive/MI3
				Started:	20/07/2021
Client:	Northumberland County Council			**Ended:**	20/07/2021
Method:	Cable Percussive with Rotary follow-on			**Backfilled:**	23/07/2021

GL (AOD):		
Easting:		
Northing:		
Logged:	KW	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing		
					Depth (m)	Type	Results
				Dense brown very sandy GRAVEL. Sand is medium to coarse. Gravel is fine to coarse subrounded to rounded of sandstone.			
		15.50		Sandstone cobble/boulder	15.50 - 15.82 15.50	SPT (S) D	N=50+ (6,8/10,27,13 for 25mm)
		15.82		Medium dense brown gravelly SAND. and is medium to course, gravel is course and rounded of sandstone			
					18.00 - 18.45	SPT (S)	N=15 (2,3/3,3,5,4)
					20.50 - 20.95	SPT (S)	N=25 (3,5/5,6,7,7)
		20.95		End of Borehole at 20.950m			

Hole Diameter		Casing Depths		General Remarks
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)	
15.50 20.95	150 102	15.50 20.95	150 102	1. Hand dug inspection pit to 1.20m. 2. Groundwater encountered at 9.00m. 3. Rotary borehole follow-on from 15.50m. 4. 100% Flush returns recorded.

Chiselling		
From (m)	To (m)	Time (hr)
15.50	15.82	00:30

Ground Water				
Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
9.00	7.50		20	6.80

SOLMEK
12-16 Yarm Road
Stockton on Tees
TS18 3NA
01642 607083
info@solmek.com

Cable Percussive with Rotary Core Follow-on Log

Scale 1:75 Sheet 1 of 2

BH02

Contract no:	S210703	**Site:**	Swindon Kennels, Northumberland	**Driller:**	RD Drilling Ltd
				Plant used:	Cable Percussive/MI3
				Started:	20/07/2021
Client:	Northumberland County Council			**Ended:**	20/07/2021
Method:	Cable Percussive with Rotary follow-on			**Backfilled:**	24/07/2021

GL (AOD):	
Easting:	
Northing:	
Logged:	KW
Status:	FINAL

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results
		0.20		MADE GROUND: Tarmac.	0.20 - 1.00	B	
				MADE GROUND: Grey slightly sandy gravel fill. Gravel is fine to coarse subangular limestone and shale.			
		1.00		Loose dark brown SAND. Sand is fine.	1.00	D	
					1.50 - 1.95	SPT (S)	N=7 (2,3/2,2,1,2)
					1.50 - 1.95	B	
					1.50 - 2.00	D	
					2.50 - 2.95	SPT (S)	N=10 (1,1/2,2,3,3)
					2.50 - 2.95	B	
					2.50 - 3.00	D	
					3.00	D	
				3.50-4.95m: Band of very loose SAND.	3.50 - 3.95	SPT (S)	N=3 (1,1/0,0,1,2)
					3.50 - 3.95	B	
					3.50 - 4.00	D	
					4.00	D	
					4.50 - 4.95	SPT (S)	N=1 (1,0/0,0,1,0)
					4.50 - 4.95	B	
					4.50 - 5.00	D	
					5.00	D	
					5.50 - 5.95	SPT (S)	N=7 (1,1/2,1,2,2)
					5.50 - 5.95	D	
					6.00	D	
					7.00 - 7.45	SPT (S)	N=5 (1,2/1,1,1,2)
					7.00 - 7.45	B	
					7.00 - 7.50	D	
					8.50 - 8.95	SPT (S)	N=9 (1,1/2,2,2,3)
					8.50 - 8.95	B	
					8.50 - 9.00	D	
					9.00	D	
		10.00		Medium dense to dense brown slightly gravelly silty SAND. Gravel is fine rounded sandstone.	10.00 - 10.45	SPT (C)	N=17 (3,4/4,3,4,6)
					10.00 - 10.50	B	
					11.00	D	
					11.50 - 11.95	SPT (C)	N=25 (4,4/5,6,6,8)
					11.50 - 12.00	B	
					12.00	D	
					13.00 - 13.45	SPT (C)	N=24 (4,6/6,7,6,5)
					13.00 - 13.50	B	
					14.00	D	
					14.50 - 14.95	SPT (C)	N=32 (5,6/7,7,7,11)
					14.50 - 15.00	B	
					15.00	D	

Hole Diameter

Depth Base (m)	Diameter (mm)
15.50	150
18.00	102

Casing Depths

Depth Base (m)	Diameter (mm)
15.50	150
18.00	102

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Groundwater encountered at 6.00m.
3. Rotary borehole follow-on from 15.50m.
4. Unable to do SPT at 18.00m due to sand and gravel back filling to 16.00m and casing jammed.
5. 100% Flush returns recorded.

