DATRYS CONSULTING ENGINEERS LTD

LAND AT TYDDYN FLETCHER, LLANBERIS ROAD, CAERNARFON, LL55 2DU

ADDITIONAL GROUND PERMEABILITY TESTS REPORT

REPORT No. E1957.PTR.R1

MAY 2025

Client:	**DATRYS CONSULTING ENGINEERS LTD**
Project Title:	**LAND AT TYDDYN FLETCHER, LLANBERIS ROAD, CAERNARFON, LL55 2DU**
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Signed:			

1. INTRODUCTION.

1.1 Background and Terms of Reference

1.1.1 In April 2025 e-geo Solutions Ltd were commissioned by Datrys Consulting Ltd to undertake additional ground permeability tests, to determine soil infiltration rates at a proposed residential development site on land known as Tyddyn Fletcher on Llanberis Road, near Caernarfon, Gwynedd.

1.1.2 This report presents the findings of a trial pit investigation and on-site permeability tests giving details of the ground conditions encountered and the results of the timed permeability tests.

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1.2 Site Location

2.1.1 The area of investigation is located 1.5Km east of the centre of Caernarfon and southeast of the A4086 adjacent to Cibyn Industrial Estate as shown on Figure 1. The site is centred at Grid Reference 249238, 362753. The extent of the site and the study area boundaries is shown on Figure 2.

Figure 1 – Site Location

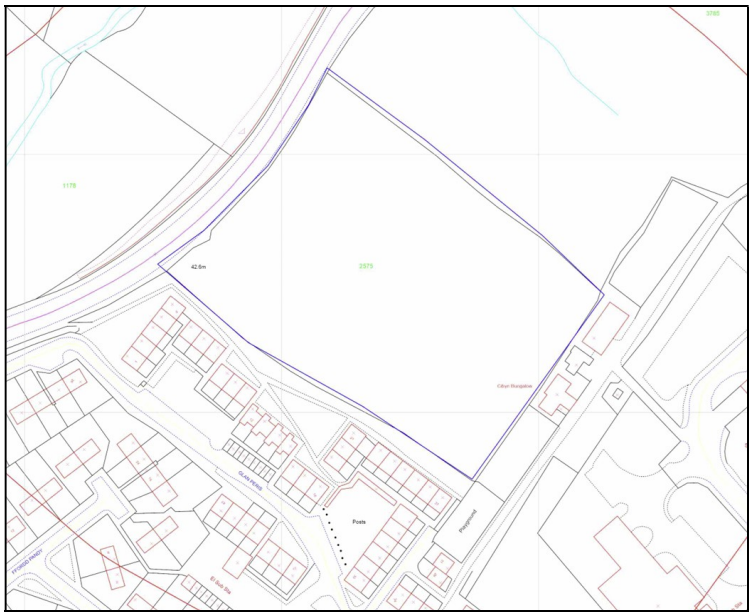

Figure 2 – Site Extent and Boundaries

2. SITE DESCRIPTION, TOPOGRAPHY AND GEOLOGY.

2.1 Site Description and Topography

2.1.1 The area of investigation (site) is situated southeast of the A4086 on the outskirts of Caernarfon and immediately north west of an existing residential housing estate. The rectangular plot of land with its long axis orientated northwest to southeast comprises agricultural land used for grazing which slopes from southeast to northwest. An aerial photograph is shown as Figure 3.

Figure 3 – Site Aerial Photograph

2.2 Published Geology

2.2.1 Information from the British Geological Survey Map indicates that drift (soil) deposits at the site comprise Glacial Till deposits of Diamicton age. The Glacial Till deposits extends for at least 500m in all directions but there is some alluvial deposit 50m north. The bedrock comprises siltstone of the Nant Francon Group. There is no record of any made ground within the site..

2.3 Hydrogeology

2.3.1 The superficial deposits are not classed as an aquifer. The bedrock at depth is classed as a Secondary undifferentiated aquifer. In general these layers have previously been designated as both minor and non aquifer in different locations due to the variable characteristics of the rock type.

3. GROUND INVESTIGATION AND PERMEABILITY TESTS.

3.1 Methodology

3.1.1 Two trial pits (PTP3, PTP4) were excavated in the southern portion of the site to undertake permeability tests. The trial pit locations are indicated on Figure 4.

