

Technical Note – WAFC Temporary Spectator Stand – Drainage Statement

Project name **Wrexham Association Football Kop Development**
Project no. **1620012485**
Client **Wrexham AFC**
Memo no. **RAM-C-WAFC-TN01**
Prepared by **James Wood**
Checked by **Jonathan Wilkinson**
Approved by **Daniel Scarfe**

1 Introduction

1.1 Consented Permanent Stand

Wrexham County Borough Council planning application P/2022/0725 was granted permission 04/08/2022. The development comprises Kop Development for 5,500 seats, inclusive of a 500 capacity hospitality area, with a 600 capacity non-match day exhibition space, new public realm and associated works.

1.2 Proposed Temporary Stand

Planning consent is now sought for the proposed construction of a temporary spectator stand, interim to full construction of the consented permanent development. The temporary stand will accommodate 2,289 seats plus space for 20 additional wheelchairs. No hospitality / exhibition space is proposed as part of the temporary construction.

Drawing 31547-AFL-Z4-ZZ-DR-A-20006 P1 illustrates the proposed temporary development and is attached as Appendix 1.

1.3 Structure of Technical Note

This Technical Note presents a review of the drainage reports submitted in support of the consented permanent stand.

The surface water and foul water features of the proposed temporary stand have been compared, with the conclusion that the proposed temporary stand falls 'within' the parameters of the consented scheme. Therefore, no additional drainage reports are required to support the temporary condition.

Whilst the consented permanent stand will be operational on non-match days (e.g. for exhibitions), this note considers only match-day impacts because the proposed temporary stand will be operational on match days only.

2 Drainage summary for the temporary stand

The following Wrexham Association Football Club Kop Development drainage report was submitted in support of planning application P/2022/0725:

- WRX-RAM-XX-XX-RP-CD-00001;

2.1 Foul Water

2.1.1 Introduction

The existing stand is currently condemned and unused with a capacity of 5000, the proposed stand is to provide seating for up to 5500 fans and the temporary stand to provide capacity for 2309 fans. The consented development was for 5500 however this will be limited to 5000 (matching the existing Kop capacity) until additional phosphate mitigation can be confirmed and accepted by Welsh Water / Wrexham County Borough Council for the additional 500 fans. Given the temporary stand will provide capacity for a significantly lower number than both the consented and historic Kop with a capacity of 2309 it is assessed to be 'within' the parameters of the consented scheme. Therefore, no additional drainage reports are required to support the temporary condition.

2.1.2 Foul water loading

The expected population for the development will vary due to the nature of the development. However, for the purpose of these calculations the maximum capacity of the temporary stand will be utilised as this would generate the highest flow. The capacity of the temporary stand will be 2309, this does not include staff, so for the purpose of these calculations a value of 2350 will be used to provide an allowance for the total occupation during a match event.

To establish the expected flow per person 'Flows & Loads 4' will be utilised to determine the most suitable scenario. The most applicable activity would be 'Local community sports club, e.g. squash, rugby & football' which gives a base flow of 40 litres per person per day. Applying this value to the 2350 expected capacity of the temporary stand, a total foul flow volume can be calculated.

Therefore;

$$U = 2350 \times 40 \frac{l}{p} / d = \mathbf{94,000 \text{ litres per day}}$$

A four-hour duration for an event is being utilised for a peak value for the foul flows. The peak foul flow, Qpop can be calculated as follows:

$$Q_{pop} = \frac{U \text{ (in litres)}}{t \text{ (in seconds)}} \text{ l/s}$$

Therefore,

$$Q_{pop} = \frac{94,000 \text{ l}}{4 \times 60 \times 60 \text{ s}} = \mathbf{6.53 \text{ l/s}}$$

The foul water from the temporary stand will be discharged off site through the use of portable toilets with self-contained foul tank. and will not be positively connected into the Welsh Water below ground

drainage infrastructure. The allowable discharge for the consented application was a peak of 16 l/s which is significantly more than the temporary stand.

2.2 Surface Water

2.2.1 Temporary Proposal Surface Water Strategy

The temporary stand will be constructed on the existing site and thus will mimic the existing site characteristics in terms of surface water discharge. From a review of survey information, it has been identified that there is no positive surface water drainage and that the surface water infiltrates directly to ground. Given that the strategy for the temporary stand mimics the current site strategy it is not deemed to have any effect on the current site situation, the consented design will then be implemented for the consented scheme. Therefore, no additional drainage reports are required to support the temporary condition. Section 2.2.2 below shows information relating to the infiltration testing carried out on the development used to support the consented development.

2.2.2 Infiltration testing

Infiltration testing has been undertaken in accordance with BRE digest 365, the test results have confirmed that the soil characteristics are suitable for managing the surface water via infiltration. Table 1 below details the soakaway test results which can be found in Appendix 2. This proves how the current undeveloped site which has no positive drainage manages surface water, which will be replicated in the temporary condition. The consented strategy manages surface water through the implementation of SuDS and a geocellular soakaway tank. The CIRIA SuDS Manual identifies the below values as having good infiltration media.

