Roger Casey Associates

Consulting Civil & Structural Engineers

Ty Mansel, 6 Mansel Street, Carmarthen, Carmarthenshire SA31 1PX
T: 01267 222646

Units 10 & 11, Merlin's Court, Winch Lane, Haverfordwest, Pembrokeshire SA61 1SB
T: 01437 762795

First Flood, unit 19, Mardon Park, Baglan Energy Park, Port Talbot, SA12 7AX
T: 01639 203280

E: office@rca-eng.co.uk
W: www.rca-eng.co.uk

Our ref: 21721/DSS/rca/EP/v1

Your ref:

Date: 22 August, 2024

DRAINAGE STRATEGY STATEMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT AT FORMER BODLONDEB HOME, PENPARCAU, SY23 1SJ.

Roger Casey Associates has been instructed by Wales and West Housing to prepare a Drainage Strategy Statement to support a planning application for the proposed development of 18 new dwellings at the above location. The purpose of this Drainage Strategy Statement is to describe the existing drainage infrastructure and identify a sustainable solution for the proposed foul and surface water drainage serving the development, providing evidence to the Local Planning Authority that the development can be sustainably drained.

Flood Risk

The proposed use of the site, residential, will classify the risk as being a 'Highly Vulnerable Development' (TAN 15, Figure 2). However, in accordance with Natural Resources Wales Flood and Welsh Government TAN 15 Development Advice Maps[1] the site is located within an area designated being Flood Zone A.

In accordance with guidance contained within TAN 15, Figure 1, further flood risks and justification tests are not required to sites located within Zone A and sound drainage design incorporating aspects of Sustainable Urban Drainage Systems (SuDS) is applicable to the development.

Planning Policy and Technical Advice Note (TAN) 15 lists six sources of flooding which need to be considered in the assessment of flood risk and the probability of flooding at the Site Location.

Flooding from Rivers or Fluvial

Not applicable - Flood Zone A as demonstrated on Flood Map[1].

Flooding from the Sea or Tidal Flooding

Not applicable - Flood Zone A as demonstrated on Flood Map[1].

Flooding from Land

Not applicable - Flood Zone A as demonstrated on Flood Map[1].

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Flooding from Groundwater

No groundwater was struck during Quantum Geotech Site Investigations which proceeded to a depth of 3.6m below existing ground level. If groundwater is struck during further site investigations and/or construction excavations, suitable measures shall be undertaken to protect proposed and existing premises from this potential flood risk from this source.

Flooding from Sewers

Not applicable due to foul and surface water management within drainage design. Notwithstanding blockage or catastrophic failure of drainage systems within the development site resulting in overland flows not being contained within kerb upstand heights, surface gradients, etc.
Where possible, floor levels will be kept above the level of the relevant adjacent roads and drives.

Flooding from Reservoirs, Canals and Other Artificial Sources

Not applicable due to Site Location and demonstrated on Flood Map[1].

Surface Water Drainage

On 7 January 2019, the Welsh Government implemented Schedule 3 of the Flood and Water Management Act (2010). The new mandatory regulations make the incorporation of sustainable drainage systems (SuDS) compulsory in new developments exceeding 100 m² in order to help reduce flood risk and improve water quality. SuDS on new developments must be designed and built in accordance with the Statutory SuDS Standards published by the Welsh Ministers and schemes must be approved by the Local Authority acting in the role of SuDS Approving Body (SAB) before construction begins.

With reference to the Statutory Sustainable Drainage Systems Standards:

Standard S1 - Surface water runoff destination

Considering the five priority levels:

Priority Level	Flow Destination
1	Surface water run-off is collected for use;
2	Surface water runoff is infiltrated to ground;
3	Surface water runoff is discharged to a surface water body;
4	Surface water runoff is discharged to a surface water sewer, highway drainage, or another drainage system;
5	Surface water runoff is discharged to a combined sewer.

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Following investigations and in response to each of the Priority Levels:

1) Due to the development proposals, capital and long-term maintenance costs of an underground tanked rainwater harvesting system, this option is not considered as a sustainable inclusion into the surface water drainage system prior to destination. The Developer may like to consider the use of a rainwater butt with suitable overflow where appropriate.

2) The Quantum site investigation provides results of infiltration testing undertaken along the centre and northern edge of the side, whilst these results are favourable, when examined with the proposed levels of the development and surrounding area we deem it unsuitable to propose soakaways as a method of discharging runoff. Due to the significant drop in levels along the northern boundary infiltration features would need to be of considerable depth to avoid water travelling laterally through the existing embankment towards the dwellings of Rhyd Y Bont.

3) The development parcel does not benefit from a watercourse within its boundary or in the surrounding locality.

4) The existing building benefits from a separate surface and foul drainage systems, therefore proposals are to utilise the outfalls to the northwest of the site for the proposed development site.

5) This Priority Level has not been considered further due to the discharge at Priority Level 4.

Standard S2 – Surface water run-off hydraulic control

From onsite CCTV investigations no evidence of existing hydraulic control has been detected. To safequard the downstream system proposals are for the proposed development to be restricted to greenfield predevelopment runoff rate of QBar, providing a betterment when compared to the current brownfield scenario. Greenfield rates for development site have been calculated as 1.6 l/s current proposals allow for a site control hydrobrake or similar flow control device with additional smaller flow controls such as orifice plates throughout the development to maximize the attenuation to the topography where possible.

The network will be designed to accommodate all storm events up and including the 1 in 100-year event plus an allowance of 40% for climate change and 10% for urban creep.

The development proposes to utilise a number of source control methods such as permeable paving and raingardens to limit the potential for debris and litter to enter the network therefore reducing the risk of blockages and failure.

The permeable pavements beneath driveways will also act as attenuation throughout the development, with a final site control to be attenuated in the cellular storage.

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Standard S3 – Water quality

The proposed development will consist of several measures which have the ability to treat-run off. All parking bays are proposed to be of porous construction which will act to treat run-off at source prior to discharging into the main system.

The runoff from dwelling roofs which is deemed very low in pollutants, where suitable runoff will be directed to rain gardens and swales, which will provide treatment prior to entry into the main network.

The runoff from the adoptable highway corridor is to runoff overland towards a dished filter drain and strip along the northern boundary prior to connection to the main drainage network.

The proposals satisfy the simple index approach outlined in the CIria Suds Manual due to several features within the treatment train draining surfaces with low (driveways and residential streets) and very low levels (roofs) of pollutants.

Standard S4 – Amenity

The use of above ground SuDS measures will create a pleasant landscaping feature within the living environment whilst providing a drainage function. Permeable surfaces will create amenity of parking and access to new dwellings. SuDS measure will aim to be multifunctional. Rainwater collection will offer water for reuse for car washing, irrigation, etc.

Standard S5 – Biodiversity

The use of above ground SuDS measures such as raingardens, filter strips/drains and swale features will create linked blue/green corridors through the proposed development site. Careful landscaping and planting of these will provide a rich opportunity to maximise the biodiversity objectives of the development as a whole.

Standard S6 – Design of drainage for construction, operation and Maintenance and structural integrity

All elements of the surface water drainage system should be designed so that they can be constructed, maintenance and operation can be undertaken (by the relevant responsible body) easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).

The surface water drainage system should be designed to ensure structural integrity of all elements under anticipated loading conditions over the design life of the development site, taking into account the requirement for reasonable levels of maintenance.

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Foul Water Drainage

A topographical survey and subsequent CCTV investigation have identified the existing routing and destination of the foul drainage routes serving the existing Bodlondeb Care Home and dwellings off Heol Y Bont.

From these investigations we understand that there is an existing 225mm combined sewer skirting the western boundary of the development whilst a separate 150mm combined sewer entering the development parcel to the rear of 1 to 5 Heol y Bont and traversers in a northerly direction towards Rhyd Y Bont. Both sewers discharge by gravity to Tan Y Cae Sewerage Pumping Station with onward conveyance to Aberystwyth (Glan Yr Avon) Sewage Works. The current development proposals respect the position of both existing combined sewers negating the requirement for sewer diversion agreements.

Onsite investigations have confirmed that the existing foul outfall of Bodlondeb Care Home is located adjacent to the vehicular access to Gwynfa and Talardd in the northwest corner of the development parcel and is proposed to being utilised as the point of connection for plots 7 to 18. This sewer communicates with the 225mm to the north of Gwynfa. Plots 1 to 6 are proposed to connect to the existing 150mm combined sewer located to their rear.

Where the new foul water drainage system lies outside of the legal curtilage of the proposed plots it will need to be adopted by Dwr Cymru Welsh Water under a Water Industry Act Section 104 Adoption Agreement between DCWW and the Developer.

Connection to the public sewer will be subject to a Water Industry Act 1991 Section 106 application and will take the form of either alteration to an existing chamber or construction of a new chamber on the line of the existing sewer.

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T: 01267 222646

Units 10 & 11, Merlin's Court, Winch Lane, Haverfordwest, Pembrokeshire SA61 1SB
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First Flood, unit 19, Mardon Park, Baglan Energy Park, Port Talbot, SA12 7AX
T: 01639 203280

