



Garganey Trust

Wombwell Wetlands

Ground Investigation Factual Report

November 2016





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Drawing No. A099966/LDS/N/02

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(Including SPT Hammer Energy Test Reports)

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1.0 Introduction

WYG Environment Planning Transport Limited (WYG) were commissioned by the Garganey Trust to carry out a ground investigation at a site located at Wombwell, Barnsley. The purpose of this investigation was to aid in creating a new wetland habitat. The ground investigation itself was focussed on assessing the ground conditions for creation of a bund and the suitability of the material on site to be used in its creation.

WYG were appointed to undertake the site investigation works, under the on-site direction from the Garganey trust and JBA Consulting.

1.1 Objectives and Report Format

The objectives of this report are to provide factual information pertaining to the site works, including the main phase of intrusive investigation, monitoring rounds and associated laboratory analysis.

Section 2 of the report presents the location and a description of the subject site.

Section 3 of the report includes details of the ground investigation works carried out by WYG and those companies subcontracted for the duration of the required elements of the investigation.

Section 4 of the report includes details of the laboratory analysis completed as part of the commission.

Drawings and factual data are presented as Appendices B to F.

1.2 Terms and Conditions

This report has been prepared for JBA and the Garganey Trust and other agreed parties in accordance with the terms and conditions outlined in the pre tender information.

Attention is drawn to the report conditions, included as Appendix A and the terms and conditions of the engagement.



2.0 Site Details

2.1 Site Location

The site is located within the agricultural land adjacent to Billing Dyke, approximately 800m east of the town of Wombwell, near Barnsley. The National Grid Reference of the approximate centre of the site is (NGR): 441315 403515. The site was accessed from Everill Gate Lane.

A Site Location Plan is presented as Drawing No. A099966-LDS-N-01, within Appendix B.

2.2 Site Description

The site comprises a large farmer's field, bounded to the North by Billings dyke, to the West by a Water Treatment plant and to the South and East by wetlands. At the time of the site works the field had been recently harvested.

Exploratory holes were undertaken on the northern side of the field adjacent to Billings dyke.

The site extents are shown on Exploratory Hole Location Plan as Drawing: A099966-LDS-N-02 within Appendix B.

2.3 Geology

2.3.1 Superficial Geology

The British Geological Survey website indicates the site to be underlain by alluvial deposits of Quaternary Age.

2.3.2 Solid Geology

The British Geological Survey website indicates that the site is underlain by the Middle Coal Measures formation of Carboniferous age.

3.0 Ground Investigation Works

3.1 Site Activities

The ground investigation was carried out on the 3rd October 2016.



The fieldwork was carried out in general accordance with BS 5930 (2015). All Site Investigation operations were completed in accordance with the Specification as provided by the Investigation Supervisor.

The site works are summarised below; exploratory hole locations are presented within Appendix B as WYG Drawing No. A099966/LDS/N/02.

3.2 Site Works

Wombwell

- 2 No. Cable Percussion Boreholes (CP001 and CP002); to depths of 3.5m and 2.5m bgl respectively.
- 5 No. Machine Excavated Trial Pits (TP001 to TP005 inclusive); to depths between 1.7m and 2.8m bgl.

3.2.1 General

- SPT Hammer Energy Test Reports are presented within Appendix C.1. The respective hammer reference is provided on the individual exploratory hole log.
- Full details of the geology encountered, samples taken and insitu testing completed in each exploratory hole are provided on the respective log within Appendix C.
- Photographs of the Machine Excavated trial Pits are presented in Appendix D.
- Upon completion of the intrusive phase of the works, each exploratory hole location was surveyed, with the coordinates recorded to UK OS National Grid and the level to Ordnance Datum; the details of which are provided on the individual exploratory hole logs within Appendix C.

3.2.2 Reinstatement

Cable Percussion boreholes were reinstated with a mix of arisings and bentonite pellets. The Machine Excavated trial pits were reinstated with arisings, with the original topsoil replaced on the top and levelled to the original ground level.



4.0 Laboratory Analysis

4.1 Chemical Laboratory Analysis

Chemical analysis (details of which are provided below) was scheduled by JBA on samples obtained during the site investigation works. Chemical testing was carried out by Jones Environmental at their laboratory in Deeside, in accordance with their UKAS / MCERTS Accreditation.

The testing scheduled is summarised in Table 4.1 below. All chemical analysis results are presented as Appendix E.

Table 4.1: Chemical Analysis Summary Table

Analysis	Total No. Samples Tested
SOILS	
WYG Soil Suite B	1
BRE Suite	1
WAC Testing	1



4.2 Geotechnical Laboratory Analysis

A suite of geotechnical analysis was scheduled by JBA on samples obtained during the site investigation works. Geotechnical testing was carried out by Professional Soils Laboratories Limited (PSL) at their laboratory in Doncaster, in accordance with their UKAS Accreditation. The testing scheduled is summarised in Table 4.2 below. The geotechnical testing results are presented in Appendix F.

Table 4.2: Geotechnical Analysis Summary

Geotechnical Test	Number of Tests
Moisture Content	5
Atterberg Limits	5
Particle Density	2
Particle Size Distribution (Sieve Analysis)	5
2.5 Kg Compaction Test	5
Consolidated Drained (CD) Shearbox Test	3
pH (& SO ₄)	4



Appendices



Appendix A – Report Conditions



APPENDIX A - REPORT CONDITIONS

GROUND INVESTIGATION

This report is produced solely for the benefit of **Garganey Trust** and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, the physical investigation works as detailed, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

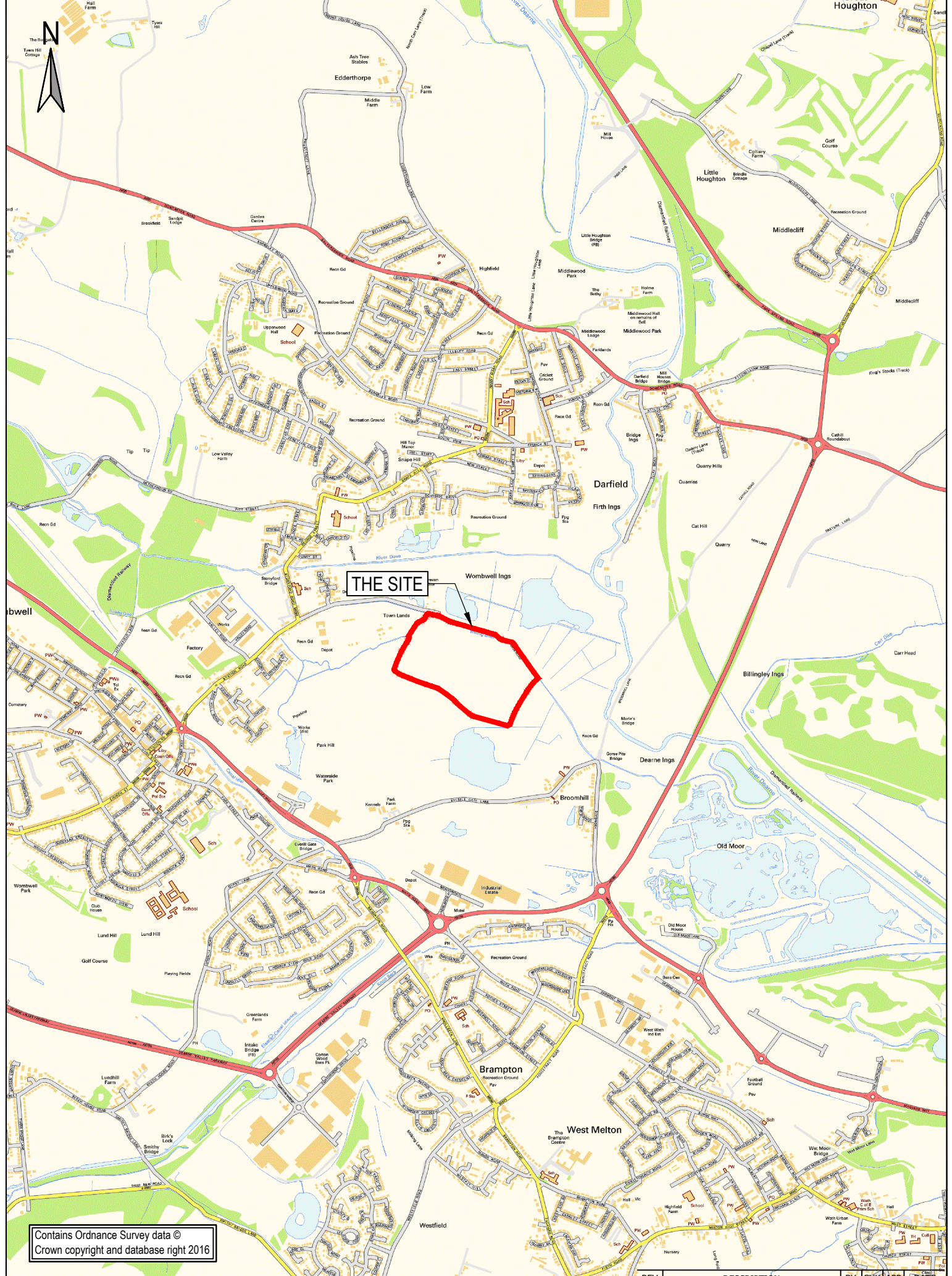
Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categorical assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYGE. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.



Appendix B – Figures and Drawings



THE SITE

Contains Ordnance Survey data ©
Crown copyright and database right 2016

ARNDALE COURT
HEADINGLEY
LEEDS
LS6 2UJ

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FAX: +44 (0)113 278 3487
email: leeds@wyg.com



Client:
GARGANEY TRUST

Project: A099966
WOMBWELL WETLANDS

Drawing Title:
SITE LOCATION PLAN

REV	DESCRIPTION	BY	CHK	APP	DATE

Scale @	A4	Drawn	Date	Checked	Date	Approved	Date
1:20,000	PW	14.11.16					
Project No.	Office	Type	Drawing No.	Revision			
A099966	LDS	N	01				



KEY:

 BOREHOLE LOCATION

 TRIAL PIT LOCATION



REV	DESCRIPTION	BY	CHK	APP	DATE
-----	-------------	----	-----	-----	------

Client:

GARGANEY TRUST

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Project: A099966

WOMBWELL WETLANDS

Drawing Title:

GROUND INVESTIGATION LOCATION PLAN

0 10 20 30 40 50 m
SCALE 1:2000 @ A3

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
1:2000	PW	14.11.16				
Project No.	Office	Type	Drawing No.		Revision	
A099966	LDS	N	02			



Appendix C – Exploratory Hole Logs



Appendix C.1 – Cable Percussion Borehole Logs (Including SPT Hammer Energy Test Reports)



Project: **Wombwell Wetlands**

Location: **Wombwell**

Client: **Garganey Trust**

Location Details

Easting: 441257.49 Northing: 403504.00
Level: 24.17mAOD Depth: 2.72m
Logger: JO Type: CP
Inclination: 90°

Status

FINAL

Borehole Number

CP002

Sheet 1 of 1

Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time				Scale: 1:50	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)	Checked By: PS
0.00	1.20	Inspection Pit	Hand Excavated	M.Clarke	1.20	-	2.50	150						Approved By: BS
1.20	2.72	Cable Percussion	Dando 2000	M.Clarke	2.72	150								Start Date: 03/10/2016
														Finish Date: 03/10/2016

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing		
						Depth (m)	Ref	Tests / Results
MADE GROUND: Dark grey slightly gravelly slightly clayey fine to medium SAND. Gravel is subangular to subrounded fine to medium sandstone.		0.40	23.77			0.00 - 0.40	B1	
Medium dense light yellowish brown very clayey fine to medium SAND and angular to subangular fine to medium sandstone and coal GRAVEL.		2.20	21.97			0.40 - 0.60	B2	
						0.60 - 1.20	B3	
						1.50 - 1.95	D4	SPT(S) 1.50m, N=24 (5,6/7,4,7,6)
Very dense light yellowish grey sandy angular to subangular medium to coarse sandstone GRAVEL. Sand is fine to medium. Light yellowish grey fine grained SANDSTONE.		2.40	21.77			1.50 - 2.00	B5	
						2.20	D6	
EOH at 2.72m - Terminated due to rock obstruction		2.72	21.45			2.50 - 2.95	D7	SPT(S) 2.50m, 50 (11,14/50 for 65mm)

Observations / Remarks	Chiselling			Water Added		Hammer Information		
	From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %	
	1. Groundwater not observed. 2. Upon completion exploratory hole backfilled with arisings.						J809	58
	Groundwater						Project Number	
	Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks	A099966	



SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

JB Site Investigations Ltd
Windmill Way West
Ramparts Business Park
Berwick-Upon-Tweed
TD15 1TB

SPT Hammer Ref: JB09
Test Date: 26/08/2016
Report Date: 26/08/2016
File Name: JB09.spt
Test Operator: JS