Table 1 - Soakaway test results

Reference	Infiltration rate (m/sec)
TP01 – Test 1	7.3×10^{-4}
TP01 – Test 2	4.7×10^{-4}
TP01 – Test 3	4.0×10^{-4}
TP02 – Test 1	1.4×10^{-3}
TP02 – Test 2	5.2×10^{-4}
TP03 – Test 3	4.2×10^{-4}

3 Comparison of Temporary Proposals with Consented Development

Table 3-1 summarises a comparison of the drainage features of the proposed temporary spectator stand with the consented development.

Table 3-1 – Comparison of Temporary Proposals with Consented Development

Feature	Consented Development	Temporary Stand Proposals
Seats	5,500 seats.	2,289 seats plus space for 20 additional wheelchairs.
Hospitality / exhibition space	500 person hospitality area / 600 person non-match day exhibition space.	None.
External works	Proposed hard landscaping to the front of the development with porous surfacing pitchside of the proposed Kop.	No permanent change to the existing site surfacing.
Foul water drainage	Discharge into the Welsh Water network, capacity restricted to 5000 (capacity of the historic stand) until phosphate permit / discussions are complete and approval for additional capacity is accepted.	All foul water to be collected and discharged off site with no positive connection into the Welsh Water network.
Surface water drainage	Discharge to ground via infiltration. Strategy is the same as the existing site status with no positive connection to any sewer network / water courses.	No change to the existing site drainage where water hits the site and naturally infiltrates to the ground.

In drainage terms;

- Surface water - The temporary proposal does not change from the existing current site strategy with water hitting the surface and infiltrating to ground through the surface finishes. When the consented scheme is progressed the SuDS strategy will be employed.
- Foul water – The temporary proposal does not discharge to the Welsh Water network with no connection to be made until the consented development is constructed. The capacity of the temporary stand is 2711 less than the historic Kop, therefore foul loads will be significantly less than the old Kop.

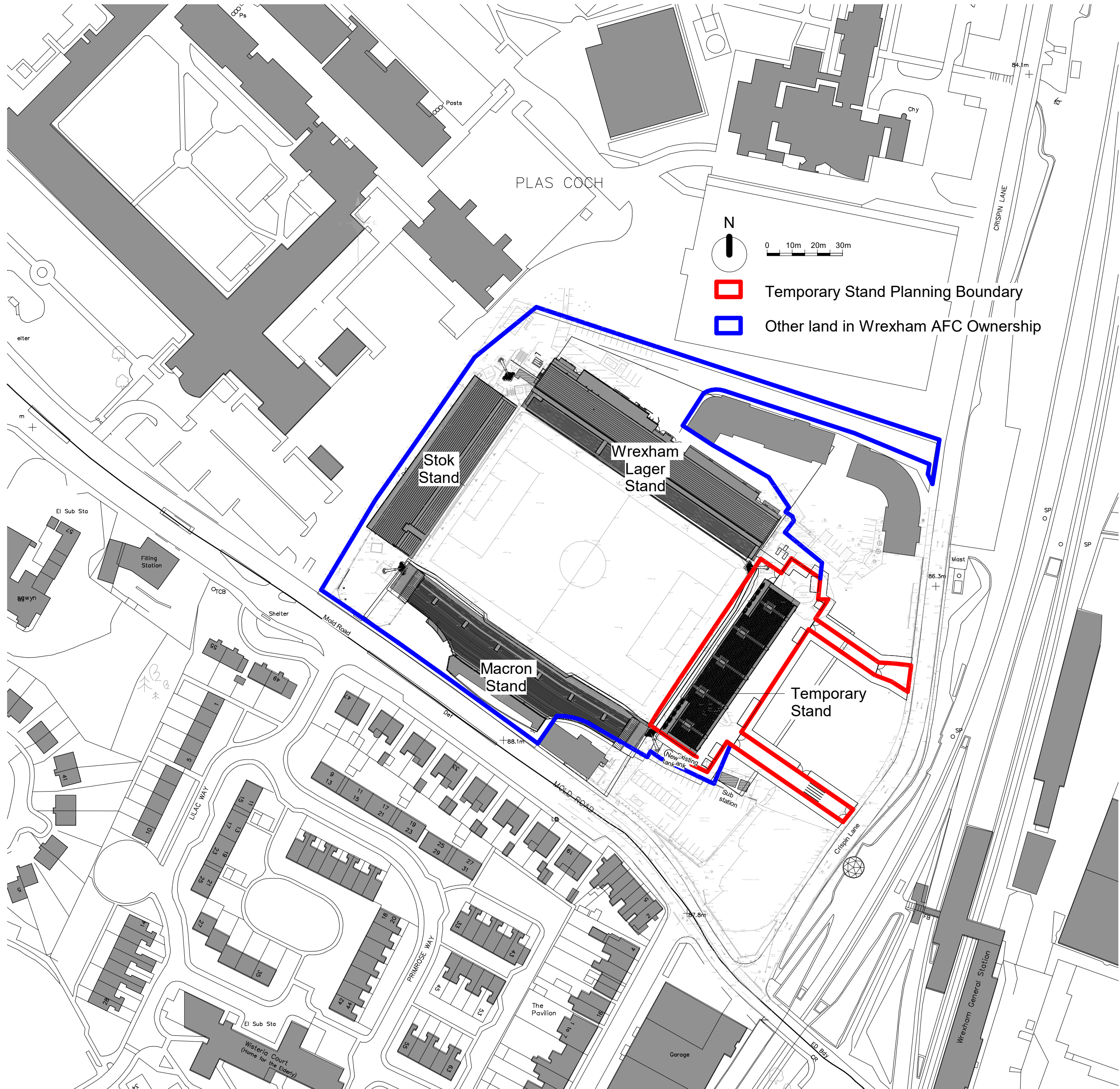
For more information on the drainage strategy for the consented scheme please refer to “*WRX-RAM-XX-XX-RP-CD-00001*”.

