



Flood Risk & SuDS Assessment

51-63 Southview Road, Southwick BN42 4TS

Client

S. D. Holdings Ltd
4A Southview Road
Southwick
West Sussex
BN42 4TU
Ref: 12383
Date: January 2026

Consulting Engineers

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Index

1	Introduction	2
2	Existing Site & Flood Risk Profile	3
3	Development Proposals and Drainage Strategy	5

Schedule of Appendices

A	Site Location Maps and Photographs of the Site
B	Topographic Survey & Sewer Records
C	EA and SFRA Flood & Groundwater Maps
D	Proposed Drainage Strategy Layout
E	Flow Drainage Calculations
F	Site Investigation (Winter BRE365 Soakage Testing and Groundwater Monitoring)
G	Conclusions from Waterco’s Hydraulic Modelling Report
H	Southern Water Correspondence
Annex: Drainage Management & Maintenance Plan	

Issue	Issue date	Compiled	Checked
Preliminary Issue	29 January 2026	JP	MR
First Issue	30 January 2026	JP	FVV

1 Introduction

- 1.1 This Flood Risk & SuDS Assessment report has been prepared for S.D. Holdings Ltd. in conjunction with the proposed development at 51-63 Southview Road, Southwick BN42 4TS. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.
- 1.2 This report follows on from the SuDS Drainage Assessment that GTA C&T prepared in January 2023.
- 1.3 This report should be read in conjunction with the Hydraulic Modelling Report prepared by Waterco, dated 22 Jan 2026. This report is too large to append and so must be read separately: this is available upon request from GTA C&T Ltd. The Conclusions are shown in Appendix G.

2 Existing Site & Flood Risk Profile

- 2.1 The application site lies in Southwick, which is administered by Adur and Worthing Councils (AWC). It comprises vacant garden space to the rear of dwellings along Southview Road. Site location maps and photos of the site are shown in Appendix A.
- 2.2 Topography: A topographical survey is shown in Appendix B. The site's levels range between approximately 11.7m AOD and 10.2m AOD. As the site is soft landscaped it is 100% permeable. The site area is approximately 3167m².
- 2.3 Geology: The BGS online map shows this area's bedrock is Tarrant Chalk. This is overlain by superficial deposits of Head (clay, silt, sand and gravel). Head has a notoriously low permeability, whilst the Chalk is likely to offer at least reasonable, if not good, porosity.
- 2.4 A Site Investigation was carried out to determine the water table level, soil types down to 6m below ground level and soil soakage rates. The boreholes show the upper level of Head being mostly clay, while the lower level being mostly sand (sized particles).
- 2.5 Soakage tests were carried out in accordance with BRE365. Appendix F contains the test results and borehole records. The lowest soakage rate is 7.6×10^{-6} m/s.
- 2.6 Winter groundwater monitoring was undertaken between 09/11/19 and 03/04/20. The water table rose from 5.5m bgl to the surface on 24 January '20 and stayed there until the end of March. The data logger graph is in Appendix F. It is clear from this result that soakage is not a viable option.
- 2.7 Public Sewers: Southern Water's sewer records (in Appendix B) show both foul and storm water public sewers in Southview Road. The depth of the surface water sewer below ground level at both the manholes upstream and downstream of the site is approximately 1.5m.
- 2.8 A Southern Water pre-application capacity check confirms that a discharge into the sewer at a maximum rate of 2.0l/s is acceptable to the Sewerage Undertaker.
- 2.9 The EA's Groundwater Source Protection Zones map show the site being removed from the nearest zone. The site overlies a Major Aquifer – High, according to Groundwater Vulnerability Zones map, however – as to be expected considering the Tarrant Chalk stratum (at depth).

Flood Risk

- 2.10 Fluvial Flooding: According to the Environment Agency's Rivers and Seas Flood Map (see Appendix C), the site lies in fluvial Flood Zone 1, Low Risk.

- 2.11 Surface Water flooding: this *can* occur when excess rainwater does not infiltrate into the ground or is not intercepted by urban drainage systems and flows across the ground. The 2 EA surface water flood extent maps in Appendix C show that this site is clear of this risk. Although these are derived from 2025 modelling, they are part of a nation-wide study. The LLFA states that the SFRA model is more relevant and granular (borough specific), even if somewhat older.
- 2.12 The LLFA's surface water flood mapping show that this site is liable to flood in the 1 in 100 years and 1 in 100 years + CC storm event. This flooding enters the site from higher land to the north. The LLFA's surface water flood risk modelling dataset (from the Adur and Worthin SFRA 2024) is shown in Appendix C. Because the 2 proposed units are to be positioned in the floodplain, a hydraulic model was commissioned.
- 2.13 As stated in section 1.4 above, Waterco's Hydraulic Modelling Report is available upon request. The conclusions of the report are shown in Appendix G. This states that a) the site floods currently in all scenarios (storm intensities) and b) there is no significant impact of the development on neighbouring properties.
- 2.14 Artificial sources: flooding from reservoirs, canals and docks. The EA's Reservoirs Flood Map in Appendix C shows the site to be removed from this source of flooding. There are no docks or canals in this area.
- 2.15 Groundwater: The site does not lie within a groundwater source protection zone but is predominantly within a 'Medium' groundwater vulnerability zone. Both maps are shown in Appendix C.
- 2.16 Historical flooding: the EA's online map in Appendix C shows that the site is removed from the nearest recorded flood event.

In conclusion – the flood risk profile of this site is Low, with the proviso that surface water flooding affects this site currently; however, in the post-development scenario both units are flood-free, as the floor levels shall be raised above the critical flood level.

3 Development Proposals and Drainage Strategy

- 3.1 The proposal is to build 2 new dwelling houses.
- 3.2 Proposed surface water drainage: SuDS (Sustainable Drainage Systems) Policy states that surface water runoff for use must be discharged according to the following hierarchy:
- Store Rainwater for re-use;
 - Infiltration to ground;
 - Discharge to a surface water body;
 - Discharge to a surface water sewer, highway drain, or another drainage system;
 - Discharge to a combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewerage undertaker.
- 3.3 The SuDS Hierarchy (infiltration, watercourses, public sewers, private sewers) was applied. At least one water butt shall be fitted in each of the 2 gardens, with the stored water available for garden watering. This will reduce the demand for potable water.
- 3.4 Winter groundwater monitoring and soakage tests were undertaken. Due to the high water table level, it is concluded that infiltration is not a viable option here. That said, there would be some infiltration into shallow subsoils without risking groundwater ingress.
- 3.5 The development's surface water will be routed to Southern Water's public sewer in Southview Road. A capacity check from Southern Water indicates that a maximum offsite runoff rate of 2.0l/s is acceptable – see the confirmation letter from Southern Water in Appendix H.
- 3.6 The sub-base of the (impermeable) road will act as a storage blanket - as coarse granular fill has a voids ratio of 0.3. This will be lined to stop any rising groundwater from percolating into the SuDS network's storage volume.
- 3.7 The sub-base's volume (see the drainage strategy layout in Appendix C) has been calculated for the critical '1 in 100 years plus 45% climate change' storm. The calculation sheets are shown in Appendix E. FEH22 data and Cv values of 1.0 have been used.
- 3.8 As confirmed in Waterco's hydraulic model report, there will be no increase in flood risk to neighbouring sites as a result of this proposal. The combination of sub-base storage and pond volume provides a significant betterment in the attenuation characteristics. The controlled offsite flow rate from the roofed areas (into the public sewer) will also decrease the overall volume of water that will flow overland southwards in all the main storm events, ie 1 in 1 year, 30 years and 100 years + CC. Currently all the water flowing into this site, whether from higher land or the sky, finds its way to

ground or off site to the south. Only a small proportion of this volume will flow to neighbouring land, if any. The combination of a controlled flow rate into the sewer (Southern Water has confirmed there is capacity for the 2l/s rate) - and SuDS storage volume with restricted flow rate - improves the flood risk of the downstream properties.