Chiselling

From (m)	To (m)	Time (hr)

Ground Water

Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
6.00	6.00		20	3.00

SOLMEK
12-16 Yarm Road
Stockton on Tees
TS18 3NA
01642 607083
info@solmek.com

Cable Percussive with Rotary Core Follow-on Log

Scale 1:75 Sheet 2 of 2

BH02

Contract no:	S210703	**Site:**	Swindon Kennels, Northumberland	**Driller:**	RD Drilling Ltd
				Plant used:	Cable Percussive/MI3
				Started:	20/07/2021
Client:	Northumberland County Council			**Ended:**	20/07/2021
Method:	Cable Percussive with Rotary follow-on			**Backfilled:**	24/07/2021

GL (AOD):		
Easting:		
Northing:		
Logged:	KW	
Status:	FINAL	

Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing: Depth (m)	Type	Results
				Medium dense to dense brown slightly gravelly silty SAND. Gravel is fine rounded sandstone.			
		15.50		Sandstone cobble/boulder	15.50 - 15.76	SPT (S)	N=50+ (10,15/27,23 for 31mm)
		15.76		Medium dense orange brown very sandy GRAVEL. Sand is medium to course, gravel is course and rounded of sandstone.	15.50	D	
					17.00 - 17.45	SPT (S)	N=17 (2,2/3,4,5,5)
		18.00		End of Borehole at 18.000m			

Hole Diameter

Depth Base (m)	Diameter (mm)
15.50	150
18.00	102

Casing Depths

Depth Base (m)	Diameter (mm)
15.50	150
18.00	102

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Groundwater encountered at 6.00m.
3. Rotary borehole follow-on from 15.50m.
4. Unable to do SPT at 18.00m due to sand and gravel back filling to 16.00m and casing jammed.
5. 100% Flush returns recorded.

Chiselling

From (m)	To (m)	Time (hr)

Ground Water

Depth Strike (m)	Depth Casing (m)	Depth Sealed (m)	Time Elapsed (min)	Water Level (m)
6.00	6.00		20	3.00

Appendix C –
Laboratory Test Results

UKAS accredited testing laboratory No. 0744 Report/Sample ID No: **S1051/01-CLS**

Northumberland County Council

Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : 1990

Client: **NCC Highways and Transport - Design, County Hall, Morpeth, NE61 2EF**
Engineer: **Michael Wright/ Simon Jones**
Project: **HB187325 - Swindon Kennels**
Location: **BH01 at 1.5-1.95m**
Material Type: **Brown very sandy CLAY/slaley sand.**

Sample Specification: **Sampled by Site Staff/Client**
Source: **Site**
Date Sampled: **22/07/2021** Date Received: **27/07/2021** Sampled By: **Clients Staff**

	Test Results	Specification
Water Content (%):	**21.3**	BS EN ISO 17892-1;2014

The liquid and Plastic Limits are prepared in accordance with BS1377: Part 2: Clause 4.2.4 due to the nature of most materials in the surrounding area (Sandy CLAY with gravel cobbles and boulders)

Passing 425mic (%):	**89**
Soil Classification:	**NP**

Remarks: **Material found to be non plastic.**

Certificate of sampling received: ☐

Signed: _____

[M] M. Newton, Laboratory Manager
[ ] P. Fletcher, Senior Technician

Start of Test Date: **28/07/2021** End of Test Date: **11/08/2021** Report Date: **11/08/2021**

UKAS accredited testing laboratory No. 0744 Report/Sample ID No: **S1051/02 -PSD**