Instrumented Rod Data

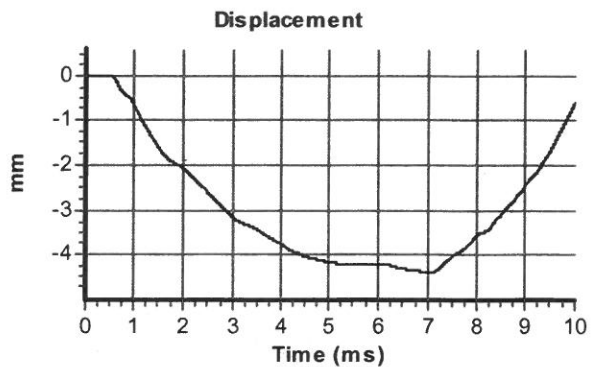
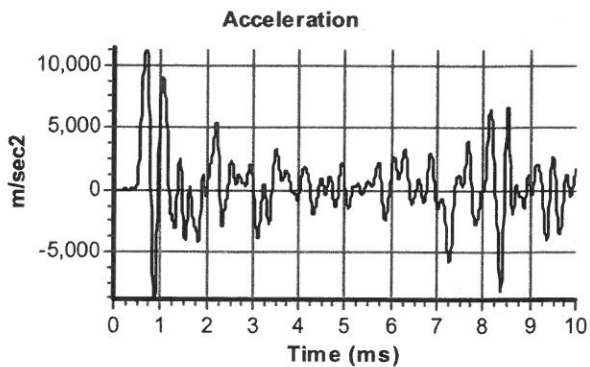
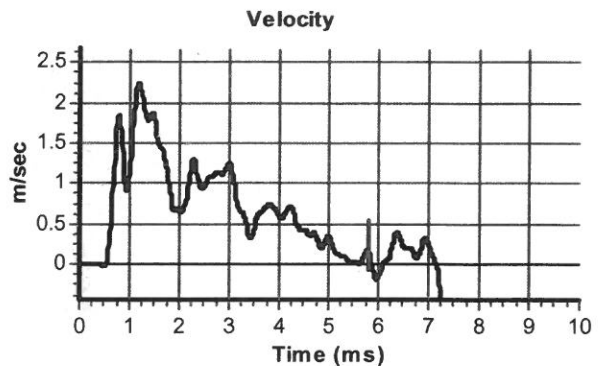
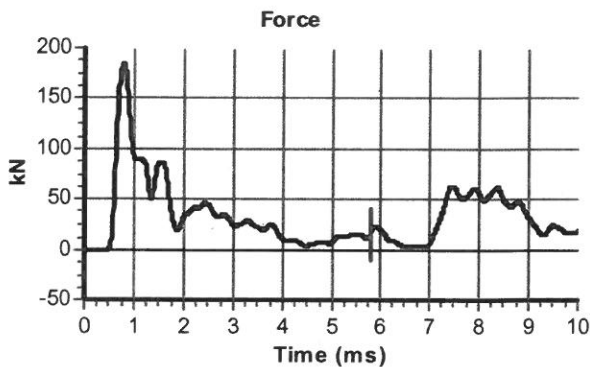
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.3
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 6178
Accelerometer No.2: 5843

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.0

Comments / Location

Hammer Type: Trip
Location: Yard



Calculations

Area of Rod A (mm²): 944
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 274

Energy Ratio E_r (%):

58

Signed: J Schofield
Title: Project Manager

The recommended calibration interval is 6 months



Appendix C.2 – Machine Excavated Trial Pit Logs

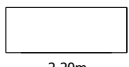


Project: **Wombwell Wetlands**
 Location: **Wombwell**
 Client: **Garganey Trust**

Location Details
 Easting: 441510.76 Northing: 403455.74
 Level: 21.48m AOD Depth: 1.70m
 Logger: JO Type: TP

Status
FINAL

Pit Number
TP001
 Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions 	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: PS
	Shoring: None	1.60	1.60	20		Approved By: BS
	Stability: Stable					Start Date: 03/10/2016
	Plant: Tracked Excavator					Finish Date: 03/10/2016

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing		
						Depth (m)	Ref	Tests / Results
MADE GROUND: Light greyish brown slightly gravelly sandy CLAY with occasional fragments of pottery and glass. Sand is fine to coarse. Gravel is angular to subangular fine to medium brick and sandstone.		0.25	21.23					
MADE GROUND: Dark grey slightly gravelly clayey coarse SAND including ash with occasional fragments of glass, pottery and metal. Gravel is angular to subrounded fine to coarse sandstone and brick.		0.60	20.88			0.40	ES1	
Soft light yellowish brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium sandstone.		1.10	20.38			0.80	B2	HV 0.80m, (p)=30 kPa (r)=10 kPa
Firm yellowish brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium fine to medium sandstone and coal.		1.70	19.78			1.40	B3	HV 1.10m, (p)=63 kPa (r)=40 kPa
EOH at 1.70m - Achieved target depth								

Observations / Remarks
 1. Upon completion exploratory hole backfilled with arisings.

Project Number
A099966

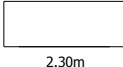


Project: **Wombwell Wetlands**
 Location: **Wombwell**
 Client: **Garganey Trust**

Location Details
 Easting: 441470.92 Northing: 403479.00
 Level: 21.28mAOD Depth: 2.20m
 Logger: JO Type: TP

Status
FINAL

Pit Number
TP002
 Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions 	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: PS
	Shoring: None	2.10	2.05	20		Approved By: BS
	Stability: Stable					Start Date: 03/10/2016
	Plant: Tracked Excavator					Finish Date: 03/10/2016

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing		
						Depth (m)	Ref	Tests / Results
MADE GROUND: Greyish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium brick and sandstone.		0.20	21.08					
Firm light yellowish grey mottled whitish grey slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium sandstone and coal.		1.10	20.18			0.70	B1	HV 0.70m, (p)=43 kPa (r)=10 kPa
Firm grey mottled orangish brown slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium sandstone.		1.80	19.48			1.30	B2	HV 1.30m, (p)=80 kPa (r)=27 kPa
Light greyish brown very sandy slightly clayey subangular to subrounded fine to medium sandstone and mudstone GRAVEL. Sand is fine to medium.		2.20	19.08			2.00	B3	
EOH at 2.20m - Achieved target depth								

Observations / Remarks	
1. Upon completion exploratory hole backfilled with arisings.	
	Project Number A099966



Project: **Wombwell Wetlands**
 Location: **Wombwell**
 Client: **Garganey Trust**

Location Details
 Easting: 441412.03 Northing: 403480.64
 Level: 21.72mAOD Depth: 2.80m
 Logger: JO Type: TP

Status
FINAL

Pit Number
TP003
 Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions 2.40m 0.60m	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: PS
	Shoring: None Stability: Stable Plant: Tracked Excavator					Approved By: BS Start Date: 03/10/2016 Finish Date: 03/10/2016

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing		
						Depth (m)	Ref	Tests / Results
MADE GROUND: Dark grey slightly gravelly sandy CLAY. Sand is fine. Gravel is subangular to subrounded fine to medium sandstone and brick.								
Orangish brown slightly gravelly sandy CLAY. Sand is fine. Gravel is subangular to subrounded fine to medium sandstone.		0.40	21.32			0.70	B1	HV 0.70m, (p)=33 kPa (r)=10 kPa
Firm yellowish grey mottled grey slightly gravelly slightly sandy CLAY. Sand is fine. Gravel is subangular to subrounded fine to medium sandstone and coal.		0.90	20.82			1.20	B2	HV 1.20m, (p)=47 kPa (r)=20 kPa
Greyish brown sandy subangular to subrounded fine to medium GRAVEL. Sand is medium to coarse.		1.40	20.32					
Stiff grey slightly gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium sandstone, mudstone and coal.		1.50	20.22			2.00	B3	HV 1.80m, (p)=77 kPa (r)=23 kPa HV 2.40m, (p)=103 kPa (r)=47 kPa
EOH at 2.80m - Achieved target depth		2.80	18.92					

Observations / Remarks

- Groundwater not observed.
- Upon completion exploratory hole backfilled with arisings.

Project Number
A099966



Project: **Wombwell Wetlands**
 Location: **Wombwell**
 Client: **Garganey Trust**

Location Details
 Easting: 441360.76 Northing: 403478.36
 Level: 23.22mAOD Depth: 2.30m
 Logger: JO Type: TP

Status
FINAL

Pit Number
TP004
 Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions 	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: PS
	Shoring: None Stability: Stable Plant: Wheeled Backhoe Excavator					Approved By: BS Start Date: 03/10/2016 Finish Date: 03/10/2016

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing		
						Depth (m)	Ref	Tests / Results
MADE GROUND: Light greyish brown slightly gravelly clayey fine SAND. Gravel is subangular to subrounded fine to medium sandstone.		0.30	22.92					
Orangish brown very clayey fine SAND.		0.65	22.58					
Orangish brown slightly gravelly very clayey fine to medium SAND. Gravel is angular to subangular fine to coarse sandstone. <i>From 0.65m bgl possible very weathered bedrock.</i>		1.00				1.00	B1	1
		2.00				2.00	B2	2
Orangish grey sandy slightly clayey angular to subangular fine to coarse sandstone GRAVEL. Sand is fine to medium. (Possible bedrock). EOH at 2.30m - Achieved target depth		2.20	21.02					
		2.30	20.92					
								3
								4
								5

Observations / Remarks	
1. Groundwater not observed. 2. Upon completion exploratory hole backfilled with arisings.	Project Number A099966



Appendix D – Trial Pit Photographs



Photograph No.1: TP001 Long Face 0.0-1.7m



Photograph No.2: TP001 Short Face 0.0-1.7m

Arndale Court
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Environmental Consultancy
Ground Technologies & Investigation



**Project :-
Wombwell Wetlands**

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No. 3: TP001 Spoil 1



Photograph No.4: TP001 Spoil 2

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Environmental Consultancy
Ground Technologies & Investigation



**Project :-
Wombwell Wetlands**

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No.5: TP002 – Long Face 0-2.2m



Photograph No 6: TP002 – Short Face 0-2.2m

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Environmental Consultancy
 Ground Technologies & Investigation



**Project :-
 Wombwell Wetlands**

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No.7: TP002 Spoil A



Photograph No.8: TP002 Spoil B

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Environmental Consultancy
 Ground Technologies & Investigation



**Project :-
 Wombwell Wetlands**

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No.9: TP003 Long Face 0.0-2.8m



Photograph No.10: TP003 Short Face 0.0-2.8m

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Environmental Consultancy
Ground Technologies & Investigation



Project :-
Wombwell Wetlands

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No.11: TP003 Spoil A



Photograph No.12: TP003 Spoil B

Arndale Court
Headingley
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LS6 2UJ

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Environmental Consultancy
Ground Technologies & Investigation



Project :-
Wombwell Wetlands

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No.13: TP004 Short Face 0.0-2.3m



Photograph No.14:TP004 Spoil A

Arndale Court
 Headingley
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 LS6 2UJ

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Environmental Consultancy
 Ground Technologies & Investigation



Project :-
 Wombwell Wetlands

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No.15: TP004 Spoil B



Photograph No.16: TP005 Long Face 0.0-2.4m

Arndale Court
 Headingley
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Environmental Consultancy
 Ground Technologies & Investigation



Project :-
 Wombwell Wetlands

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No.17: TP005 Short Face 0.0-2.4m



Photograph No.18: TP005 Spoil A

Arndale Court
 Headingley
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Environmental Consultancy
 Ground Technologies & Investigation



**Project :-
 Wombwell Wetlands**

Client:- Garganey Trust

Project No. :- A099966

Date :- November 2016



Photograph No.19: TP005 Spoil B

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**Project :-
 Wombwell Wetlands**

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Project No. :- A099966

Date :- November 2016



Appendix E – Geo-environmental Laboratory Analysis Data



Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. UK

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

WYG
Arndale Court
Arndale Centre
Otley Road
Leeds
LS6 2UJ

Tel: +44 (0) 1244 833780

Fax: +44 (0) 1244 833781



Attention : Joseph Owen
Date : 20th October, 2016
Your reference : JBA
Our reference : Test Report 16/15334 Batch 1
Location : Wombwell A099966
Date samples received : 6th October, 2016
Status : Final report
Issue : 1

One sample was received for analysis on 6th October, 2016 of which one was scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Bruce Leslie
Project Co-ordinator

Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	33.9		
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	74.7		
Particle Size <4mm =	>95%				
JEFL Job No	16/15334		Landfill Waste Acceptance Criteria Limits		
Sample No	3				
Client Sample No	E1-TP001				
Depth/Other	0.4				
Sample Date	03/10/2016				
Batch No	1				
Solid Waste Analysis					
Total Organic Carbon (%)	33.63		3		
Loss on Ignition (%)	22.7		-		
Sum of BTEX (mg/kg)	<0.025		6		
Sum of 7 PCBs (mg/kg)	<0.035		1		
Mineral Oil (mg/kg)	<30		500		
PAH Sum of 17(mg/kg)	29.37		100		
pH (pH Units)	7.56		-		
ANC to pH 7 (mol/kg)	NDP		-		
ANC to pH 4 (mol/kg)	0.67		-		
			to be evaluated		
			to be evaluated		
Eluate Analysis	10:1 concⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg		
	C₁₀	A₁₀	mg/kg		
	mg/l	mg/kg			
Arsenic	0.0047	0.047	0.5	2	25
Barium	0.028	0.28	20	100	300
Cadmium	<0.0005	<0.005	0.04	1	5
Chromium	<0.0015	<0.015	0.5	10	70
Copper	0.007	<0.07	2	50	100
Mercury	<0.001	<0.01	0.01	0.2	2
Molybdenum	<0.002	<0.02	0.5	10	30
Nickel	<0.002	<0.02	0.4	10	40
Lead	0.006	0.06	0.5	10	50
Antimony	<0.002	<0.02	0.06	0.7	5
Selenium	<0.003	<0.03	0.1	0.5	7
Zinc	0.014	0.14	4	50	200
Chloride	<0.3	<3	800	15000	25000
Fluoride	0.6	6	10	150	500
Sulphate as SO4	11.47	114.6	1000	20000	50000
Total Dissolved Solids	85	850	4000	60000	100000
Phenol	<0.01	<0.1	1	-	-
Dissolved Organic Carbon	6	60	500	800	1000