Appendix 1 – Proposed Temporary Stand

NOTES
All dimensions and levels to be checked on site
Any discrepancies are to be reported to the Architect before any work commences
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1 Temporary Seats Site Location Plan
1 : 1250

P1	05.12.23	WR	PLANNING ISSUE
rev no.	rev date	rev by	description
project			
Kop Development			
location			
Racecourse Ground			
Employer			

client



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key plan

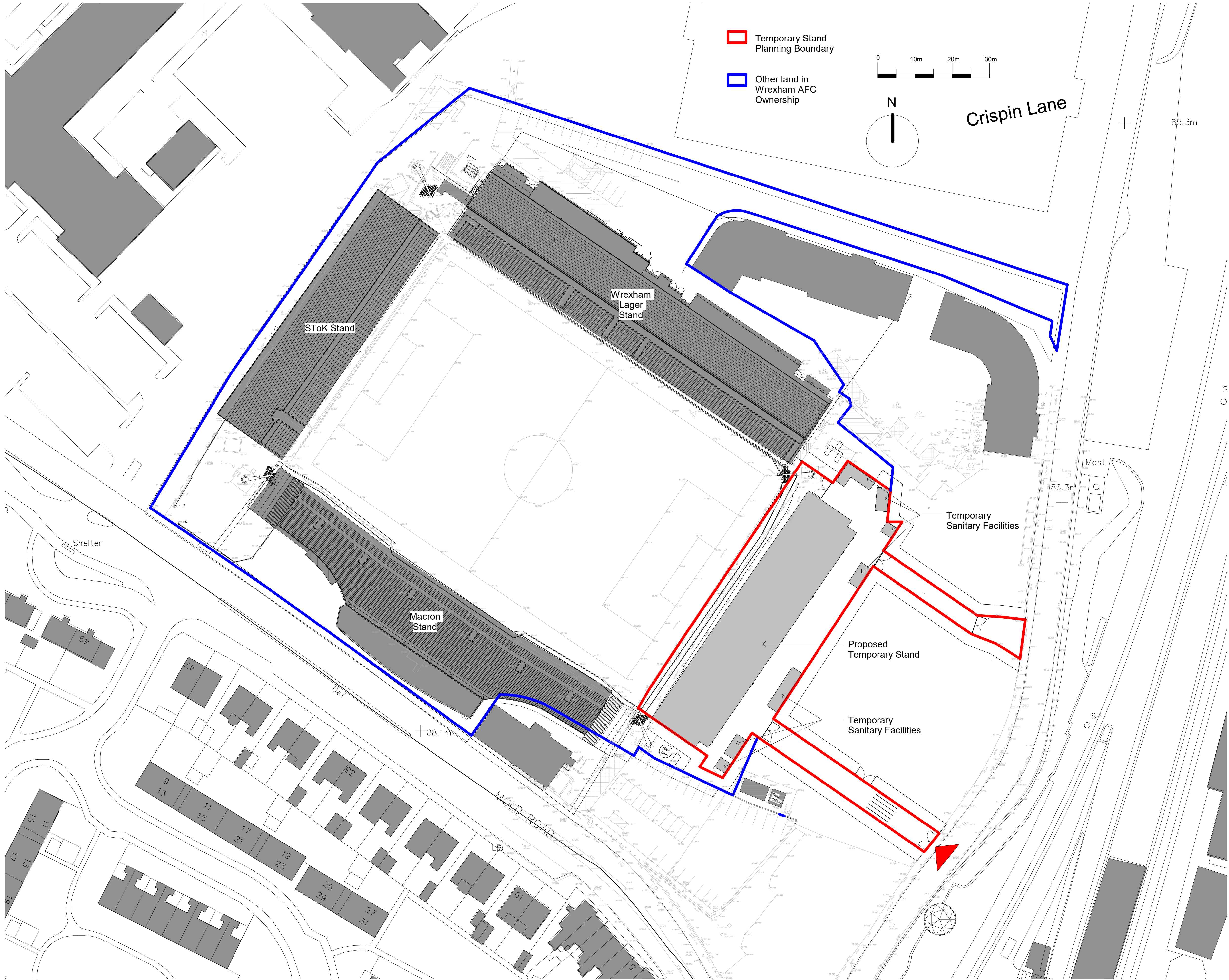
drawing title
Temporary Seats Site Location Plan

AFL job number	scale @ A1	drawn	WR	checked	JR
231547	1 : 1250	rev date	05.12.23		
dwg purpose	status	rev			
PLANNING	S2	P1			
bim project	origin	zone	level	type	role
231547-AFL-ZZ-DR-A-20000					

