



SITE INVESTIGATION REPORT

WHITEGATE ROAD HOUSING DEVELOPMENT, WREXHAM

Prepared for:

Stephen Bowen
Bowen Consultants Ltd
Merchants House
High Street
Newtown
Powys
SY16 2NR

Prepared by:

Datrys
Yr Aelwyd
3-5 Church Street
Caernarfon
Gwynedd
LL55 1SW

June 2014

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1.0 INTRODUCTION

The intention of the development is to construct a new housing estate on a currently vacant plot of land. The estate will contain a number of semi-detached, detached and terrace properties of traditional masonry and timber construction. There will be a new estate road to provide access to parking spaces for each property.

This report confers the findings of the second stage in the site investigation process which was the intrusive investigation. The investigation and this report have been prepared as a result of the recommendations of the Desk study and Site Walkover report which suggested that trial pits should be undertaken to determine the ground strata.

The report details and discusses the results of these investigations and recommends the most appropriate foundations to use for the structures.

2.0 TRIAL PITS

Trial pits were excavated in order to identify the underlying strata and establish whether there is rock present and if so, at what depth.

A total of 10 trial pits were excavated on the 2nd May 2014 to depths varying to 2m below existing ground level. The logs for each hole are included in Appendix A along with the Trial Pit Location Plan.

Trial pits were positioned outside of the proposed building foundations so as not to create soft spots.

Observations

There was a general consistency in the arrangement of the underlying strata in all of the trial pits.

The following table describes the material encountered. Ground water was encountered between depths of 1.6m to 1.9m The sides of the excavated holes

remained stable unless groundwater was present. No rock was encountered at any of the locations.

Trial Pits

<u>Depth</u>	<u>Material</u>
0.0 – 0.3m	Tarmacadam and sub-base
0.3 – 0.7m	Organic grey dense silty SAND
0.6 – 1.0m	Orange silty SAND with gravel
1.0m +	Brown medium dense silty GRAVEL with cobbles and boulders

3.0 CONTAMINATION TESTING

Contamination testing was undertaken in the laboratory using four samples of ground taken from varying depths and locations over the site. The results are appended. All values are below the levels for which contamination is deemed present and therefore the site is not contaminated.

4.0 DISCUSSION

The ground investigation reveals that the ground is sandy gravel at a depth of 1m below existing ground level. This material is medium dense. The water table is at a level of 1.6m. If traditional footings were used then this would be lower than the underside which would be beneficial. Groundwater is unlikely to be an issue for consideration within the foundation design.

The gravel material is considered suitable for strip foundations and would conservatively have an allowable bearing pressure of 100kN/m². No hard spots were uncovered so reinforced foundations are not likely to be necessary.

5.0 CONCLUSION & RECOMMENDATIONS

The site investigation has revealed that beyond a depth of 1.0m the ground is suitable for normal strip foundations designed for a minimum safe ground bearing capacity of 100kN/m².