3.9 The water will be treated by the sub-base granular fill. The filtration qualities of coarse fill are excellent and, in this way, the quality - cleanliness - of water as it joins the sewer will be high. Table 26.2 of CIRIA’s SuDS Manual shows that residential developments have pollution hazard indices as follows (overleaf):

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

The TSS index for a private dwelling with a drive is $0.2 + 0.5 = 0.7$, the metals index is $0.2 + 0.4 = 0.6$ and the hydrocarbons index is $0.05 + 0.4 = 0.45$.

3.10 Table 26.3 of CIRIA’s SuDS Manual shows that permeable pavements have pollution hazard indices as follows, namely 0.7, 0.6 and 0.7 for each of the 3 categories:

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6

Each of these equals or is higher than each respective pollution index – see section 2.11 above.

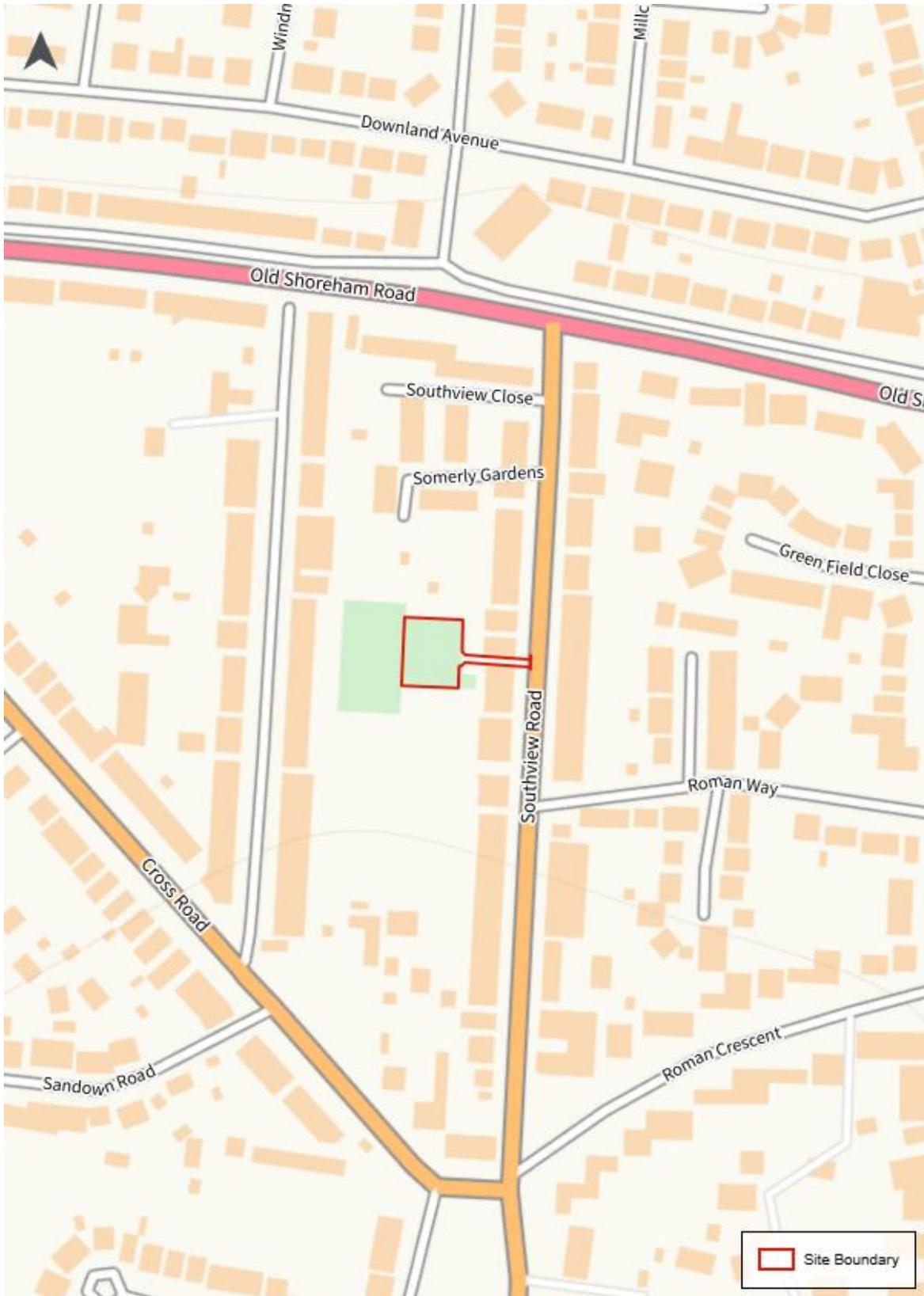
- 3.11 A Drainage Maintenance & Management Plan is attached in the Annex at the rear of this report. This sets out how the various components will be inspected and maintained – in line with Industry Standards as per CIRIA's SuDS Manual C753. The responsibility of maintenance, repair, renewal and replacement of the surface water drainage system will be conferred on to the property owners with all costs shared on an equal basis. These arrangements will be administered in the Transfer Document TP1 of each property at the point of sale with the same responsibilities transferring with each property to the successors in title.
- 3.12 Exceedance flows: any exceedance flows shall be southwards, as per the hydraulic modelling. As the units are raised, there is no risk of internal flooding.
- 3.13 Conclusion

This development will not increase the flood risk, either on this site or to neighbouring properties, and so complies fully with the 2025 NPPF and current PPG.

- End of Statement -

Appendix A

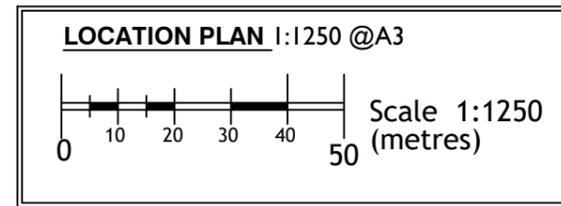
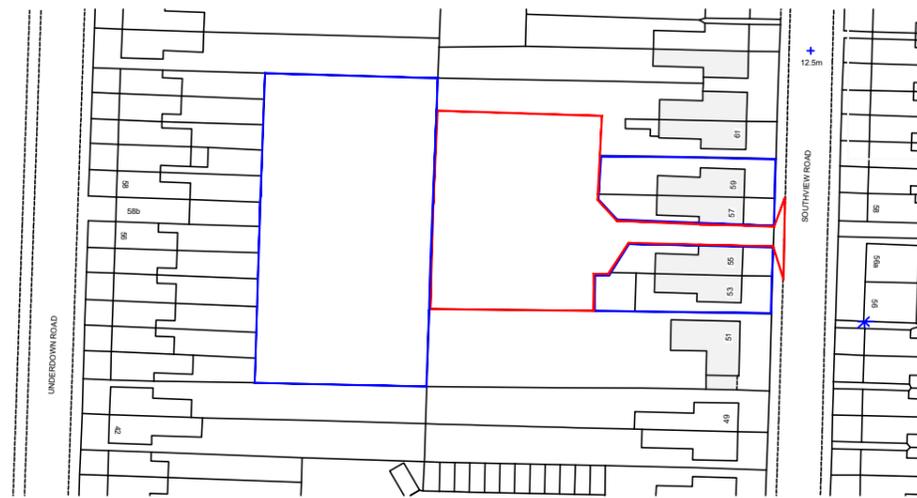
Site Location Map and Photographs of the Site