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/15334

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 16/15334

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes

JE Job No: 16/15334

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified USEPA 160.4. Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (450°C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.	Yes	Yes	AR	Yes
TM27	Modified US EPA method 9056. Determination of water soluble anions using Dionex (Ion-Chromatography).	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

JE Job No: 16/15334

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen and hydrazine. Samples are extracted using an orbital shaker.	Yes		AR	Yes
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes
TM77	Modified DDCEN/TS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No



Appendix F - Geotechnical Laboratory Analysis Data



LABORATORY REPORT



4043

Contract Number: PSL16/4844

Report Date: 08 November 2016

Client's Reference: A099966

Client Name: WYG Leeds
Arndale Court
Otley Road
Headingley
Leeds
LS6 2UJ

For the attention of: Peter Smith

Contract Title: Wombwell Wetlands, Wombwell

Date Received: 14/10/2016

Date Commenced: 14/10/2016

Date Completed: 8/11/2016

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

D Lambe
(Senior Technician)

S Royle
(Senior Technician)


A Fry
(Senior Technician)

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Page 1 of

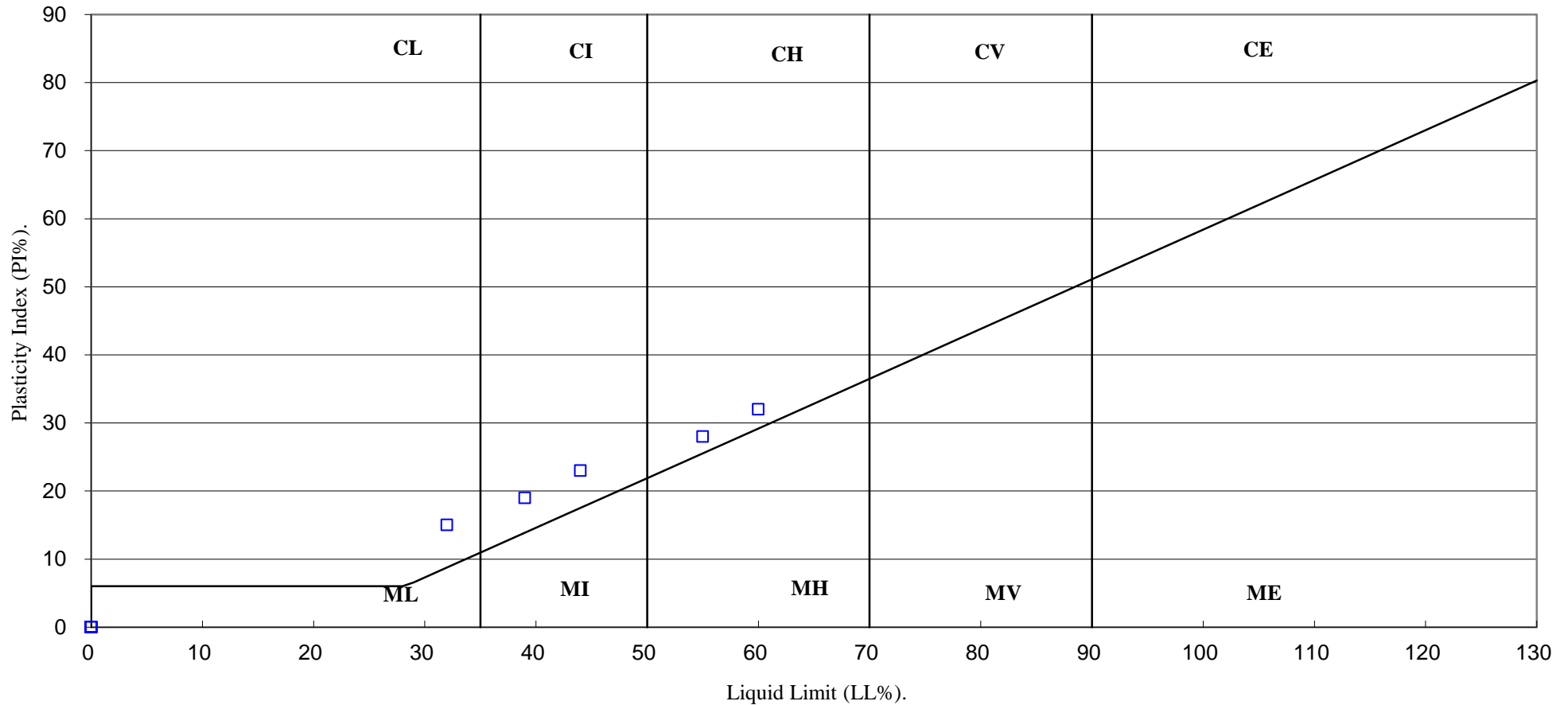
SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
CP001	4	B	1.50	2.00	Brown very gravelly very sandy very silty CLAY.
CP001	5	D	2.20		Brown slightly gravelly very sandy very silty CLAY.
CP001	7	B	2.50	3.00	Brown slightly gravelly very sandy very silty CLAY.
CP002	3	B	0.60	1.20	Brown very gravelly very sandy very silty CLAY.
CP002	5	B	1.50	2.00	Brown gravelly very sandy very silty CLAY.
TP001	2	B	0.80		Brown slightly gravelly slightly sandy very silty CLAY.
TP001	3	B	1.40		Brown slightly gravelly slightly sandy very silty CLAY.
TP002	1	B	0.70		Brown slightly gravelly sandy very silty CLAY.
TP002	2	B	1.30		Brown slightly gravelly sandy very silty CLAY.
TP003	2	B	1.20		Brown gravelly sandy very silty CLAY.
TP003	3	B	2.00		Brown slightly gravelly sandy very silty CLAY.
TP005	1	B	0.70		Brown slightly gravelly sandy very silty CLAY.
TP005	2	B	1.40		Brown slightly gravelly slightly sandy very silty CLAY.

	Checked / Approved	<i>AP</i>	Date	08/11/16	Contract No:
	Wombwell Wetlands				PSL16/4844
					Client Ref:
					A099966

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



Checked /Approved	<i>AR</i>	Date	08/11/16	Contract No:
Wombwell Wetlands				PSL16/4844
				Client Ref:
				A099966

PARTICLE SIZE DISTRIBUTION TEST

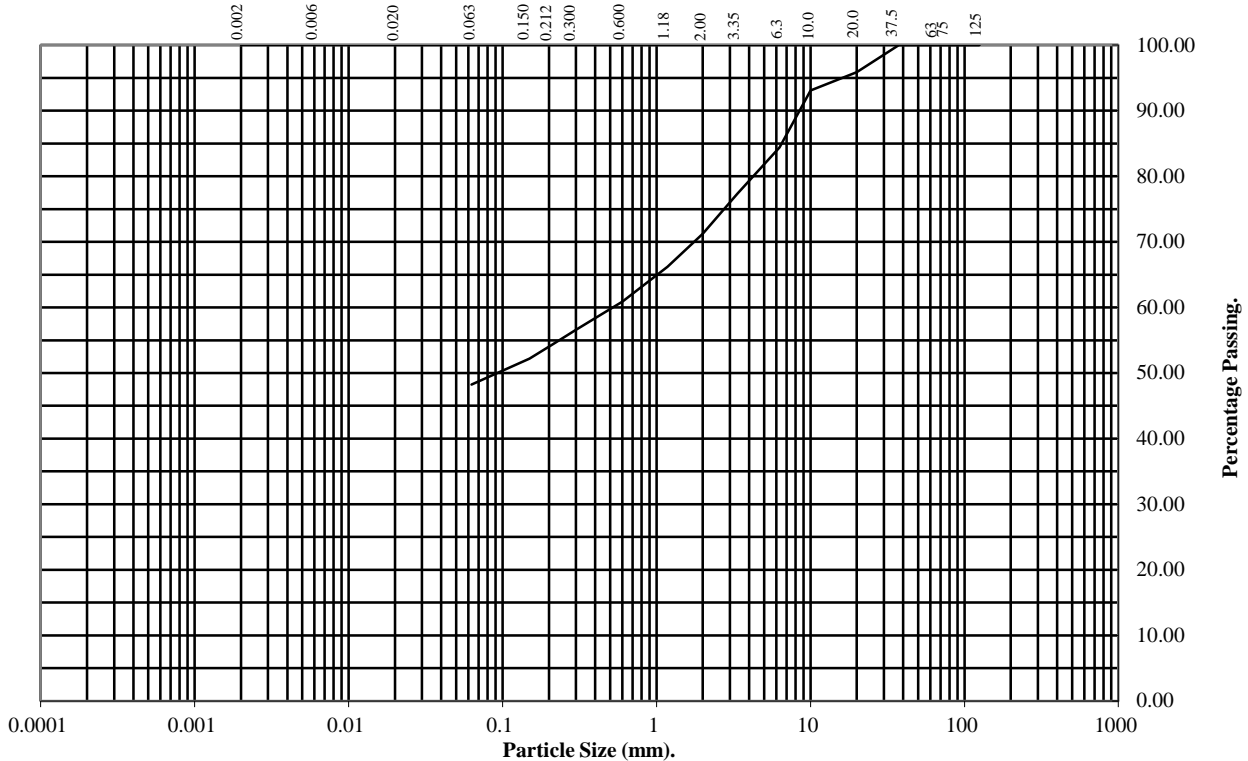
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: CP001 **Top Depth (m):** 1.50

Sample Number: 4 **Base Depth(m):** 2.00

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	93
6.3	84
3.35	77
2	71
1.18	66
0.6	61
0.3	57
0.212	54
0.15	52
0.063	48

Soil Fraction	Total Percentage
Cobbles	0
Gravel	29
Sand	23
Silt/Clay	48

Remarks:
See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	08/11/16	Contract No:	PSL16/4844
Wombwell Wetlands				Client Ref:	A099966

PARTICLE SIZE DISTRIBUTION TEST

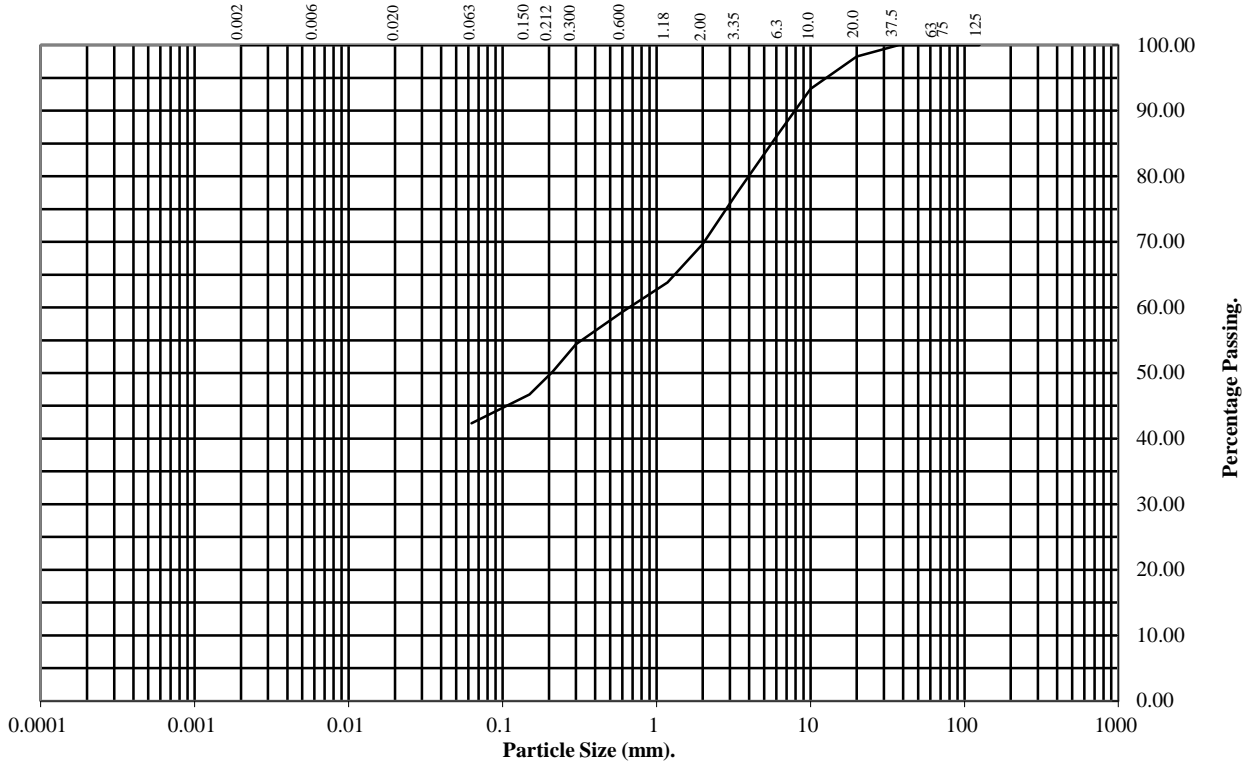
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: CP002 **Top Depth (m):** 0.60