E: office@rca-eng.co.uk
W: www.rca-eng.co.uk

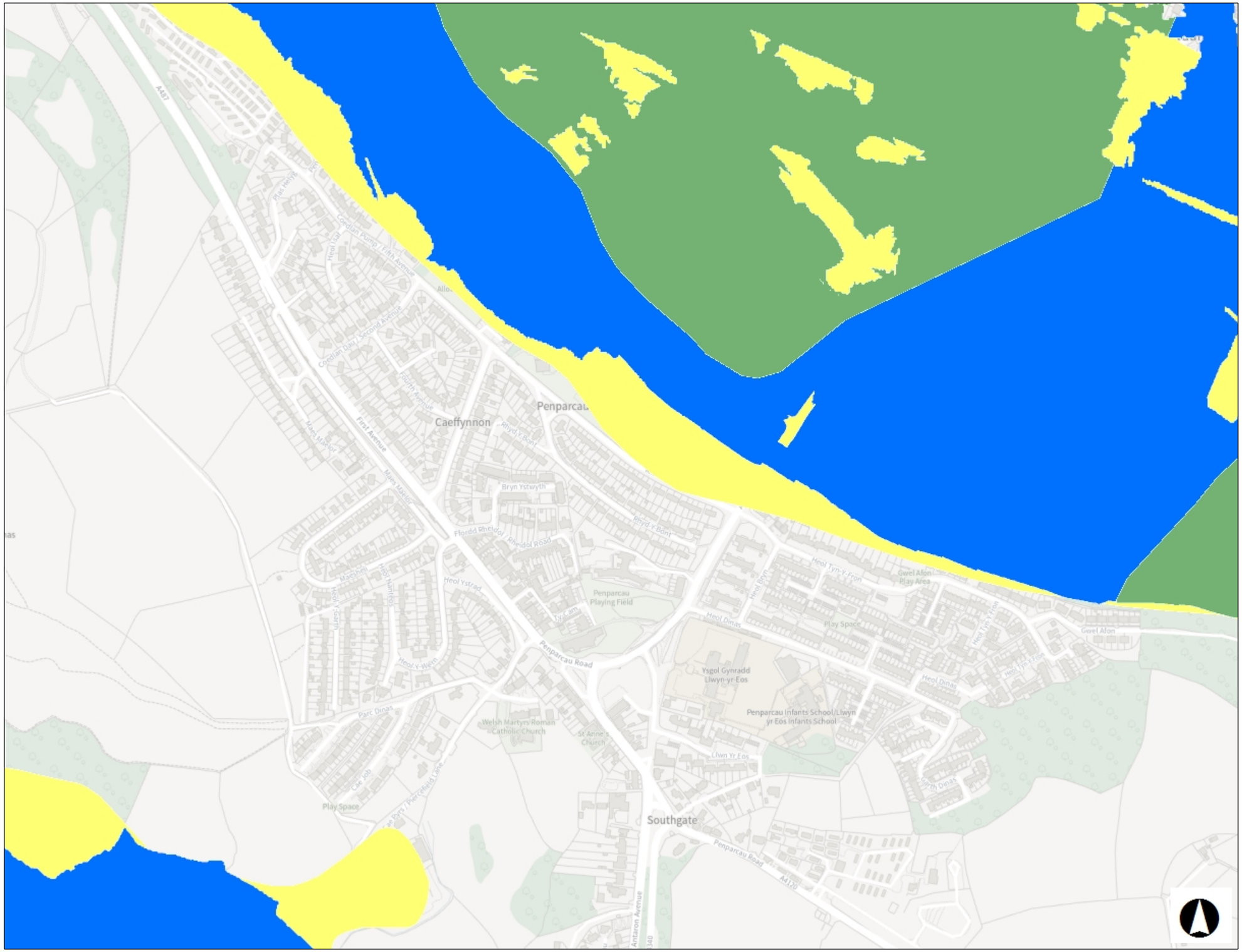
Summary

This Drainage Strategy Statement concludes that an achievable and sustainable drainage scheme can be designed for both foul and surface water drainage systems:

- All proposed development works are located in a low flood risk location considered by TAN 15.
- Surface water flows drained by gravity to onsite surface water drain via suitable SuDS measures and attenuated to greenfield (preexisting development) runoff rate of 1.6l/s.
- Foul water flows drained by gravity to the existing public foul water sewer network on site .

Edward Powell MEng GMICE
Civil Engineer
e.powell@rca-eng.co.uk
for Roger Casey Associates

Encs:
[1] National Resources Wales Flood Risk Map and Welsh Government TAN 15 Development Advice Map
[2] Soakaway Extracts from Quantum Geotech Phase II: Ground Investigation Interpretative Report dated August 2023
[3] Concept Drainage Strategy Plan



Cyfoeth Naturiol Cymru
Natural Resources Wales

Map Perygl Llifogydd / Flood Risk Map -

Allwedd / Map Key

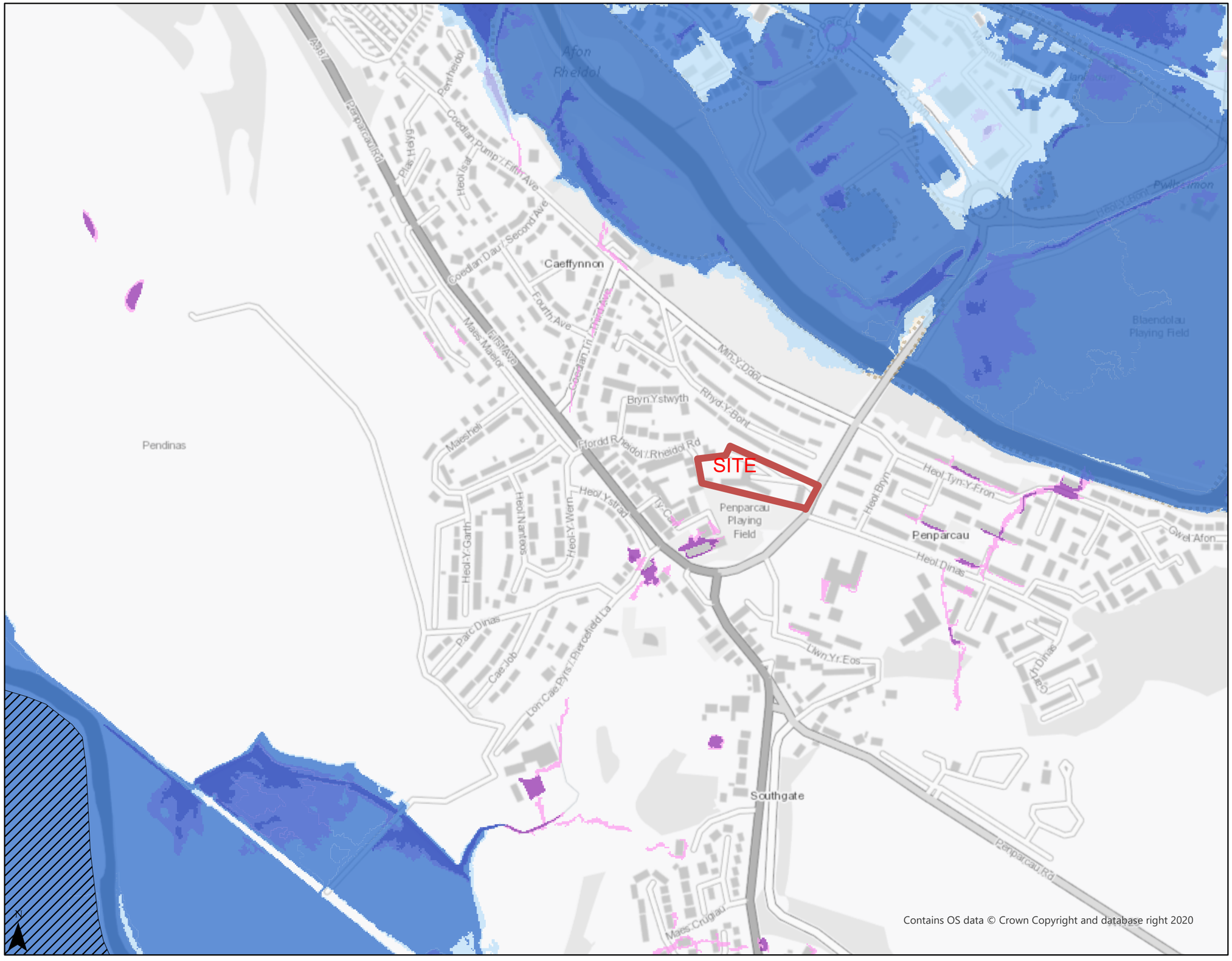
- Zone C1
- Zone C2
- Zone B
- Zone A

Graddfa / Scale at A3 1: 5,001

Dyddiad / Date
22/08/2024

0.3 0 0.13 0.3

British_National_Grid Kilometers



Cyfoeth Naturiol Cymru
Natural Resources Wales

Flood Map for Planning - Basic

Bodlondeb

Legend

TAN15 Defended Zones

- Rivers
- Sea
- Rivers and Sea

Rivers and Sea

- Flood Zone 3
- Flood Zone 2

Surface Water and Small Watercourses

- Flood Zone 3
- Flood Zone 2
- Recorded Flood Extents

Scale at A3: 1:5,000

Date: 22/08/2024

0.2 0.1 0 0.2

km

British National Grid

Disclaimer

https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en

5.0 GROUND CONDITIONS ENCOUNTERED

5.1 General

The sequence of deposits encountered during the investigation is detailed within the Engineering Geologist's logs presented within Appendix II and III. The following sections summarise the findings of the exploratory holes.

5.2 Ground Conditions

5.2.1 Overview of Strata Encountered

The ground conditions encountered across the site generally comprised a surface layer of Topsoil or Tarmac. Made Ground was encountered below the Topsoil / Tarmac within the exploratory holes undertaken to the north of the main nursing home building. Underlying the Made Ground, or directly below the Topsoil within the exploratory holes to the south of the building, either Head Deposits or weak / weathered Siltstone (Aberystwyth Grits Formation) were encountered. Where no Head Deposits were present, the Topsoil / Tarmac was directly above weathered and / or weak Siltstone (Aberystwyth Grits Formation). A summary of the ground conditions encountered is presented in Table 8.

General Strata Description	Elevation of base of Strata (mbgl)									
	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8		
Topsoil	0.08	0.07	0.07	0.06	--	0.05	0.06	--		
Tarmac	--	--	--	--	--	--	--	0.08		
Made Ground	--	0.8	1.8	0.9	0.35	1.05	--	0.3		
Head Deposits	--	1.4	2.3	--	0.8	--	0.8	2.2+		
Aberystwyth Grits Formation	2.0+	2.0+	3.0+	1.4+	3.0+	3.0+	2.0+	--		
	WS1	WS2	WS3	WS4	WS5	WS6	WS7	WS8	WS9	WS10
Topsoil	--	--	0.1	0.1	0.1	--	0.1	--	--	--
Tarmac	0.07	0.07	--	--	--	--	--	0.25	0.25	0.25
Made Ground	0.4	--	--	--	--	0.5	--	1.6	--	--
Head Deposits	--	--	0.9	--	1.5	--	--	1.9	--	--
Aberystwyth Grits Formation	2.0+	0.9+	1.7+	0.7+	2.7+	1.9+	0.8+	3.6+	1.4+	1.4+

-- Strata not encountered within exploratory hole
+ Depth of strata not proven

Topsoil / Tarmac

Topsoil was encountered within all the exploratory holes undertaken within the grassed areas of the site to depths of between 0.05 and 0.1mbgl.

A layer of Tarmac was encountered within all exploratory holes undertaken within the areas of hardstanding, to depths of between 0.07 and 0.25mbgl.