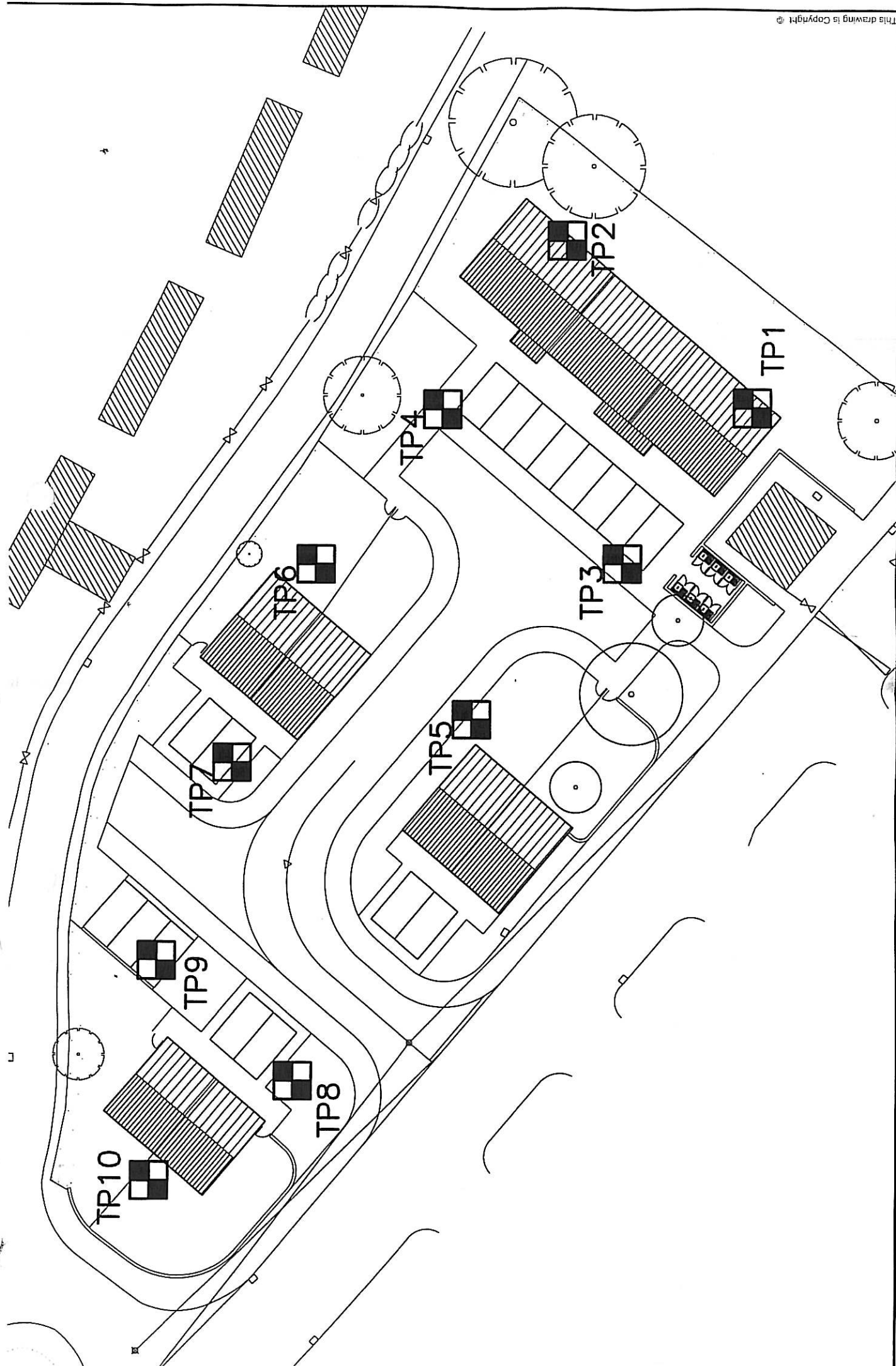
We recommend the following:

1. Use standard mass concrete foundations typically 600mm wide to a bearing depth of 1.0m or down to the medium dense gravel (whichever is at the greatest depth).
2. Considering the depth of the organic grey material which is not considered suitable for ground bearing, ground floors are likely to need to be suspended Beam & block or similar although this will depend upon the levels.

APPENDICES

Appendix A

Testing Location Layout



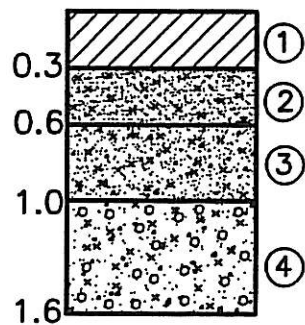
This drawing is Copyright ©

TITLE		PROJECT		DATE		SCALE		NTS		REV	
Trial Pit Location Plan		Whitegate Road, Wrexham		13.05.14		PASSED		WL			
				Job No. 14065		ACAD Ref. 14065/TPPLAN		DRAWN OB		DRG No. TPPlan	
				Yr. Assent 3-4 Church Street Caernarfon 01286 871027 01286 874434 info@datrys.com www.datrysconsulting.com		Telephone Fax Email Internet					
				 DATRYS CONSULTING							

Appendix B

Trial Pit Logs

TP1



SIDES STABLE

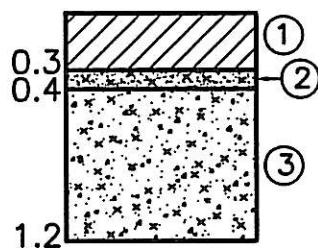
GROUNDWATER
PRESENT AT 1.6m

- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orangey Silty SAND with gravel, medium dense with some cohesion