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P1	05.12.23	WR	PLANNING ISSUE
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project			
Kop Development			
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key plan



drawing title
Proposed Site Plan

AFL job number	scale @ A1	drawn	WR	checked	JR
231547	1 : 500	rev date	05.12.23		
dwg purpose		status		rev	
PLANNING		S2		P1	
bim project	origin	zone	level	type	role 5-digit no.
231547-AFL-Z4-00-DR-A-20001					

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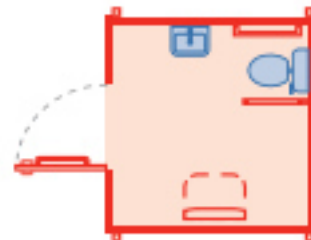
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Disabled Facilities

8' x 8' Anti-Vandal Disabled Toilet >

- One large cubicle with handrails
- 32A commando plug
- Electric water heater
- Ramps optional for wheelchair access



9'8" x 8'6" 1+1 Disabled Toilet and Shower >

- A combined toilet and shower facility with handrail supports
- 32A commando plug
- Electric water heater
- Ramps can be attached for wheelchair access

IMAGE OF PROPOSED ACCESSIBLE TOILET

20' x 10' 4 Bay Anti-Vandal Gents Toilet >

- Four cubicles
- Eight urinals
- Complete with storage cupboard, tap for cleaners & storage
- 32A commando plug
- Split water inlets for sinks & cisterns

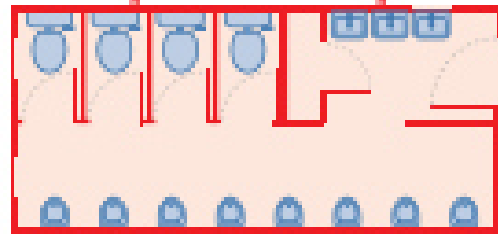


IMAGE OF PROPOSED MENS TOILETS

< 20' x 10' 7 Bay Anti-Vandal Ladies Toilet

- Seven cubicles
- Complete with storage cupboard, tap for cleaners & storage
- 32A commando plug
- Split water inlets for sinks & cisterns

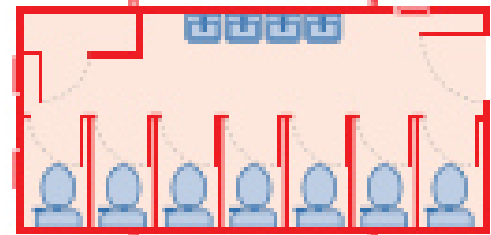


IMAGE OF PROPOSED LADIES TOILETS

P1 05.12.23 WR PLANNING ISSUE

rev no.	rev date	rev by	description
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project

Kop Development

location

Racecourse Ground

Employer

client



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key plan



drawing title

Temporary Stand - Proposed Toilets

AFL job number	scale @ A1	drawn	WR	checked	JR
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231547		rev date	05.12.23		
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dwg purpose	status	rev
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PLANNING	S2	P1
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bim project	origin	zone	level	type	role	5-digit no.
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231547-AFL-Z4-ZZ-D-A-20008						
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Appendix 2 – Infiltration Testing

Dear Wrexham AFC Limited,

Please find below the results of your Infiltration testing. The information contained below is a summary of the site works carried out on 13th July 2022.

Geology

An examination of the available British Geological Survey data of the area for the site has been examined and indicates that the site has superficial drift deposits composed of Glaciofluvial Sheet Deposits (sand and gravel), and bedrock deposits recorded as the Etruria Formation (mudstone).

Fieldworks

The programme of this investigation included the excavation of two trial pits. The locations of the soakaway tests were selected by the client. During this work, the soils encountered were logged in general accordance with BS5930: 1990, as amended in 2007.

Percolation Testing

During the soakaway tests the water achieved a fall from 75% to 25% of the effective depth of the storage volume. The results obtained from the soakaway tests are summarised below:

WS	Dimensions (m)	Depth (m)	Soil Description	Infiltration Rate (m/sec)	Drainage Characteristics
TP01 test1	1.95 x 0.70	2.50	Dark brown gravelly SAND.	7.3E-4	Good
TP01 test2	1.95 x 0.70	2.50	Dark brown gravelly SAND.	4.7E-4	Good
TP01 test3	1.95 x 0.70	2.50	Dark brown gravelly SAND.	4.0E-4	Good
TP02 test1	1.80 x 0.70	2.50	Dark brown gravelly SAND.	1.4E-3	Good
TP02 test2	1.80 x 0.70	2.50	Dark brown gravelly SAND.	5.2E-4	Good
TP02 test3	1.80 x 0.70	2.50	Dark brown gravelly SAND.	4.2E-4	Good

Conclusion

The soils encountered beneath the site were found to be predominantly SAND. The soakage rates obtained during the investigation were found to be good and permeable. Given the data from the test, it is considered that the use of soakaways is suitable for this site.

References

- Building Research Establishment (BRE) Digest 365, *Soakaway Design*, September 1991.
- British Standards Institution (1999) BS5930: *Code of practice for site investigations*, B.S.I., London.
- British Standards Institution (2007), Amendment No 1, BS5930: *Code of practice for site investigations*, B.S.I., London.

