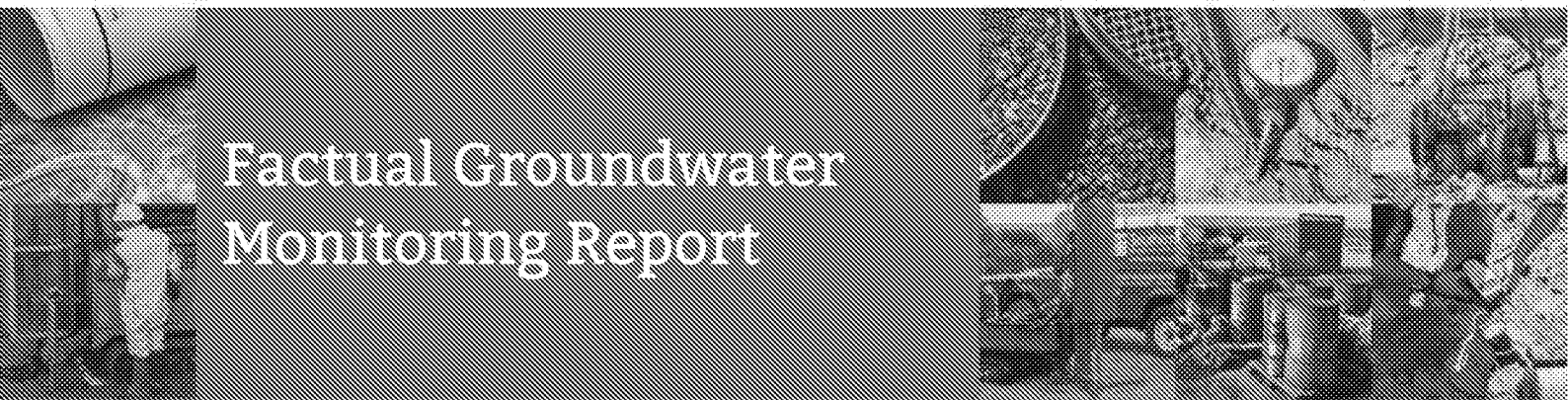




Factual Groundwater Monitoring Report

Project Name: Land off Dappers Lane

Location: Angmering, BN16 4EN

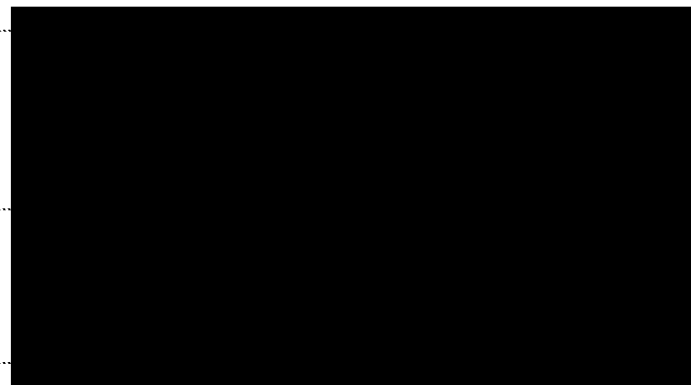
Client: Frontier Estates (Mering) Ltd.

Project ID: J14604

Report Date: 10 May 2021

Report Issue: 1

Author	J M Whibberley BSc MSc FGS
Check / Review	C Lennard BEng (Hons)



For and on behalf of Southern Testing Laboratories Limited

DOCUMENT HISTORY AND STATUS

Issue No.	Date	Purpose or Status	Author	Check / Review
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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in a Southern Testing Project Order form completed by Mr S Rous, representing Frontier Estates (Mering) Ltd, dated the 14th October 2020 and in relation to our quotation ref. Q201709-2, dated 13th October 2020.

2 Location

The site is located on the north eastern side of the junction of Water Lane and Dapper's Lane, to the east of the town of Angmering, West Sussex, as indicated on Figure 1 within Appendix A.

The approximate National Grid Reference of the site is TQ 07320 04675.

3 Background & Objectives

This is a factual groundwater monitoring investigation only.

The object of this investigation was to obtain information on the groundwater table during the winter months to aid the design of surface water drainage.

Two previous phases of investigation comprising infiltration testing have been conducted on this site by STL. These investigations are reported under separate covers (STL ref. J14440 – Soakage Investigation Report - May 2020 and STL ref. J14604 – Soakage Test Report - April 2021).

4 Scope

This report presents our exploratory hole logs and groundwater monitoring results only.

As with any site there may be differences in soil conditions between exploratory hole positions.

This report is not an engineering design and the figures and calculations contained in the report should be used by the Engineer, taking note that variations will apply, according to variations in design loading, in techniques used, and in site conditions. Our figures therefore should not supersede the Engineer's design.

The site investigation has been completed with reference to BS 5930 Ref [1] and BS 10175 Ref [2].

This is a factual groundwater monitoring investigation only. Contamination and geotechnical issues are not considered in this report.

Waste Classification of soils was not included within our brief for the investigation.

The findings and opinions conveyed via this investigation report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Ltd. believes are reliable. Nevertheless, Southern Testing Laboratories Ltd. cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

The investigation was conducted and this report has been prepared for the sole internal use and reliance of Frontier Estates (Mering) Ltd. and their appointed Engineers. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Southern Testing Laboratories Ltd. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

B GEOLOGY & SITE DESCRIPTION

No formal Phase 1 Desk Study was included within our brief for this investigation.

4.1 Geology

The British Geological Survey Map of the area (Sheet No. 317/332 – Chichester & Bognor) indicates that the site geology consists of superficial Head Deposits over the Lambeth Group, with the overlying London Clay Formation shown to outcrop to the north of the site, with the underlying Tarrant Chalk Member present to the south of the site.

4.1.1 Head

Head is a superficial deposit comprising a poorly sorted and poorly stratified material formed mostly by solifluction and/or hillwash and soil creep. This is a polymict deposit of gravel, sand and clay depending on the local upslope geology, from which it is derived.

4.1.2 London Clay

The London Clay mainly comprises blue-grey or grey-brown fissured clay and silty clay, which weathers to brown near the surface. It commonly contains thin courses of carbonate concretions ('cementstone nodules'), selenite crystals and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation.

Although slopes will stand in the clay at steep angles in the short term, the long-term stable slope angle is about 7° for grassed, or cleared slopes, and a few degrees more for wooded slopes.

This formation is known to contain pyrite.

4.1.3 Lambeth Group

The Lambeth Group comprises a vertically and laterally very variable sequence of multi-coloured and mottled clays and sands. The sands are greenish yellow or brown, and generally alternate with the multi-coloured mottled clays and sometimes bands of lignite. Pebble Beds, locally cemented into conglomerate, and some bands of concretionary ironstone may also be present. Shells are frequently found in the clays and are sometimes locally cemented into a limestone bed that may form an obstruction to pile borings. At the base of the formation there can be layer of greenish sands with flint pebbles where they rest directly above the Thanet Beds.

Clays within this group are known to contain pyrite.

4.1.4 Tarrant Chalk Member

The Tarrant Chalk Member comprises a fairly homogeneous white chalk with regular and conspicuous flint bands. These flints are commonly laterally very continuous and traceable over large distances. Some of the flints can be very large. A few marl seams are present within the lower parts of the formation.

4.2 General Site Description

The site, which is irregular in shape and extends to approximately 150m x 110m, currently comprises a series of areas of undeveloped land/ fields. The site boundaries on all four sides are defined by hedgerows/vegetation. The site is bounded to the west by Dapper's Lane, beyond which are residential properties. Water Lane is present to the south of the site, running approximately south west to north east. Similar fields/paddocks are present beyond the eastern site boundary. To the north of the site is a small industrial estate. The site is partially sub-divided by Herras fencing.

At the time of the investigation there were no structures present on site. Generally the site is split into three rough sections. The north western section of the site, where it is believed a residential house was previously present. The eastern section of the site, which comprises an open field and the southern section of the site, which comprises overgrown undeveloped land. The surrounding area is predominately residential, but includes some commercial/industrial structures.

On a regional scale, the topography of the local area generally slopes down gently towards the south. The overall topography of the site follows a similar trend to the regional topography. A number of landscaped bunds and

depressions are present across the site, especially within the north eastern section of the site. An old excavation is present adjacent to part of the western site boundary.

Drainage ditches were noted along the southern boundary with Water Lane and along part of the western boundary with Dapper's Lane. A stream and a fishing pond are present to south of the site, on the opposite side of Water Lane.

The majority of the site is covered in grass/vegetation, with the southern section of the site overgrown with brambles. At the time of the investigation, a number of semi-mature to mature trees were present both on site and within the surrounding area, including Conifers, Oaks and Sycamores.

5 Soakage Test Investigation

At the time of writing, two soakage investigations have been conducted by Southern Testing on this site which are reported under separate covers. The reader is referred to these previous reports for a full description of the testing conducted, soakage test trial pit logs and in-situ test results.