Made Ground

Made Ground was encountered within the majority of exploratory holes undertaken to the north of the nursing home building. The Made Ground generally comprised brown clayey slightly silty slightly sandy siltstone, brick, tile and glass Gravel with brick cobble content, and grey slightly silty slightly sandy siltstone, sandstone and brick Gravel. The Made Ground was proven to depths of between 0.3 and 1.8mbgl.

Head Deposits

Pockets of soil interpreted to be Head Deposits were encountered either underlying the Made Ground or directly below the Topsoil where Made Ground was not found to be present. These deposits were encountered to depths of between 0.8 and 2.3mbgl.

Aberystwyth Grit Formation

Within each exploratory hole, with the exception of TP8, strata interpreted to be the Aberystwyth Grit Formation was encountered either below the Made Ground deposits or the Head Deposits. These deposits were either highly weathered to slightly silty sandy Gravel or weak Siltstone. The competency of these deposits increased with depth and the exploratory holes terminated upon refusal at depths of between 0.7 and 3.0mbgl.

5.2.2 Groundwater Conditions

No groundwater was encountered during the investigation or post fieldwork monitoring.

Please Note: The groundwater conditions observed in these exploratory holes are those appertaining to the period of the investigation and monitoring. However, it should be noted that groundwater levels are subject to diurnal, seasonal and climatic conditions or may vary due to other causes.

5.2.3 Visual & Olfactory Evidence of Soil Contamination

No visual or olfactory evidence of soil contamination was observed/ recorded.

5.2.4 Visual & Olfactory Evidence of Groundwater & Surface Water Contamination

No visual or olfactory evidence of any groundwater contamination or surface water contamination during the investigation works was observed/ recorded.

APPENDIX IV – SOAKAWAY TEST CERTIFICATES

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP1,1

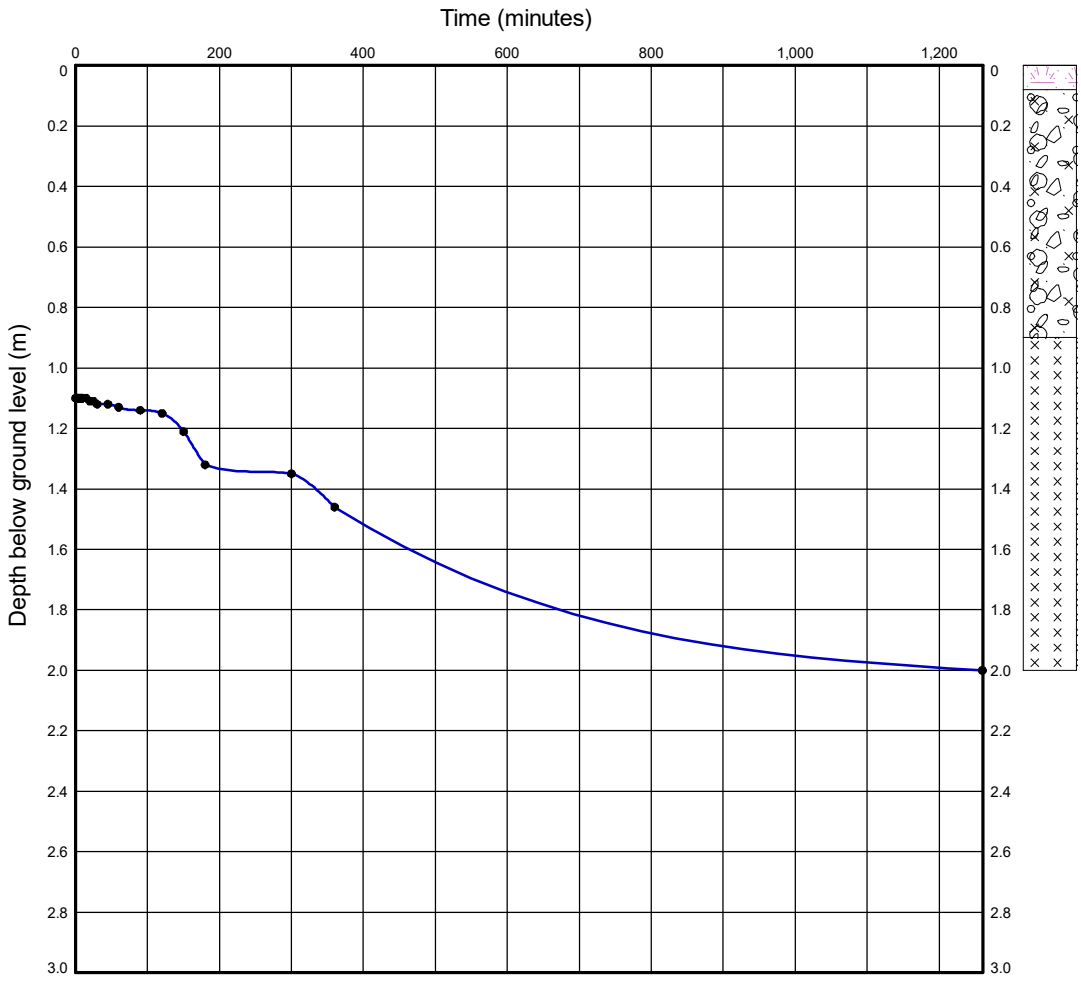
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	1.1
1.0	1.1
2.0	1.1
3.0	1.1
4.0	1.1
5.0	1.1
6.0	1.1
7.0	1.1
8.0	1.1
9.0	1.1
10.0	1.1
15.0	1.1
20.0	1.11
25.0	1.11
30.0	1.12
45.0	1.12
60.0	1.13
90.0	1.14
120.0	1.15
150.0	1.21
180.0	1.32
300.0	1.35
360.0	1.46
1260.0	2

Field Observations from soakaway trial pit



Remarks:

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	2.000 m	V_{p75-25}=	0.450 m^3
Trial Pit Length	2.500 m	a_{p50}=	3.485 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	450.000 minutes
Effective Depth	0.450 m		
Outflow Time	450 mins from 75% to 25% full		

f = 4.7824E-6 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 14/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 1

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP3,1

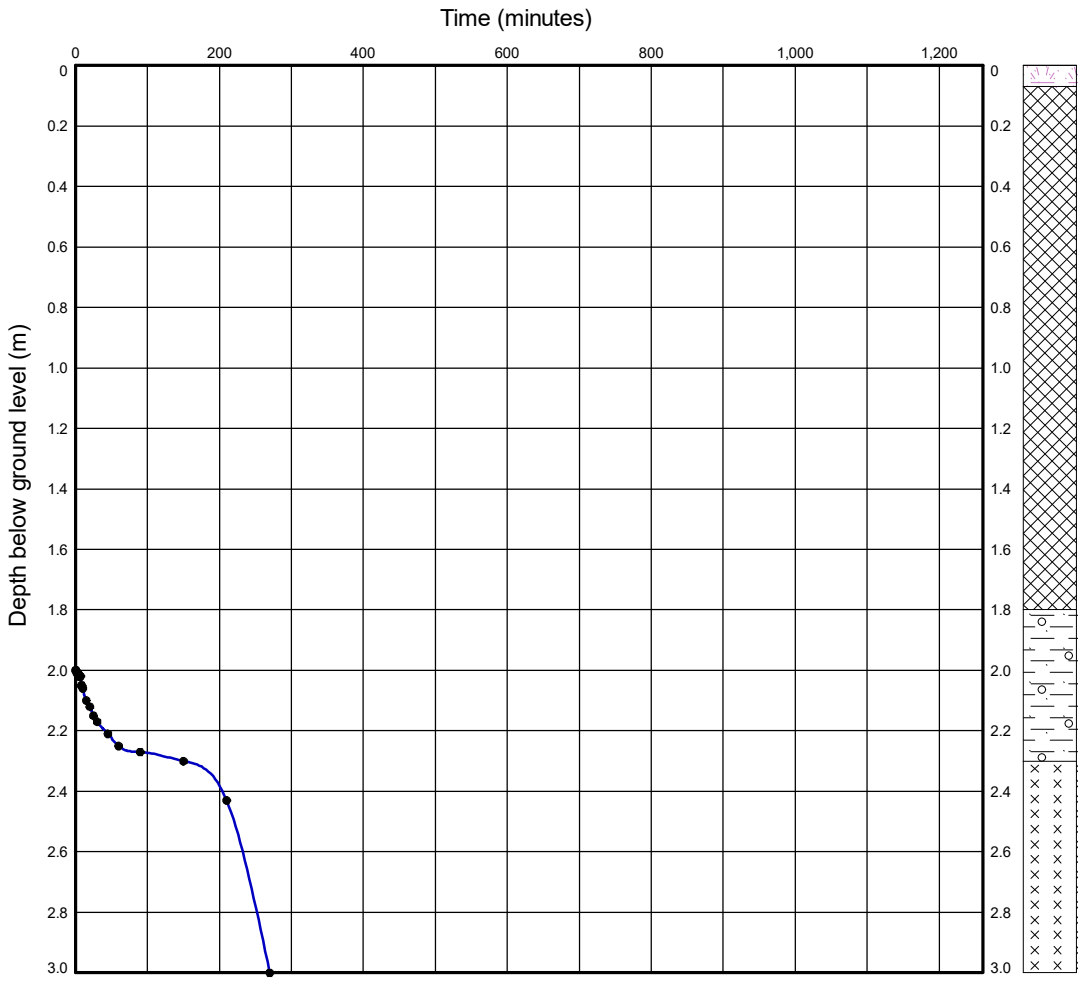
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	2
1.0	2
2.0	2.01
3.0	2.01
4.0	2.01
5.0	2.02
6.0	2.02
7.0	2.02
8.0	2.05
9.0	2.05
10.0	2.06
15.0	2.1
20.0	2.12
25.0	2.15
30.0	2.17
45.0	2.21
60.0	2.25
90.0	2.27
150.0	2.3
210.0	2.43
270.0	3

Field Observations from soakaway trial pit



Remarks:

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	3.000 m	V_{p75-25}=	0.500 m^3
Trial Pit Length	2.500 m	a_{p50}=	3.650 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	190.000 minutes
Effective Depth	0.500 m		
Outflow Time	190 mins from 75% to 25% full		

f = 1.2016E-5 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

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All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 2