Please do contact me on 01243 787150 or 07758 162624 should you have any questions.

Regards

A handwritten signature in grey ink, appearing to read 'Nick Hammond'.

Nick Hammond
Geo-Environmental Engineer



Appendix A





Site Investigation Plan



Kop Stand - Wrexham
YEX4390
Jul-22

Appendix B



				Trial Pit Log			TrialPit No TP02 Sheet 1 of 1	
Project Name: Kop Stand, Wrexham AFC				Project No. YEX4390		Co-ords: - Level:		Date 13/07/2022
Location: Mold Road, Wrexham, LL11 2AH						Dimensions (m):		Scale 1:25
Client: Gardiner & Theobald						Depth 2.50		Logged LB
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.15			MADE GROUND. Grey fine to coarse angular COBBLES and GRAVEL of concrete	1 2 3 4 5
				0.60			MADE GROUND. Blackish brown gravelly SAND containing occasional concrete, brick, metal debris and plastic bottles	
				2.50			Dark brown very gravelly cobbly fine to medium SAND. Gravel is fine to coarse rounded to subangular of sandstone, mudstone and siltstone. Cobbles of sandstone.	
							End of Pit at 2.50m	
Remarks: No groundwater encountered. Excavation sides collapsing.								
Stability:								



Appendix C

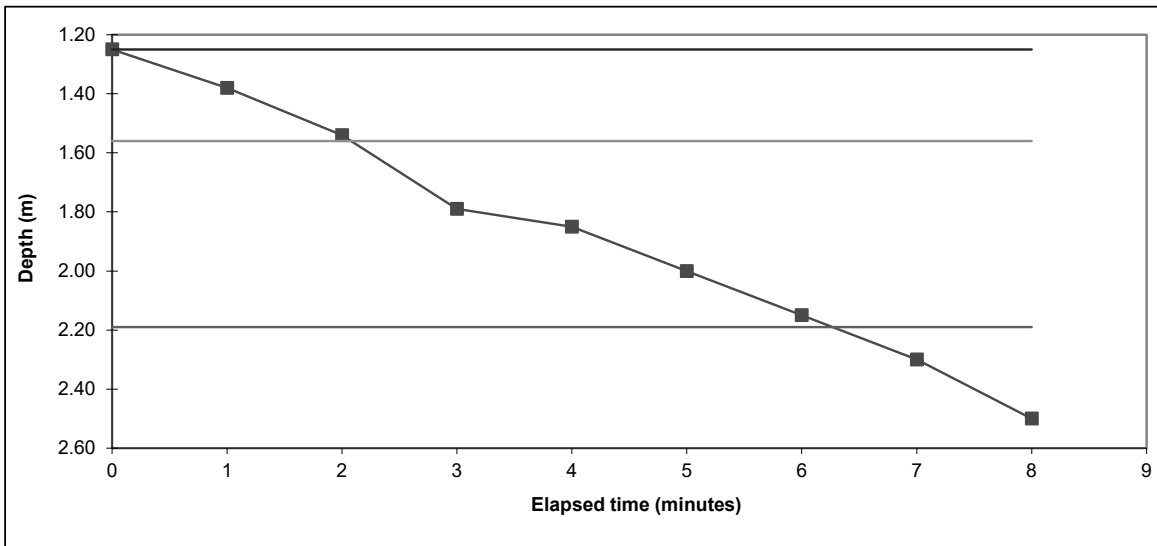


Your Environment

Soakaway Test

Trial Pit No:	TP01	Test No:	1	Date:	13/07/2022
Length (m):	1.950	Datum Height:		0.00 m agl	
Width (m):	0.70	Granular infill:	None		
Depth (m):	2.50	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.250		
1	1.380		
2	1.540		
3	1.790		
4	1.850		
5	2.000		
6	2.150		
7	2.300		
8	2.500		



Start water depth for analysis (mbgl)	1.25		
75% effective depth (mbgl):	1.56	Elapsed time (mins):	2.1
50% effective depth (mbgl):	1.88		
25% effective depth (mbgl):	2.19	Elapsed time (mins):	6.3
Base of soakage zone (mbgl):	2.50		
Volume outflow between 75% and 25% effective depth (m ³):		0.860	
Mean surface area of outflow (m ²):		4.65	
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):		4.2	

Soil infiltration rate (m/s):	7.3E-4
Remarks	Results processed following BRE 365 (2007). 800L of water used for the test