The first investigation (STL ref. J14440 – Soakage Investigation Report, dated May 2020), was conducted prior to this groundwater monitoring programme. This investigation reported variable rates of infiltration within relatively shallow trial pits.

The second investigation (STL ref. J14604 – Soakage Test Report, dated April 2021) was conducted close to the end of this groundwater monitoring programme and reported relatively high infiltration rates within typically granular soils encountered above the groundwater table.

C GROUND INVESTIGATION

6 Strategy and Method

The strategy adopted for the intrusive investigation comprised the following:

Activity / Method	Purpose	Depth Range (mbgl)	Installations / Notes
WLS101 – WLS106 Dynamic Windowless Sampling	Boreholes to install shallow groundwater monitoring wells.	4.0 – 6.0	Installation of 50mm groundwater monitoring wells and dataloggers within all boreholes to monitor groundwater levels. Installation of barologger in WLS102 to monitor atmospheric pressure and temperature.

The groundwater monitoring well locations were determined based on correspondence between the representative of the client (Fairhurst) and the local authority's planning officer, and are shown in Figure 2 in Appendix A.

In-situ tests, sampling and monitoring method descriptions employed are given in Appendix B.

7 Weather Conditions

The initial fieldwork to install the groundwater monitoring wells was carried out on the 21st October 2020, at which time the weather was generally overcast and cold, with the occasional rain shower.

During October 2020, rainfall recorded at the closest climate station to this site, Shoreham, located approximately 9 miles west, was approximately 197% of the long-term average for the period 1981 to 2010.

The groundwater monitoring period extended from mid-October 2020 until mid-April 2021. The volume of rainfall during this time was variable, with rainfall in the South East of England during November recorded as being below average (74%). However, above average rainfall was recorded for the months of December (146%), January (139%) and February (102%). Rainfall during March and April was recorded as 66% and 19% of the long term average respectively.

8 Soils as Found

The soils encountered are described in detail in the attached exploratory hole logs (Appendix A), but in general comprised a covering of Topsoil over Head/ Head Gravel over London Clay, over the Lambeth Group. The thickness of superficial deposits varied across the site. A summary is given below.

Depth (m)	Thickness (m)	Soil Type	Description
GL to 0.2/0.4	0.2 to 0.4	Topsoil	TOPSOIL comprising grass over dark brown slightly gravelly sandy CLAY with rootlets. Gravel comprises fine subangular flint and occasional brick.
0.2 to 0.4/ 0.9 (WLS103 & WLS106 only)	0.2 to 0.7	Clay (Head)	Firm mid brown slightly gravelly slightly sandy CLAY.
0.2/ 0.9 to 1.1/ 4.0+	0.7 to 3.7+	Clay (Head Gravel)	Mid to dark brown slightly sandy silty clayey GRAVEL with low flint cobble content. Gravel comprises fine to medium angular to subrounded flint.
1.1/ 3.9 to 3.0/ 6.0+	1.0 to 2.9+	Silty Clay (London Clay)	Stiff mid brown occasionally black ironstained silty CLAY.
3.0/ 4.5 to 6.0+ (WLS105 & WLS106 only)	0.5+ to 3.0+	Sandy Silty Clay (Lambeth Group)	Stiff to very stiff orange brown mottled red and grey very sandy silty CLAY.

9 Groundwater Observations

During the fieldwork (ie. at the time of the monitoring well installation), groundwater was observed in the exploratory holes as tabulated below. In addition, groundwater monitoring wells were installed in all boreholes (WLS101 to WLS106) and the results of the subsequent monitoring are included in Section 10 below.

Hole ID	Water Strike Depth (m)	Stratum
WLS101	3.10	Head Gravel
WLS102	No groundwater encountered	/
WLS103	No groundwater encountered	/
WLS104	No groundwater encountered	/
WLS105	1.71	London Clay
WLS106	1.88	London Clay

10 Groundwater Monitoring

Groundwater monitoring wells were installed within all boreholes drilled on the site (WLS101 to WLS106). Dataloggers were installed within the wells to record water levels at intervals of six hours throughout the monitoring period. A barologger was also installed within WLS102 to record the ambient atmospheric pressure and temperature at the same time intervals.

Groundwater monitoring data recorded between the installation (21/10/2020) and removal of the dataloggers (13/04/2021) has been tabulated and appended to this report in Appendix C.

Groundwater monitoring data was downloaded from the dataloggers during five approximately monthly interim visits and the final visit at the end of the monitoring programme.

Groundwater levels within each borehole at the time of datalogger installation, the interim data download visits, during soakage testing in adjacent pits (see Section 5) and upon removal of the dataloggers are tabulated below.

BH ID	Depth to Groundwater (mbgl)			
	Date			
	21/10/20 (During Silework)	18/11/2020	16/12/2020	18/01/2021
WLS101	3.1	1.95	2.36	2.60
WLS102	*	1.74	2.0	2.06
WLS103	*	1.33	1.65	1.90
WLS104	*	1.91	2.25	2.49
WLS105	1.71	0.81	1.10	1.14
WLS106	1.88	1.26	1.30	1.26

*No groundwater recorded within monitoring well.

BH ID	Depth to Groundwater (mbgl)			
	Date			
	15/02/2021	18/03/2021	29/03/2021 (During Soakage Investigation)	13/04/2021
WLS101	2.76	2.99	3.07	3.38
WLS102	2.42	2.62	2.79	2.90
WLS103	2.28	2.50	2.75	3.77
WLS104	2.69	3.19	3.37	3.58
WLS105	1.24	1.33	1.72	2.11
WLS106	1.36	1.66	1.74	1.98

REFERENCES

- [1] BSI Standards, "BS 5930 Code of practice for ground investigations," 2015.
- [2] BSI Standards, "BS10175 Investigation of potentially contaminated sites – Code of practice," 2013.
- [3] BSI Standards, "BS 3882:2015 Specification for Topsoil," 2015.
- [4] CIRIA, "C574 Engineering in Chalk," 2002.
- [5] R. N. Mortimore, Logging the Chalk, 2014.



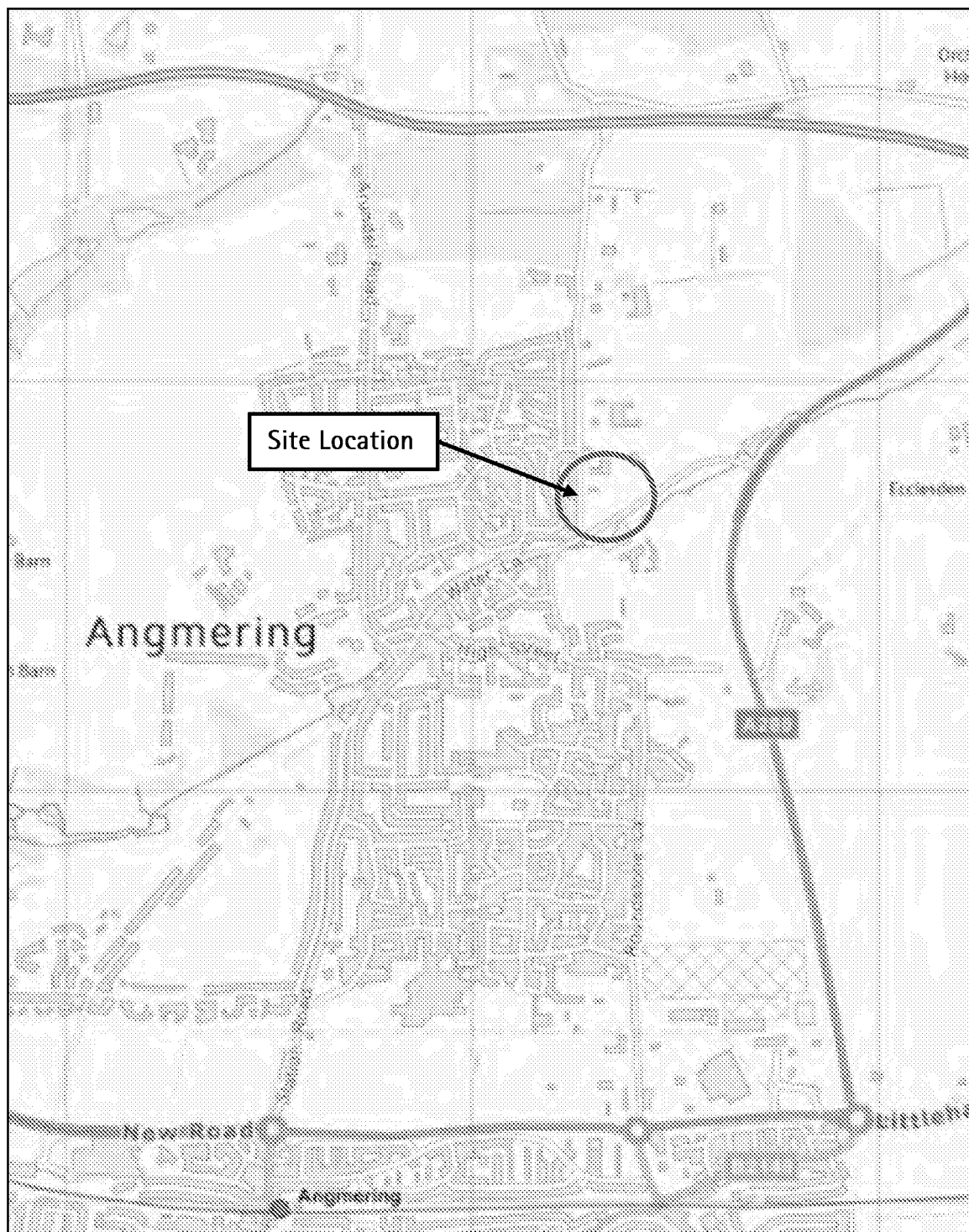
Southern Testing
Environmental & Geotechnical