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP3,2

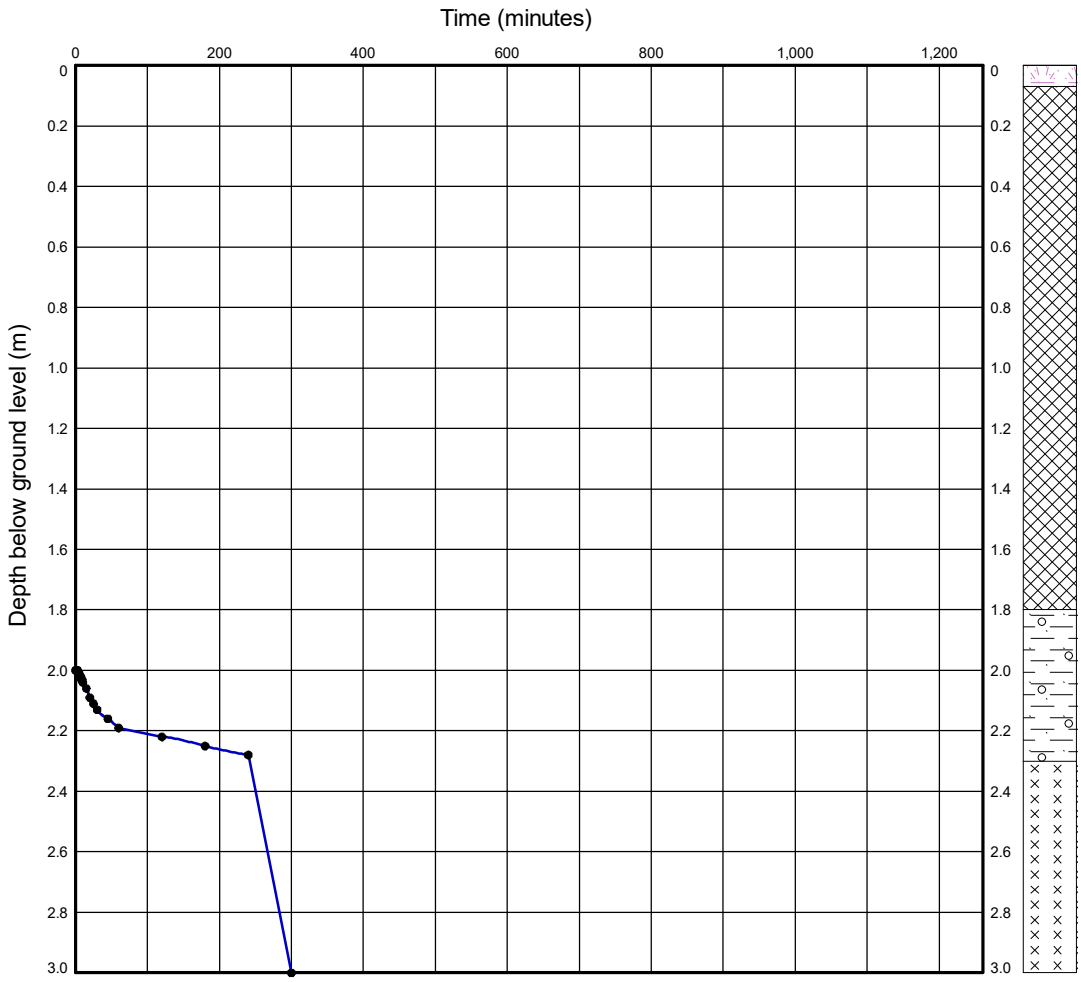
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	2
1.0	2
2.0	2
3.0	2
4.0	2.01
5.0	2.01
6.0	2.02
7.0	2.02
8.0	2.03
9.0	2.03
10.0	2.04
15.0	2.06
20.0	2.09
25.0	2.11
30.0	2.13
45.0	2.16
60.0	2.19
120.0	2.22
180.0	2.25
240.0	2.28
300.0	3

Field Observations from soakaway trial pit



Remarks:

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	3.000 m	V_{p75-25}=	0.500 m^3
Trial Pit Length	2.500 m	a_{p50}=	3.650 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	100.000 minutes
Effective Depth	0.500 m		
Outflow Time	100 mins from 75% to 25% full		

f = 2.2831E-5 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 15/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 3

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP4,1

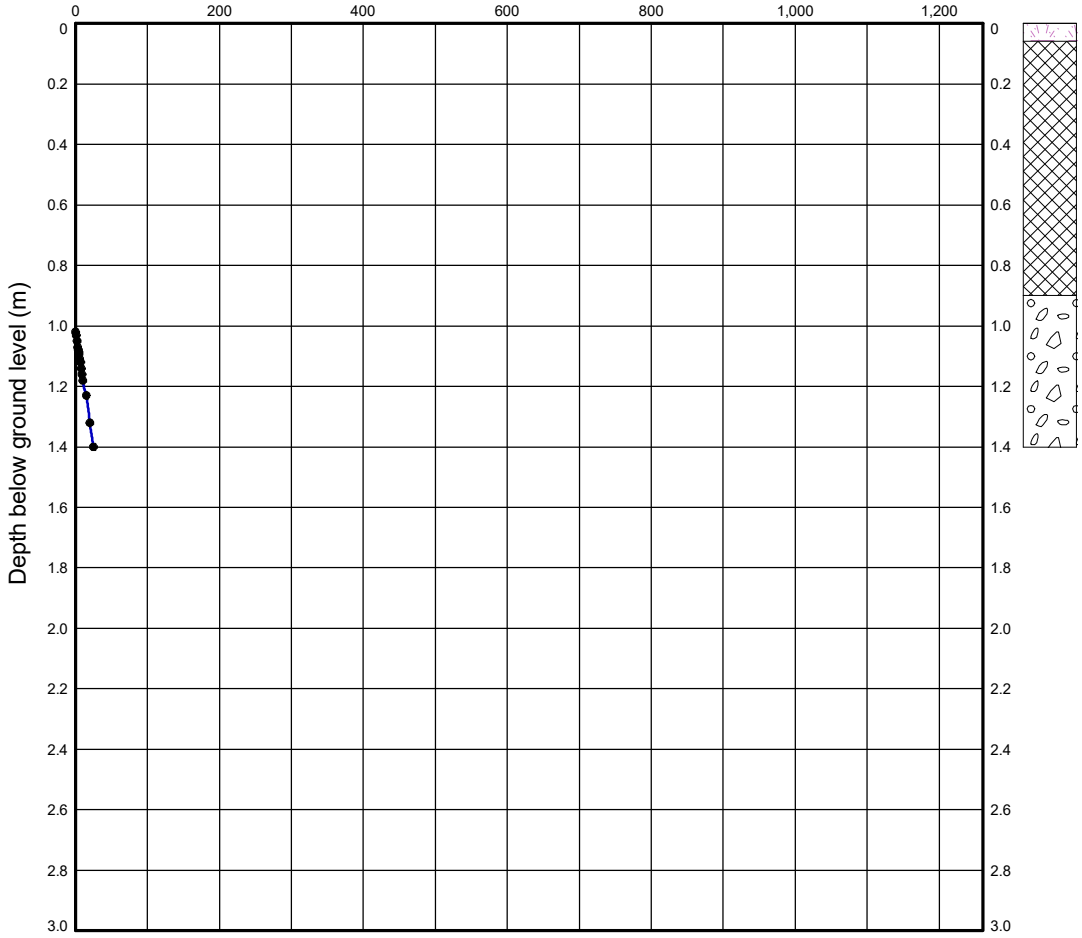
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	1.02
1.0	1.03
2.0	1.05
3.0	1.07
4.0	1.08
5.0	1.09
6.0	1.11
7.0	1.12
8.0	1.14
9.0	1.16
10.0	1.18
15.0	1.23
20.0	1.32
25.0	1.4

Field Observations from soakaway trial pit



Remarks:

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	1.400 m	V_{p75-25}=	0.200 m^3
Trial Pit Length	2.500 m	a_{p50}=	2.660 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	14.000 minutes
Effective Depth	0.200 m		
Outflow Time	14 mins from 75% to 25% full		

f = 8.9509E-5 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 14/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 4

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP4,2

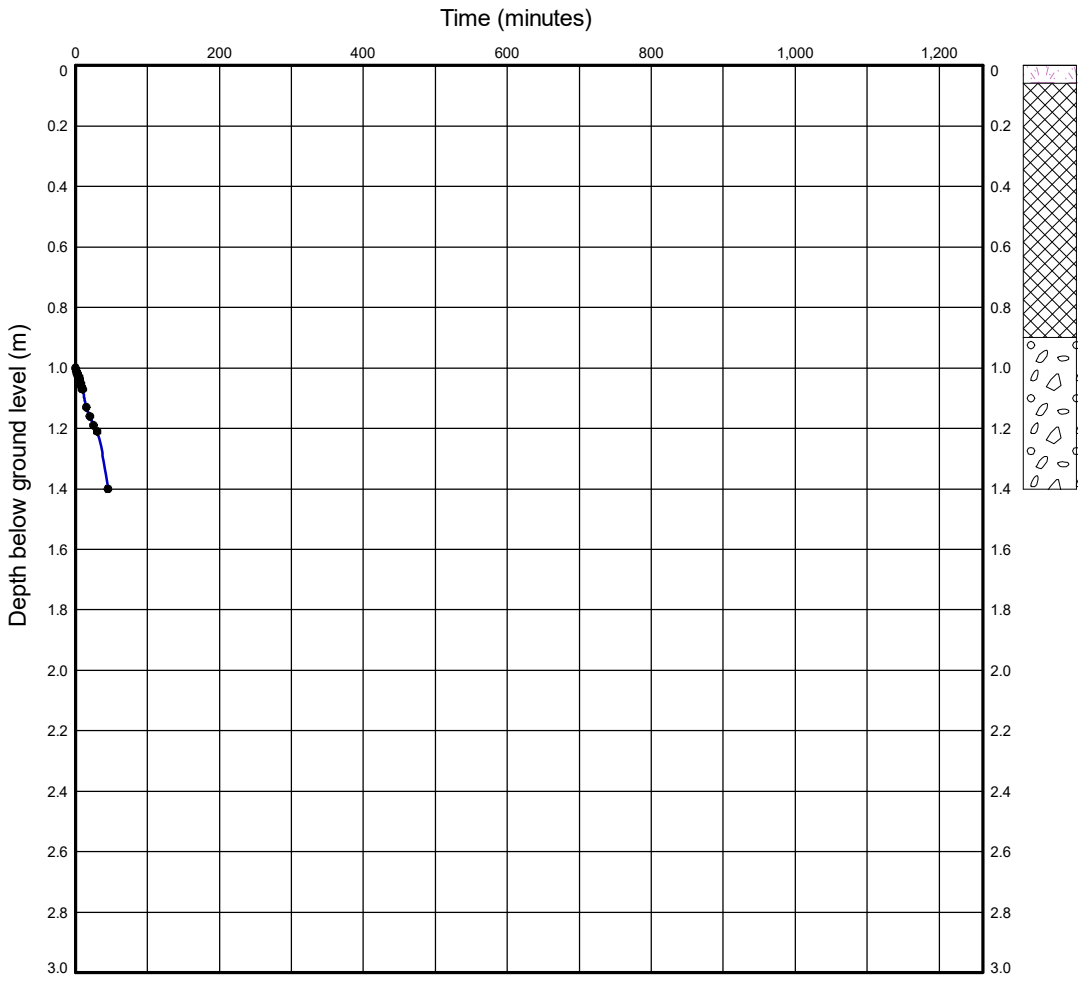
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	1
1.0	1.01
2.0	1.02
3.0	1.02
4.0	1.03
5.0	1.03
6.0	1.04
7.0	1.05
8.0	1.06
9.0	1.07
10.0	1.07
15.0	1.13
20.0	1.16
25.0	1.19
30.0	1.21
45.0	1.4