Sample Number: 3 **Base Depth(m):** 1.20

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	98
10	93
6.3	87
3.35	78
2	70
1.18	64
0.6	59
0.3	54
0.212	50
0.15	47
0.063	42

Soil Fraction	Total Percentage
Cobbles	0
Gravel	30
Sand	28
Silt/Clay	42

Remarks:
See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	08/11/16	Contract No:	PSL16/4844
Wombwell Wetlands				Client Ref:	A099966

PARTICLE SIZE DISTRIBUTION TEST

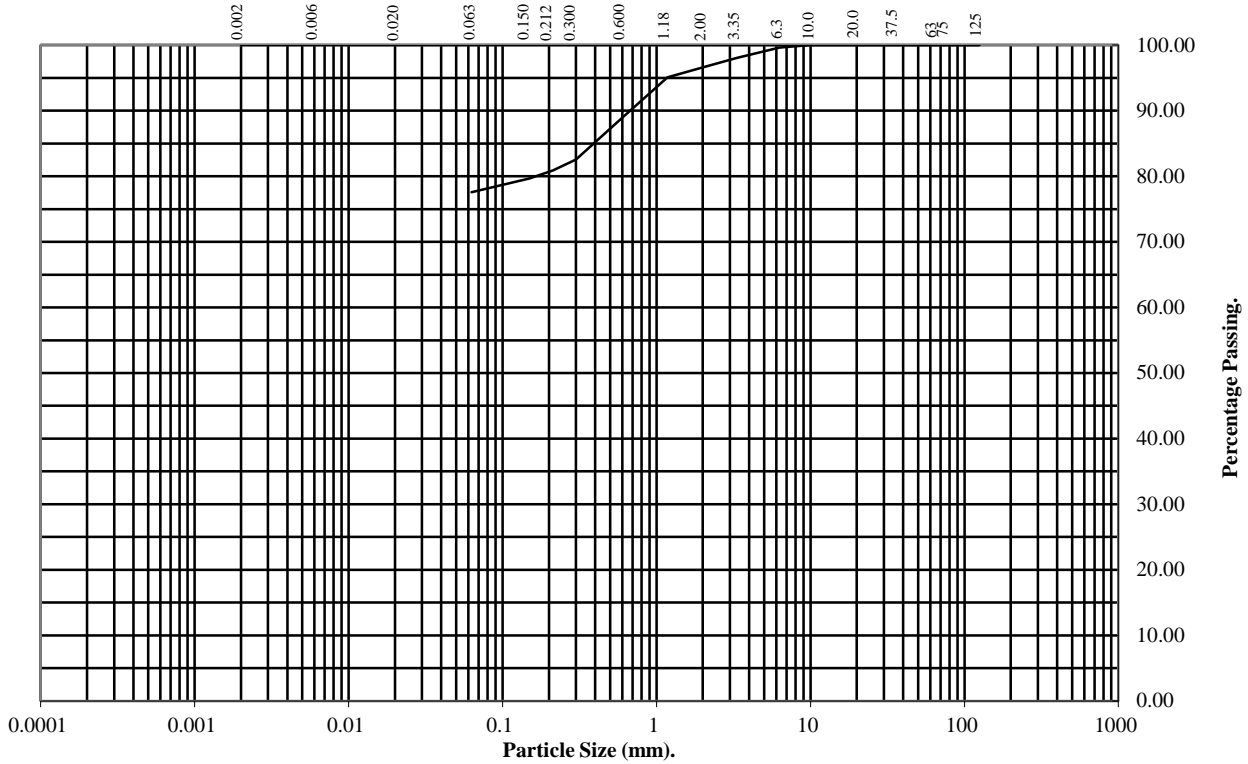
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP002 **Top Depth (m):** 1.30

Sample Number: 2 **Base Depth(m):**

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	98
2	97
1.18	95
0.6	89
0.3	83
0.212	81
0.15	80
0.063	78

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	19
Silt/Clay	78

Remarks:
See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	08/11/16	Contract No:	PSL16/4844
Wombwell Wetlands				Client Ref:	A099966

PARTICLE SIZE DISTRIBUTION TEST

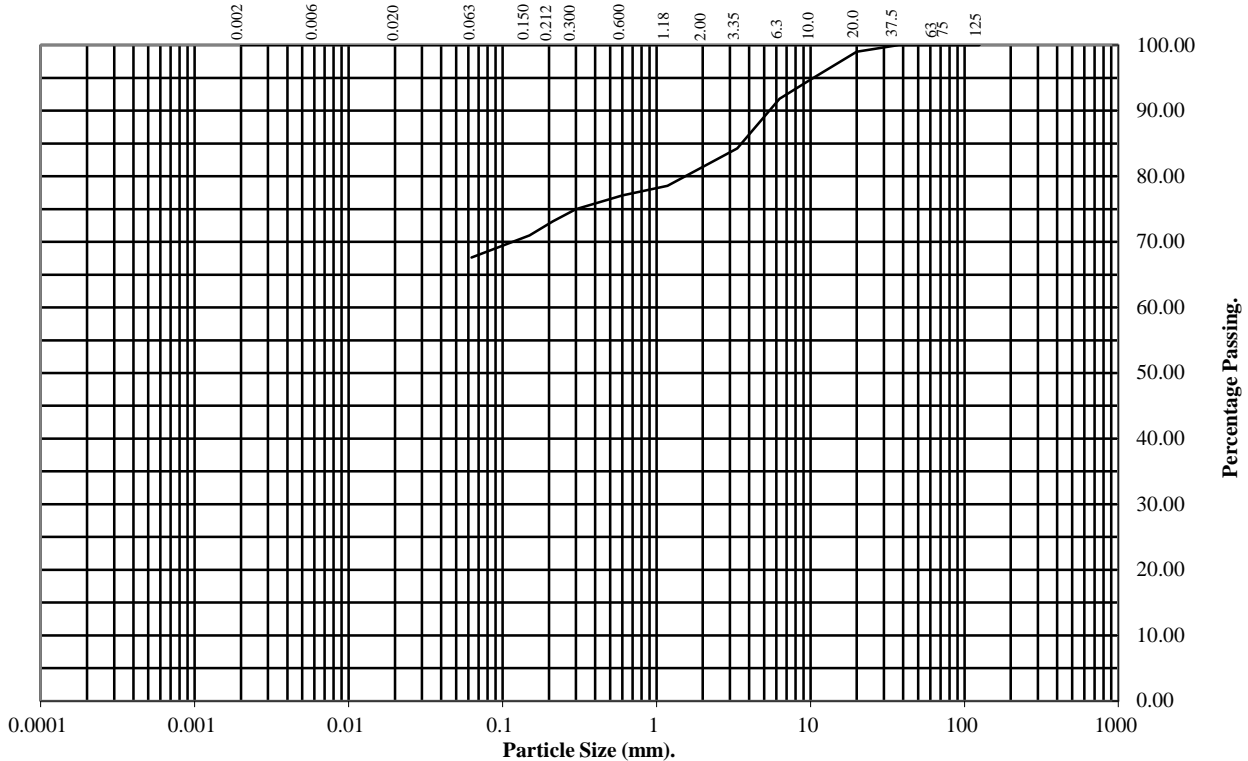
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP003 **Top Depth (m):** 1.20

Sample Number: 2 **Base Depth(m):**

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	99
10	95
6.3	92
3.35	84
2	81
1.18	79
0.6	77
0.3	75
0.212	73
0.15	71
0.063	68

Soil Fraction	Total Percentage
Cobbles	0
Gravel	19
Sand	13
Silt/Clay	68

Remarks:
See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	08/11/16	Contract No:
Wombwell Wetlands				PSL16/4844
				Client Ref:
				A099966

PARTICLE SIZE DISTRIBUTION TEST

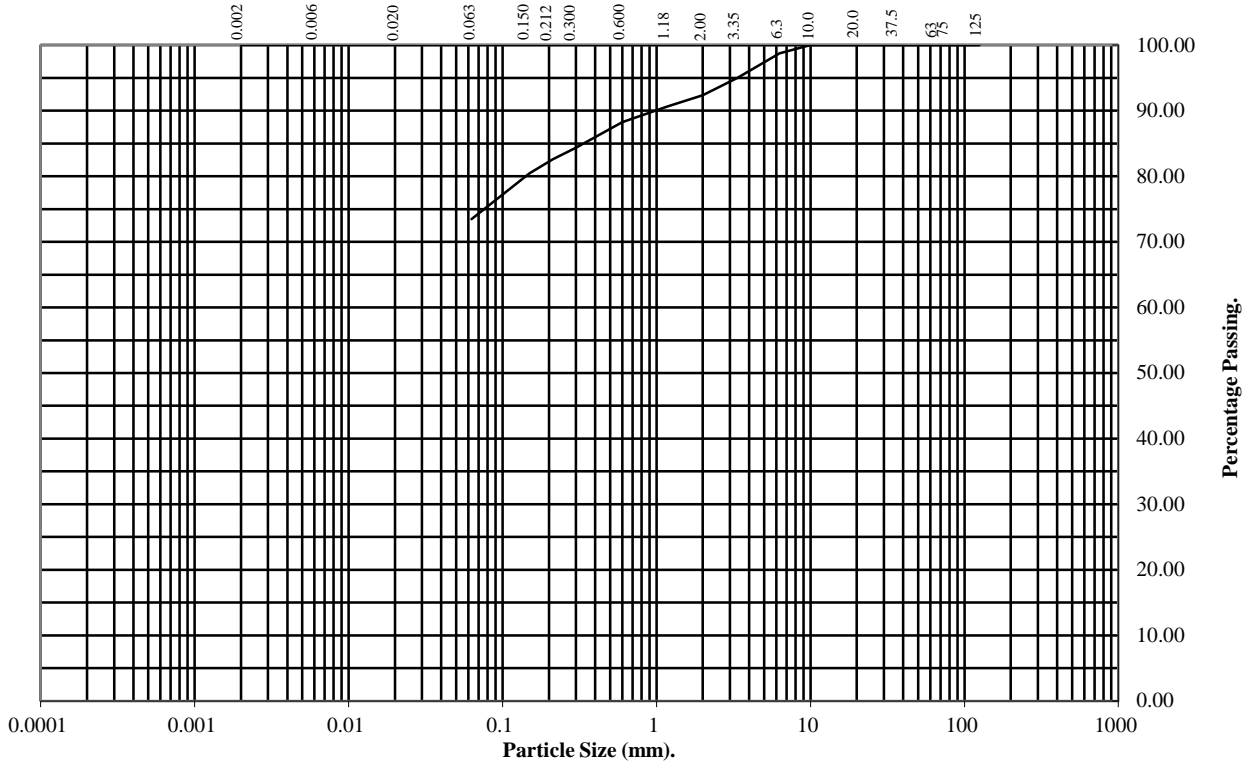
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP005 **Top Depth (m):** 0.70

Sample Number: 1 **Base Depth(m):**

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	95
2	92
1.18	91
0.6	88
0.3	84
0.212	83
0.15	80
0.063	73

Soil Fraction	Total Percentage
Cobbles	0
Gravel	8
Sand	19
Silt/Clay	73

Remarks:
See summary of soil descriptions.