ST Consult
Environmental & Geotechnical

APPENDIX A

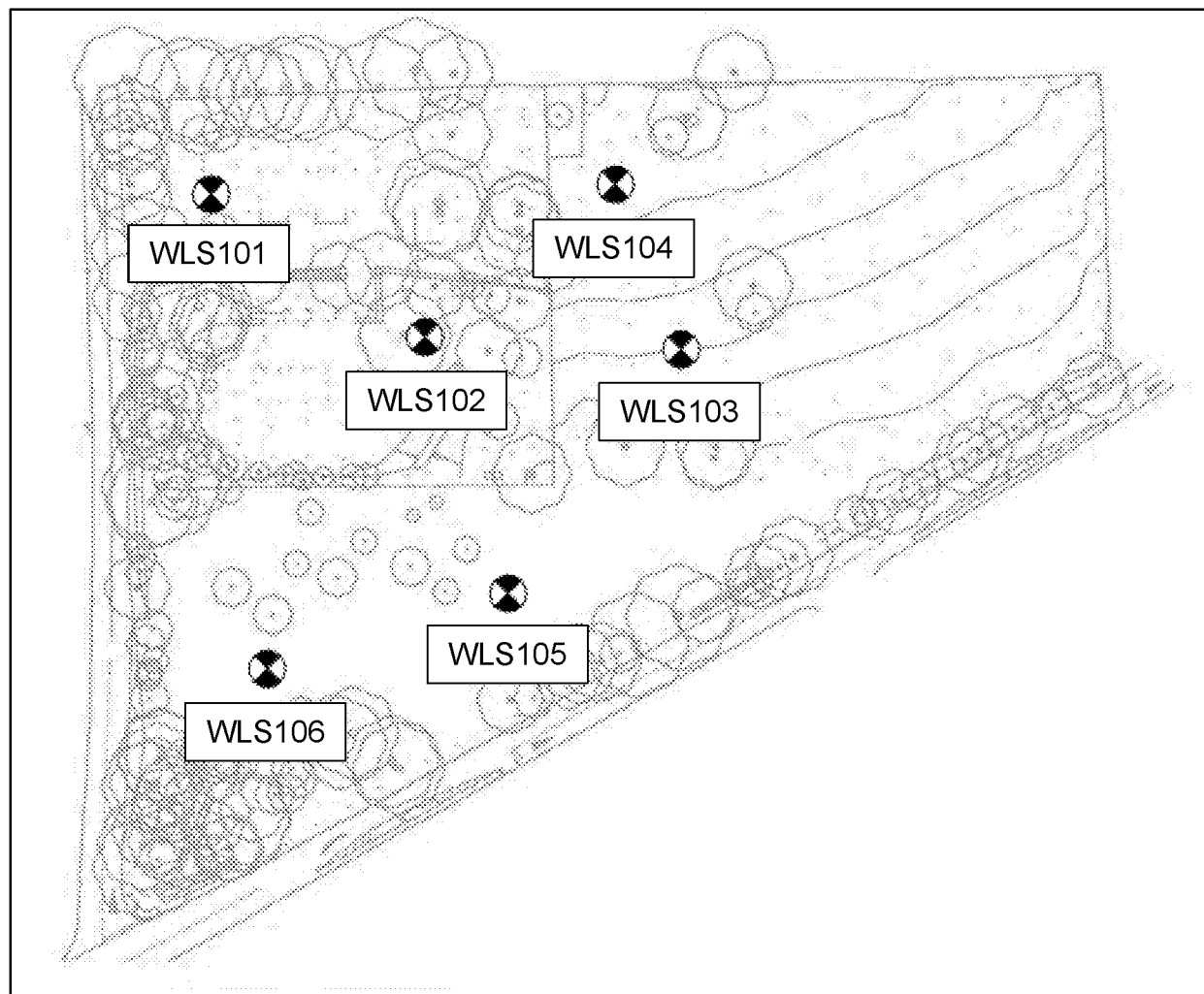
Site Plans and Exploratory Hole Logs





Contains Ordnance Survey Data © Crown Copyright and Database Right 2021

Site:	Land off Dappers Lane, Angmering, Worthing, BN16 4EN	Project ID	J14604
Figure 1	Site Location Plan	Date:	10/05/2021



NB: Positions of exploratory holes / test positions are only indicative unless dimensioned

Site:	Land off Dappers Lane, Angmering, Worthing, BN16 4EN	Project ID	J14604
Figure 2	Site Investigation Layout Plan	Date:	10/05/2021

Key to Exploratory Hole Logs, Plans and Sections

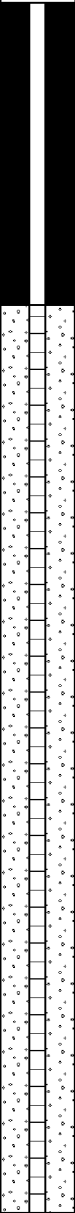
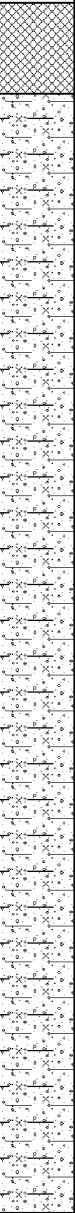
Backfill Symbols	Pipe Symbols	Principal Soil Types	Principal Rock Types	Drilling Records
Arisings	Plain Pipe	Topsoil	Mudstone	Water Strike
Concrete	Slotted Pipe	Made Ground	Claystone	Depth Water Rose
Blacktop	Piezometer	Clay	Siltstone	Total Core Recovery (%) [TCR]
Bentonite	Piezometer Tip	Silt	Sandstone	Solid Core Recovery (%) [SCR]
Gravel Filter	Filter Tip	Sand	Limestone	Rock Quality Index (%) [RQI]
Sand Filter	Extensometer	Gravel	Chalk	Fracture Index (fractures / m) [FI]
	Inclinometers	Peat		

All soil and rock descriptions are in general accordance with BS5930 2015, BS EN ISO 14688-1:2002+A1:2013 and BS EN ISO 14689-1:2003. Chalk descriptions are also based on CIRIA C574 and "Logging the Chalk – R.N. Mortimer 2015". The Geology Code is only provided where a positive identification of the sample strata has been made.

Location / Method Identifiers		In-situ Test Location / Method	
BH	Borehole (undefined)	DP	Dynamic Probe
CP	Cable Percussive	CPT	Cone Penetration Test
RC	Rotary Core	CBR	In-situ CBR Test
RO	Rotary Open Hole	DCP	CBR using Dynamic Cone Penetrometer
ODC	Rotary Odex/Symmetrix drilling cased	CBRT	CBR using TRL Probe
CP+RC	Cable Percussive to Rotary Core	PB	Plate Bearing Test
SNC	Sonic	SPT (S)	Standard Penetration Test (Split Barrel Sampler)
CFA	Continuous Flight Auger	SPT (C)	Standard Penetration Test (Solid Cone)
FA	Flight Auger	N	SPT Result
VC	Vibro Core	-/-	Blows/Penetration (mm) after seating drive
WLS+RC	Windowless (Dynamic) Sampler to Rotary Core	-*/-	Total Blows / Penetration (mm)
WLS	Windowless Sampler	()	Extrapolated Value
WS	Window Sampler	PPT	Perth Penetration (In-House Method - Equivalent N Value)
HA	Hand Auger	HP / UCS	Strength from Hand Penetrometer (kN/m ²)
C	Road / Pavement Core	IVN	Strength from Hand Vane ((kN/m ²) P = peak, R = residual
IP	Inspection Pit (Hand Excavation)	PID	Photo Ionisation Detector (ppm)
TP	Trial Pit (Machine Excavated)	MEXE	Mexi-Cone CBR (%)
OP	Observation Pit (Supported Excavation Hand or Machine)		