Field Observations from soakaway trial pit



Remarks:

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	1.400 m	V_{p75-25}=	0.200 m^3
Trial Pit Length	2.500 m	a_{p50}=	2.660 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	26.000 minutes
Effective Depth	0.200 m		
Outflow Time	26 mins from 75% to 25% full		

f = 4.8197E-5 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 14/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 5

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP4,3

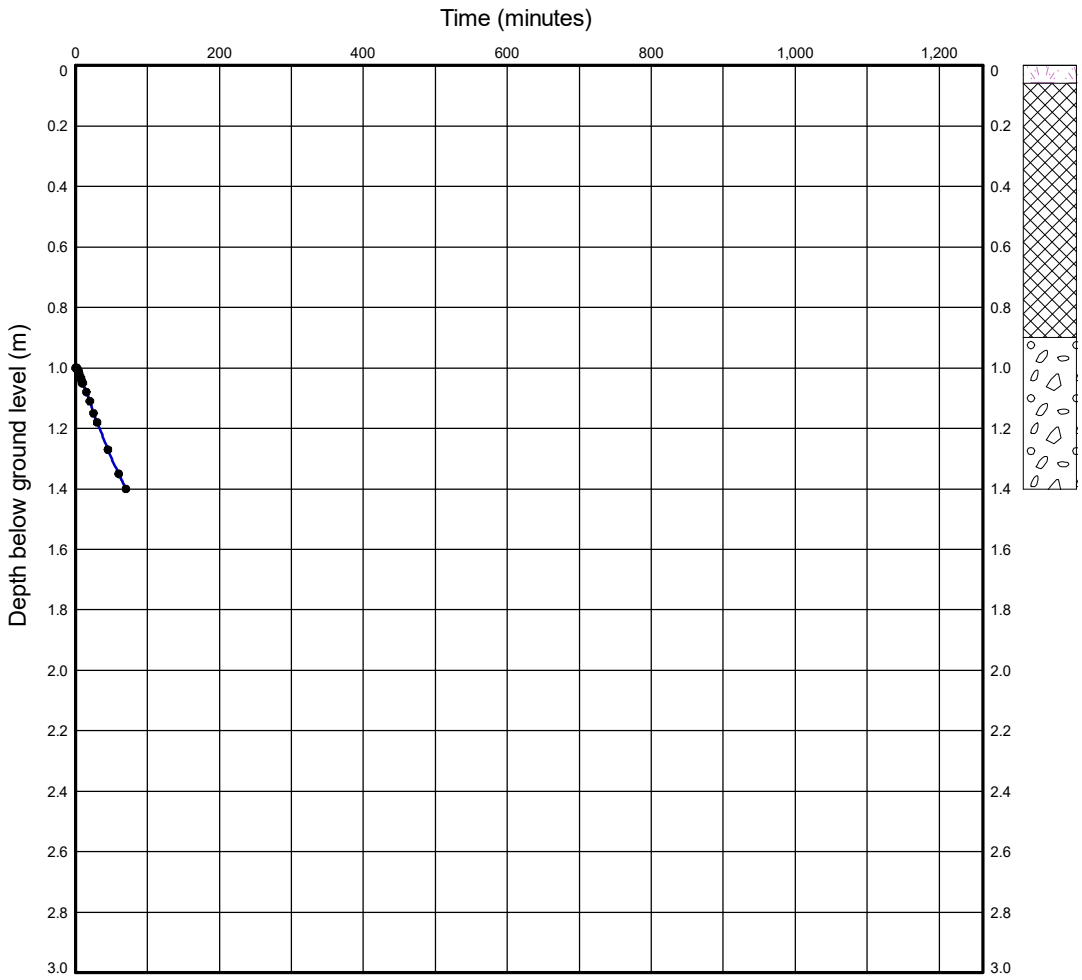
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	1
1.0	1
2.0	1
3.0	1.01
4.0	1.01
5.0	1.02
6.0	1.03
7.0	1.03
8.0	1.04
9.0	1.05
10.0	1.05
15.0	1.08
20.0	1.11
25.0	1.15
30.0	1.18
45.0	1.27
60.0	1.35
70.0	1.4

Field Observations from soakaway trial pit



Remarks:

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	1.400 m	V_{p75-25}=	0.200 m^3
Trial Pit Length	2.500 m	a_{p50}=	2.660 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	30.000 minutes
Effective Depth	0.200 m		
Outflow Time	30 mins from 75% to 25% full		

f = 4.1771E-5 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 14/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 6

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP6,1

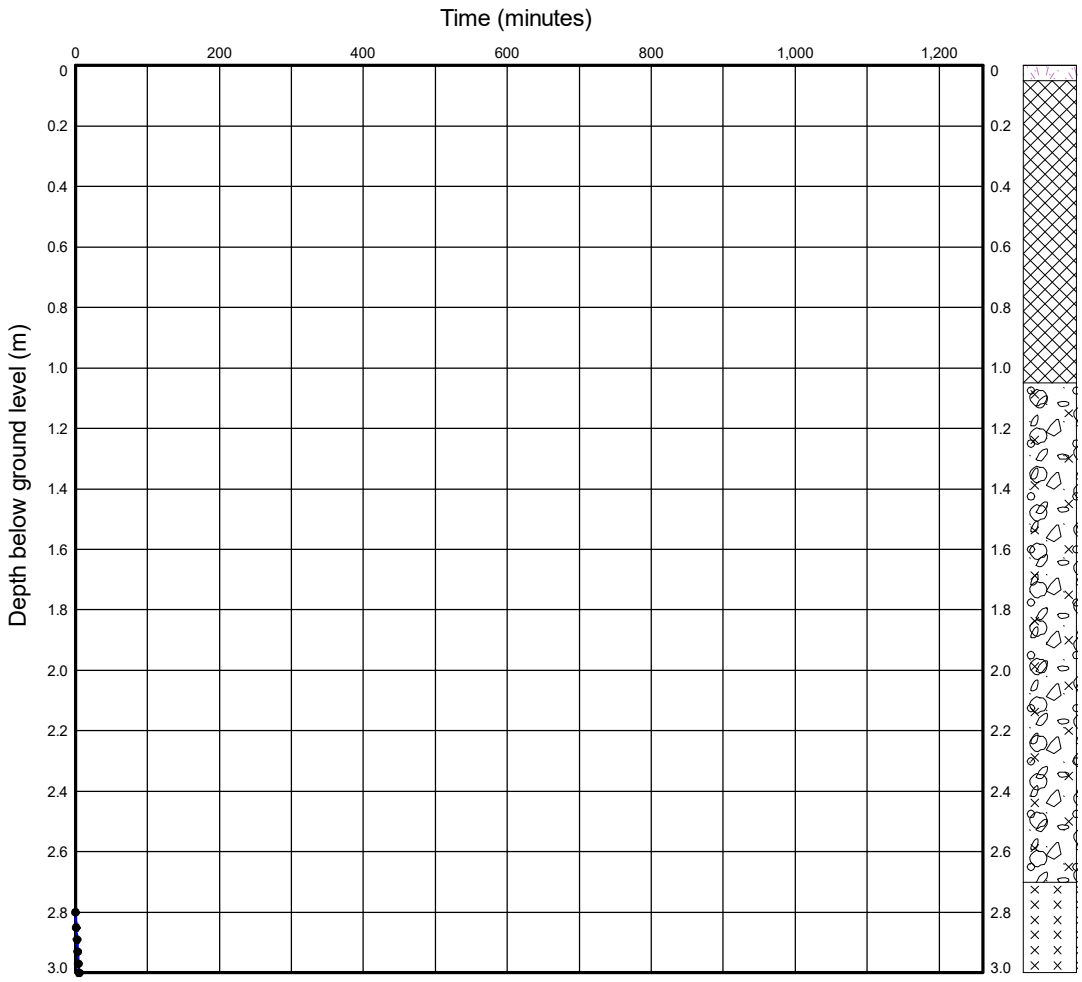
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	2.8
1.0	2.85
2.0	2.89
3.0	2.93
4.0	2.97
5.0	3

Field Observations from soakaway trial pit



Remarks: Unable to raise head of water - 1000l pumped into hole

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	3.000 m	V_{p75-25}=	0.100 m^3
Trial Pit Length	2.500 m	a_{p50}=	2.330 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	2.000 minutes
Effective Depth	0.100 m		
Outflow Time	2 mins from 75% to 25% full		

f = 3.5765E-4 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 15/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 7