3.1.2 The permeability test trial holes were excavated with the aid of a JCB 4CX excavator to be:

PTP3 – 1.90m long by 0.70m wide by 2.60m deep
PTP4 – 2.00m long by 0.70m wide by 2.60m deep

3.1.3 The permeability tests were carried out within the full trial pit open excavation with water supplied by an agricultural slurry tanker to ensure the trial pits were filled rapidly. Both trial pits were filled with water and left to pre-soak overnight before commencing the timed tests. Photographs are presented on the trial pit records in Appendix 1.

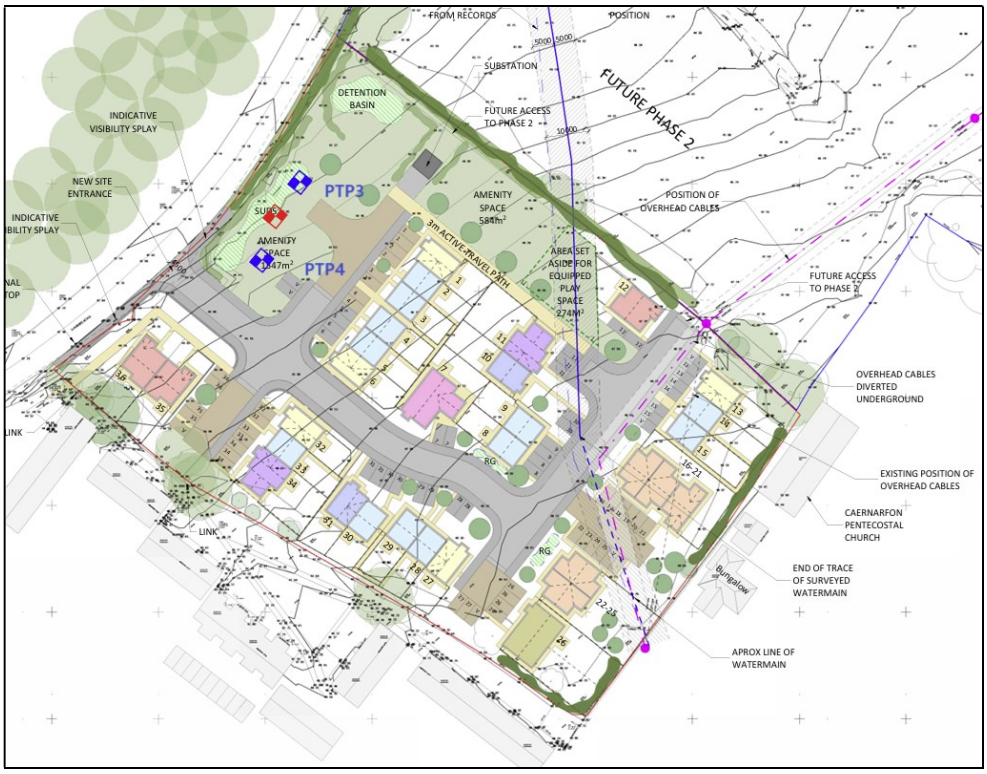

Figure 4 - Trial Pits and Permeability Test Locations (PTP3, PTP4)

3.2 Ground Conditions and Geology

3.2.1 The ground conditions and ground strata encountered are shown on the trial hole records in Appendix 1 and comprised:

Stratum	Description	Depth to base m range (av)
TOPSOIL	Dark brown gravelly silty TOPSOIL	0.30
Gravelly CLAY	Firm light brown and medium orangish brown gravelly to very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subrounded of various lithologies	1.30
Very gravelly CLAY	Firm medium greyish brown very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subrounded of various lithologies predominantly siltstone. Medium cobble content.	2.60+

3.2.2 No groundwater seepages were encountered in the trial pits to a depth of at least 2.90m bgl.

3.3 Permeability Test Results

3.3.1 The results of the permeability tests are presented on the Field Test Results sheets in Appendix 2.

3.4 Soil Infiltration Rate Calculations

3.4.1 The Soil Infiltration Rate (f) is based on the method described in the BRE Digest and is calculated from the time taken for the water level to fall from 75% to 25% of the actual water depth in the trial hole, following a pre-soak.