LOCATION/BLOCK PLANS

25-016 P01 A A3

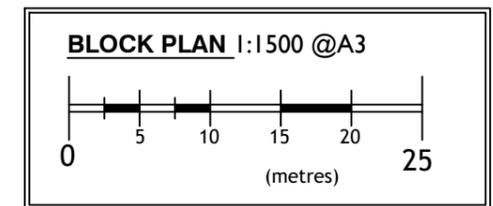
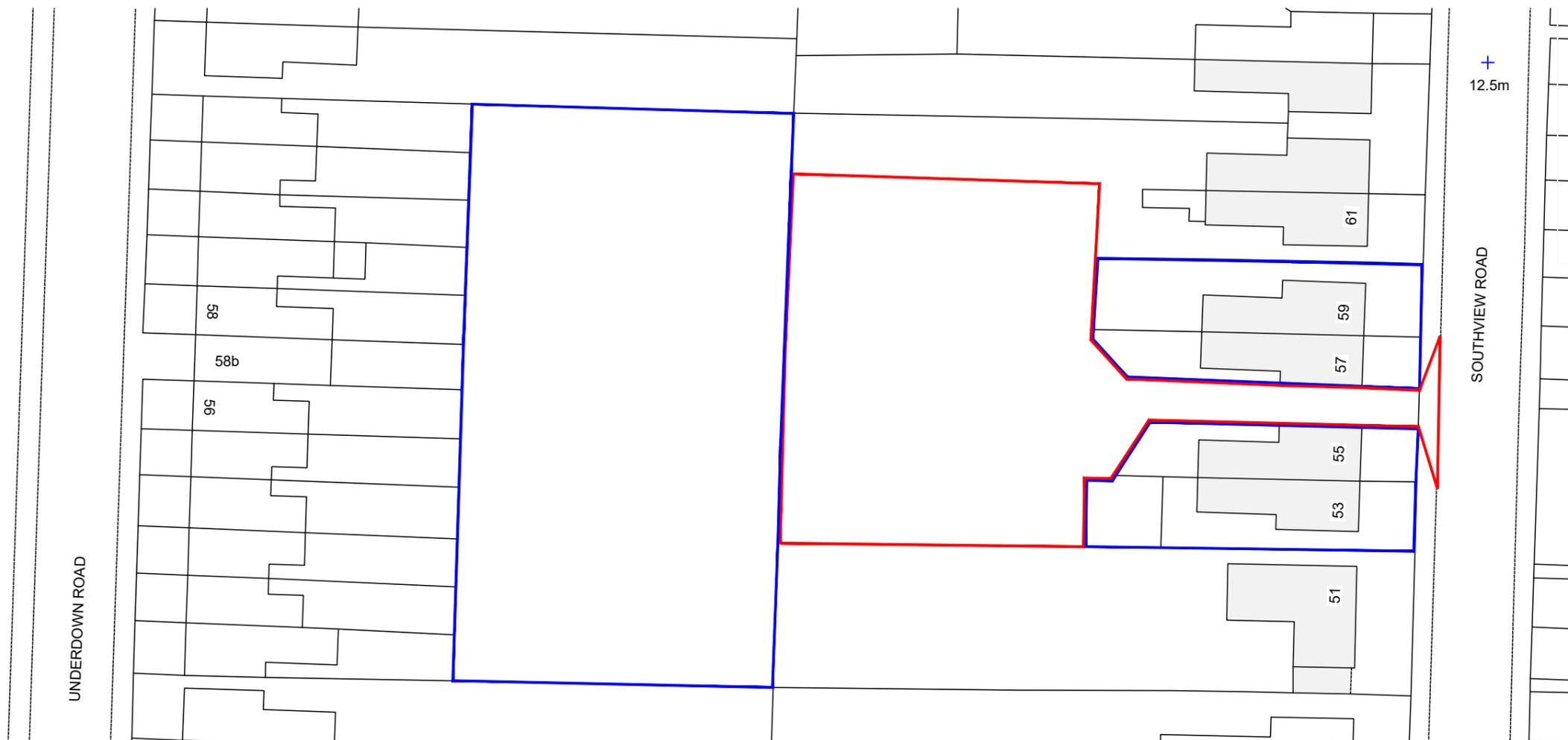
rev A 11.08.25 2 road names for validation