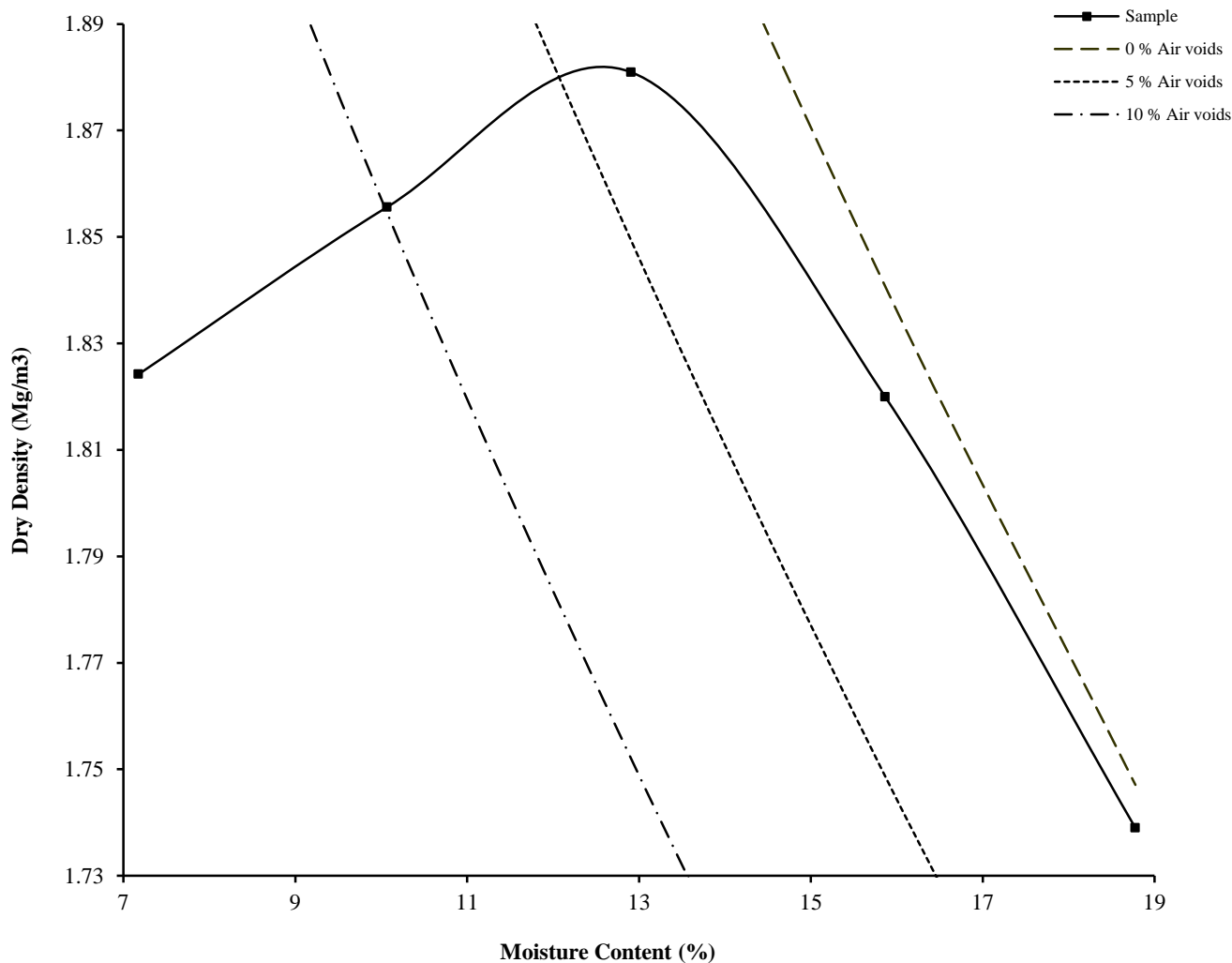


Checked / Approved	<i>AP</i>	Date	08/11/16	Contract No:	PSL16/4844
Wombwell Wetlands				Client Ref:	A099966

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: CP001 Top Depth (m) : 2.50
 Sample Number: 7 Base Depth (m) : 3.00
 Sample Type: B



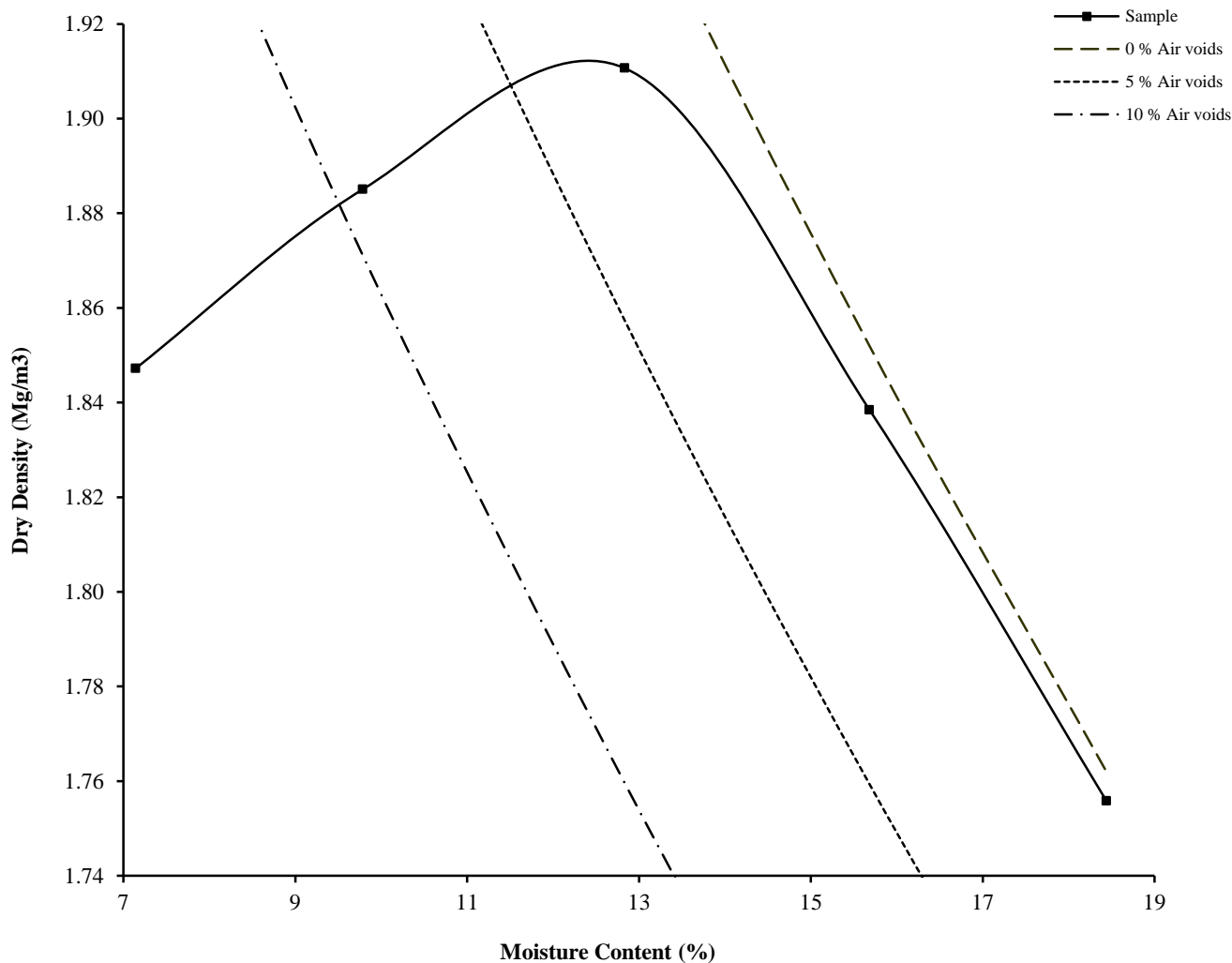
Initial Moisture Content:	13	Method of Compaction:	2.5Kg Rammer	Separate Samples
Particle Density (Mg/m ³):	2.6	Actual	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m ³):	1.88		Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	13			
Remarks				
See summary of soil descriptions				

	Checked / Approved	AR	Date	08/11/16	Contract No.
	Wombwell Wetlands				PSL16/4844
					Client Ref
					A099966

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: CP002 Top Depth (m) : 1.50
 Sample Number: 5 Base Depth (m) : 2.00
 Sample Type: B



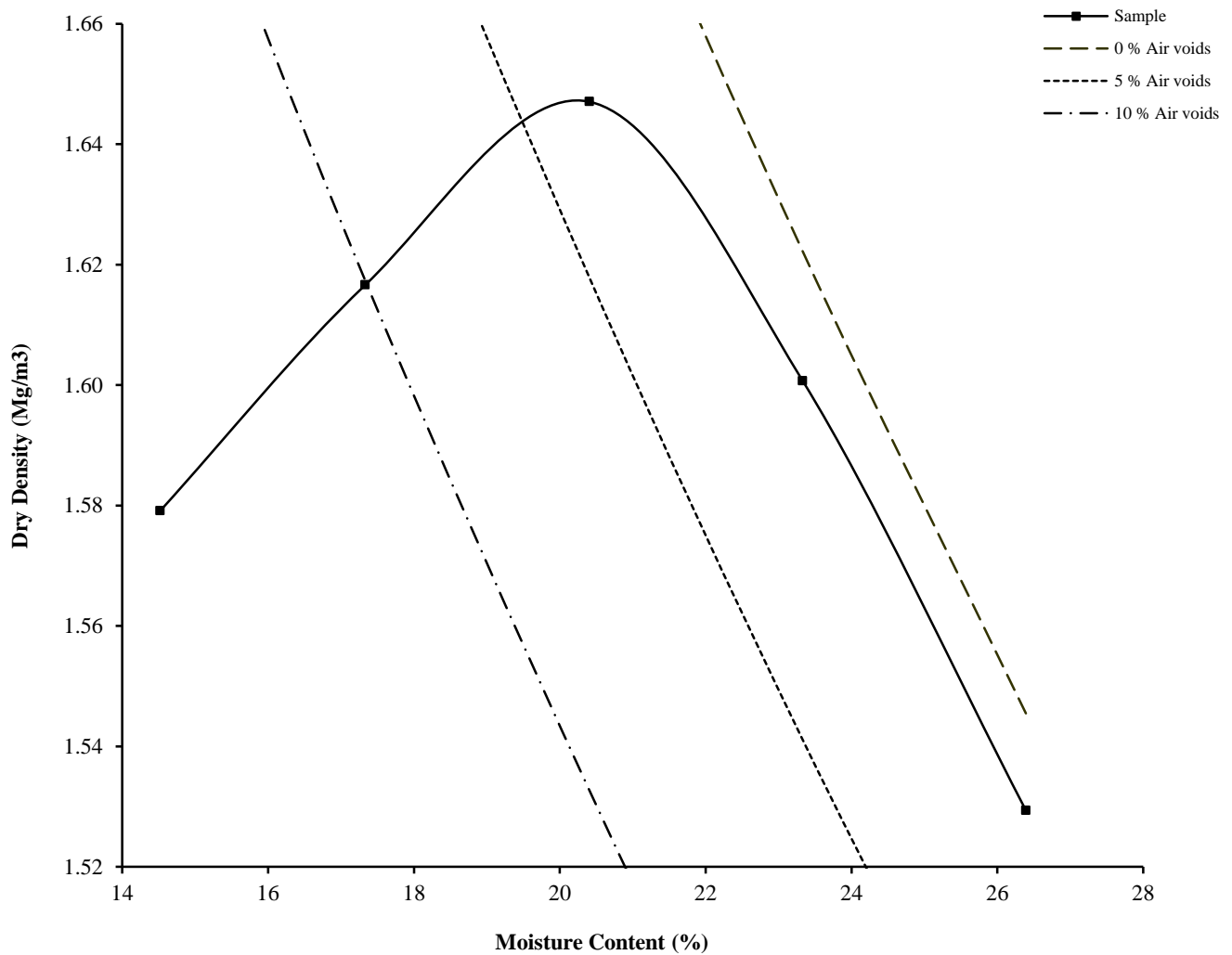
Initial Moisture Content:	13	Method of Compaction:	2.5Kg Rammer	Separate Samples
Particle Density (Mg/m ³):	2.61	Actual	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m ³):	1.91		Material Retained on 20.0 mm Test Sieve (%):	2
Optimum Moisture Content (%):	13			
Remarks				
See summary of soil descriptions				

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	Wombwell Wetlands				PSL16/4844
					Client Ref
					A099966

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP001 Top Depth (m) : 0.80
 Sample Number: 2 Base Depth (m) :
 Sample Type: B