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TITLE Trial Pit 1	PROJECT Whitegate Road, Wrexham	 Datrys Peirllanwyr Ymgyngwraol Consulting Engineers	DRAWN OB	SCALE 1:40
			DATE 13.05.14	CHKD WL
			DRG No.	0001

TP2



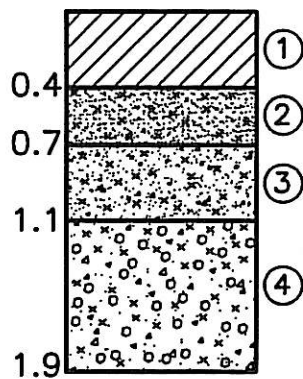
SIDES STABLE
NO GROUNDWATER

- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orangeey Silty SAND with gravel, medium dense with some cohesion

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TITLE Trial Pit 2	PROJECT Whitegate Road, Wrexham		DRAWN OB	SCALE 1:40
			DATE 13.05.14	CHKD WL
			DRG No.	0002

TP3



SIDES STABLE UNTIL
WATERTABLE

GROUNDWATER
PRESENT AT 1.9m

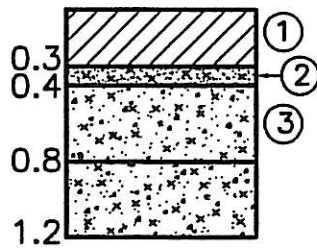
- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orangeey Silty SAND with gravel, medium dense with some cohesion

④



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TITLE Trial Pit 3	PROJECT Whitegate Road, Wrexham	 Peirionwyr Ymgynghoriol Consulting Engineers	DRAWN OB	SCALE 1:40
			DATE 13.05.14	CHKD WL
			DRG No.	0003

TP4

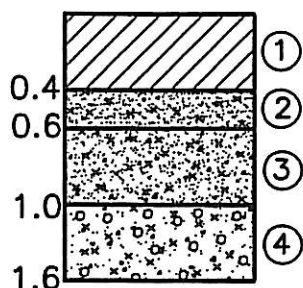
SIDES STABLE
NO GROUNDWATER

- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Brown Silty GRAVEL containing coal
- ④ Brown medium dense Silty GRAVEL with cobbles and boulders

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TITLE Trial Pit 4	PROJECT Whitegate Road, Wrexham		DRAWN OB	SCALE 1:40
			DATE 13.05.14	CHKD WL
			DRG No.	0004

TP5



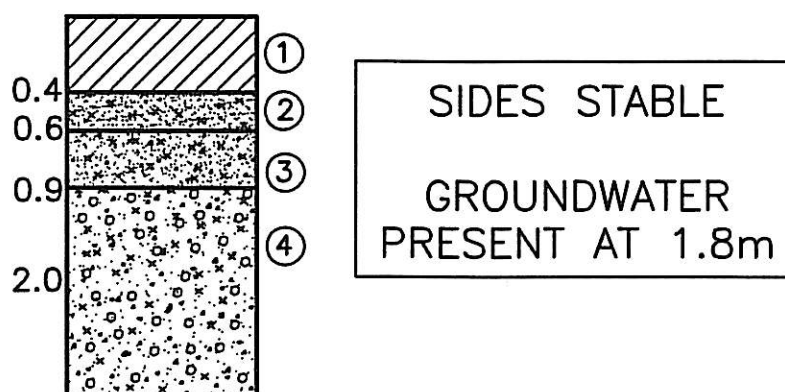
SIDES STABLE
NO GROUNDWATER

- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orangeey Silty SAND with gravel, medium dense with some cohesion
- ④ Brown medium dense Silty GRAVEL with cobbles and boulders

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TITLE Trial Pit 5	PROJECT Whitegate Road, Wrexham	 Patrionwyr Tmgyngchorol Consulting Engineers	DRAWN OB	SCALE 1:40
			DATE 15.05.14	CHKD WL
			DRG No.	0005

TP6

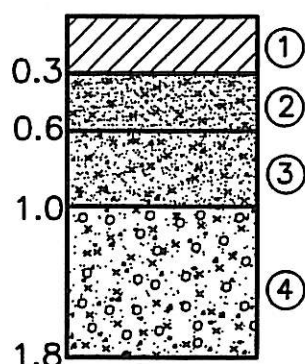


- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orange Silty SAND with gravel, medium dense with some cohesion
- ④ Brown medium dense Silty GRAVEL with cobbles and boulders