APPLICATION SITE BORDERED IN **RED**

ADJACENT SITES OWNED OR MANAGED BY APPLICANT IN **BLUE**

SITE AREA 1181 sq.m



PLANNING APPLICATION

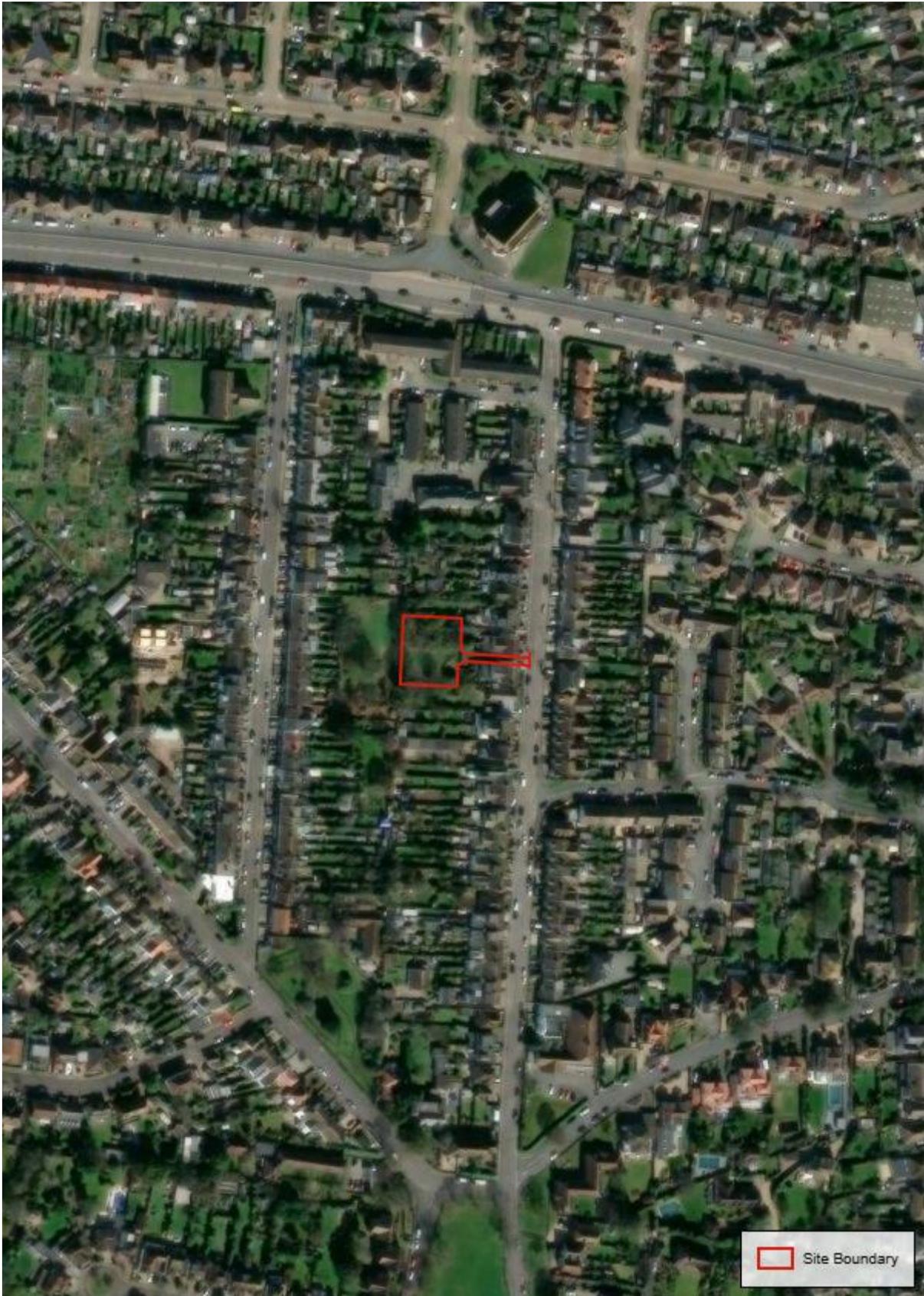
PROPOSED 2 NEW DWELLINGS
R/O 53-61 SOUTHVIEW ROAD
SOUTHWICK BN42 4TS

JULY 2025
SCALE AS SHOWN @ A3

circle 25
design & planning
07984207786 office@circle25.co.uk

This drawing is the sole copyright of Circle25 Design and Planning
Any discrepancies between this drawing and other information should be reported.

Aerial Photo





View of site from west boundary looking east



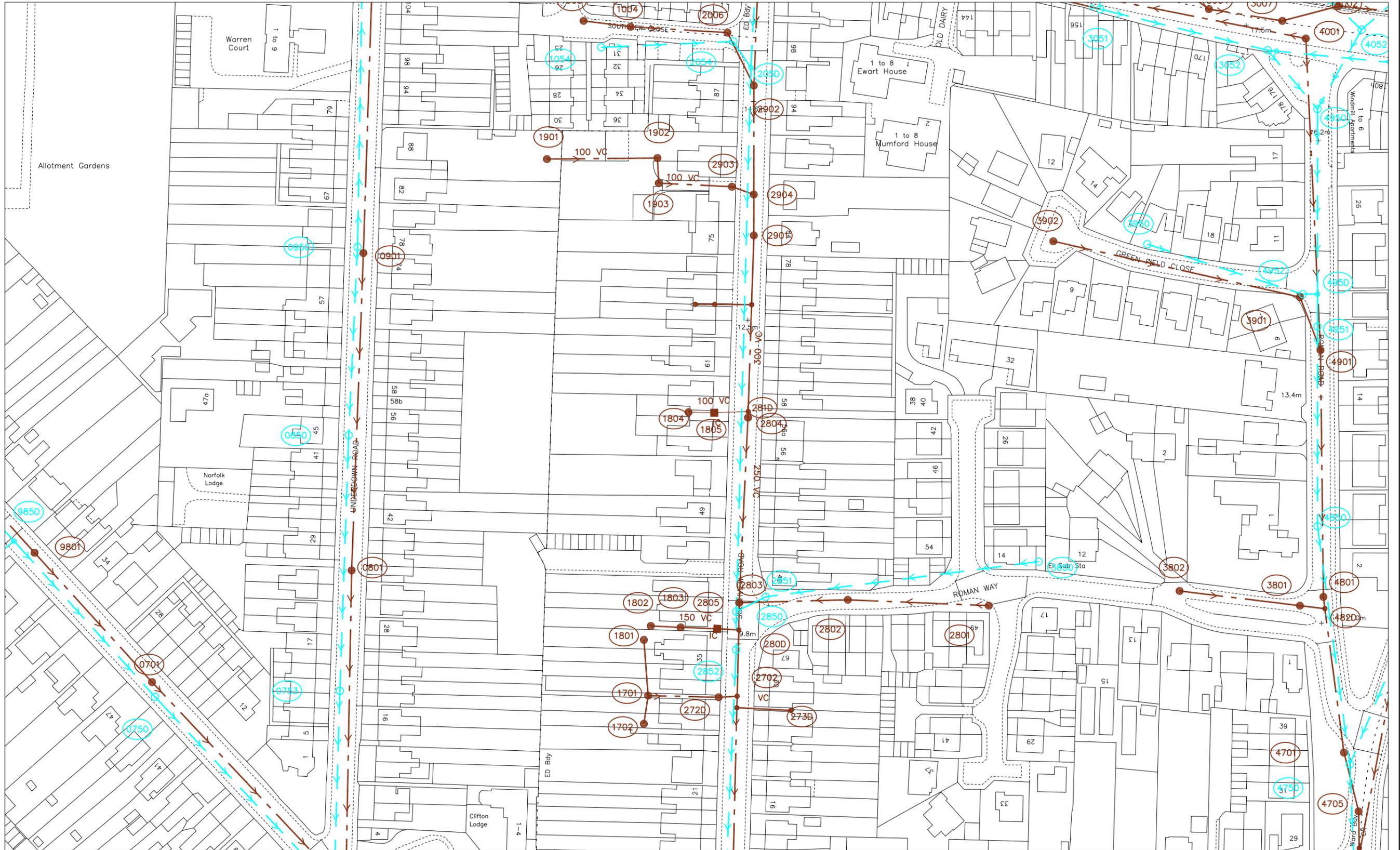
View looking northwards along west boundary

Appendix B

Topographic Survey & Sewer Records

SEWER RECORDS PAGE 1 OF 2

106026



105738

O.S. REF. TQ2405NW	Drawn by: gujskew	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement		
	Scale: 1:1250			
Title: 295119_51 to 63 Southview road	Date: 30/05/2018	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.		