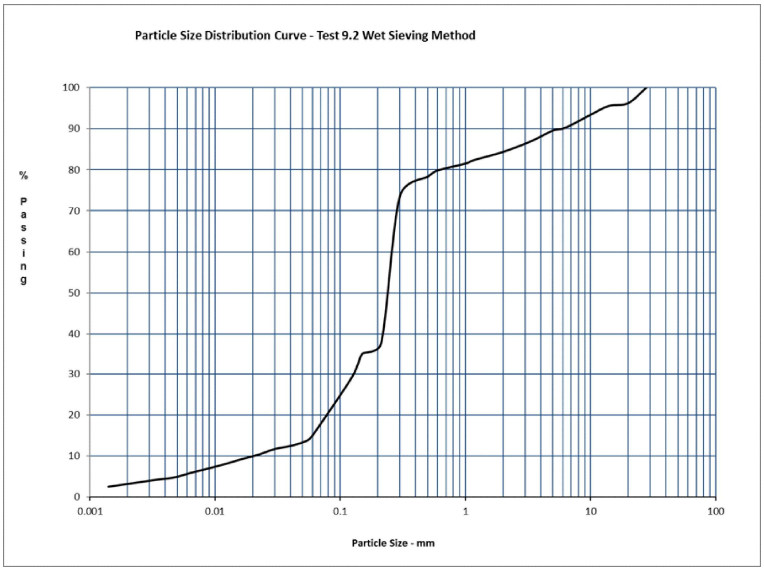
Northumberland
County Council

Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : Part 2 Clause 9 :1990

Client: **NCC Highways and Transport - Design, County Hall, Morpeth, NE61 2EF**
Engineer: **Michael Wright/ Simon Jones**
Project: **HB187325 - Swindon Kennels**
Location: **BH01 at 2.5-2.95m**
Material Type: **Brown slightly clayey SAND.**
Sample Spec: **Sampled by Site Staff/Client**
Source: **Site**
Date Sampled: **22/07/2021** Date Received: **27/07/2021** Sampled By: **Clients Staff**
Natural Moisture Content (%): **21.6** Part 2 Clause 3.2



If Sedimentation test by Hydrometer (Test Method 9.5), was used, then no pretreatment was carried out.

Remarks: **None**

Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager
[ ] P. Fletcher. Technician

Start of Test Date: **28/07/2021** End of Test Date: **11/08/2021** Report Date: **11/08/2021**

UKAS accredited testing laboratory No. 0744 Report/Sample ID No: **S1051/03 -PSD**

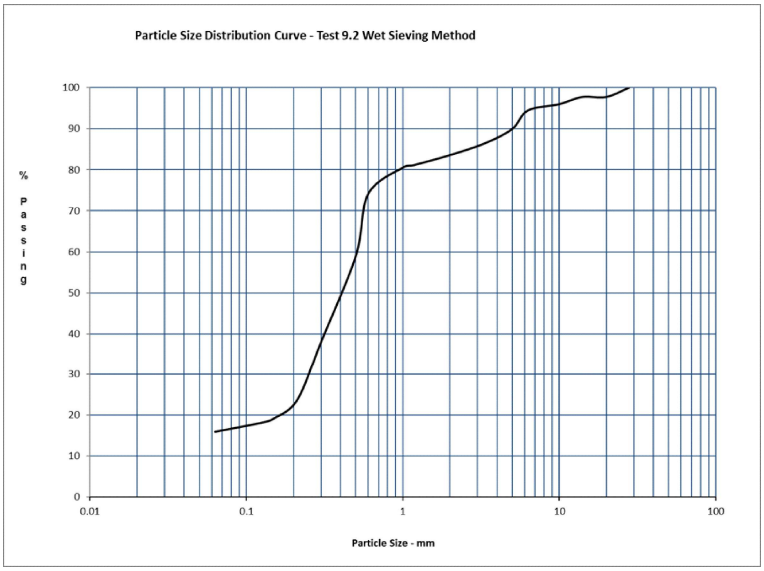
Northumberland
County Council

Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : Part 2 Clause 9 :1990

Client: **NCC Highways and Transport - Design, County Hall, Morpeth, NE61 2EF**
Engineer: **Michael Wright/ Simon Jones**
Project: **HB187325 - Swindon Kennels**
Location: **BH01 at 7.0-7.45m**
Material Type: **Brown SAND with excess water.**
Sample Spec: **Sampled by Site Staff/Client**
Source: **Site**
Date Sampled: **22/07/2021** Date Received: **27/07/2021** Sampled By: **Clients Staff**
Natural Moisture Content (%): **23.2** Part 2 Clause 3.2



If Sedimentation test by Hydrometer (Test Method 9.5), was used, then no pretreatment was carried out.