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP6,2

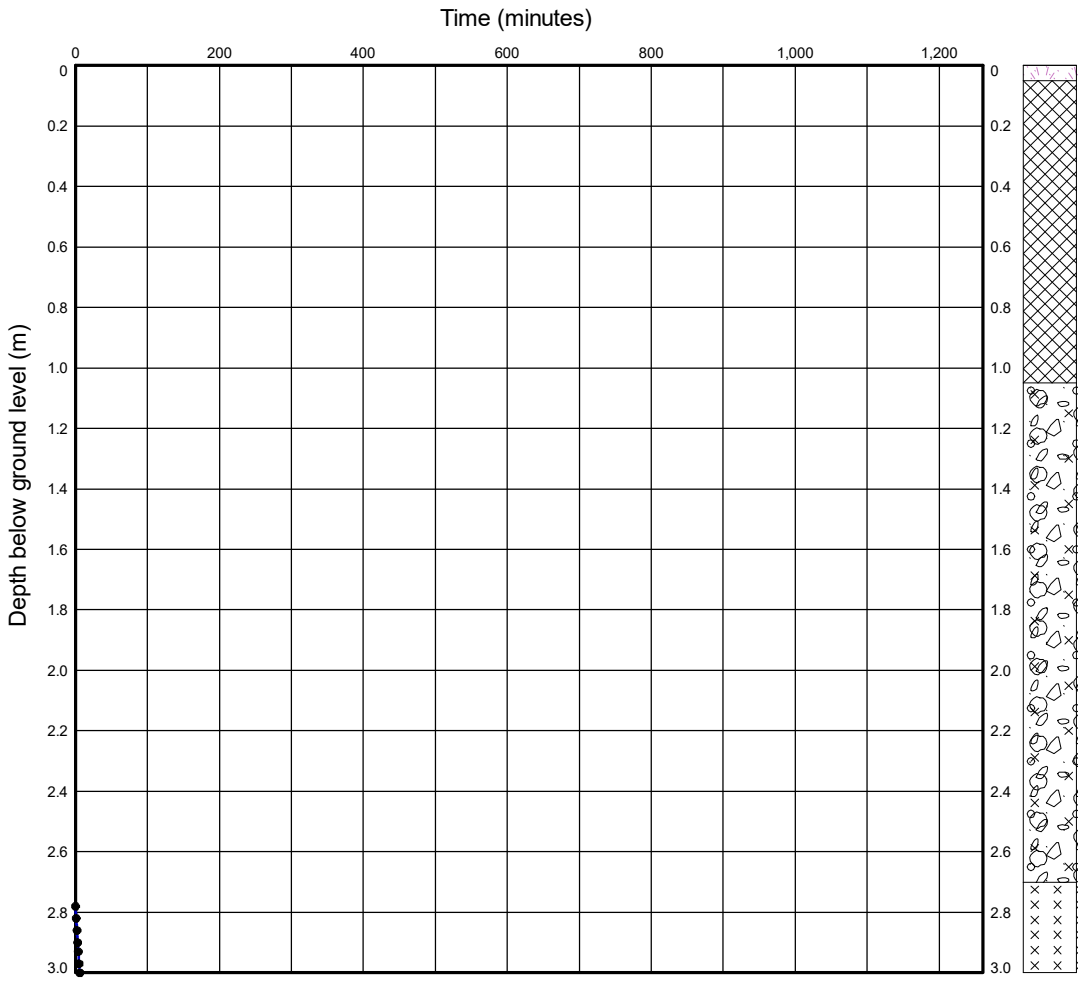
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	2.78
1.0	2.82
2.0	2.86
3.0	2.9
4.0	2.93
5.0	2.97
6.0	3

Field Observations from soakaway trial pit



Remarks: Unable to raise head of water - 1000l pumped into hole

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	3.000 m	V_{p75-25}=	0.100 m^3
Trial Pit Length	2.500 m	a_{p50}=	2.330 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	2.000 minutes
Effective Depth	0.100 m		
Outflow Time	2 mins from 75% to 25% full		

f = 3.5765E-4 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 15/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 8

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP6,3

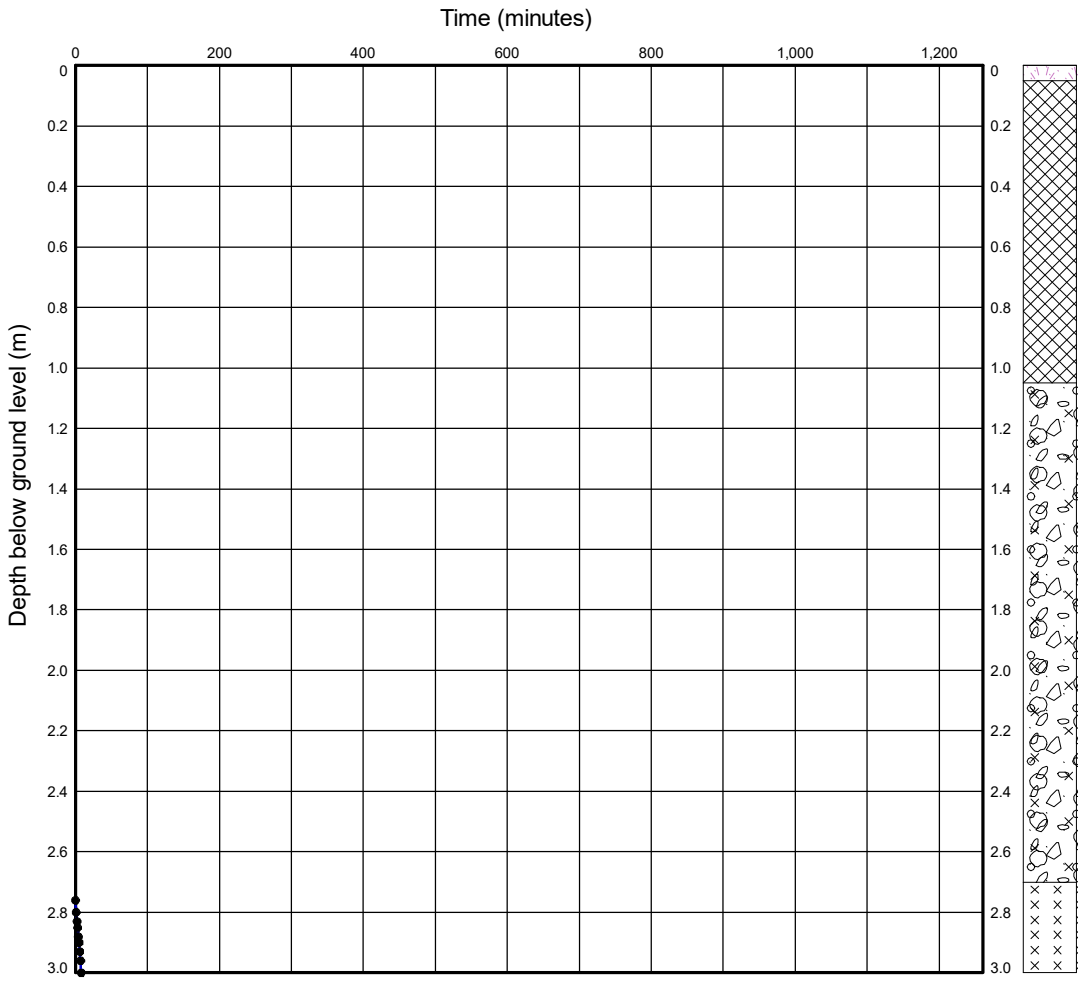
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	2.76
1.0	2.8
2.0	2.83
3.0	2.85
4.0	2.88
5.0	2.9
6.0	2.93
7.0	2.96
8.0	3

Field Observations from soakaway trial pit



Remarks: Unable to raise head of water - 1000l pumped into hole

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	3.000 m	V_{p75-25}=	0.110 m^3
Trial Pit Length	2.500 m	a_{p50}=	2.363 m^2
Trial Pit Width	0.800 m	t_{p75-25}=	2.000 minutes
Effective Depth	0.110 m		
Outflow Time	2 mins from 75% to 25% full		

f = 3.8792E-4 m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 15/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 9

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP7,1

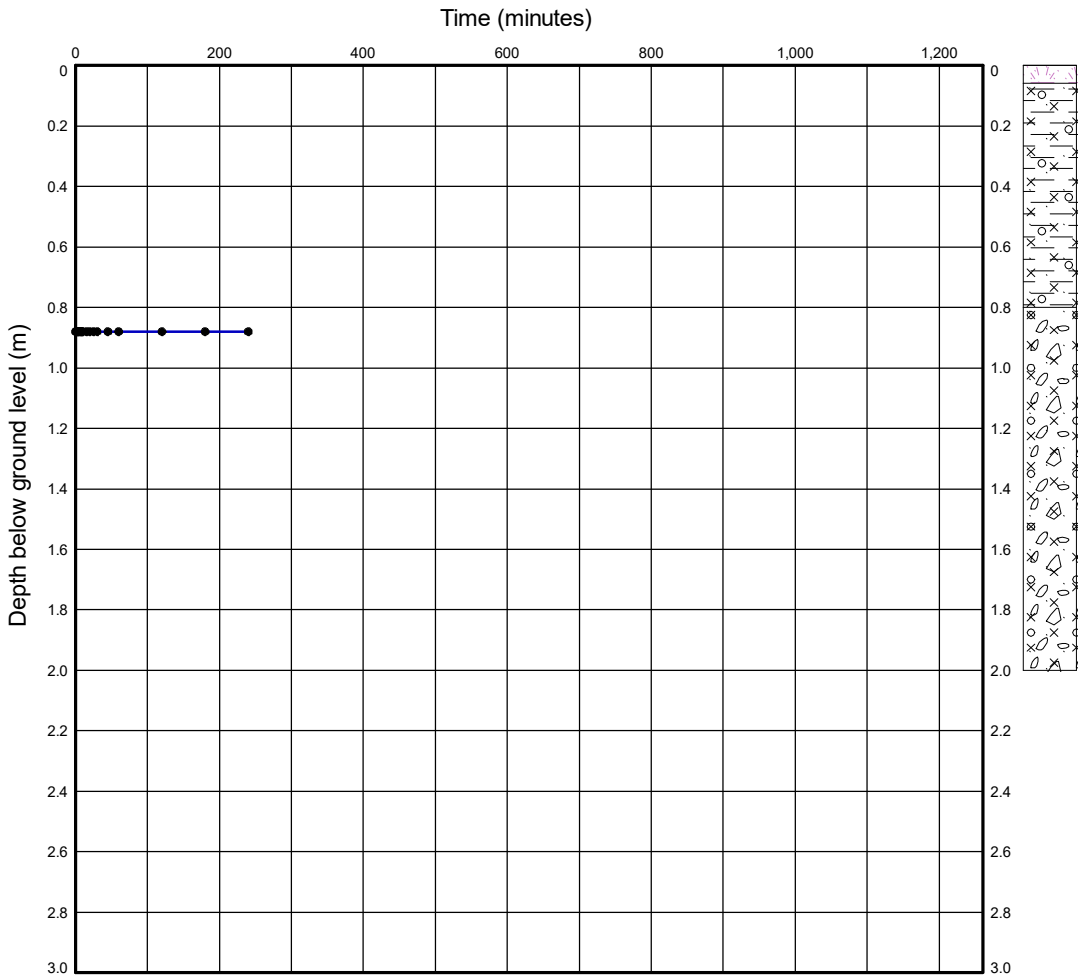
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	0.88
1.0	0.88
2.0	0.88
3.0	0.88
4.0	0.88
5.0	0.88
6.0	0.88
7.0	0.88
8.0	0.88
9.0	0.88
10.0	0.88
15.0	0.88
20.0	0.88
25.0	0.88
30.0	0.88
45.0	0.88
60.0	0.88
120.0	0.88
180.0	0.88
240.0	0.88

Field Observations from soakaway trial pit



Remarks: Insufficient outflow to calculate permeability.