523958

524429

SEWER RECORDS PAGE 2 OF 2

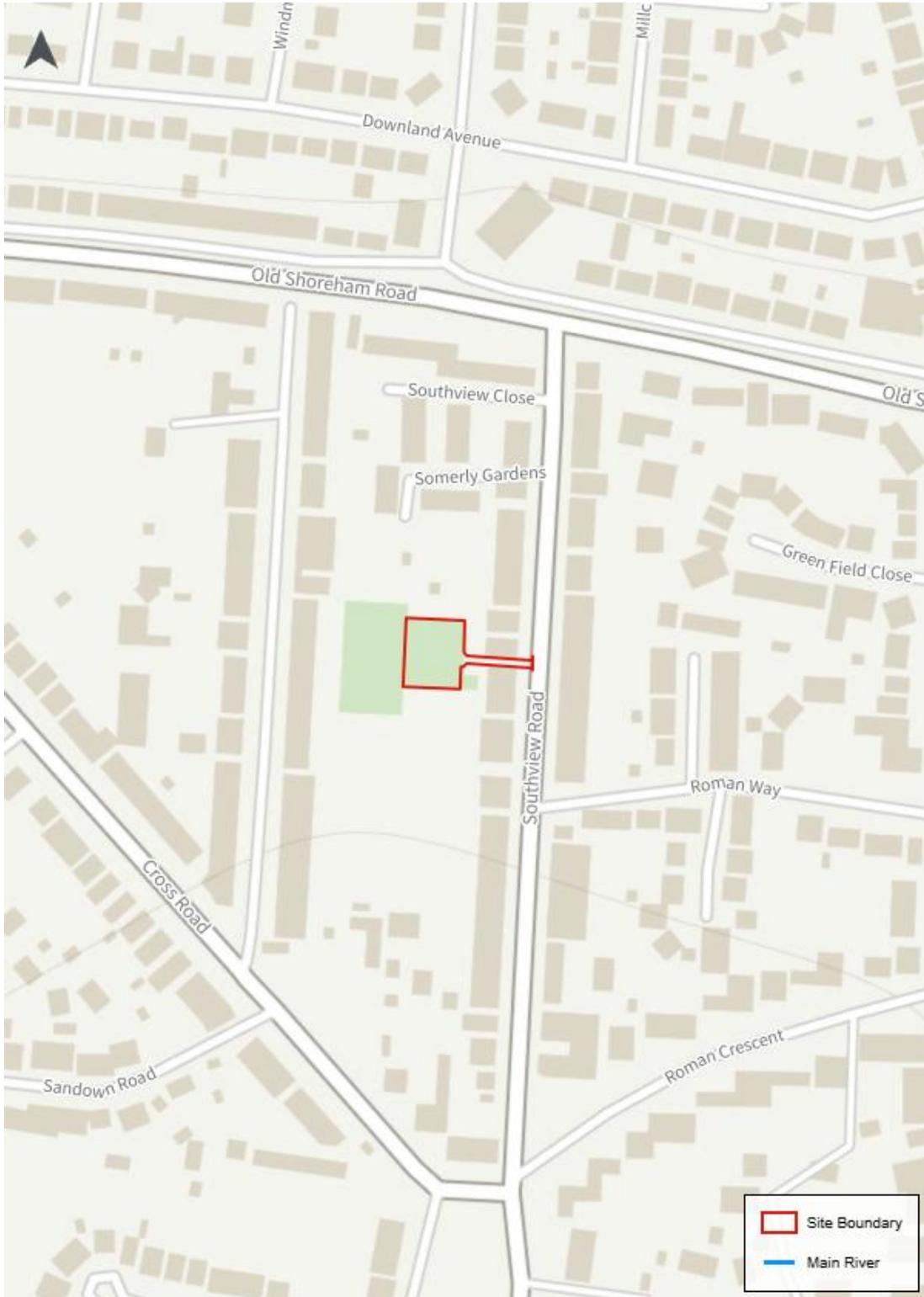
Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0701X	10.72	8.8	225	VC	CIRC	4901X	13.68	11.99	225	VC	CIRC												
0750X	10.62	9.4	150	VC	CIRC	4950X	16.47	11.47	750	CP	CIRC												
0753X	9.62	8.3	150	VC	CIRC	4951X	13.99	10.41	750	CP	CIRC												
0801X	10.12	8.32	200	VC	CIRC	4952X	14.32	12.63	150	VC	CIRC												
0850X	10.63	9.48	150	VC	CIRC	495DX	11		750	CP	CIRC												
0901X	12.11	10.15	200	VC	CIRC	9801X	11.74	9.66	200	VC	CIRC												
0950X	12.11	10	150	VC	CIRC	985DX	10.44		150	VC	CIRC												
0950Y	12.11		150	VC	CIRC																		
1004X	14.89	12.86	150	VC	CIRC																		
1005X	14.79	13.11	150	VC	CIRC																		
1054X	14.78	14.15	150	VC	CIRC																		
1701X				UNK	UNK																		
1702X				UNK	UNK																		
1801X				UNK	UNK																		
1802X			150	VC	CIRC																		
1803X			150	VC	CIRC																		
1804X			100	VC	CIRC																		
1805X			100	VC	CIRC																		
1901X	13.06	12.19	100	VC	CIRC																		
1902X	13.11	11.7	100	VC	CIRC																		
1903X	12.94	11.62	100	VC	CIRC																		
190DX				UNK	UNK																		
191DX				UNK	UNK																		
2006X	15.37	12.47	150	VC	CIRC																		
2054X	15.34	13.86	150	VC	CIRC																		
205DX	15.13	13.64	150	VC	CIRC																		
2702X				UNK	UNK																		
270DX				VC	CIRC																		
272DX				VC	CIRC																		
273DX				UNK	UNK																		
2801X	11.23	8.28	150	VC	CIRC																		
2802X	10.83	7.86	150	VC	CIRC																		
2803X	10.08	7.47	225	VC	CIRC																		
2804X	11.61	9.02	250	VC	CIRC																		
2805X			150	VC	CIRC																		
280DX			250	VC	CIRC																		
281DX			300	VC	CIRC																		
2850X	10.01	8.54	150	VC	CIRC																		
2851X	10.25	8.72	300	CP	CIRC																		
2852X	9.75	8.28	150	VC	CIRC																		
2901X	13.37	10.75	300	VC	CIRC																		
2902X	14.95	12.07	250	VC	CIRC																		
2903X	13.645	11.31	100	VC	CIRC																		
2904X	13.76	11.094	250	VC	CIRC																		
290DX			300	VC	CIRC																		
3004X	17.67	14.34	300	VC	CIRC																		
3007X	17.56	14.23	300	VC	CIRC																		
3051X	17.9	12.59	675	CP	CIRC																		
3052X	17.52	11.77	675	CP	CIRC																		
3801X	11.03		150	VC	CIRC																		
3802X	11.42	10.46	150	VC	CIRC																		
3850X	11.37	9.32	150	VC	CIRC																		
3901X	14.45	12.29	150	VC	CIRC																		
3902X	14.81	13.46	150	VC	CIRC																		
3950X	14.81	13.56	150	VC	CIRC																		
4001X	17.65	15.15	150	VC	CIRC																		
4001Y	17.65	15.11	225	VC	CIRC																		
4002X	18.4	14	450	CP	CIRC																		
4052X	17.37	15.45	375	CP	CIRC																		
4701X	10.72	8.96	225	VC	CIRC																		
4705X	10.5		200	VC	CIRC																		
4750X	10.73	8.55	OTHER	CP	CIRC																		
4801X	11.04		225	VC	CIRC																		
482DX	9.67		225	VC	CIRC																		
4850X	11.51	9.18	900	CP	CIRC																		