Remarks: **None**

Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager
[ ] P. Fletcher. Technician

Start of Test Date: **28/07/2021** End of Test Date: **11/08/2021** Report Date: **11/08/2021**

UKAS accredited testing laboratory No. 0744 Report/Sample ID No: **S1051/04 -PSD**

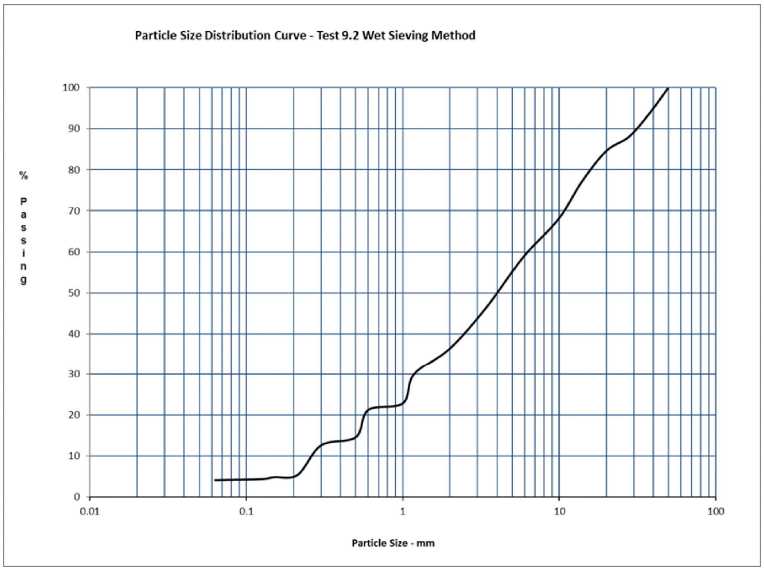
Northumberland
County Council

Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : Part 2 Clause 9 :1990

Client: **NCC Highways and Transport - Design, County Hall, Morpeth, NE61 2EF**
Engineer: **Michael Wright/ Simon Jones**
Project: **HB187325 - Swindon Kennels**
Location: **BH01 at 13.0-13.5m**
Material Type: **Brown SAND with gravel.**
Sample Spec: **Sampled by Site Staff/Client**
Source: **Site**
Date Sampled: **22/07/2021** Date Received: **27/07/2021** Sampled By: **Clients Staff**
Natural Moisture Content (%): **10.2** Part 2 Clause 3.2



If Sedimentation test by Hydrometer (Test Method 9.5), was used, then no pretreatment was carried out.

Remarks: **None**

Certificate of sampling received: ☐

Signed: _____

[✓] M. Newton, Laboratory Manager
[ ] P. Fletcher. Technician

Start of Test Date: **28/07/2021** End of Test Date: **11/08/2021** Report Date: **11/08/2021**

UKAS accredited testing laboratory No. 0744 Report/Sample ID No: **S1051/05 -PSD**

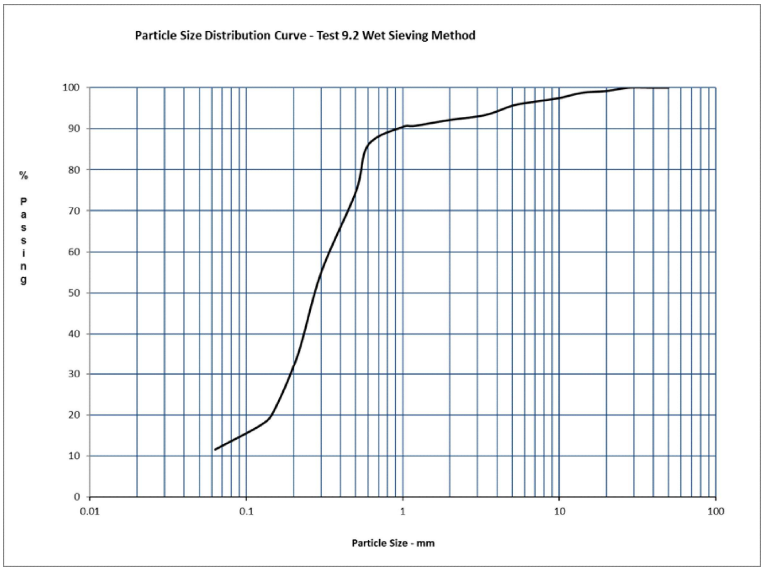
Northumberland
County Council

Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : Part 2 Clause 9 :1990

Client: **NCC Highways and Transport - Design, County Hall, Morpeth, NE61 2EF**
Engineer: **Michael Wright/ Simon Jones**
Project: **HB187325 - Swindon Kennels**
Location: **BH02 at 4.5-4.95m**
Material Type: **Brown, orange SAND with gravel.**
Sample Spec: **Sampled by Site Staff/Client**
Source: **Site**
Date Sampled: **22/07/2021** Date Received: **27/07/2021** Sampled By: **Clients Staff**
Natural Moisture Content (%): **16.2** Part 2 Clause 3.2



If Sedimentation test by Hydrometer (Test Method 9.5), was used, then no pretreatment was carried out.