3.4.2 The Soil Infiltration Rate (f) is calculated by the equation:

f = Vp75 – 25/ ap50 x tp75 -25
Where - Vp75 -25 is the storage volume in the hole from 75% to 25% effective depth,
ap50 is the internal surface area of the hole to 50% effective depth plus the base area,
tp75 – 25 the time taken for water to fall from 75% to 25% effective depth.

3.4.3 In PTP3 the following results were obtained:

Test PTP3.1
Vp75 – 25 = 2.10 x 0.70 x (1.65 - 0.55) = 1.617 cu.m
Ap50 = Base + (Int surface area to 50% eff depth)
Ap50 = (1.90 x 0.70) + (2 x 1.90 x 2.20/2 + 2 x 0.70 x 2.20/2) = 7.05 sq.m
tp75 – 25 = 175 – 21 = 154 min

Soil Infiltration Rate PTP3.1 = Vp75–25/ap50xtp75-25 = 1.617/7.05x154x60 = 2.48 x 10 – 5 m/sec

Test PTP3.2
Vp75 – 25 = 2.10 x 0.70 x (1.78 - 0.59) = 1.7493 cu.m
Ap50 = Base + (Int surface area to 50% eff depth)
Ap50 = (1.90 x 0.70) + (2 x 1.90 x 2.38/2 + 2 x 0.70 x 2.38/2) = 7.518 sq.m
tp75 – 25 = 855 – 59 = 796 min

Soil Infiltration Rate PTP3.2=Vp75–25/ap50xtp75-25 = 1.7493/7.518x796x60 = 4.87 x 10 – 6 m/sec

Test PTP3.3
Vp75 – 25 = 2.10 x 0.70 x (1.59 - 0.53) = 1.5582 cu.m
Ap50 = Base + (Int surface area to 50% eff depth)
Ap50 = (1.90 x 0.70) + (2 x 1.90 x 2.13/2 + 2 x 0.70 x 2.13/2) = 6.868 sq.m
tp75 – 25 = 1020 – 56 = 964 min

Soil Infiltration Rate PTP3.3=Vp75–25/ap50xtp75-25 = 1.5582/6.868x964x60 = 3.92 x 10 – 6 m/sec

3.4.4 In PTP4 the following results were obtained:
Test PTP4.1
Vp75 – 25 = 2.00 x 0.70 x (1.07 - 0.35) = 1.008 cu.m
Ap50 = Base + (Int surface area to 50% eff depth)
Ap50 = (2.00 x 0.70) + (2 x 2.00 x 1.43/2 + 2 x 0.70 x 1.43/2) = 5.261 sq.m
tp75 – 25 = 1400 – 227 = 1173 min
Soil Infiltration Rate PTP4.1=Vp75–25/ap50xtp75-25 = 1.008/5.261x1173x60 = 2.7 x 10 – 6 m/sec

Appendix 1 - Trial Pit Records

TRIAL PIT RECORD

		Trial Pit No: **PTP3**
Site : LAND AT TYDDYN FLETCHER, LLANBERIS ROAD, CAERNARFON, LL55 2DU		Ref: E1957
Excavator :JCB 4CX Excavator		Date: 9/11.05.25
Pit size : 1.90 x 0.70m	Depth : 2.60m	Elev (m aOD):

Pit No	Depth From (m)	Depth To (m)	Interval (m)	Strata Description	Depth	SAMPLE RECORD Type B U D W	Depth (m)	Number
	0.00	0.30	0.30	Dark brown gravelly silty TOPSOIL				
	0.30	1.20	0.90	Firm light brown and medium orangish brown gravelly to very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subrounded of various lithologies	0.5 1.0			
	1.20	2.60+	1.40	Firm medium greyish brown very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subounded of various lithologies predominantly siltstone. Medium cobble content.	1.5 2.0 2.5			
		2.60		Base of pit at 2.60m	3.0			

Remarks

Sidewalls :	Stable
Groundwater :	None
In-situ testing :	Permeability test
Contaminants :	None observed
Services :	None

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TRIAL PIT RECORD

Trial Pit No: **PTP4**

Site : LAND AT TYDDYN FLETCHER, LLANBERIS ROAD, CAERNARFON, LL55 2DU

Ref: E1957

Excavator :JCB 4CX Excavator

Date: 9/11.05.25

Pit size : 2.00 x 0.70m Depth : 2.60m

Elev (m aOD):