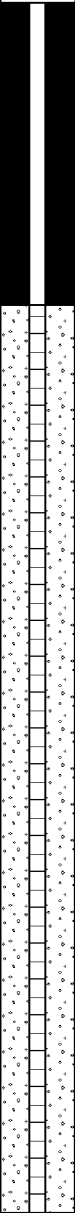
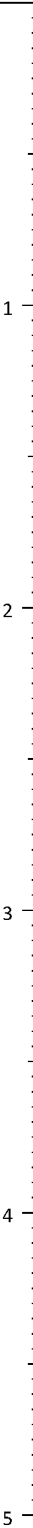
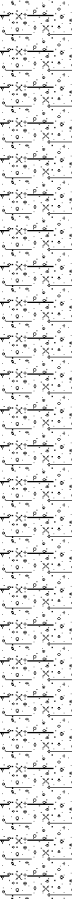
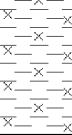
Samples / Test Type		Samples / Test Type	
B	Bulk Sample	SPTLS	Standard Penetration Test Split Barrel Sample
BLK	Block Sample	TW	Thin Wall Push In Sample (e.g. Shelby Sampler)
C	Core Sample	U	Undisturbed Open Drive Sample (blows to take)
CBRS	CBR Mould Sample	UT	Thin Wall Undisturbed Open Drive Sample (blows to take)
D	Small Disturbed Sample	W	Water Sample (Geotechnical)
ES	Environmental Sample (Soil)	SP	Sample from Stockpile
EW	Environmental Sample (Water)	P	Piston Sample
GS	Environmental Sample (Gas)	AMAL	Amalgamated Sample

 Southern Testing ST Consult				Start - End Date 21/10/2020		Project ID: J14604		Hole Type: WLS		WLS101 Sheet 1 of 1	
Project Name: Land off Dappers' Lane				Remarks:		Co-ordinates:		Level:		Logger: JMW	
Location: Angmering, BN16 4EN				Groundwater encountered at 3.1m bgl. Monitoring well installed to 4.0mbgl within borehole.							
Client: Frontier Estates (Mering) Ltd.											

Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
		Depth (m bgl)	Type	Results						
		1.50	B		(3.70)		0.30	Made Ground comprising firm mid brown gravelly CLAY, with fine gravel sized brick. Gravel comprises fine to medium angular flint. Mid to dark brown slightly sandy silty clayey GRAVEL with low flint cobble content. Gravel comprises fine to coarse subrounded to angular flint. HEAD GRAVEL	1	
		3.00	B				4.00	End of Borehole at 4.00m	4	
									5	

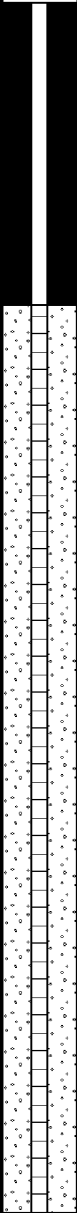
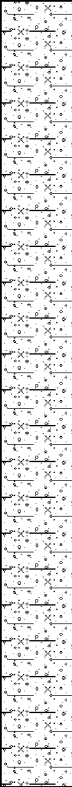
Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
4.00	102			21-10-2020	3.10				0				

 Southern Testing ST Consult				Start - End Date 21/10/2020		Project ID: J14604		Hole Type: WLS		WLS102 Sheet 1 of 1	
Project Name: Land off Dappers' Lane				Remarks:		Co-ordinates:		Level:		Logger: JMW	
Location: Angmering, BN16 4EN				Borehole dry upon completion. Monitoring well installed to 4.0mbgl within borehole.							
Client: Frontier Estates (Mering) Ltd.											

Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description		
		Depth (m bgl)	Type	Results							
						(0.20)		0.20	Mid brown slightly gravelly CLAY with rootlets. Gravel comprises fine angular flint.		
						(3.00)			Mid to dark brown slightly sandy silty clayey GRAVEL with low flint cobble content. Gravel comprises fine to coarse subrounded to angular flint. HEAD GRAVEL		
		3.30	HP	UCS(kPa)=250			3.20				Stiff mid brown veined orange brown slightly silty CLAY. LONDON CLAY
		3.70	HP	UCS(kPa)=200		(0.80)	4.00				End of Borehole at 4.00m

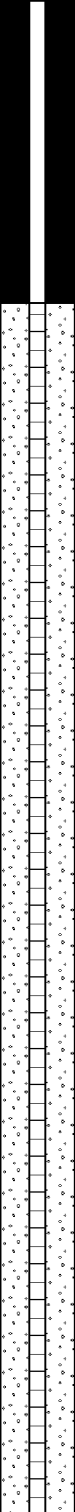
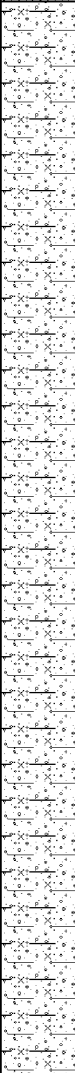
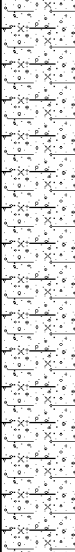
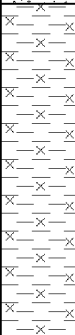
Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
4.00	102								0				

				Start - End Date		Project ID:		Hole Type:		WLS103			
				21/10/2020		J14604		WLS		Sheet 1 of 1			
Project Name:		Land off Dappers' Lane			Remarks:		Co-ordinates:			Level:		Logger:	
Location:		Angmering, BN16 4EN			Borehole dry upon completion. Monitoring well installed to 4.0mbgl within borehole.								
Client:		Frontier Estates (Mering) Ltd.											

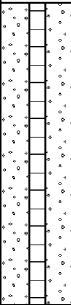
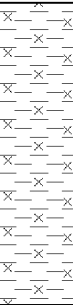
Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
		Depth (m bgl)	Type	Results						
										
						(0.20)		0.20	Made Ground comprising dark brown/dark grey sandy silty CLAY with fine subangular red brick gravel.	
						(0.20)		0.40	Firm mid to dark brown gravelly slightly sandy CLAY. HEAD	
						(2.60)			Mid to dark brown slightly sandy silty clayey GRAVEL with low flint cobble content. Gravel comprises fine to coarse subrounded to angular flint. HEAD GRAVEL	1
		2.50	B							
		3.20	HP	UCS(kPa)=320			3.00	Stiff to very stiff mid brown, occasional veined orange brown silty CLAY. LONDON CLAY	3	
		3.50	D							
		3.60	HP	UCS(kPa)=260		(1.00)				
							4.00	End of Borehole at 4.00m	4	
									5	

Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
4.00	102												

 Southern Testing ST Consult				Start - End Date 21/10/2020		Project ID: J14604		Hole Type: WLS		WLS104 Sheet 1 of 2	
Project Name: Land off Dappers Lane				Remarks:		Co-ordinates:		Level:		Logger: JMW	
Location: Angmering, BN16 4EN				Borehole dry upon completion. Monitoring well installed to 6.0mbgl within borehole.							
Client: Frontier Estates (Mering) Ltd.											

Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
		Depth (m bgl)	Type	Results						
					(0.35)		0.35	Dark brown slightly gravelly slightly sandy silty CLAY with rootlets. Gravel comprises fine to medium flint, occasional fine red brick.		
								Mid to dark brown slightly sandy silty very clayey GRAVEL with low flint cobble content. Gravel comprises fine to coarse subrounded to angular flint. HEAD GRAVEL		
		2.00	B		(3.55)					
		4.20	HP	UCS(kPa)=280			3.90	Stiff mid brown occasionally black speckled ironstained silty CLAY. LONDON CLAY		
		4.40	HP	UCS(kPa)=300						
		4.50	D		(2.10)					
		5.00	HP	UCS(kPa)=320				4.8m to 4.9m; lens of clayey GRAVEL. Gravel comprises fine angular flint.		

Hole Details		Casing Details		Waterstrike (m bgl)					Standing/Chiselling (m bgl)				
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
6.00	102												

 Southern Testing ST Consult					Start - End Date		Project ID:		Hole Type:		WLS104		
					21/10/2020		J14604		WLS		Sheet 2 of 2		
Project Name: Land off Dappers' Lane					Remarks:		Co-ordinates:		Level:		Logger: JMW		
Location: Angmering, BN16 4EN					Borehole dry upon completion. Monitoring well installed to 6.0mbgl within borehole.								
Client: Frontier Estates (Mering) Ltd.													
Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description				
		Depth (m bgl)	Type	Results									
		5.50	HP	UCS(kPa)=250				6.00	Stiff mid brown occasionally black speckled ironstained silty CLAY. LONDON CLAY <i>From 5.1m; becoming beige brown mottled grey.</i>				
									End of Borehole at 6.00m				
6 7 8 9 10													
Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
6.00	102												

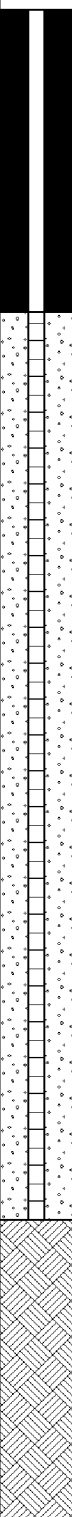
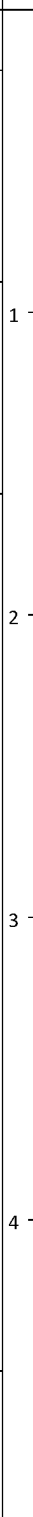
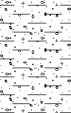
ARUN DISTRICT COUNCIL A/210/21/DOC

 Southern Testing ST Consult				Start - End Date 21/10/2020		Project ID: J14604		Hole Type: WLS		WLS105 Sheet 2 of 2	
Project Name: Land off Dappers' Lane				Remarks:		Co-ordinates:		Level:		Logger: JMW	
Location: Angmering, BN16 4EN				Groundwater encountered at 1.71m bgl. Monitoring well installed to 5.0mbgl within borehole.							
Client: Frontier Estates (Mering) Ltd.											

Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
		Depth (m bgl)	Type	Results						
									Orange brown mottled red and grey very sandy silty CLAY. LAMBETH GROUP	
							6.00		End of Borehole at 6.00m	6
										7
										8
										9
										10

Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
5.00	102			21-10-2020	1.71				0				

				Start - End Date 21/10/2020		Project ID: J14604		Hole Type: WLS		WLS106 Sheet 1 of 1	
Project Name: Land off Dappers' Lane				Remarks:		Co-ordinates:		Level:		Logger: JMW	
Location: Angmering, BN16 4EN				Groundwater encountered at 1.88m bgl. Borehole infilled to 4.0m upon completion. Monitoring well installed to 4.0mbgl within borehole.							
Client: Frontier Estates (Mering) Ltd.											

Well	Water Strikes	Samples and Insitu Testing			Level (m AOD)	Thickness (m)	Legend	Depth (m bgl)	Stratum Description	
		Depth (m bgl)	Type	Results						
						(0.20)		0.20	Dark brown sandy CLAY, with rootlets.	
						(0.70)			Mid brown slightly gravelly sandy CLAY. Gravel comprises fine subangular flint. HEAD	
						(0.70)		0.90	Mid to dark brown slightly sandy silty clayey GRAVEL with low flint cobble content. Gravel comprises fine to coarse subrounded to angular flint. HEAD GRAVEL	
		1.70	HP	UCS(kPa)=300		1.60			Stiff to very stiff mid brown slightly sandy silty CLAY. LONDON CLAY	
		2.00	D HP	UCS(kPa)=250						
		2.90	HP	UCS(kPa)=200		(2.90)			At 2.5m; band of fine angular flint. From 2.8m; becoming orange brown mottled grey, sandy. 3.2m to 3.5m mid brown slightly clayey SAND.	3
		4.60	D HP	UCS(kPa)=550		(0.50)		4.50	Very stiff brownish grey very sandy silty CLAY (Possible Lambeth Group). LAMBETH GROUP	4
								5.00	End of Borehole at 5.00m	5

Hole Details		Casing Details		Waterstrike (m bgl)						Standing/Chiselling (m bgl)			
Depth (m bgl)	Dia. (mm)	Depth (m bgl)	Dia. (mm)	Date	Depth Strike	Depth Casing	Depth Sealed	Rose to:	Time (mins)	From	To	Time	Remarks
5.00	102			21-10-2020	1.88				0				



APPENDIX B

Field Sampling and In-Situ Test Methods and Results

B

Soil and Rock Descriptions

All soil and rock descriptions are in general accordance with BS5930 Ref [1].

Anthropogenic soils ('made ground' or 'fill') describe materials which have been placed by man and can be divided into those composed of reworked natural soils and those composed of or containing man-made materials. 'Fill' is used to describe material placed in a controlled manner and 'made ground' is used to describe materials placed without strict engineering control.

The classification of materials such as topsoil is based on visual description only and should not be interpreted to mean that the material complies with criteria used in BS 3882 Ref [3].

Chalk descriptions are based on CIRIA C574 Ref [4] and Mortimore Ref [5].

The geology code is only provided on logs where a positive identification of the sample strata has been made.

Inspection Pit

Inspection pits are hand excavated from the surface (maximum depth 1.2 – 1.5m) using appropriate tools to locate and avoid existing buried services at exploratory hole positions. They are also regularly used as part of investigations on existing structures to expose and determine foundation detail.

Dynamic Sampling - Window or Windowless

Window sampling is carried out by driving hollow steel tubes incorporating a longitudinal access slot (window) and a cutting shoe into the ground using a percussive 'breaker'. This enables recovery of a continuous soil sample for examination and sub-sampling.

Windowless samplers are designed for taking disturbed, continuous soil samples to depths up to 10 metres (depending on ground conditions). The samplers comprise steel tubes of about 50-100mm diameter with a rigid plastic liner (no window) and are driven into the ground with a sliding hammer mounted on a tracked purpose-designed soil sampling rig. After driving and extracting the sampler from the ground, the plastic liner is extracted together with the enclosed soil sample. The sample can then either be extracted, split and sub-sampled or plastic end caps may be fitted, the tube labelled and transported for future examination and sub-sampling.

Soil samples are disturbed by the driving process with both techniques and can be regarded as being between Class 5 up to Class 3 samples at best (in favourable ground).

The major advantage of using windowless samplers is that the plastic liner greatly reduces the possibility of cross-contamination between successive samples.

An equivalent in-situ test to the Standard Penetration Test can be carried out with the windowless sampler rig.

Monitoring Well

A groundwater and/or ground gas monitoring well consists of a perforated pipe, which is installed in the ground. The standpipe is typically 50mm nominal in diameter and is installed in a lined borehole. It is perforated from the base with a sand/gravel surround through the soil horizon of interest to an appropriate depth below ground level. Above this there is a bentonite seal with solid pipework and is provided with an end cap or a gas valve at the top as appropriate.

Gas monitoring is carried out via the gas tap. Water sampling/purging can be undertaken by removing the gas tap and bung.

The well is usually completed at the surface with a flush cast iron cover or raised lockable cover.

Groundwater Monitoring – Dip Meter

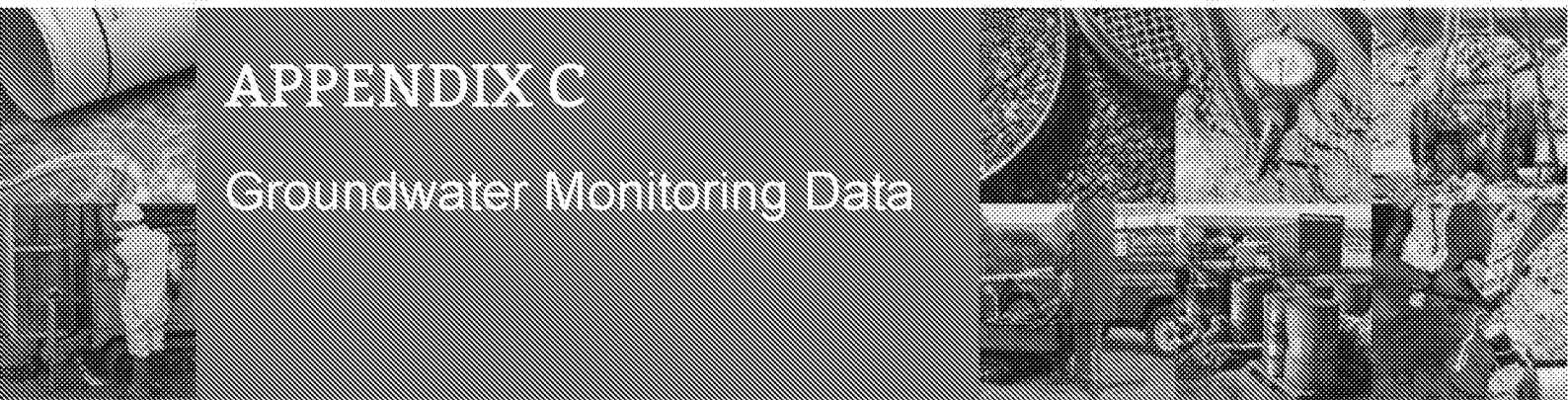
The dip meter is used to measure standing water levels within boreholes. The probe is lowered into the borehole until the meter detects the groundwater with an audible 'beep'. The level is then read from the tape.

Groundwater Monitoring – Digital Level Loggers

Digital loggers placed within borehole standpipes measuring water pressure, barometric pressure and temperature were used to record data over the monitoring period. The data was processed, using proprietary software, to determine temperature and barometric pressure compensated water levels.