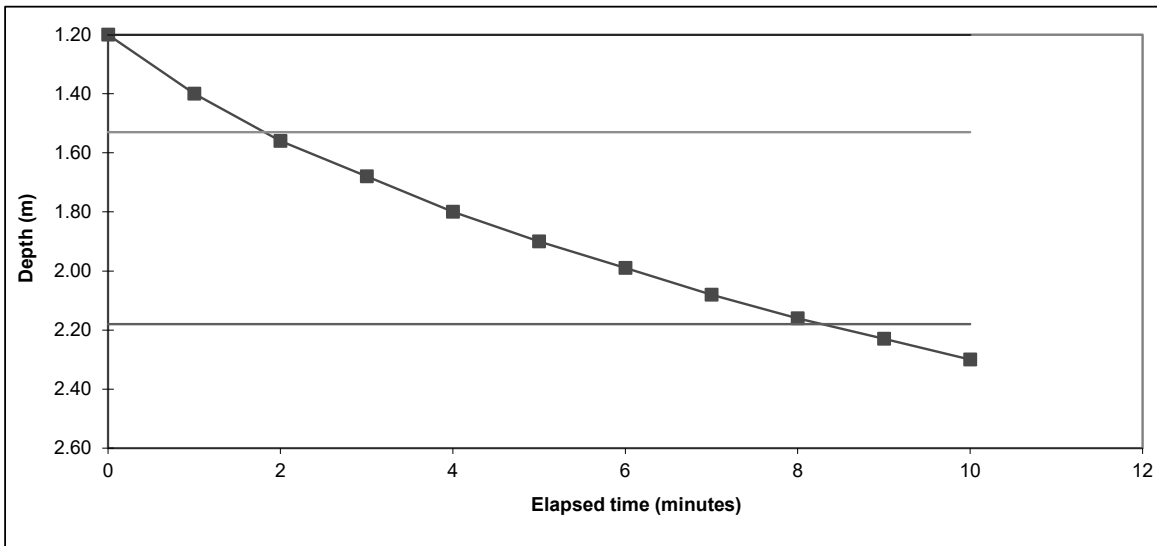
Client:	Wrexham AFC Limited	TP01
Site:	Kop Stand, Wrexham AFC	

Your Environment

Soakaway Test

Trial Pit No:	TP01	Test No:	2	Date:	13/07/2022
Length (m):	1.950	Datum Height:		0.00 m agl	
Width (m):	0.70	Granular infill:	None		
Depth (m):	2.50	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.200		
1	1.400		
2	1.560		
3	1.680		
4	1.800		
5	1.900		
6	1.990		
7	2.080		
8	2.160		
9	2.230		
10	2.300		



Start water depth for analysis (mbgl)	1.20		
75% effective depth (mbgl):	1.53	Elapsed time (mins):	1.8
50% effective depth (mbgl):	1.85		
25% effective depth (mbgl):	2.18	Elapsed time (mins):	8.3
Base of soakage zone (mbgl):	2.50		
Volume outflow between 75% and 25% effective depth (m ³):			0.887
Mean surface area of outflow (m ²):			4.81
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):			6.5

Soil infiltration rate (m/s):	4.7E-4
Remarks	Results processed following BRE 365 (2007). 800L of water used for the test

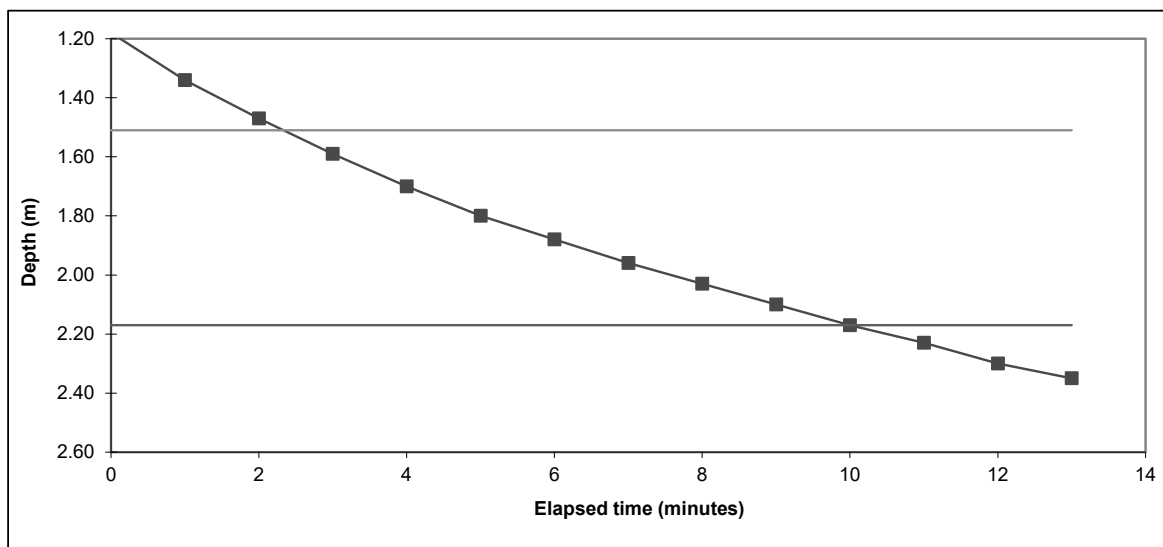
Client:	Wrexham AFC Limited	TP01
Site:	Kop Stand, Wrexham AFC	

Your Environment

Soakaway Test

Trial Pit No:	TP01	Test No:	3	Date:	13/07/2022
Length (m):	1.950	Datum Height:		0.00 m agl	
Width (m):	0.70	Granular infill:	None		
Depth (m):	2.50	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.180		
1	1.340		
2	1.470		
3	1.590		
4	1.700		
5	1.800		
6	1.880		
7	1.960		
8	2.030		
9	2.100		
10	2.170		
11	2.230		
12	2.300		
13	2.350		