Remarks: **None**

Certificate of sampling received: ☐

Signed: _____

[☑] M. Newton, Laboratory Manager
[ ] P. Fletcher. Technician

Start of Test Date: **28/07/2021** End of Test Date: **11/08/2021** Report Date: **11/08/2021**

UKAS accredited testing laboratory No. 0744 Report/Sample ID No: **S1051/06 -PSD**

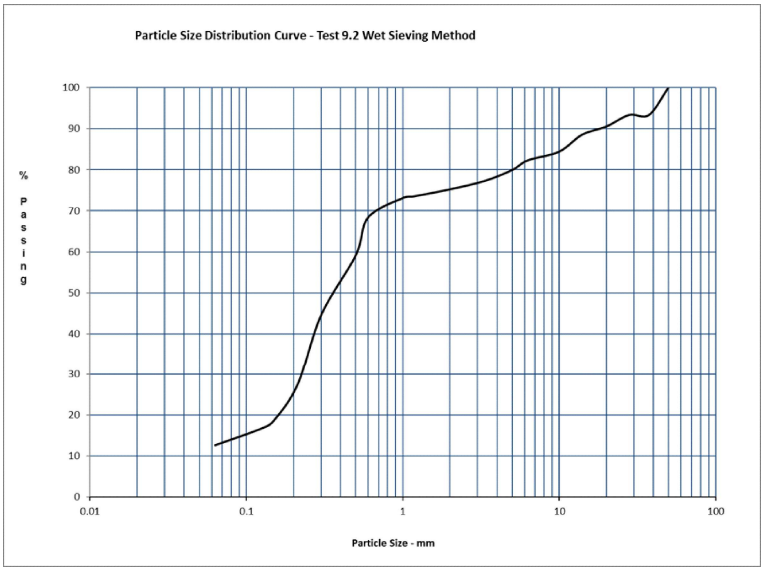
Northumberland
County Council

Highways Laboratory
Bassington Drive • Cramlington • Northumberland • NE23 8AJ
Tel (01670) 737575 • Email highwayslaboratory@northumberland.gov.uk

CLASSIFICATION OF SOILS

Tests according to B.S. 1377 : Part 2 Clause 9 :1990

Client: **NCC Highways and Transport - Design, County Hall, Morpeth, NE61 2EF**
Engineer: **Michael Wright/ Simon Jones**
Project: **HB187325 - Swindon Kennels**
Location: **BH02 at 11.5-11.95m**
Material Type: **Brown SAND with gravel.**
Sample Spec: **Sampled by Site Staff/Client**
Source: **Site**
Date Sampled: **22/07/2021** Date Received: **27/07/2021** Sampled By: **Clients Staff**
Natural Moisture Content (%): **14.1** Part 2 Clause 3.2



If Sedimentation test by Hydrometer (Test Method 9.5), was used, then no pretreatment was carried out.

Remarks: **None**

Certificate of sampling received: ☐

Signed: _____

[M] M. Newton, Laboratory Manager
[ ] P. Fletcher. Technician

Start of Test Date: **28/07/2021** End of Test Date: **11/08/2021** Report Date: **11/08/2021**

ANALYTICAL TEST REPORT

Contract no: 98868

Contract name: Swindon Kennels

Client reference: S1051

Clients name: Northumberland County Council

Clients address: Highways Laboratory
Bassington Drive
Cramlington
NE23 8AJ

Samples received: 28 July 2021

Analysis started: 28 July 2021

Analysis completed: 04 August 2021

Report issued: 04 August 2021

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:

Rachael Burton
Customer Support Squad Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):
Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
98868-1	BH01	2.00	Loamy Sandy Clay	-	-	17.9
98868-2	BH01	5.00	Loamy Sandy Clay	-	-	22.5
98868-3	BH01	15.00	Sandy Clay with Gravel	-	-	11.1
98868-4	BH02	6.00	Loamy Sandy Clay with Gravel	-	-	10.8
98868-5	BH02	11.00	Loamy Clay	-	-	18.3