<p>LINE STYLES / COLOURS</p> <ul style="list-style-type: none"> Brown --- Foul Dark Blue --- Foul Siphon Sewer Red --- Foul Vacuum Main Red --- Foul Rising Main Red --- Combined Red --- Combined Siphon Sewer Red --- Combined Rising Main Orange --- Lateral Drain Orange --- Building Over Agreement Area Dark Blue --- Treated Effluent Purple --- Sludge Purple --- Sewer Catchment Purple --- Section 104 Area Light Blue --- Surface Water Light Blue --- Surface Water Rising Main Yellow --- Private Green --- Access Shaft Green --- Decommissioned 	<p>MATERIALS</p> <ul style="list-style-type: none"> AK Alkathene BAC Bonded Asbestos Cement BRC Brick (Common) BRE Brick (Engineering) CC Concrete Box Culvert CI Cast Iron CO Concrete (In-Situ) CP Concrete (Pre-Cast) CSB Concrete Segments (bolted) CSU Concrete Segments (unbolted) DI Ductile Iron GRC Glass Reinforced Concrete GRP Glass Reinforced Plastic MAR Masonry in regular Courses MAS Masonry in random Courses PE Polyethylene PF Pitch Fibre PP Polypropylene PVC Polyvinyl Chloride RPM Reinforced Plastic Matrix SI Spun Iron ST Steel VC Vitreous Clay XXX Other ZZZ Unknown 	<p>LEGEND - SEWERS</p> <ul style="list-style-type: none"> Manhole (SW) Manhole (F&C) Lamp hole (SW) Lamp hole (F&C) Pumping Station (SW) Pumping Station (F&C) Side entry manhole (SW) Side entry manhole (F&C) Blind shaft (SW) Blind shaft (F&C) Ejector station (SW) Ejector station (F&C) Waterlight door (SW) Waterlight door (F&C) Flushing ch. Mn-e (SW) Flushing ch. Mn-e (F&C) Flushing ch. No-e (SW) Flushing ch. No-e (F&C) Demarcation Chamber Washout (SW) Washout (F&C) Rodding Eye (SW) Rodding Eye (F&C) Gauging point (SW) Gauging point (F&C) Intercept chamber (SW) Intercept chamber (F&C) Storm Tank (SW) Storm Tank (F&C) Vortex chamber (SW) Vortex chamber (F&C) Label @1pse Dummy/S24 manhole Other (s) Other Change in sewer (s) Change in sewer Reflex valve Flap valve Cascade Anode Valve Closed Valve Air Valve Hatch box (SW) Hatch box (F&C) Direction arrow Emptying valve Penstock chamber Damboards Storm Overflow Backdrop manhole Other (s) Wastewater treatment works Marine treatment works Outfall headworks Vent Vent column Tidal storage tank Blank end Head of Public Sewer Micro Pumping Station 	<p>SHAPES (S)</p> <ul style="list-style-type: none"> A Arched B Barrel C Circular E Egg H Horseshoe R Rectangular S Square T Trapezoidal U U Shape X Other <p>NODE REFERENCING SYSTEM</p> <ul style="list-style-type: none"> 1st digit: hundred metre easting identifier 2nd digit: hundred metre northing identifier 3rd digit: sewer type identifier 4th digit: next sequential node
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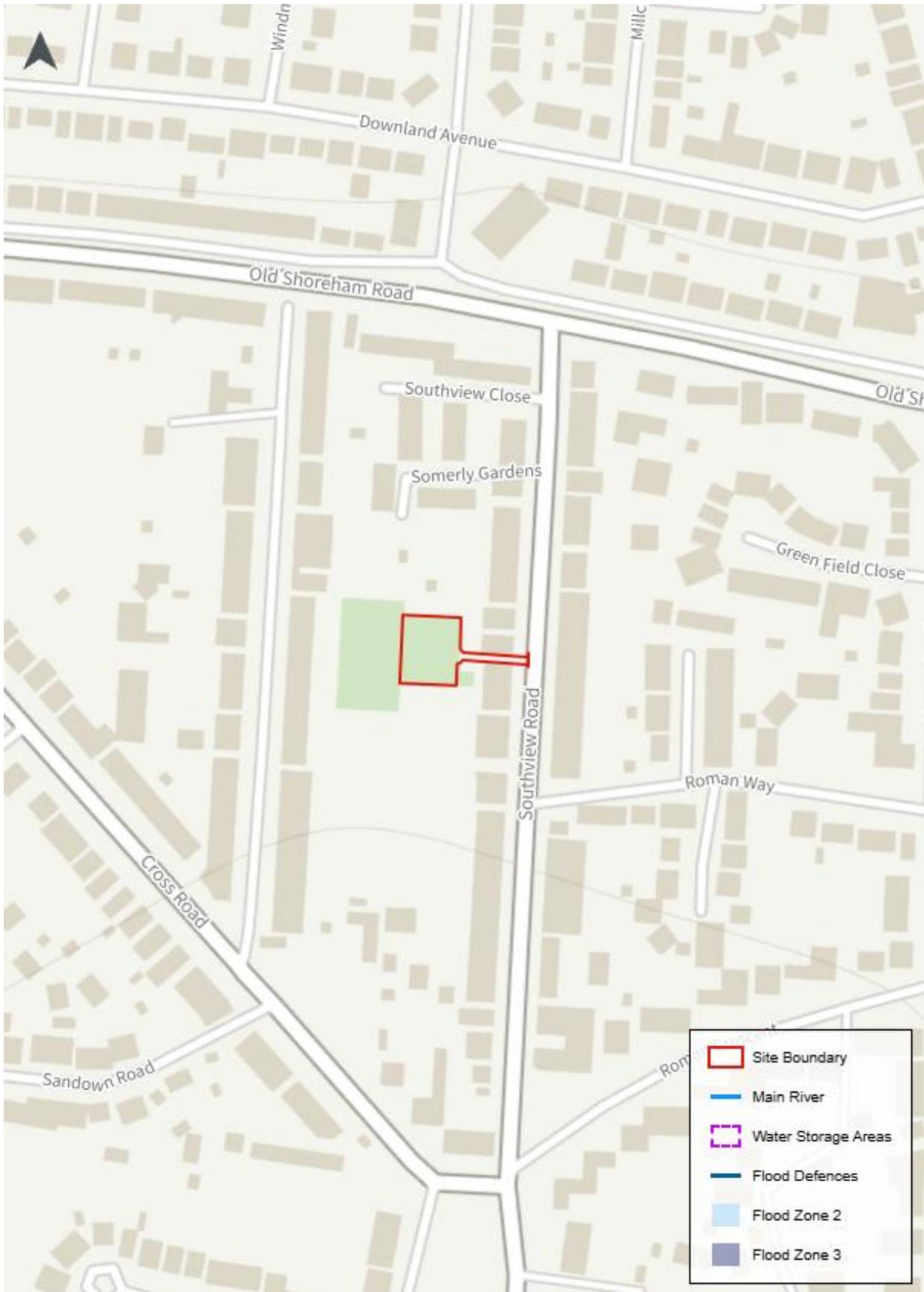
<p>Drawn by: gujskew</p>	
<p>Title: 295119_51 to 63 Southview road</p>	
<p>Date: 30/05/2018</p>	