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TITLE Trial Pit 6	PROJECT Whitegate Road, Wrexham	 Peirionwyr Ymgynghoriol Consulting Engineers	DRAWN OB	SCALE 1:40
			DATE 15.05.14	CHKD WL
			DRG No.	0006

TP7



SIDES STABLE

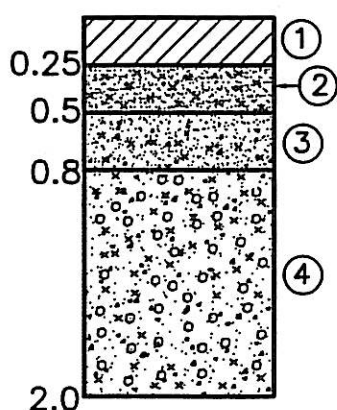
GROUNDWATER
PRESENT AT 1.7m

- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orangeey Silty SAND with gravel, medium dense with some cohesion
- ④ Brown medium dense Silty GRAVEL with cobbles and boulders

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TITLE Trial Pit 7	PROJECT Whitegate Road, Wrexham		DRAWN OB	SCALE 1:40
			DATE 15.05.14	CHKD WL
			DRG No.	0007

TP8



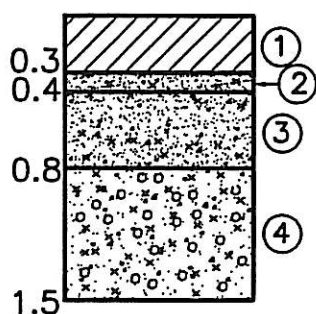
SIDES UN-STABLE
NO GROUNDWATER

- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orangeey Silty SAND with gravel, medium dense with some cohesion
- ④ Brown medium dense Sandy GRAVEL with cobbles

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TITLE Trial Pit 8	PROJECT Whitegate Road, Wrexham	 Patrionwyr Ymgynghori Consulting Engineers	DRAWN OB	SCALE 1:40
			DATE 15.05.14	CHKD WL
			DRG No.	0008

TP9



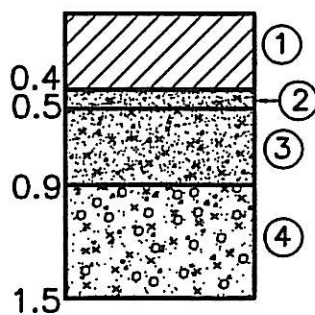
SIDES STABLE
NO GROUNDWATER

- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orangeey Silty SAND with gravel, medium dense with some cohesion
- ④ Brown medium dense Sandy GRAVEL with cobbles

This drawing is Copyright ©

TITLE Trial Pit 9	PROJECT Whitegate Road, Wrexham	 Patrianwyr Ymgyddiaethol Consulting Engineers	DRAWN OB	SCALE 1:40
			DATE 15.05.14	CHKD WL
			DRG No.	0009

TP10



SIDES STABLE
NO GROUNDWATER

- ① Tarmacdam Surface & Sub-base Layers
- ② Organic Grey dense silty SAND
- ③ Orangeey Silty SAND with gravel, medium dense with some cohesion
- ④ Brown medium dense Sandy GRAVEL with cobbles

This drawing is Copyright ©

TITLE Trial Pit 10	PROJECT Whitegate Road, Wrexham		DRAWN OB	SCALE 1:40
			DATE 15.05.14	CHKD WL
			DRG No.	0010

Appendix C

Photographs



Photograph 1: General view to TP6.



Photograph 2: Trial pit 1.



Photograph 3: Spoil from TP3.



Photograph 4: Trial pit 3.



Photograph 5: Trial pit 2.



Photograph 6: Trial pit 2.



Photograph 7: Trial pit 2



Photograph 8: Trial pit 4



Photograph 9: Trial pit 10.



Photograph 10: Spoil from TP10

Appendix D

Contamination test results

✱ Posford Datrys
3 - 5 Church Street
Caernarfon
Gwynedd
LL55 1SW

Date: 13th June 2014
Test Report Ref. STR: 371826

Page 1 of 2

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Chemical Analysis of a sample as per clients request.