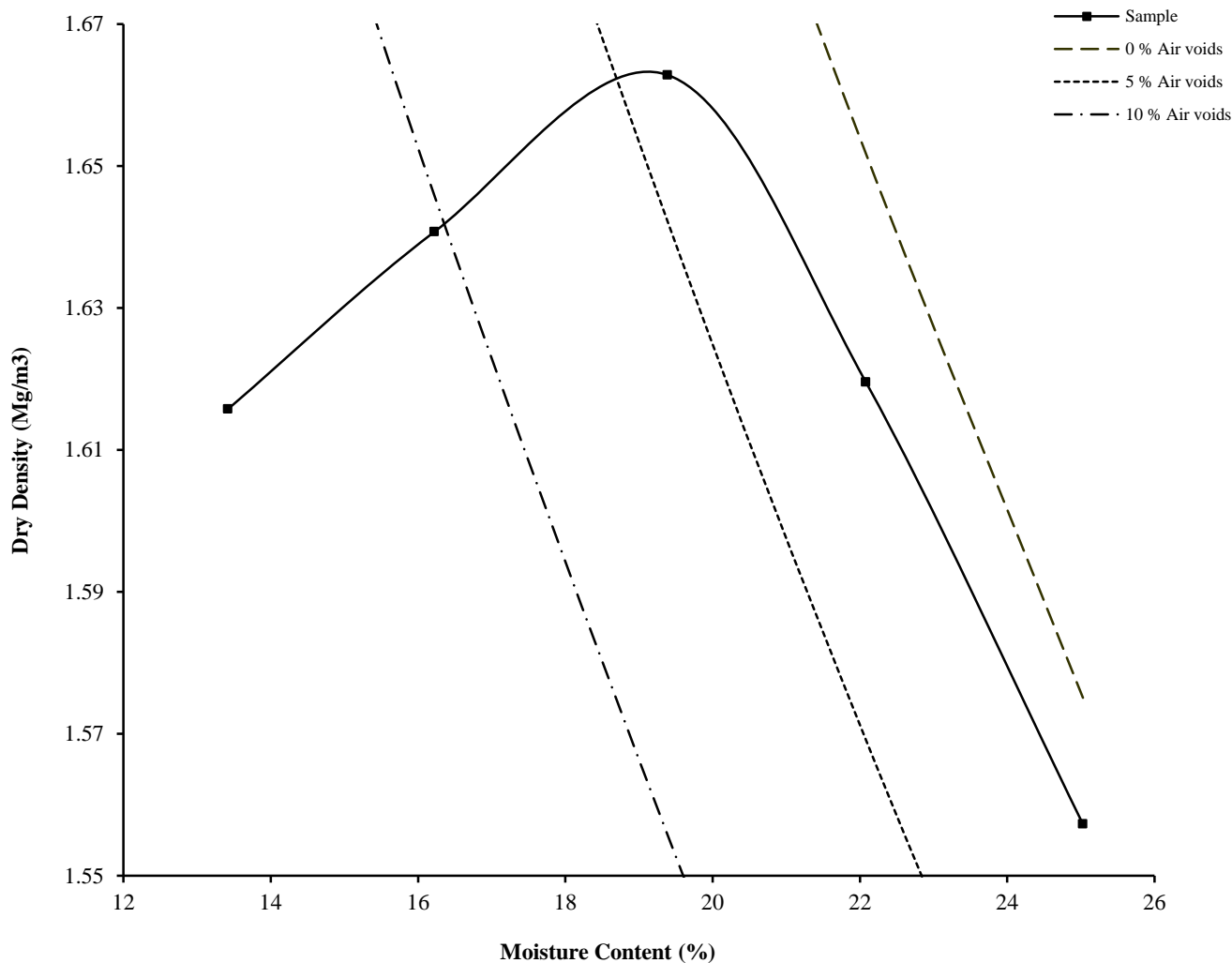
Initial Moisture Content:	26	Method of Compaction:	2.5Kg Rammer	Separate Samples
Particle Density (Mg/m ³):	2.61	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m ³):	1.65		Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	20			
Remarks See summary of soil descriptions				

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					Client Ref
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP002 Top Depth (m) : 0.70
 Sample Number: 1 Base Depth (m) :
 Sample Type: B



Initial Moisture Content:	25	Method of Compaction:	2.5Kg Rammer	Separate Samples
Particle Density (Mg/m ³):	2.6	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m ³):	1.66		Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	19			
Remarks See summary of soil descriptions				

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					Client Ref
					A099966

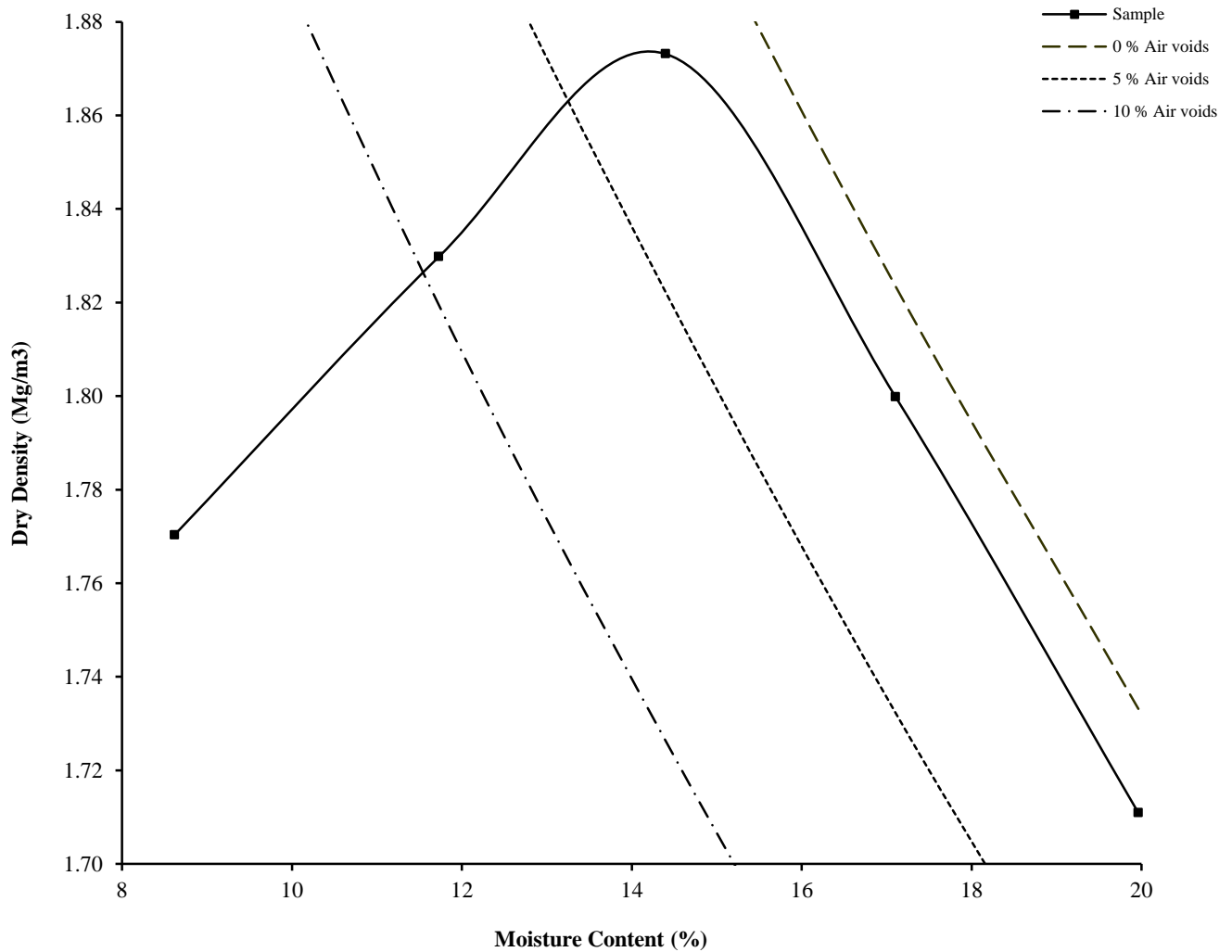
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : 1990

Hole Number: TP003 Top Depth (m) : 1.20

Sample Number: 2 Base Depth (m) :

Sample Type: B



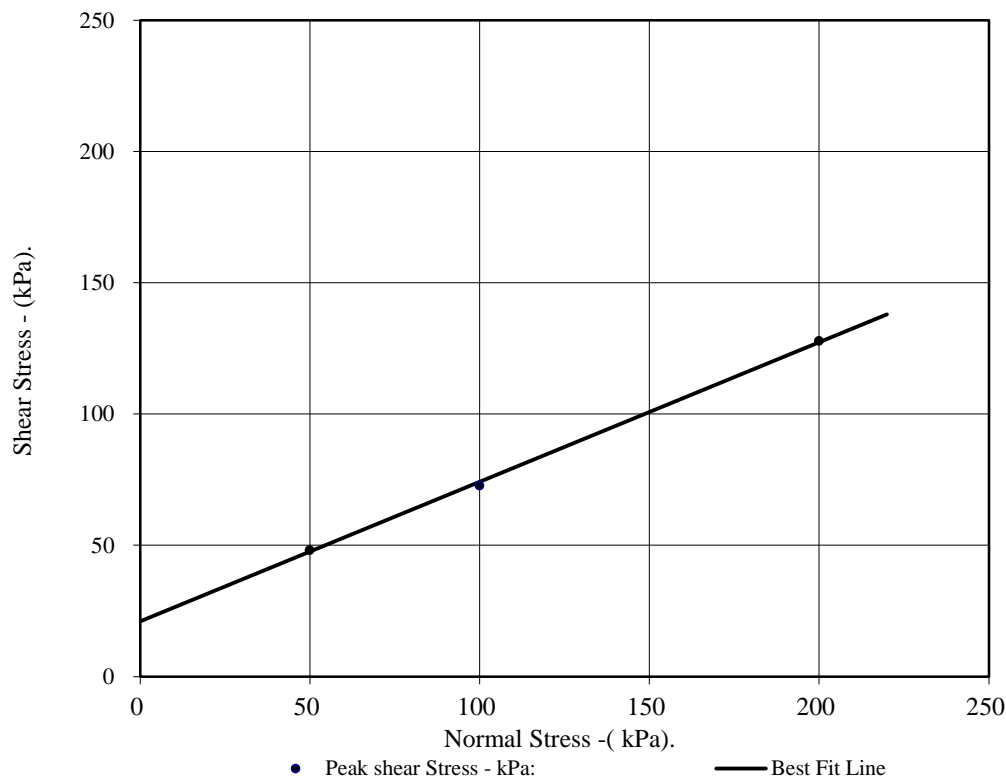
Initial Moisture Content:	14	Method of Compaction:	2.5Kg Rammer	Separate Samples
Particle Density (Mg/m ³):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m ³):	1.87		Material Retained on 20.0 mm Test Sieve (%):	1
Optimum Moisture Content (%):	14			
Remarks				
See summary of soil descriptions				


	Checked / Approved	AR	Date	08/11/16	Contract No.
	Wombwell Wetlands				PSL16/4844
					Client Ref

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	CP001		Top Depth:	3.50	
Sample Number:	9		Base Depth:	3.95	
Sample Conditions:	Submerged		Sample Type	D	
Particle Density - Mg/m ³ :	2.65	Assumed	Remarks:		
Sample Preparation:	Remoulded using 2.5kg effort Material tested passing 2mm sieve				
Sample Description:	Brown slightly gravelly slightly sandy very silty CLAY.				
STAGE			1	2	3
Initial Conditions					
Height - mm:			19.78	19.78	19.78
Length - mm:			60.01	60.01	60.01
Moisture Content - %:			27	27	27
Bulk Density - Mg/m ³ :			1.95	1.97	1.97
Dry Density - Mg/m ³ :			1.53	1.54	1.54
Voids Ratio:			0.728	0.717	0.716
Normal Pressure- kPa			50	100	200
Consolidation Stage					
Consolidated Height - mm:			18.99	18.59	18.22
Shearing Stage					
Rate of Strain (mm/min)			0.026	0.026	0.026
Displacement at peak shear stress (mm)			6.00	8.00	8.00
Peak shear Stress - kPa:			48	73	128
Final Consolidated Conditions					
Moisture Content - %:			28	27	26
Bulk Density - Mg/m ³ :			2.03	2.09	2.14
Dry Density - Mg/m ³ :			1.58	1.64	1.69
Peak					
Angle of Shearing Resistance:(θ)			28		
Effective Cohesion - kPa:			21		