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	2.000 m	V_{p75-25}=	m^3
Trial Pit Length	2.500 m	a_{p50}=	m^2
Trial Pit Width	0.800 m	t_{p75-25}=	minutes
Effective Depth	m		
Outflow Time	mins from 75% to 25% full		

f = m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 15/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 10

Contract : Former Bodlondeb Residential Home

Client : Wales and West Housing

Point Plotted
TP8,1

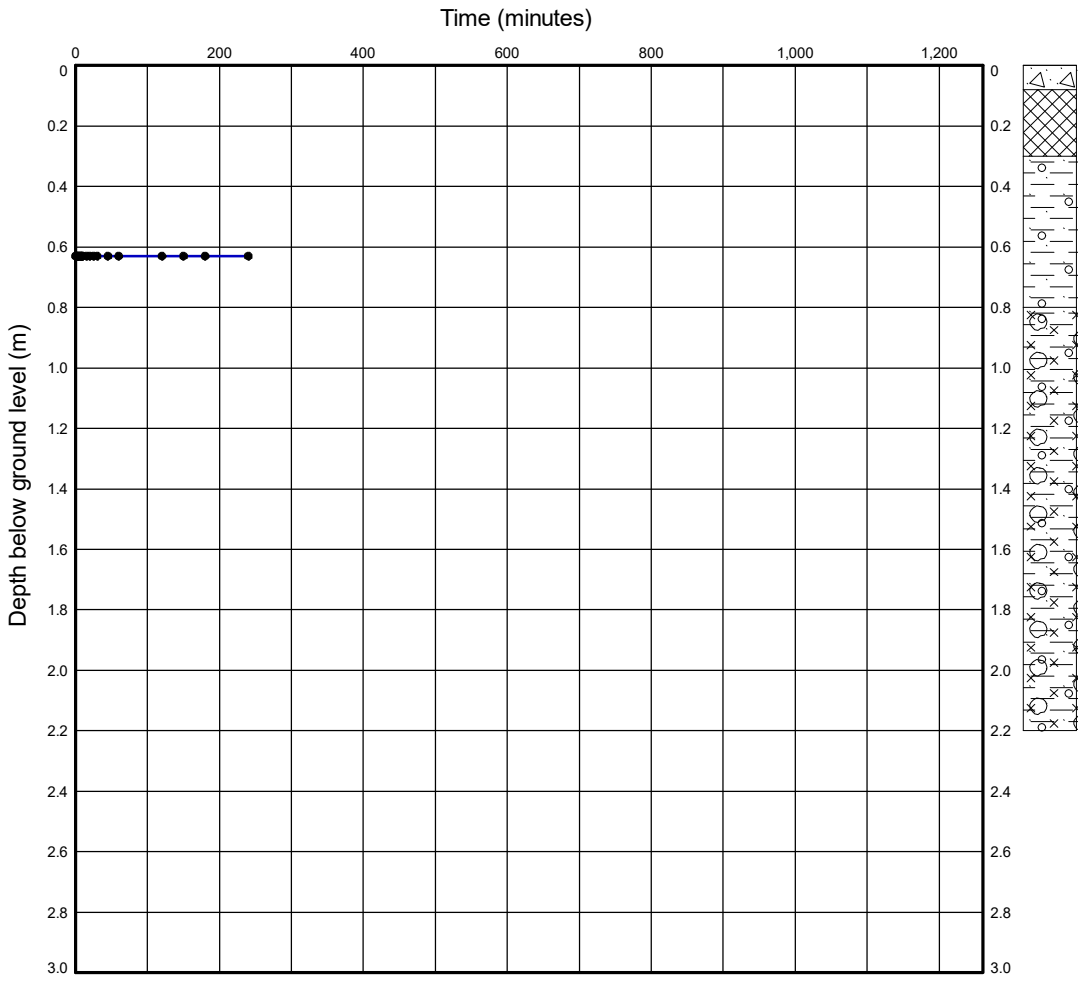
Job Number : Q1149

Engineer : Roger Casey Associates

SOAKAWAY TEST CALCULATION SHEET

Time (Minutes)	Depth of water from ground level (m)
0.0	0.63
1.0	0.63
2.0	0.63
3.0	0.63
4.0	0.63
5.0	0.63
6.0	0.63
7.0	0.63
8.0	0.63
9.0	0.63
10.0	0.63
15.0	0.63
20.0	0.63
25.0	0.63
30.0	0.63
45.0	0.63
60.0	0.63
120.0	0.63
150.0	0.63
180.0	0.63
240.0	0.63

Field Observations from soakaway trial pit



Remarks: Insufficient outflow to calculate permeability

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	2.200	m	V_{p75-25}=	m^3
Trial Pit Length	2.500	m	a_{p50}=	m^2
Trial Pit Width	0.800	m	t_{p75-25}=	minutes
Effective Depth		m		
Outflow Time		mins from 75% to 25% full		

f = m/sec

Quantum

Plas Newydd
Swansea
Tel: 01554744880
Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test: 15/06/2023

All measurements in metres unless otherwise stated

Project File: Q1149.GPJ

Figure No. 11

DO NOT SCALE

POINT OF CONNECTION FOR PROPOSED DEVELOPMENT SURFACE WATER AND FOUL WATER, DETAILS TO BE CONFIRMED AT DETAILED DESIGN STAGE. EXISTING UPSTREAM SEWERS ARE PITCH FIBRE AND ARE INTENDED FOR REPLACEMENT

240m³ SITE CONTROL CELLULAR STORAGE BENATH PERMABLE PAVING, PROVIDED TO ATTENUATION ALL STORM EVENTS UP TO THE 1 IN 100 YEAR EVENT + 40% CLIMATE CHANGE.

FILTER DRAIN TO OUTFALL INTO PROPOSED SURFACE WATER NETWORK

SITE FLOW CONTROL CHAMBER TO RESTRICT ALL FLOWS TO EXISTING GREENFIELD QBAR RUNOFF RATES OF 1.6l/s FOR 0.567ha

ASSUMED PUBLIC SEWER PIPELINE ROUTE AND ASSOCIATED 6m WIDE EASEMENT

1m FILTER DRAIN TO CAPTURE AND CONVEY SURFACE WATER TO OUTFALL

ASSUMED EXISTING DCWW COMBINED SEWER TO REMAIN IN SITU WITH ASSOCIATED 6m WIDE EASEMENT

NON PERFORATED PIPE LINK THROUGH DCWW EASEMENT

NO SUDS TO BE LOCATED OVER EXISTING DCWW SEWER

KERB LINES PROPOSED TO MAINTAIN MINIMUM 500mm OFFSET TO EXISTING MANHOLES AS REQUIRED BY DCWW

1m MIN FILTER STRIP ADJACENT TO CARRIAGEWAY TO CAPTURE AND CONVEY RUNOFF TO FILTER DRAIN WHILST PROVDING WATER QUALITY, BIODIVERSITY AND AMENITY BENEFITS

RAIN GARDENS/PLANTING AREAS TO BE UTILIZED IN OPEN AREAS WHERE POSSIBLE TO DIRECT SURFACE WATER TOWARD OUTFALLS VIA PERFORATED PIPES/DIFFUSERS, TO PROVIDE BIODIVERSITY, AMENITY AND WATER QUALITY BENEFITS. TO BE PLANTED AS PER LANDSCAPE ARCHITECTS SPECIFICATION

RUN-OFF FROM ROOFS TO DISCHARGE INTO CLEAN STONE VIA DIFFUSER BLOCK.

FRENCH DRAINS TO BE PROVIDED AT BASE OF RETAINING WALLS. ALLOW FOR CATCHPIT CHAMBER BEFORE CONNECTION INTO MAIN SYSTEM.

300mm DEEP SWALE WITH 1 IN 2 SIDE SLOPES TO BE PLANTED AS PER LANDSCAPE ARCHITECTS SPECIFICATION TO PROVIDE BIODIVERSITY, AMENITY AND WATER QUALITY BENEFITS

ALL PARKING BAYS TO HAVE POROUS PAVING. MINIMUM 350mm CLEAN STONE LAYER WRAPPED IN IMPERMABLE GEOMEMBRANE TO ACT AS ATTENUATION. ORIFICE CHAMBER IN EACH DRIVE TO RESTRICT DISCHARGE INTO MAIN SYSTEM TO MAXIMIZE ATTENUATION.

NO SuDS PROPOSED OVER EXISTING DCWW COMBINED SEWER WHICH IS TO REMAIN IN SITU SUBJECT TO ACCEPTABLE COVER DEPTHS BELOW PROPOSED CAR PARKING AREA

RWP'S TO DISCHARGE ONTO RAIN GARDENS VIA RILL/CHANNEL WHERE POSSIBLE.

KEY

- EXISTING COMBINED WATER DRAINAGE
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- PERFORATED PIPE
- POROUS PARKING BAYS
- SWALE
- RAIN GARDEN
- DIFFUSER UNIT
- RILL/CHANNEL
- CELLULAR STORAGE
- HEADWALL UNIT
- FILTER DRAIN
- FILTER STRIP
- PROPOSED RETAINING WALL

ANY DISCREPANCIES IN INFORMATION CONTAINED IN THIS DRAWING & ANY PROPOSED ALTERATIONS TO ROAD ALIGNMENT OR DRAINAGE MUST BE REPORTED TO ENGINEER FOR REVISION AND AGREEMENT WITH RELEVANT AUTHORITY.

FOUL WATER & SURFACE WATER SEWER (3m MAXIMUM PIPE LENGTHS)

ALL PIPES AND FITTINGS FOR DIAMETER OF 100/110mm TO BE EITHER:

* JDP ULTRA3 UNDERGROUND DRAINAGE SYSTEM.
* MARLEY SOLID WALL UNDERGROUND DRAINAGE PIPE SYSTEM.
* OSMADRAIN BUILDING DRAINAGE SYSTEM.
* POLYPIPE EN1401-1 STANDARD UNDERGROUND DRAIN SYSTEM.
* OR SIMILAR APPROVED BY RELEVANT AUTHORITY AND/OR RCA.