SAMPLE DETAILS:

Certificate of sampling received:	Yes
Laboratory Ref. No:	S47672
Client Ref. No:	2
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	04/06/2014
Date of Start of Test.:	06/06/2014
Sampling Location:	Whitegate Road, Wrecsam
Name of Source:	Whitegate Road, Wrecsam
Method of Sampling:	Unknown
Sampled By:	Client
Aggregate Type and Nominal Size:	Clay
Target Specification:	N/A

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

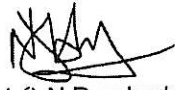
The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS

See attached.

() E. R. Goulden
Technical Manager
Approved Signatories

() E. N. Jones
Soils Laboratory Manager


(✓) N Dumbarton
Assistant Laboratory Manager

RESULTS:

Test	Unit	Result
Metals		
Arsenic	mg/kg	7.7
Cadmium	mg/kg	0.9
Chromium	mg/kg	20
Copper	mg/kg	14
Lead	mg/kg	30
Mercury	mg/kg	< 0.05
Nickel	mg/kg	24
Selenium	mg/kg	0.9
Zinc	mg/kg	48
Inorganics		
pH		7.5
Cyanide total	mg/kg	< 0.1
Total Sulphate as SO ₄	%	0.02
PAHs		
Acenaphthene	mg/kg	< 0.1
Acenaphthylene	mg/kg	< 0.1
Anthracene	mg/kg	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1
Benzo(g,h,i)perylene	mg/kg	< 0.1
Chrysene	mg/kg	< 0.1
Dibenzo(a,h)anthracene	mg/kg	< 0.1
Fluoranthene	mg/kg	< 0.1
Fluorene	mg/kg	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	< 0.1
Naphthalene	mg/kg	< 0.1
Phenanthrene	mg/kg	< 0.1
Pyrene	mg/kg	< 0.1
PAH	mg/kg	< 1.6
Phenols		
Phenol - Monohydric	mg/kg	< 0.3

* Posford Datrys
3 - 5 Church Street
Caernarfon
Gwynedd
LL55 1SW

Date: 13th June 2014
Test Report Ref. STR: 371825

Page 1 of 2

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Chemical Analysis of a sample as per clients request.

SAMPLE DETAILS:

Certificate of sampling received:	Yes
Laboratory Ref. No:	S47672
Client Ref. No:	1
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	04/06/2014
Date of Start of Test.:	06/06/2014
Sampling Location:	Whitegate Road, Wrecsam
Name of Source:	Whitegate Road, Wrecsam
Method of Sampling:	Unknown
Sampled By:	Client
Aggregate Type and Nominal Size:	Clay
Target Specification:	N/A

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS

See attached.

() E. R. Goulden
Technical Manager
Approved Signatories

() E. N. Jones
Soils Laboratory Manager


(✓) N Dumbarton
Assistant Laboratory Manager

RESULTS:

Test	Unit	Result
Metals		
Arsenic	mg/kg	5.9
Cadmium	mg/kg	0.5
Chromium	mg/kg	15
Copper	mg/kg	18
Lead	mg/kg	27
Mercury	mg/kg	< 0.05
Nickel	mg/kg	20
Selenium	mg/kg	< 0.5
Zinc	mg/kg	47
Inorganics		
pH		7.7
Cyanide total	mg/kg	< 0.1
Total Sulphate as SO4	%	0.02
PAHs		
Acenaphthene	mg/kg	< 0.1
Acenaphthylene	mg/kg	< 0.1
Anthracene	mg/kg	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1
Benzo(g,h,i)perylene	mg/kg	< 0.1
Chrysene	mg/kg	< 0.1
Dibenzo(a,h)anthracene	mg/kg	< 0.1
Fluoranthene	mg/kg	< 0.1
Fluorene	mg/kg	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	< 0.1
Naphthalene	mg/kg	< 0.1
Phenanthrene	mg/kg	< 0.1
Pyrene	mg/kg	< 0.1
PAH	mg/kg	< 1.6
Phenols		
Phenol - Monohydric	mg/kg	< 0.3

Posford Datrys
3 - 5 Church Street
Caernarfon
Gwynedd
LL55 1SW

Date: 13th June 2014
Test Report Ref. STR: 371828

Page 1 of 2

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Chemical Analysis of a sample as per clients request.