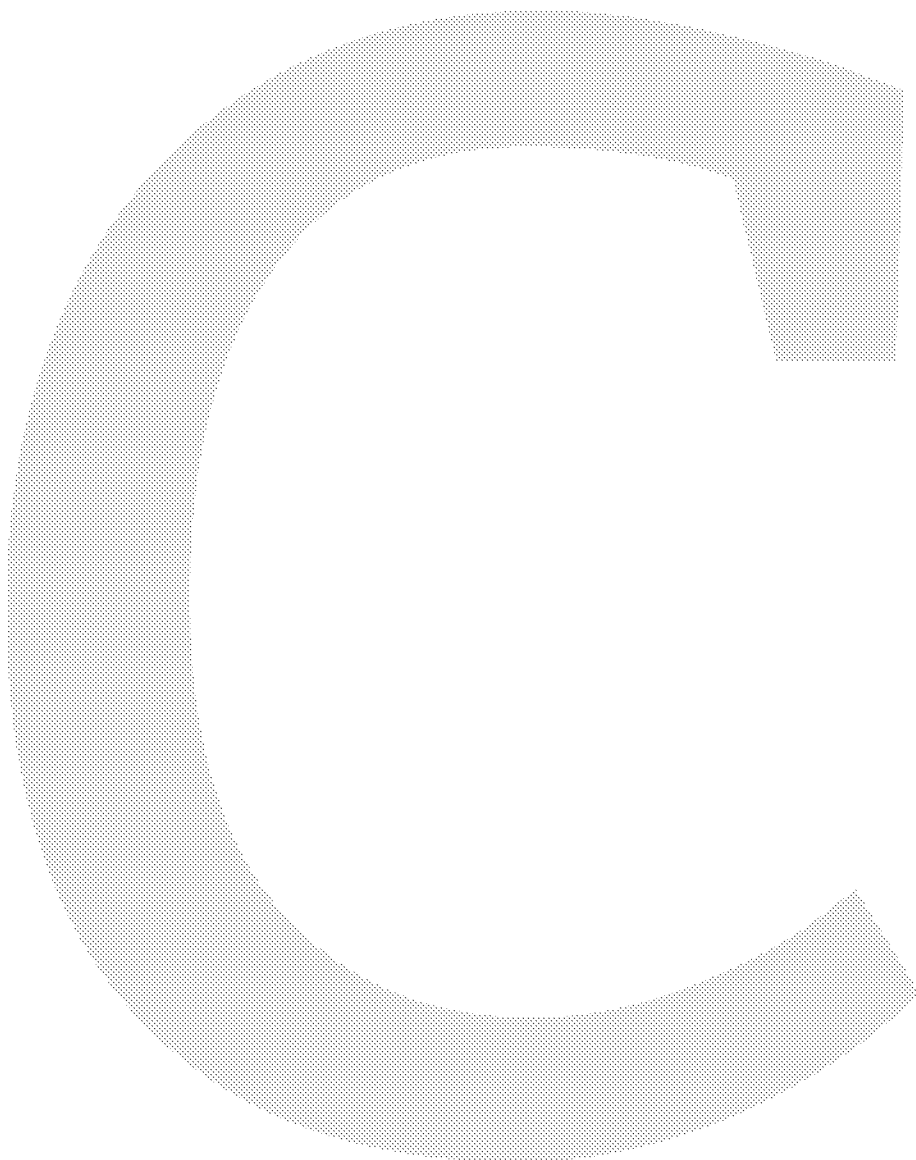


The equipment can record parameters at pre-determined time intervals and has a capacity of many thousands of readings and is therefore suitable for monitoring over extended periods of time.