Start water depth for analysis (mbgl)	1.18		
75% effective depth (mbgl):	1.51	Elapsed time (mins):	2.3
50% effective depth (mbgl):	1.84		
25% effective depth (mbgl):	2.17	Elapsed time (mins):	10.0
Base of soakage zone (mbgl):	2.50		
Volume outflow between 75% and 25% effective depth (m ³):		0.901	
Mean surface area of outflow (m ²):		4.86	
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):		7.7	

Soil infiltration rate (m/s):	4.0E-4
Remarks	Results processed following BRE 365 (2007). 800L of water used for the test

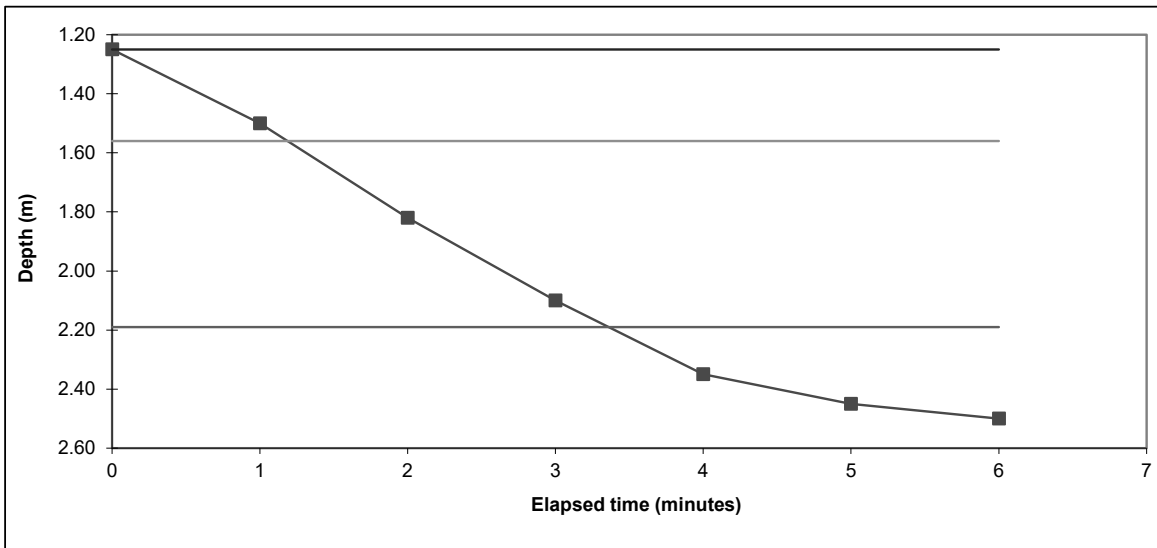
Client:	Wrexham AFC Limited	TP01
Site:	Kop Stand, Wrexham AFC	

Your Environment

Soakaway Test

Trial Pit No:	TP02	Test No:	1	Date:	13/07/2022
Length (m):	1.800	Datum Height:		0.00 m agl	
Width (m):	0.70	Granular infill:	None		
Depth (m):	2.50	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.250		
1	1.500		
2	1.820		
3	2.100		
4	2.350		
5	2.450		
6	2.500		



Start water depth for analysis (mbgl)	1.25		
75% effective depth (mbgl):	1.56	Elapsed time (mins):	1.2
50% effective depth (mbgl):	1.88		
25% effective depth (mbgl):	2.19	Elapsed time (mins):	3.4
Base of soakage zone (mbgl):	2.50		
Volume outflow between 75% and 25% effective depth (m ³):		0.794	
Mean surface area of outflow (m ²):		4.36	
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):		2.2	

Soil infiltration rate (m/s):	1.4E-3
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Remarks	Results processed following BRE 365 (2007). 800L of water used for the test
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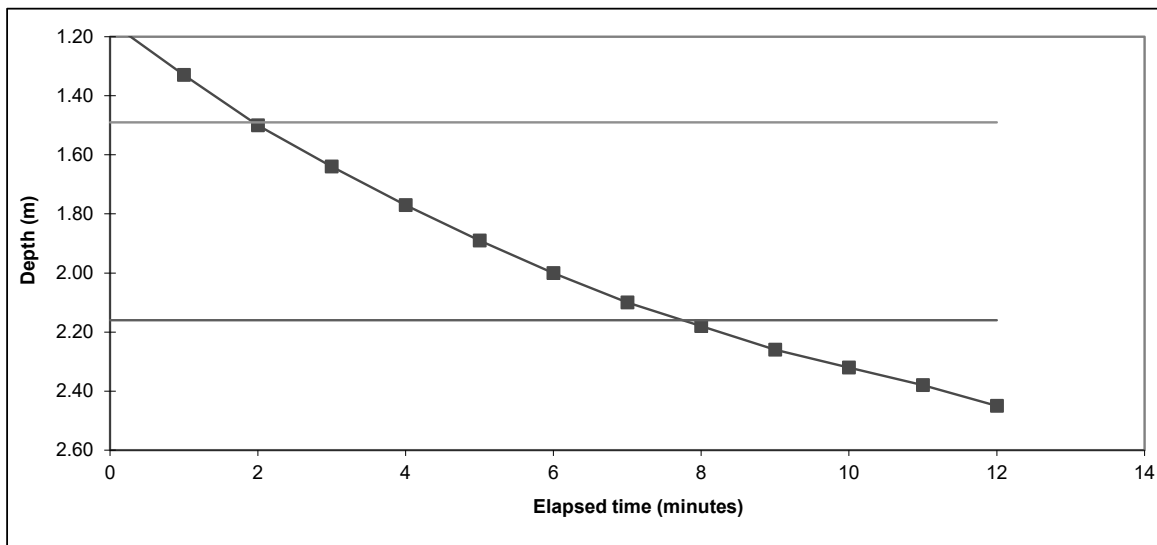
Client:	Wrexham AFC Limited	TP02
Site:	Kop Stand, Wrexham AFC	