Pit No	Depth From (m)	Depth To (m)	Interval (m)	Strata Description	Depth	SAMPLE RECORD Type B U D W	Depth (m)	Number
	0.00	0.30	0.30	Dark brown gravelly silty TOPSOIL				
	0.30	1.40	1.10	Firm light brown and medium orangish brown gravelly to very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subrounded of various lithologies	0.5 1.0 1.5			
	1.40	2.60+	1.20+	Firm medium greyish brown very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subounded of various lithologies predominantly siltstone. Medium cobble content.	2.0 2.5			
		2.60		Base of pit at 2.60m	3.0			

Remarks

Sidewalls : Stable

Groundwater : None

In-situ testing : Permeability test

Contaminants : None observed

Services : None

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Appendix 2 - Permeability Tests Results PTP3,PTP4

POROSITY/PERMEABILITY TEST

SITE:	LAND AT TYDDYN FLETCHER, LLANBERIS ROAD, CAERNARFON, LL55 2DU
PROJECT No:	E1957
CLIENT:	DATRYS CONSULTING ENGINEERS LTD
DATE:	9/12.04.25
WEATHER:	Sunny & dry
PIT No: PTP3- 2.6m	

GMT	Time Elapsed	Depth to Water	Water Depth	Fall	WDx0.75	WDx0.25
PTP3.1						
09:55	0	0.40	2.20			
10:00	5	0.55	2.05			
10:05	10	0.76	1.84			
10:25	30	1.05	1.55		1.65	
10:45	50	1.35	1.25			
11:15	80	1.63	0.97			
12:05	130	1.89	0.71			
12:55	170	2.04	0.56			0.55
13:25	200	2.11	0.49			
PTP3.2						
13:30	0	0.22	2.38			
13:35	5	0.35	2.25			
13:40	10	0.41	2.19			
13:55	25	0.55	2.05			
14:30	60	0.83	1.77		1.78	
15:00	90	1.01	1.59			
15:30	120	1.20	1.40			
16:30	180	1.45	1.15			
17:30	240	1.53	1.07			0.59
09:00	1170	2.25	0.35			
PTP3.3						
09:05	0	0.47	2.13			
09:15	10	0.63	1.97			
09:30	25	0.82	1.78			
10:00	55	0.98	1.62		1.59	
10:30	85	1.24	1.36			
11:30	145	1.40	1.20			
12:30	205	1.50	1.10			
13:30	265	1.56	1.04			
14:30	325	1.60	1.00			
8.05	1380	1.84	0.29			0.53

Pit Dimensions:	0.70w X 1.90L X 2.60D		
Soil Description:	0.00	0.30	Dark brown gravelly silty TOPSOIL
	0.30	1.20	Firm light brown and medium orangish brown very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subrounded of various lithologies
	1.20	2.60+	Firm medium greyish brown very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subrounded of various lithologies predominantly siltstone. Medium cobble content.

POROSITY/PERMEABILITY TEST

SITE:	LAND AT TYDDYN FLETCHER, LLANBERIS ROAD, CAERNARFON, LL55 2DU
PROJECT No:	E1957
CLIENT:	DATRYS CONSULTING ENGINEERS LTD
DATE:	9/11.04.25
WEATHER:	Sunny & dry
PIT No: PTP4- 2.6m	

GMT	Time Elapsed	Depth to Water	Water Depth	Fall	WDx0.75	WDx0.25
09:52	0	0.47	1.43			
10:02	10	0.49	1.41			
10:22	30	0.53	1.37			
12:02	130	0.67	1.23			
14:02	250	0.86	1.04		1.07	
17:02	430	0.98	0.92			
10:02	1450	1.58	0.32			0.35
The pit was dug to 2.6m, but after the pre-soak and being left overnight, the water level was at 1.90m.						

Pit Dimensions:	0.70w X 2.00L X 2.60D		
Soil Description:	0.00	0.30	Dark brown gravelly silty TOPSOIL
	0.30	1.40	Firm light brown and medium orangish brown very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subrounded of various lithologies
	1.40	2.60+	Firm medium greyish brown very gravelly sandy silty CLAY. Gravel is fine to coarse subangular to subounded of various lithologies predominantly siltstone. Medium cobble content.