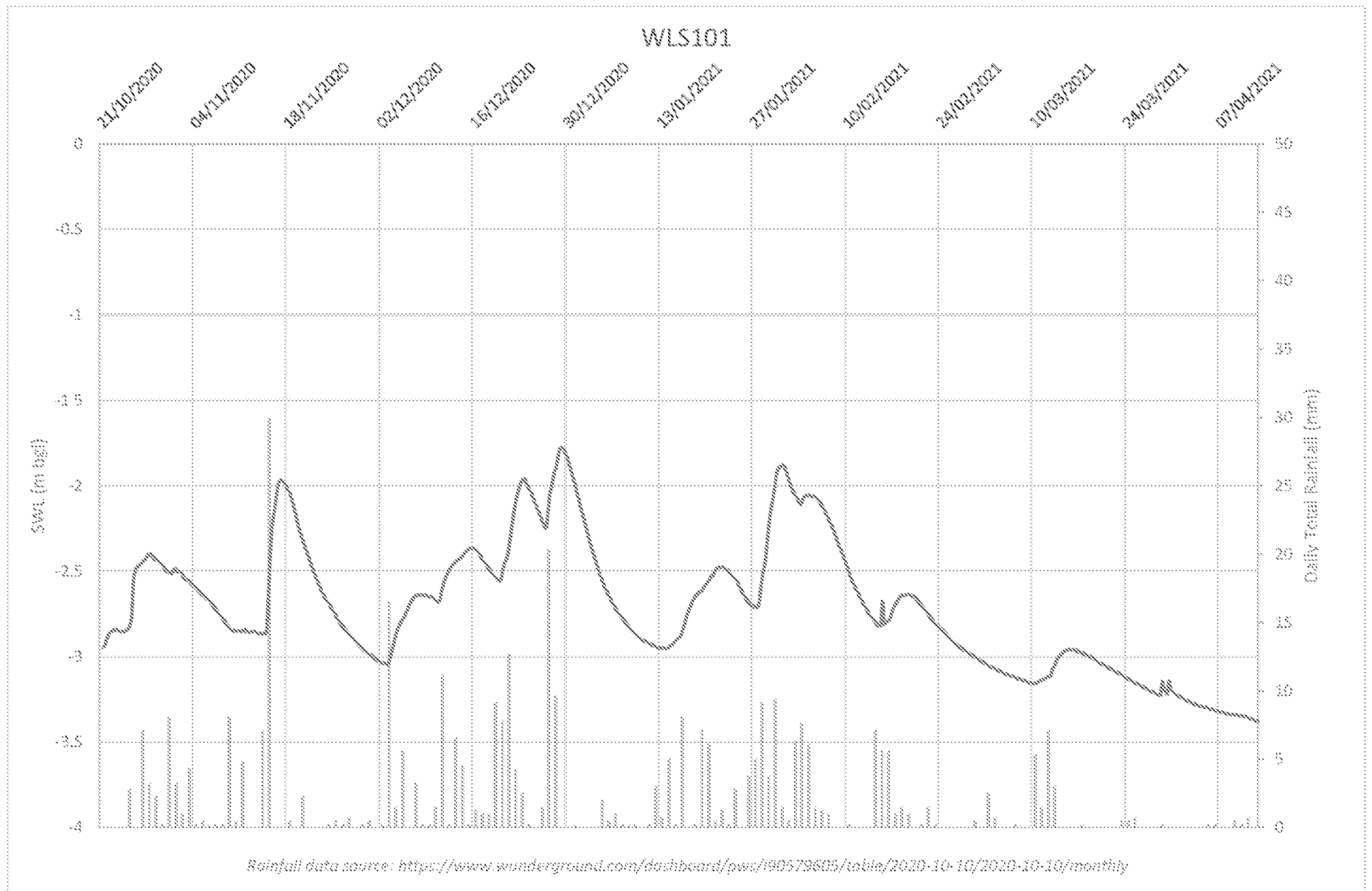


APPENDIX C

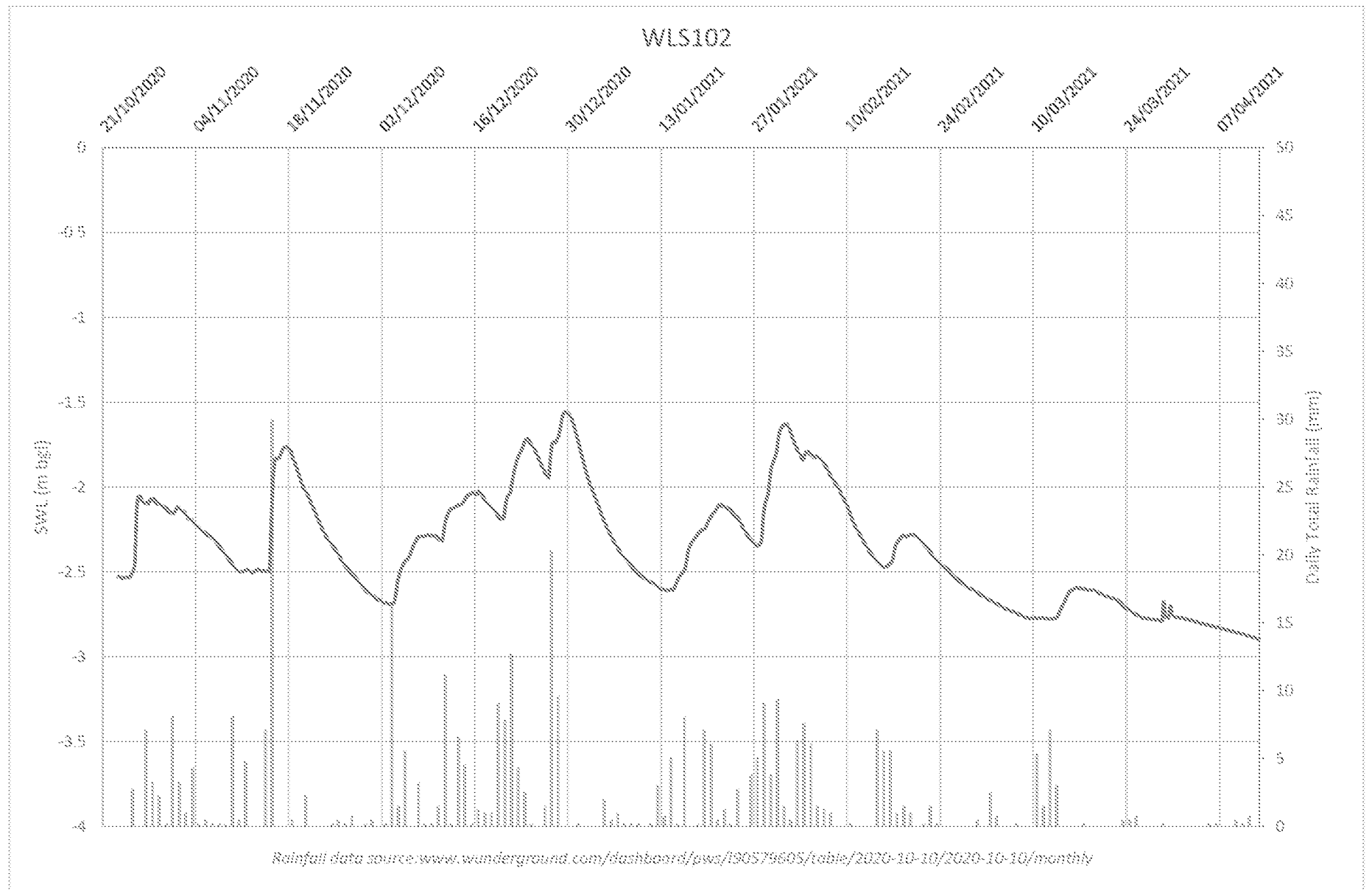
Groundwater Monitoring Data



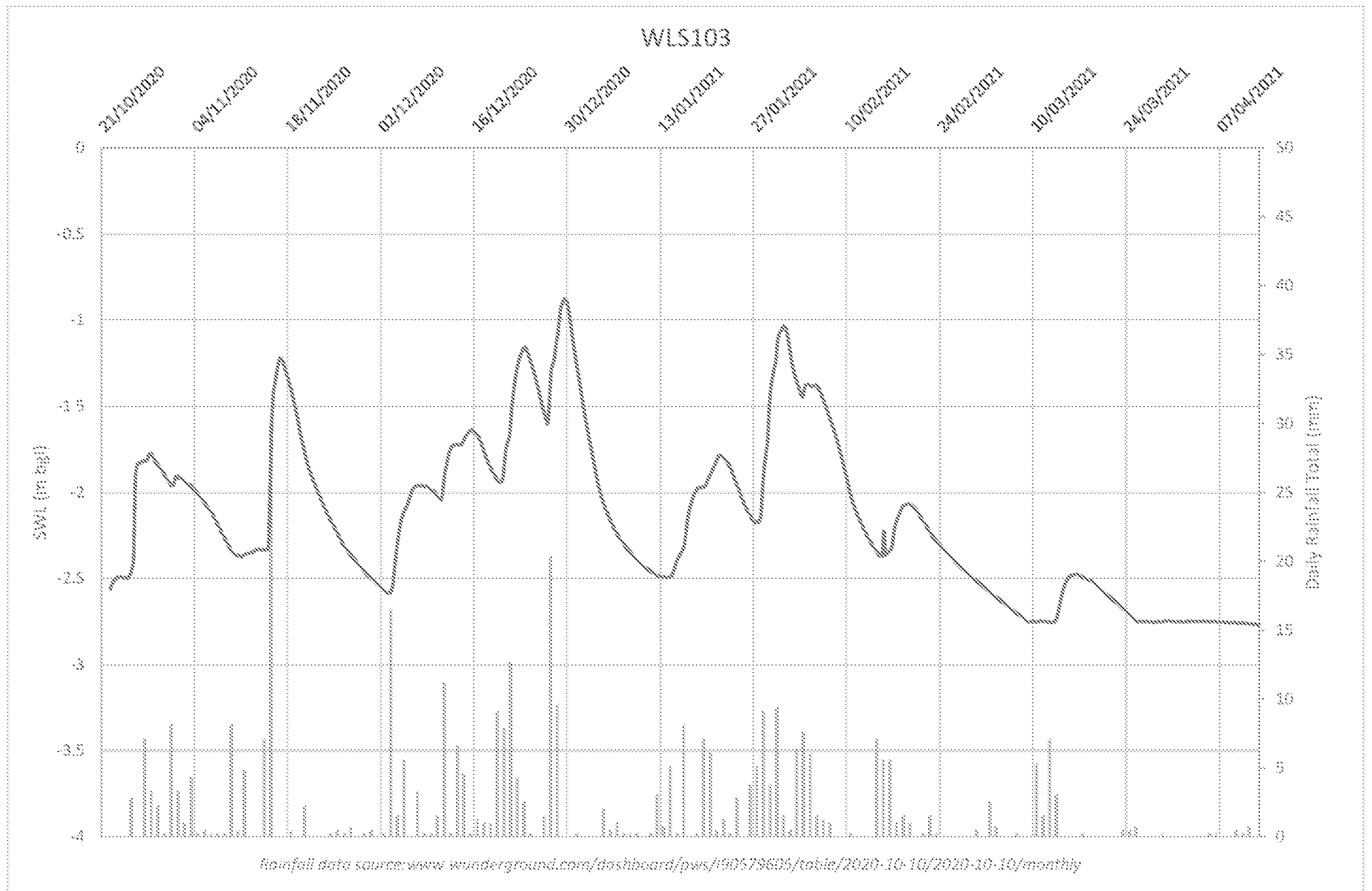
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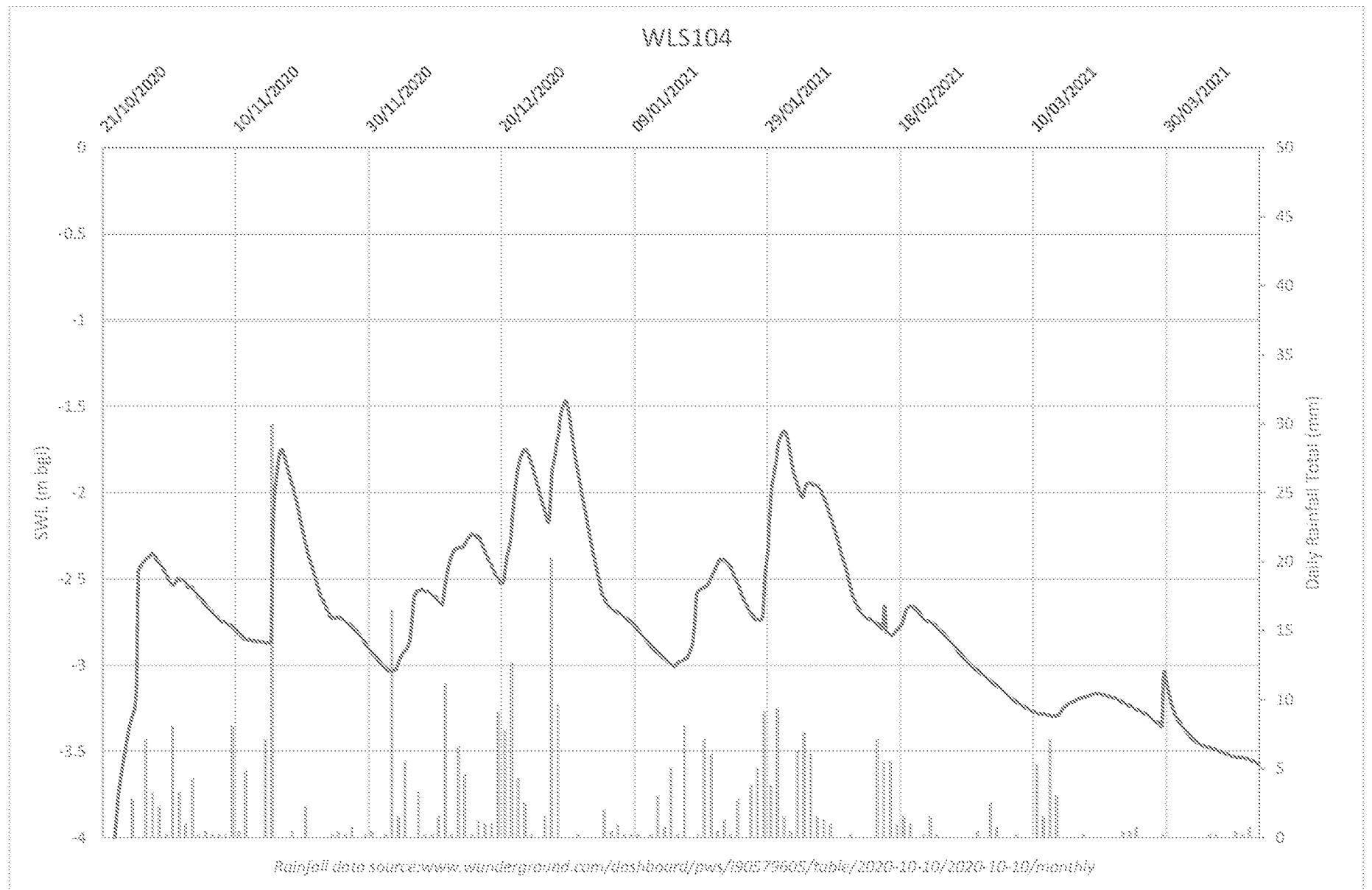
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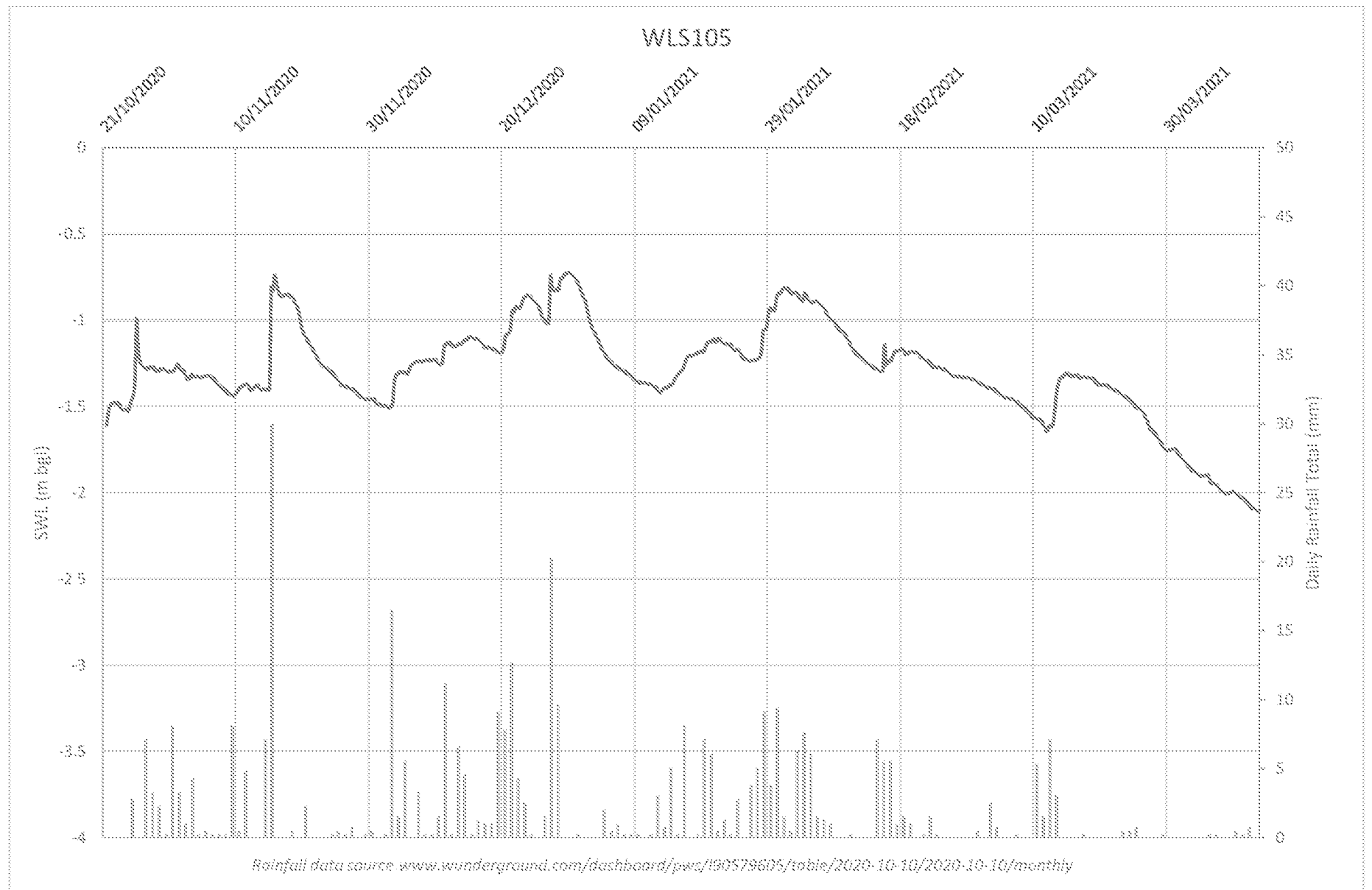