SAMPLE DETAILS:

Certificate of sampling received:	Yes
Laboratory Ref. No:	S47672
Client Ref. No:	4
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	04/06/2014
Date of Start of Test:	06/06/2014
Sampling Location:	Whitegate Road, Wreccsam
Name of Source:	Whitegate Road, Wreccsam
Method of Sampling:	Unknown
Sampled By:	Client
Aggregate Type and Nominal Size:	Clay
Target Specification:	N/A

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS

See attached.

() E. R. Goulden
Technical Manager
Approved Signatories

() E. N. Jones
Soils Laboratory Manager


(✓) N Dumbarton
Assistant Laboratory Manager

RESULTS:

Test	Unit	Result
Metals		
Arsenic	mg/kg	4.0
Cadmium	mg/kg	0.5
Chromium	mg/kg	14
Copper	mg/kg	16
Lead	mg/kg	36
Mercury	mg/kg	< 0.05
Nickel	mg/kg	16
Selenium	mg/kg	< 0.5
Zinc	mg/kg	46
Inorganics		
pH		8.1
Cyanide total	mg/kg	< 0.1
Total Sulphate as SO4	%	0.01
PAHs		
Acenaphthene	mg/kg	< 0.1
Acenaphthylene	mg/kg	< 0.1
Anthracene	mg/kg	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1
Benzo(g,h,i)perylene	mg/kg	< 0.1
Chrysene	mg/kg	< 0.1
Dibenzo(a,h)anthracene	mg/kg	< 0.1
Fluoranthene	mg/kg	< 0.1
Fluorene	mg/kg	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	< 0.1
Naphthalene	mg/kg	< 0.1
Phenanthrene	mg/kg	< 0.1
Pyrene	mg/kg	< 0.1
PAH	mg/kg	< 1.6
Phenols		
Phenol - Monohydric	mg/kg	< 0.3

✦ Posford Datrys
3 - 5 Church Street
Caernarfon
Gwynedd
LL55 1SW

Date: 13th June 2014
Test Report Ref. STR: 371827

Page 1 of 2

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Chemical Analysis of a sample as per clients request.

SAMPLE DETAILS:

Certificate of sampling received:	Yes
Laboratory Ref. No:	S47672
Client Ref. No:	3
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	04/06/2014
Date of Start of Test.:	06/06/2014
Sampling Location:	Whitegate Road, Wreccsam
Name of Source:	Whitegate Road, Wreccsam
Method of Sampling:	Unknown
Sampled By:	Client
Aggregate Type and Nominal Size:	Clay
Target Specification:	N/A

COMMENTS/ DEPARTURE FROM SPECIFIED PROCEDURE

The work was carried out by our accredited, competent, sub contracted laboratory.

RESULTS

See attached.

() E. R. Goulden
Technical Manager
Approved Signatories

() E. N. Jones
Soils Laboratory Manager


(✓) N Dumbarton
Assistant Laboratory Manager

RESULTS:

Test	Unit	Result
Metals		
Arsenic	mg/kg	9.8
Cadmium	mg/kg	0.7
Chromium	mg/kg	25
Copper	mg/kg	19
Lead	mg/kg	25
Mercury	mg/kg	< 0.05
Nickel	mg/kg	30
Selenium	mg/kg	0.6
Zinc	mg/kg	54
Inorganics		
pH		7.1
Cyanide total	mg/kg	< 0.1
Total Sulphate as SO ₄	%	0.03
PAHs		
Acenaphthene	mg/kg	< 0.1
Acenaphthylene	mg/kg	< 0.1
Anthracene	mg/kg	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1
Benzo(g,h,i)perylene	mg/kg	< 0.1
Chrysene	mg/kg	< 0.1
Dibenzo(a,h)anthracene	mg/kg	< 0.1
Fluoranthene	mg/kg	< 0.1
Fluorene	mg/kg	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	< 0.1
Naphthalene	mg/kg	< 0.1
Phenanthrene	mg/kg	< 0.1
Pyrene	mg/kg	< 0.1
PAH	mg/kg	< 1.6
Phenols		
Phenol - Monohydric	mg/kg	< 0.3