Appendix C

EA and SFRA Flood & Groundwater Maps

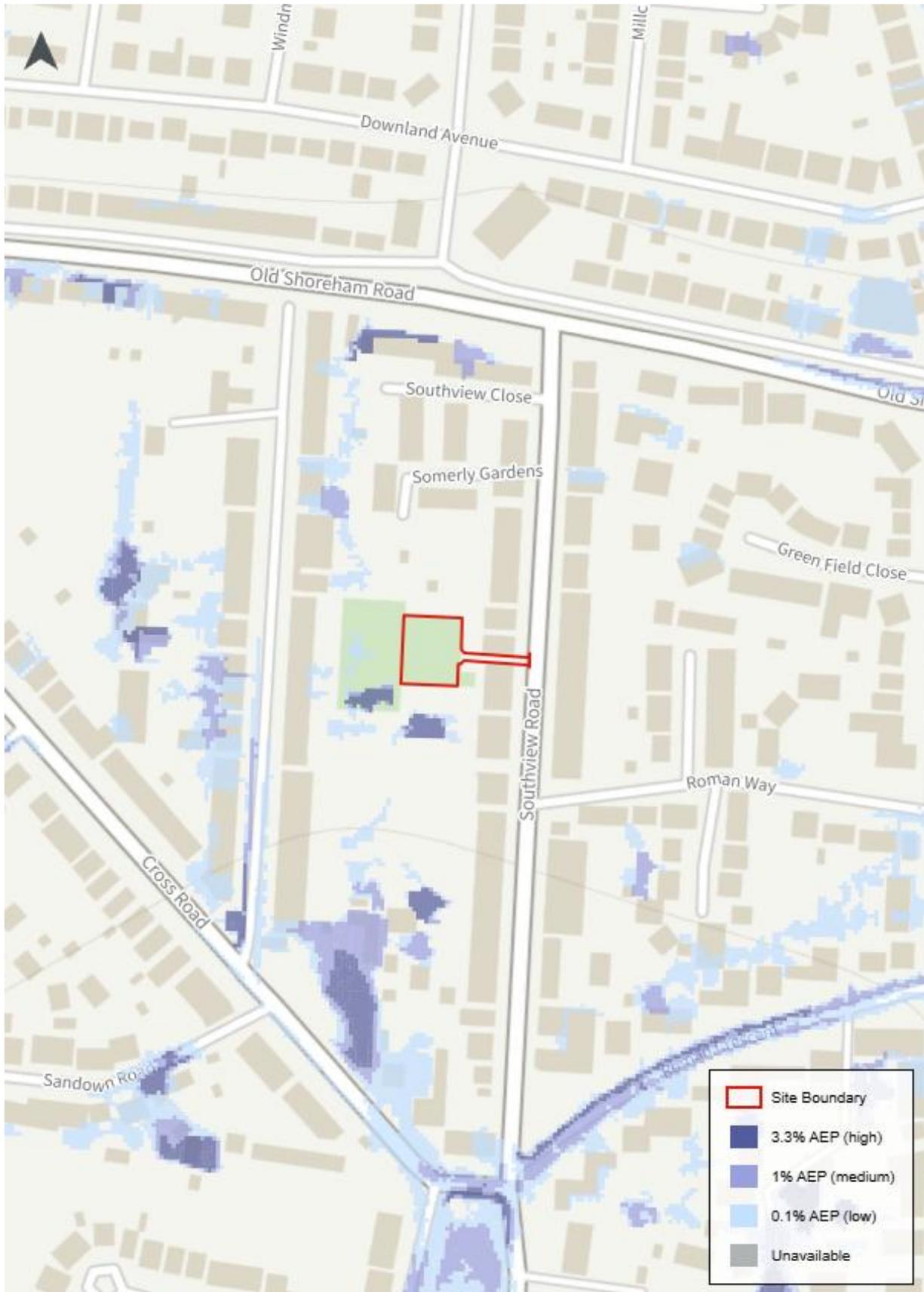


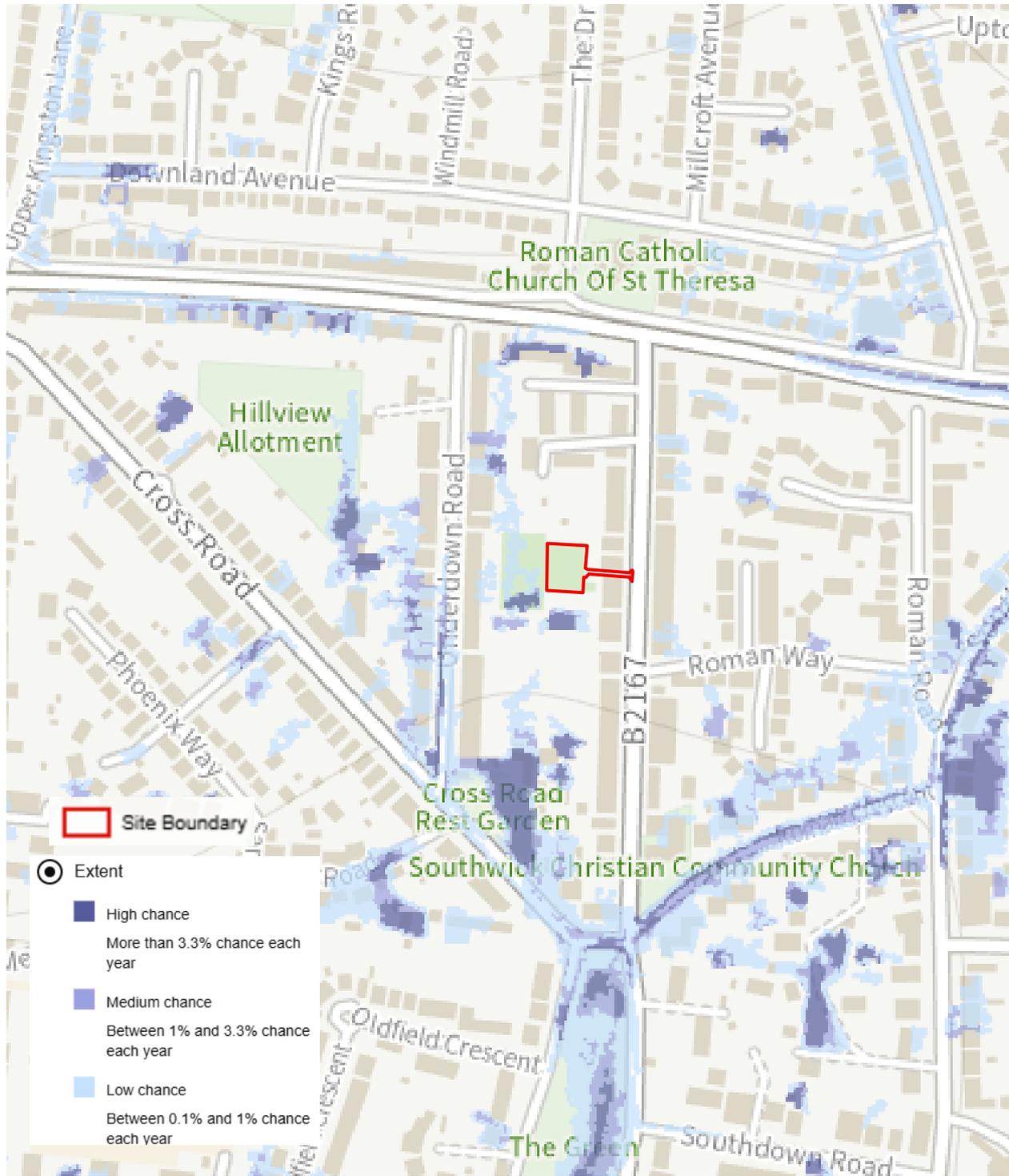
Environment Agency Main Rivers Map



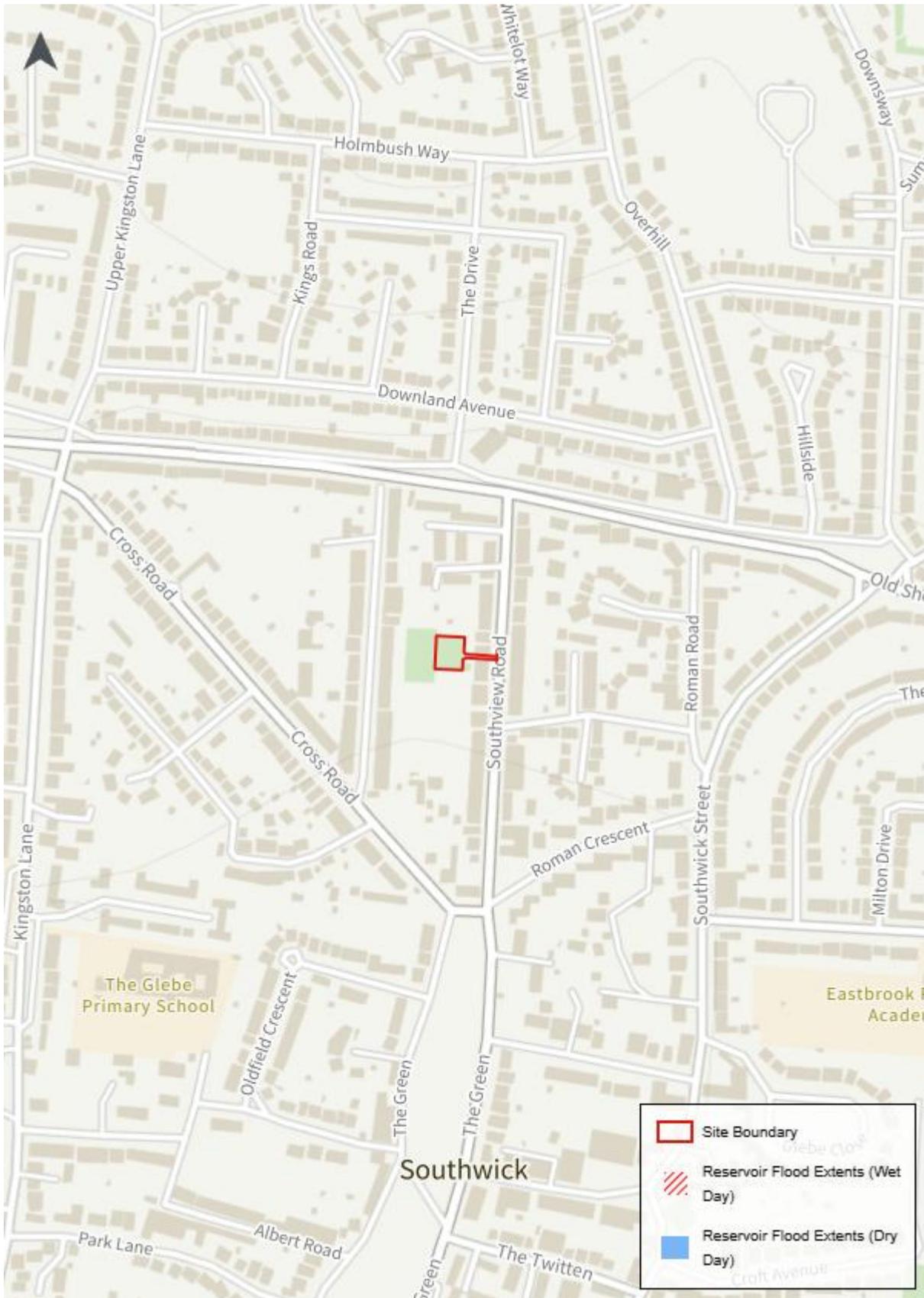