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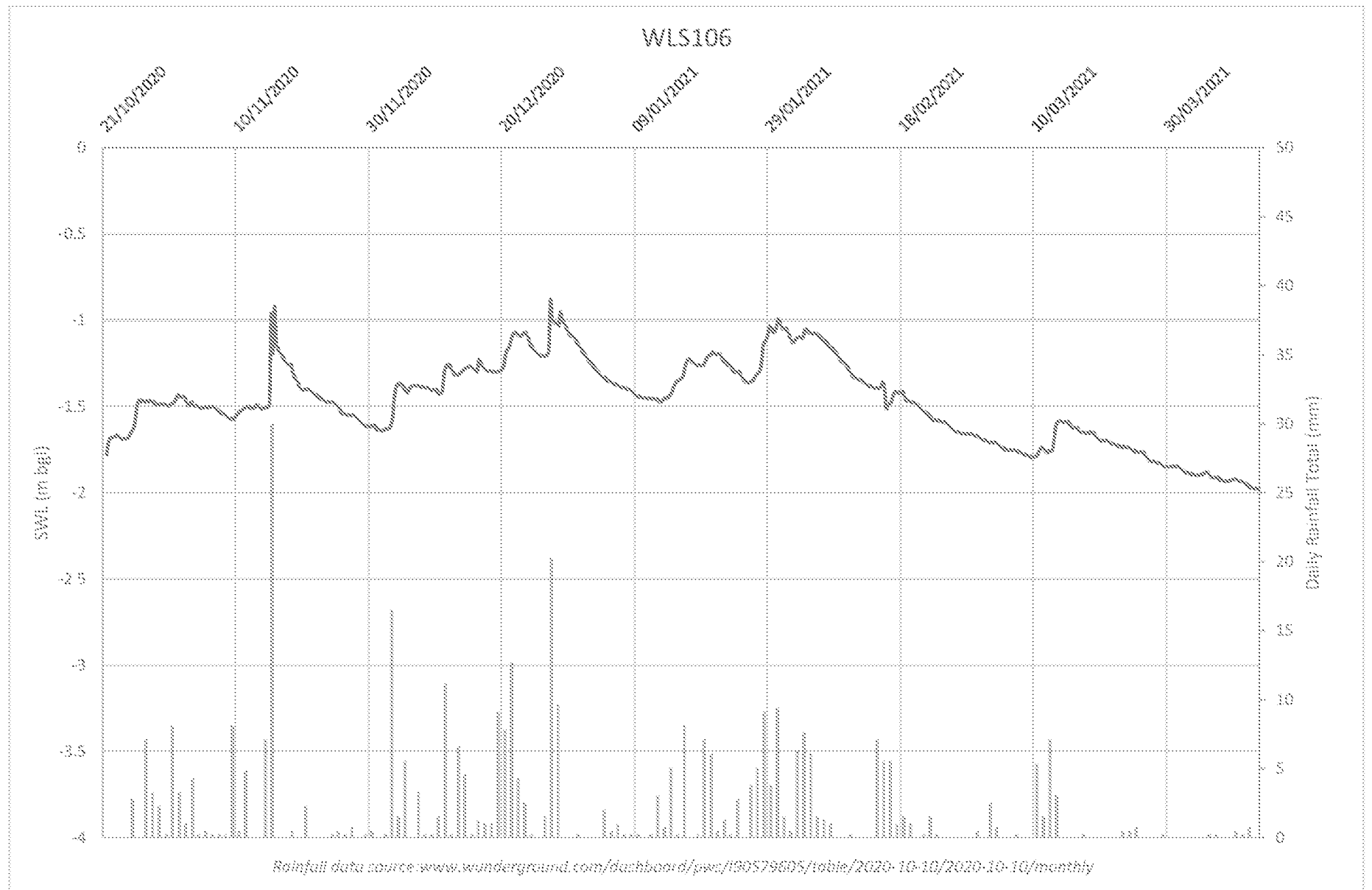
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J14604 Angmering Groundwater Monitoring Data (21/10/20 – 13/04/2021)





Head Office
East Grinstead

ST Consult Midlands
Nottingham

ST Consult Thames Valley
Henington

ST Consult North West
Warrington