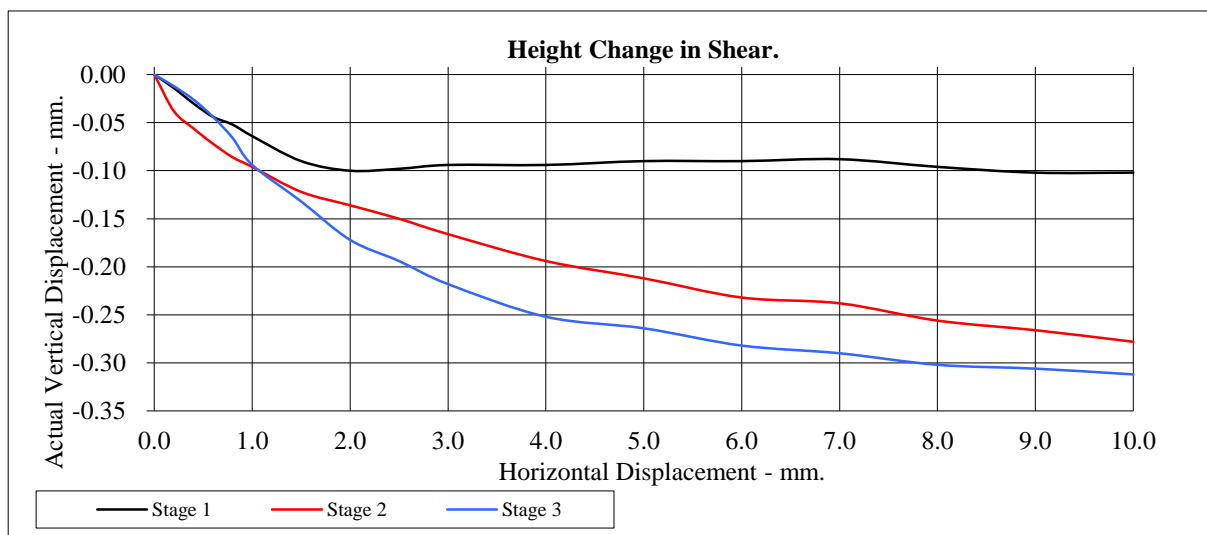
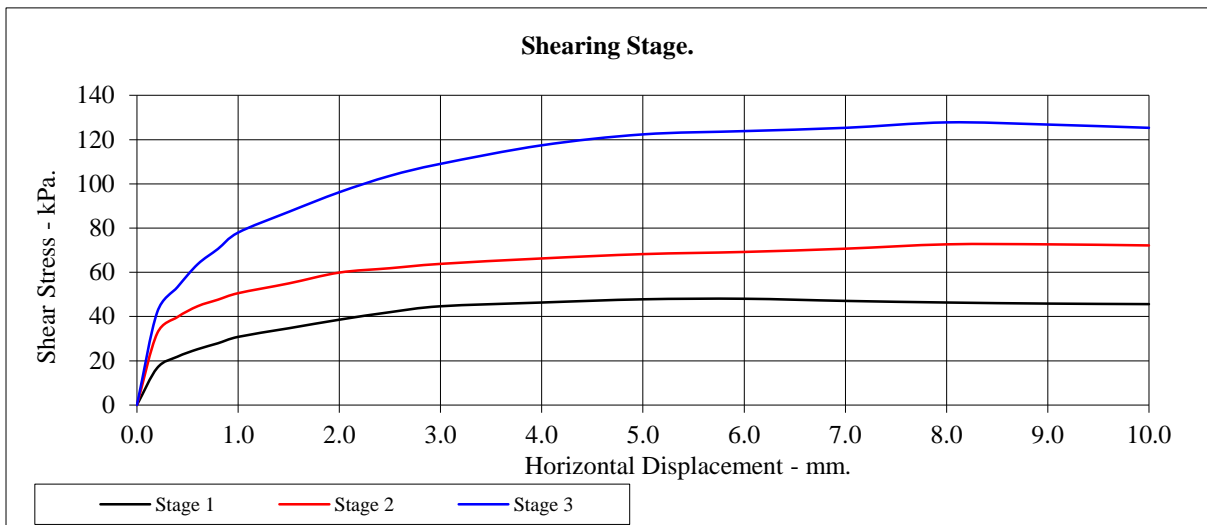
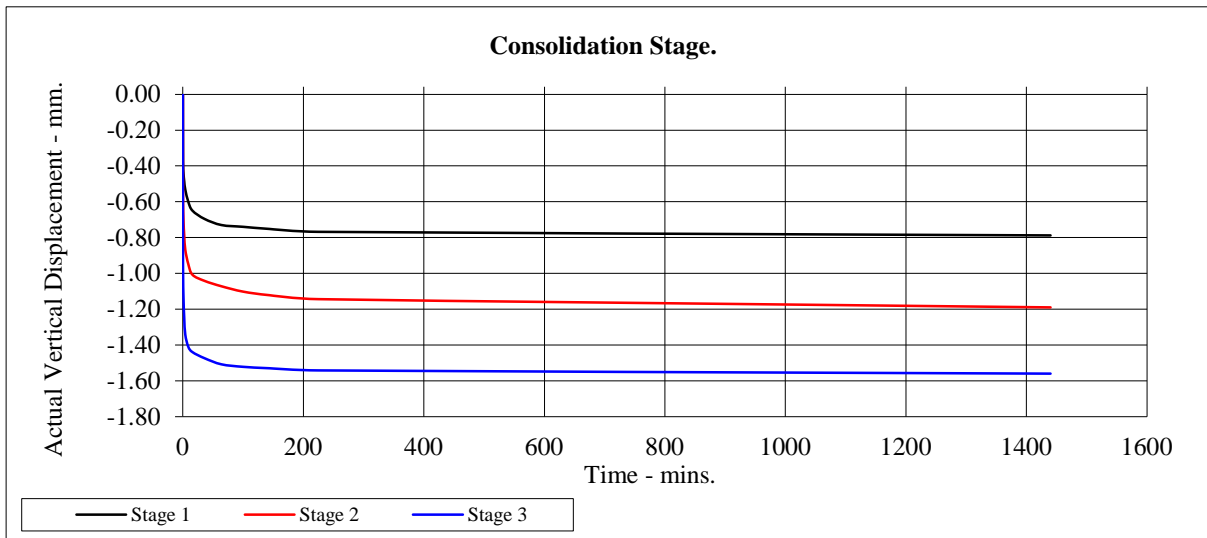


	Checked / Approved	AR	Date	08/11/16	Contract No:
	Wombwell Wetlands				PSL16/4844
					Client Ref:
				A099966	

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	CP001	Top Depth:	3.50
Sample Number:	9	Base Depth:	3.95

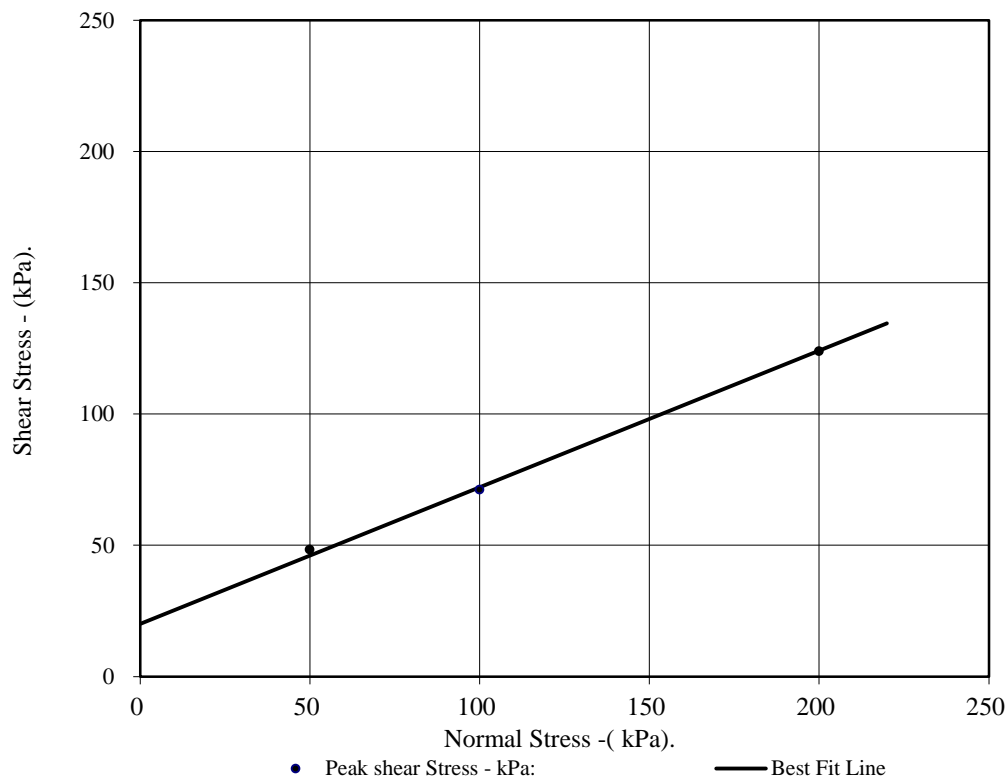


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Wombwell Wetlands				Client Ref:	A099966

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	TP001		Top Depth:	0.80	
Sample Number:	2		Base Depth:	-	
Sample Conditions:	Submerged		Sample Type	B	
Particle Density - Mg/m ³ :	2.65	Assumed	Remarks:		
Sample Preparation:	Remoulded using 2.5kg effort Material tested passing 2mm sieve				
Sample Description:	See summary of soil descriptions.				
STAGE			1	2	3
Initial Conditions					
Height - mm:			24.98	24.98	24.98
Length - mm:			60.01	60.01	60.01
Moisture Content - %:			26	26	26
Bulk Density - Mg/m ³ :			1.93	1.93	1.94
Dry Density - Mg/m ³ :			1.53	1.54	1.54
Voids Ratio:			0.729	0.724	0.719
Normal Pressure- kPa			50	100	200
Consolidation Stage					
Consolidated Height - mm:			23.72	23.42	22.96
Shearing Stage					
Rate of Strain (mm/min)			0.030	0.030	0.030
Displacement at peak shear stress (mm)			6.00	5.00	8.00
Peak shear Stress - kPa:			48	71	124
Final Consolidated Conditions					
Moisture Content - %:			24	23	20
Bulk Density - Mg/m ³ :			2.03	2.06	2.11
Dry Density - Mg/m ³ :			1.64	1.68	1.75
Peak					
Angle of Shearing Resistance:(θ)			28		
Effective Cohesion - kPa:			20		

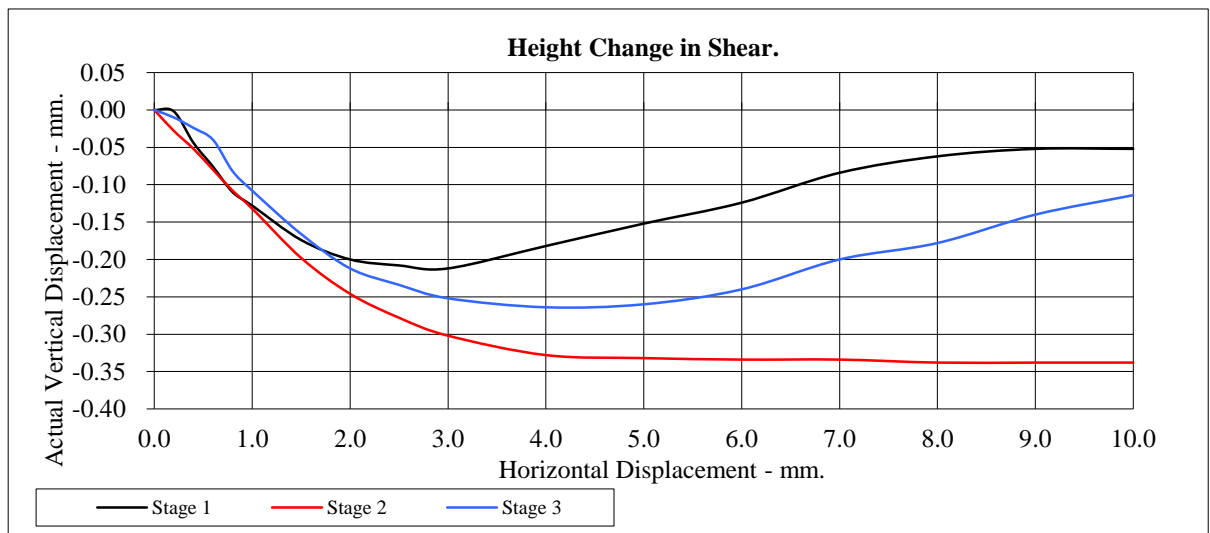
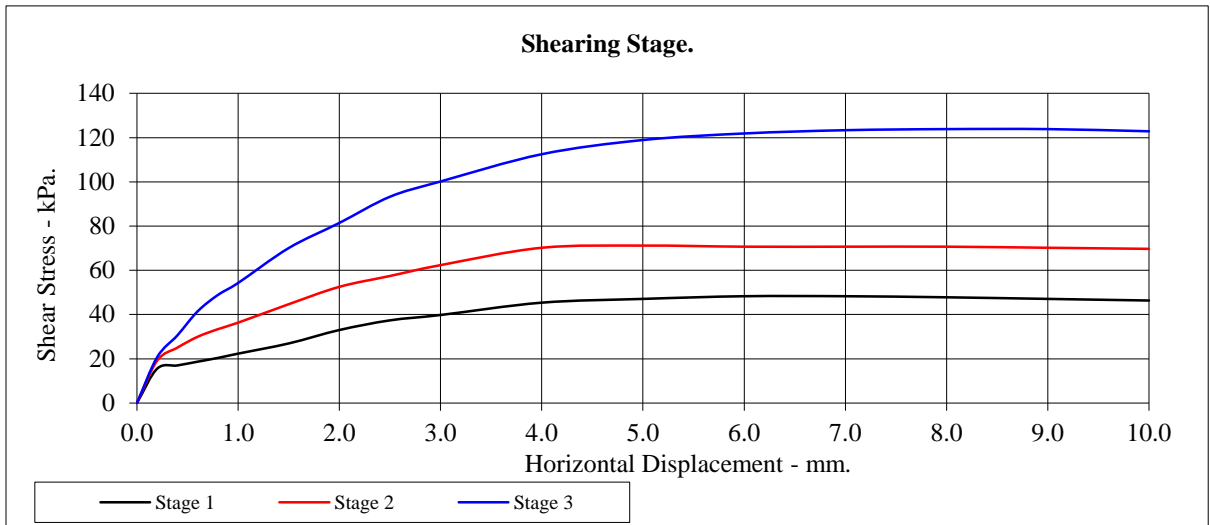
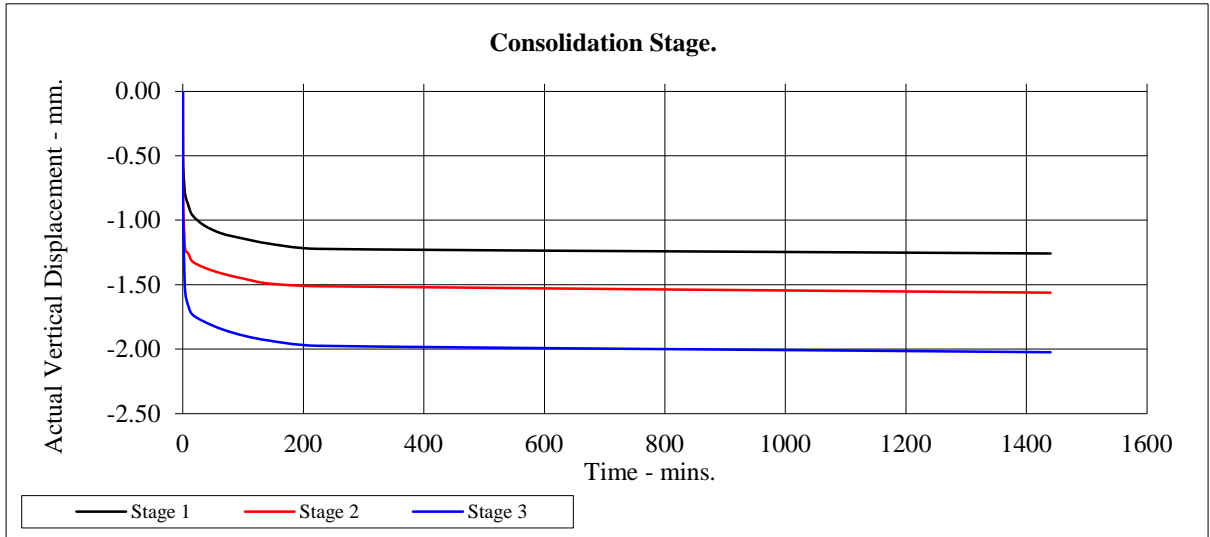