ALL PIPES AND FITTINGS FOR DIAMETERS OF 150mm – 300mm TO BE EITHER:

* JDP ULTRA3 UNDERGROUND DRAINAGE SYSTEM.
* MARLEY QUANTUM SEWER SYSTEM.
* POLYPIPE CIVILS POLYSEWER SYSTEM.
* UPONOR ULTRA-RIB SYSTEM.
* WAVIN OSMA ULTRA-RIB SYSTEM.
* OR SIMILAR APPROVED BY RELEVANT AUTHORITY AND/OR RCA.

3m MAXIMUM LENGTH PVC-U PIPES INSTALLED BY BPF/PPG ACCREDITED CONTRACTOR – COPY OF CERTIFICATE REQUIRED.

USE OF DIFFERENT PIPE SUPPLIER, PIPE LENGTH OR SPECIFICATION MUST BE APPROVED BY THE STATUTORY UNDERTAKER – IF IN DOUBT ASK.

WHERE SPECIFIED AS PLASTIC CHAMBERS ON RCA CHAMBER SCHEDULES CHAMBERS MUST COMPLY WITH BS EN 13598-1 AND BS EN 13598-2 OR HAVE EQUIVALENT INDEPENDENT APPROVAL* (* TO BE AGREED WITH ADOPTING AUTHORITY). CHAMBERS TO BE EITHER JDP AXEDO INSPECTION CHAMBER SYSTEM, POLYPIPE POLYSEWER INSPECTION CHAMBER SYSTEM, OSMA INSPECTION CHAMBER SYSTEM, BRETT MARTIN ADOPTABLE CHAMBERS OR SIMILAR APPROVED BY RELEVANT AUTHORITY AND/OR RCA – CHAMBER SPECIFICATION MUST BE SUITABLE FOR PIPE DIAMETER, BURIAL DEPTH, LOCATION AND COVER LOADING – IF IN DOUBT ASK.

ALL PIPEWORK MANUFACTURED IN UNPLASTICIZED POLYVINYL CHLORIDE (PVC-U). PVC-U DRAINAGE SYSTEMS WITH FLEXIBLE JOINTS TO BS EN1401-1:1998, BS 4660 OR BS 5481. PVC-U PIPES INSTALLED BY BRITISH PLASTICS FEDERATION – PLASTIC PIPES GROUP – MANUFACTURER APPROVED INSTALLERS. PLEASE PROVIDE COPY OF CERTIFICATION TO RCA PRIOR TO LAYING ANY PIPEWORK.

WHEN SEWERS ARE LOCATED WITHIN A PUBLIC HIGHWAY, THE OUTSIDE OF THE SEWER SHOULD BE IN THE VEHICLE CARRIAGEWAY (NOT FOOTPATH) AND BE AT LEAST 1M AWAY FROM THE KERBLINE. THE OUTSIDE OF MANHOLE CONSTRUCTIONS SHOULD BE AT LEAST 0.5M AWAY FROM THE KERBLINE.

THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED POTENTIALLY ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN "SEWERS FOR ADOPTION – A DESIGN AND CONSTRUCTION GUIDE FOR DEVELOPERS" 7TH EDITION AND THE REQUIREMENTS OF THE STATUTORY UNDERTAKER DWR CYMRU WELSH WATER (DCWW) AND CONFIRM THE SAME IN WRITING TO THE ADOPTION AUTHORITY.

THE CONTRACTOR SHALL ENSURE THAT AN UP TO DATE COPY OF SEWERS FOR ADOPTION 7TH EDITION TOGETHER WITH ALL ITS CURRENT DWR CYMRU WELSH WATER ADDENDUM AND WELSH GOVERNMENT MINISTERS' STANDARDS DOCUMENTS IS AVAILABLE ON SITE FOR COMPLIANCE.

THIS PROJECT HAS BEEN DESIGNED TO COMPLY WITH SEWERS FOR ADOPTION 7TH EDITION AND WELSH GOVERNMENT MINISTERS' STANDARDS.

PRIVATE DRAINAGE NOTES

ALL PIPEWORK SHALL BE UPVC COMPLYING WITH SEWERS FOR ADOPTION 7TH EDITION, CESWI 6TH EDITION AND ALL CURRENT RELEVANT BRITISH STANDARDS, BBA CERTIFICATES AND MANUFACTURERS RECOMMENDATIONS AND INSTALLED TO MEET THE SAME.

PROVIDE 150MM CONCRETE SURROUND WITH FLEXIBLE JOINTS WHERE SEWER PIPES HAVE LESS THAN 900MM COVER IN NON-ADOPTABLE TRAFFICKED AREAS. ALL OTHER DEPTH PIPELINES SHALL HAVE GRANULAR PIPE BED AND SURROUND AS DETAILS. IN NON-TRAFFICKED AREAS WHERE THERE IS NO RISK OF DAMAGE FROM GARDEN IMPLEMENTS (SURFACED PATHS) SHALL HAVE GRANULAR BED AND SURROUND AS DETAILS. WHERE THERE IS A RISK FROM GARDEN IMPLEMENT DAMAGE AND PIPELINE HAS LESS THAN 600MM COVER PROVIDE 50MM DP CONCRETE PAVING SLAB LAID ON 75MM GRANULAR PIPE BEDDING MATERIAL ABOVE CROWN OF PIPELINE.

DRAIN/SEWER PIPE DEFINITIONS:

100mmø < 1/100 CC
- CONCRETE SURROUND
- GRADIENT
- FLOW DIRECTION
- DIAMETER

IMPORTANT – UNTIL TECHNICAL ACCEPTANCE AND/OR APPROVAL HAS BEEN OBTAINED FROM THE RELEVANT LOCAL AUTHORITY, IT SHOULD BE UNDERSTOOD THAT ALL DRAWINGS & DETAILS ISSUED ARE PRELIMINARY AND NOT FOR CONSTRUCTION. SHOULD THE CONTRACTOR COMMENCE SITE WORK PRIOR TO TECHNICAL ACCEPTANCE AND/OR APPROVAL BEING GIVEN, IT IS ENTIRELY AT THEIR OWN RISK. INFRASTRUCTURE SUBJECT TO A SECTION 104 ADOPTION AGREEMENT SHALL NOT BE CONSTRUCTED UNTIL SUCH TIME THAT THE SECTION 104 ADOPTION AGREEMENT HAS BEEN LEGALLY COMPLETED BETWEEN THE DEVELOPER AND THE STATUTORY UNDERTAKER

NOTES:

THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN ROGER CASEY ASSOCIATES AND MUST NOT BE COPIED OR REPRODUCED IN ANY WAY WITHOUT THE WRITTEN CONSENT OF ROGER CASEY ASSOCIATES.

THE CONTRACTOR IS TO CHECK ALL LEVELS AND DIMENSIONS BEFORE WORK COMMENCES, AND ANY DISCREPANCIES TO BE REPORTED IMMEDIATELY TO THE CONSULTANTS.

WORK TO FIGURED DIMENSIONS IN PREFERENCE TO SCALING.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ROGER CASEY ASSOCIATES DRAWINGS AND SPECIFICATIONS AND ALL OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS RELATING TO THIS PROJECT.

THE CONTRACTOR IS EXPECTED TO SUPPLY AND DO EVERYTHING NECESSARY FOR THE PROPER EXECUTION OF THE WORKS THAT MAY BE REASONABLY INFERRED FROM THE DRAWINGS AND SPECIFICATION, WHETHER REFERRED TO IN DETAIL OR NOT, WITHOUT EXTRA PAYMENT IN RESPECT THEREOF.

NOTES (CONTINUED)

ALL FIGURED LEVELS ARE RELATED TO LAND SURVEY DATUM AS RCA DRAWING NUMBER JOB NUMBER/01 UNLESS NOTED OTHERWISE.

ALL FIGURED DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

ALL WORKS SHALL BE IN ACCORDANCE WITH CURRENT RELEVANT SECTIONS OF:

* SPECIFICATION FOR HIGHWAY WORKS
* DESIGN MANUAL FOR ROADS AND BRIDGES
* LOCAL AUTHORITY HIGHWAY ADOPTION REQUIREMENTS
* LOCAL AUTHORITY SAB APPROVAL AND REQUIREMENTS
* SEWERS FOR ADOPTION 7th EDITION
* BUILDING REGULATIONS
* BRITISH STANDARDS
* NEW ROADS AND STREET WORKS ACT
* HEALTH AND SAFETY REGULATIONS
* GOOD PRACTICE

IT IS KNOWN THAT EXISTING UTILITY COMPANY UNDERGROUND SERVICES AND APPARATUS IS PRESENT WITHIN THE PROPOSED WORKS AREA THE CONTRACTOR SHOULD ALLOW FOR ALL NECESSARY INVESTIGATIVE WORK (CAT DETECTION, TRIAL HOLES, ETC.) TO DETERMINE ROUTE AND DEPTH OF ALL UNDERGROUND SERVICES TO AVOID DAMAGE AND PRESERVE SUPPLIES TO EXISTING DWELLINGS / PREMISES.

ALL REDUNDANT SERVICES AND DRAINAGE INFRASTRUCTURE ARE TO BE GRUBBED UP

REV.	DESCRIPTION	DRAWN	CHECK	DATE
P03	REVISED TO PLANNING STATUS AND TO LATEST ARCHITECTURAL LAYOUT	EP	PWJL	22.08.23
P02	1 to 11 REVISED IN LINE WITH LATEST ARCHITECTURAL LAYOUT	EP	PWJL	13.09.23

DRAWING STATUS: PLANNING

Roger Casey Associates
Consulting Civil & Structural Engineers

Ty Mansel, 6 Mansel Street, Carmarthen, Carmarthenshire SA31 1PX
T: 01267 222 646
Units 10 & 11, Merlin's Court, Winch Lane, Haverfordwest, Pembrokeshire SA61 1SB
T: 01437 762 795
E: office@rca-eng.co.uk
W: www.rca-eng.co.uk

CLIENT: WALES AND WEST HOUSING

ARCHITECT: RLH ARCHITECTURAL

PROJECT: RESIDENTIAL DEVELOPMENT AT FORMER BODLONDEB HOME, PENPARCAU, SY23 1SJ

DRAWING TITLE: P01 ENGINEERING LAYOUT (DRAINAGE STRATEGY)

RCA PROJECT REFERENCE No.:	DRAWN BY:	DESIGN BY:	CHECKED BY:	DATE:	SCALE:
21721	EP	EP	PWJL	AUG 2023	SHOWN

DRAWING No.: 21721-RCA-01-XX-DR-C-05

REVISION: P03