Your Environment

Soakaway Test

Trial Pit No:	TP02	Test No:	2	Date:	13/07/2022
Length (m):	1.800	Datum Height:		0.00 m agl	
Width (m):	0.70	Granular infill:	None		
Depth (m):	2.50	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.150		
1	1.330		
2	1.500		
3	1.640		
4	1.770		
5	1.890		
6	2.000		
7	2.100		
8	2.180		
9	2.260		
10	2.320		
11	2.380		
12	2.450		



Start water depth for analysis (mbgl)	1.15		
75% effective depth (mbgl):	1.49	Elapsed time (mins):	1.9
50% effective depth (mbgl):	1.83		
25% effective depth (mbgl):	2.16	Elapsed time (mins):	7.8
Base of soakage zone (mbgl):	2.50		
Volume outflow between 75% and 25% effective depth (m ³):		0.844	
Mean surface area of outflow (m ²):		4.61	
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):		5.9	

Soil infiltration rate (m/s):	5.2E-4
Remarks	Results processed following BRE 365 (2007). 800L of water used for the test

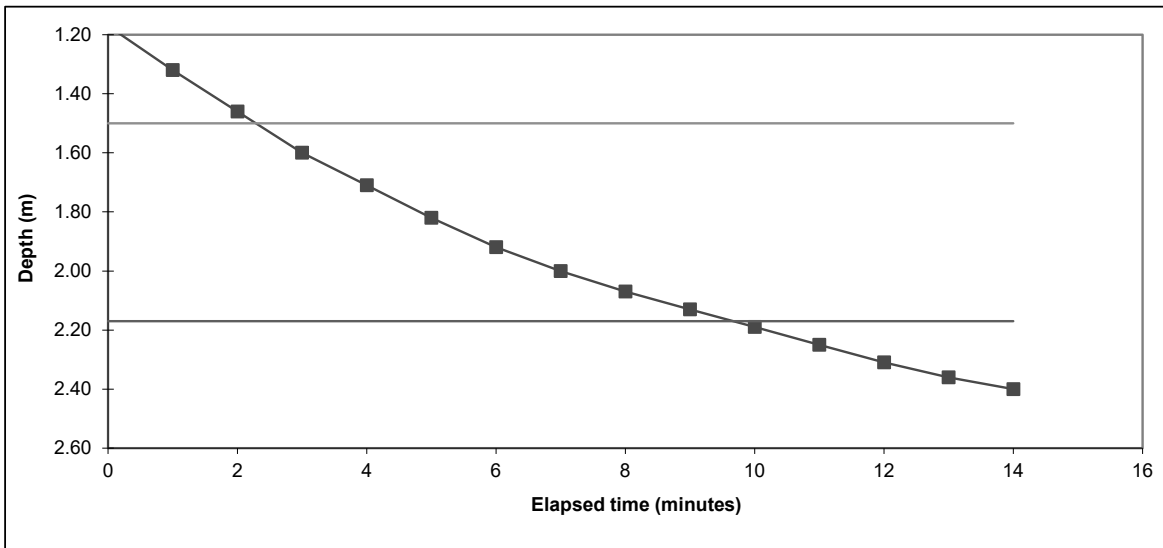
Client:	Wrexham AFC Limited	TP02
Site:	Kop Stand, Wrexham AFC	

Your Environment

Soakaway Test

Trial Pit No:	TP02	Test No:	3	Date:	13/07/2022
Length (m):	1.950	Datum Height:		0.00 m agl	
Width (m):	0.70	Granular infill:	None		
Depth (m):	2.50	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.170	14	2.400
1	1.320		
2	1.460		
3	1.600		
4	1.710		
5	1.820		
6	1.920		
7	2.000		
8	2.070		
9	2.130		
10	2.190		
11	2.250		
12	2.310		
13	2.360		



Start water depth for analysis (mbgl)	1.17		
75% effective depth (mbgl):	1.50	Elapsed time (mins):	2.3
50% effective depth (mbgl):	1.84		
25% effective depth (mbgl):	2.17	Elapsed time (mins):	9.7
Base of soakage zone (mbgl):	2.50		
Volume outflow between 75% and 25% effective depth (m ³):			0.915
Mean surface area of outflow (m ²):			4.86
(side area at 50% effective depth + base area)			
Time for outflow between 75% and 25% effective depth (mins):			7.4

Soil infiltration rate (m/s):	4.2E-4
Remarks	Results processed following BRE 365 (2007). 800L of water used for the test

Client:	Wrexham AFC Limited	TP02
Site:	Kop Stand, Wrexham AFC	

Appendix D