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CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	TP001	Top Depth:	0.80
Sample Number:	2	Base Depth:	-

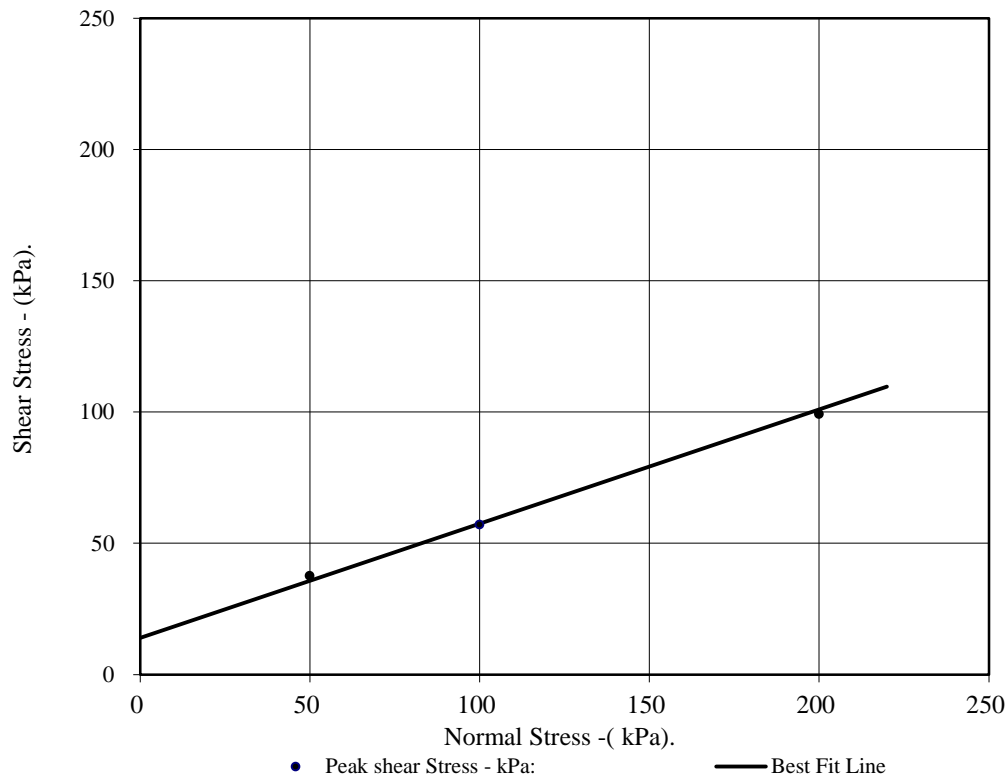


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Wombwell Wetlands				Client Ref:	A099966

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	TP005		Top Depth:	1.40	
Sample Number:	2		Base Depth:	-	
Sample Conditions:	Submerged		Sample Type	B	
Particle Density - Mg/m ³ :	2.65	Assumed	Remarks:		
Sample Preparation:	Remoulded using 2.5kg effort Material tested passing 2mm sieve				
Sample Description:	See summary of soil descriptions.				
STAGE			1	2	3
Initial Conditions					
Height - mm:			24.98	24.98	24.98
Length - mm:			60.01	60.01	60.01
Moisture Content - %:			28	28	28
Bulk Density - Mg/m ³ :			1.82	1.83	1.83
Dry Density - Mg/m ³ :			1.43	1.43	1.43
Voids Ratio:			0.859	0.854	0.847
Normal Pressure- kPa			50	100	200
Consolidation Stage					
Consolidated Height - mm:			24.11	23.72	23.22
Shearing Stage					
Rate of Strain (mm/min)			0.020	0.020	0.020
Displacement at peak shear stress (mm)			10.00	10.00	10.00
Peak shear Stress - kPa:			38	57	99
Final Consolidated Conditions					
Moisture Content - %:			30	29	28
Bulk Density - Mg/m ³ :			1.89	1.92	1.97
Dry Density - Mg/m ³ :			1.45	1.49	1.55
Peak					
Angle of Shearing Resistance:(θ)			24		
Effective Cohesion - kPa:			14		

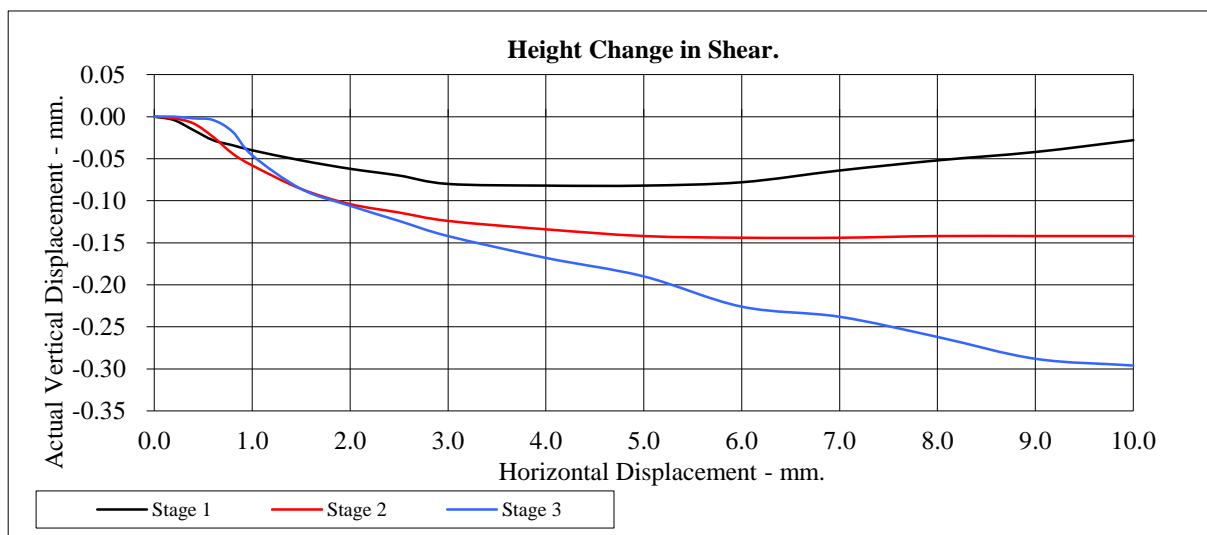
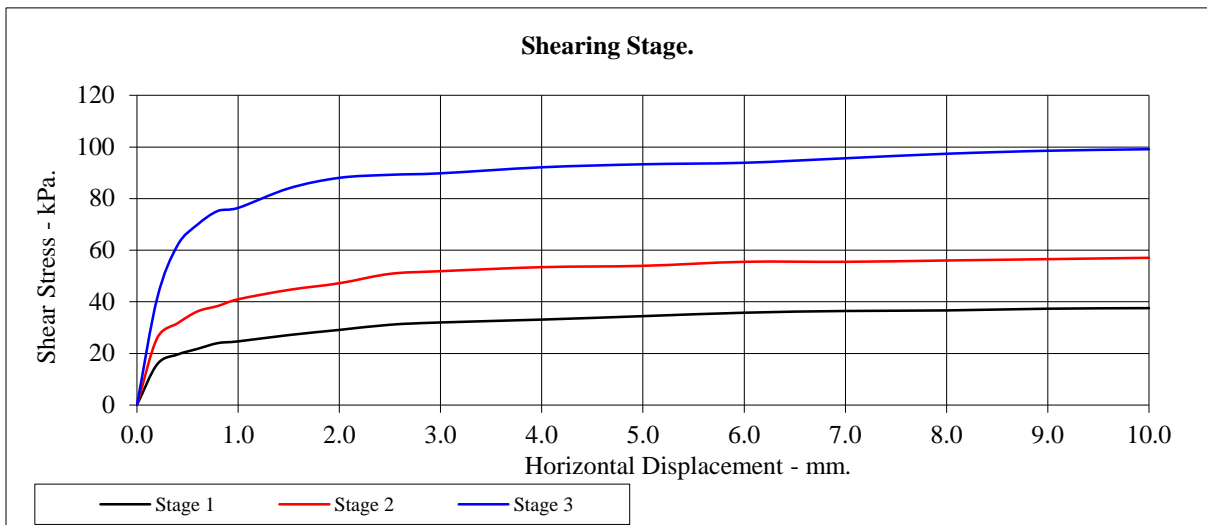
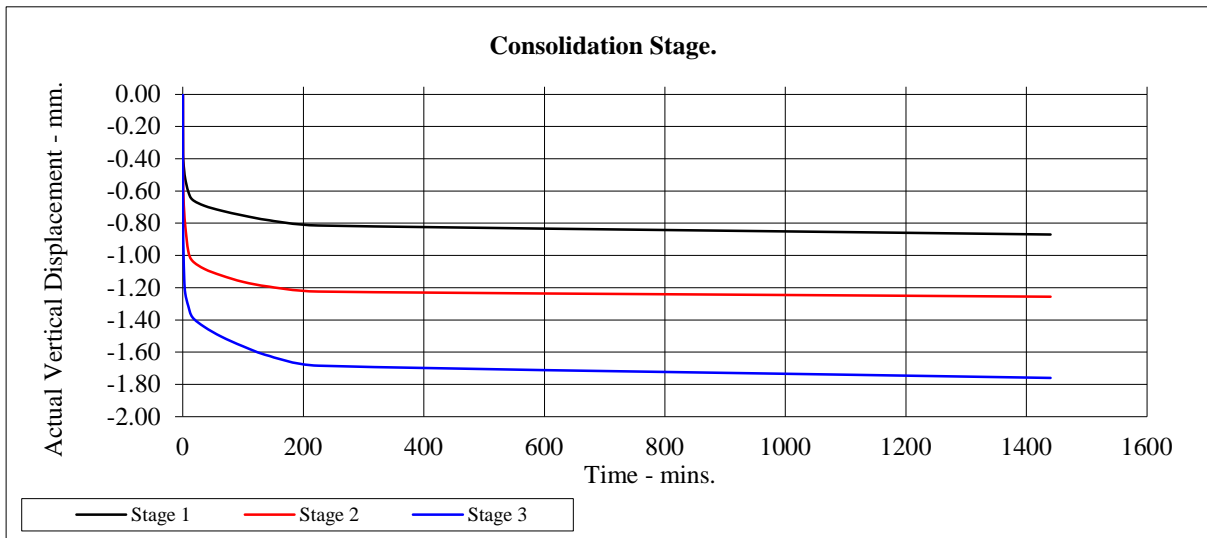


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Wombwell Wetlands				Client Ref:	A099966

CONSOLIDATED DRAINED SHEARBOX TEST

BS1377:Part 7:1990 Clause 4.5.4

Hole Number:	TP005	Top Depth:	1.40
Sample Number:	2	Base Depth:	-



Checked/Approved	AP	Date	08/11/16	Contract No:	PSL16/4844
Wombwell Wetlands				Client Ref:	A099966



Certificate of Analysis

Certificate Number 16-82010

27-Oct-16

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 16-82010

Client Reference PSL16/4844

Order No (not supplied)

Contract Title Wombwell Wetlands

Description 4 Soil samples.

Date Received 24-Oct-16

Date Started 24-Oct-16

Date Completed 27-Oct-16

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read "Rob Brown".

Rob Brown
Business Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 16-82010

Client Ref PSL16/4844

Contract Title Wombwell Wetlands

Lab No	1072812	1072813	1072814	1072815
Sample ID	CP001	TP001	TP002	TP003
Depth	2.20	1.40	0.70	2.00
Other ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sampling Date	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Inorganics							
pH	DETS 2008#			7.4	6.6	6.5	6.7
Sulphate Aqueous Extract as SO4	DETS 2076#	10	mg/l	28	46	50	18

Information in Support of the Analytical Results

Our Ref 16-82010
Client Ref PSL16/4844
Contract Wombwell Wetlands

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1072812	CP001 2.20 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1072813	TP001 1.40 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1072814	TP002 0.70 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1072815	TP003 2.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months