Chemtech Environmental Limited

SOILS

Lab number			98868-1	98868-2	98868-3	98868-4	98868-5
Sample id			BH01	BH01	BH01	BH02	BH02
Depth (m)			2.00	5.00	15.00	6.00	11.00
Date sampled			22/07/2021	22/07/2021	22/07/2021	22/07/2021	22/07/2021
Test	**Method**	**Units**					
pH	CE004 [M]	units	8.0	7.6	8.4	8.4	8.0
Sulphate (2:1 water soluble)	CE061 [U]	mg/l SO_4	45	74	106	21	45

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/kg SO_4

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
98868-1	BH01	2.00	N	
98868-2	BH01	5.00	N	
98868-3	BH01	15.00	N	
98868-4	BH02	6.00	N	
98868-5	BH02	11.00	N	

ANALYTICAL TEST REPORT

Contract no: 98806

Contract name: Swindon Kennels Bridge

Client reference: 21070

Clients name: Coast Consulting Engineers

Clients address: 7 Silverton Court
Northumberland Business Park
Cramlington
NE23 7RY

Samples received: 27 July 2021

Analysis started: 27 July 2021

Analysis completed: 03 August 2021

Report issued: 03 August 2021

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:
Rachael Burton
Customer Support Squad Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
98806-1	CP01	0.25-1.00	Loamy Sand with Gravel	-	-	1.7
98806-2	CP02	0.20-1.00	Loamy Sand with Gravel	-	-	5.8

Chemtech Environmental Limited

SOILS

Lab number			98806-1	98806-2
Sample id			CP01	CP02
Depth (m)			0.25-1.00	0.20-1.00
Date sampled			20/07/2021	20/07/2021
Test	**Method**	**Units**		
Arsenic (total)	CE127 M	mg/kg As	2.7	3.8
Boron (water soluble)	CE063 M	mg/kg B	<0.5	<0.5
Cadmium (total)	CE127 M	mg/kg Cd	0.3	<0.2
Chromium (total)	CE127 M	mg/kg Cr	23	32
Copper (total)	CE127 M	mg/kg Cu	18	16
Lead (total)	CE127 M	mg/kg Pb	8.4	12
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	12	11
Selenium (total)	CE127 M	mg/kg Se	1.1	1.5
Zinc (total)	CE127 M	mg/kg Zn	50	41
pH	CE004 M	units	8.4	7.9
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	57	162
Cyanide (total)	CE077	mg/kg CN	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5
Total Organic Carbon (TOC)	CE197	% w/w C	3.1	4.2
Estimate of OMC (calculated from TOC)	CE197	% w/w	5.3	7.2
PAH				
Naphthalene	CE087 M	mg/kg	8.75	5.05
Acenaphthylene	CE087 M	mg/kg	0.69	1.14
Acenaphthene	CE087 M	mg/kg	42.94	61.45
Fluorene	CE087 U	mg/kg	54.34	75.72
Phenanthrene	CE087 M	mg/kg	179.47	391.94
Anthracene	CE087 U	mg/kg	57.45	123.14
Fluoranthene	CE087 M	mg/kg	172.58	504.52
Pyrene	CE087 M	mg/kg	118.23	350.20
Benzo(a)anthracene	CE087 U	mg/kg	69.32	209.23
Chrysene	CE087 M	mg/kg	65.80	204.22
Benzo(b)fluoranthene	CE087 M	mg/kg	69.15	203.93
Benzo(k)fluoranthene	CE087 M	mg/kg	27.95	84.64
Benzo(a)pyrene	CE087 U	mg/kg	50.27	155.24
Indeno(123cd)pyrene	CE087 M	mg/kg	36.78	113.14
Dibenz(ah)anthracene	CE087 M	mg/kg	8.96	30.57
Benzo(ghi)perylene	CE087 M	mg/kg	30.51	91.21
PAH (total of USEPA 16)	CE087	mg/kg	993	2605
TPH				
EPH (>C10-C40)	CE033 M	mg/kg	7063	6324
Subcontracted analysis				
Asbestos (qualitative)	$	-	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	As received		0.5	mg/kg PhOH
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE033	EPH (>C10-C40)	Solvent extraction, GC-FID	As received	M	10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
98806-1	CP01	0.25-1.00	N	
98806-2	CP02	0.20-1.00	N	

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