Environment Agency Flood Map for Planning

The site is located in fluvial Flood Zone 1



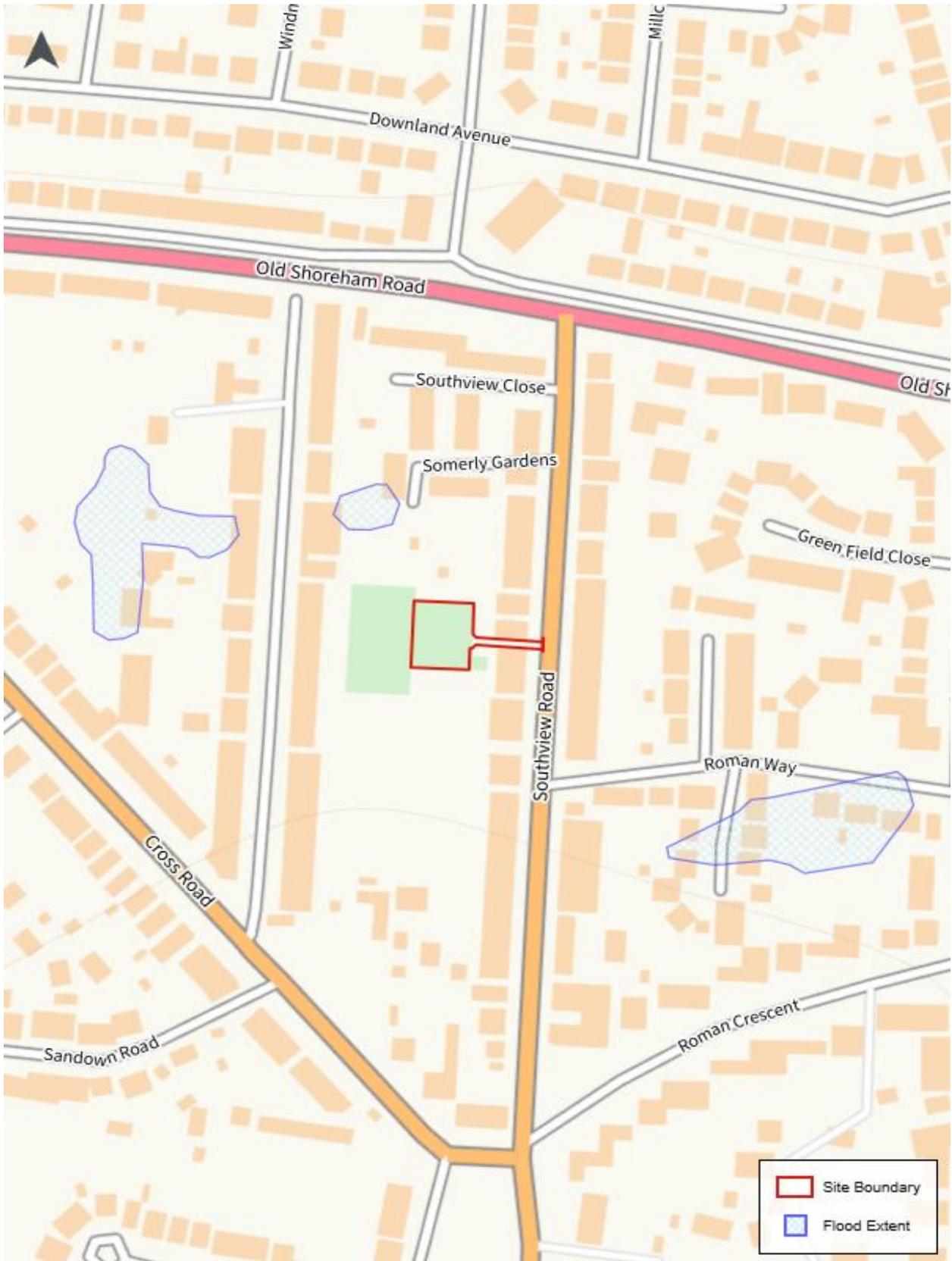


Environment Agency Surface Water Flood Extents Map – Yearly Chance of Flooding 2040 - 2060



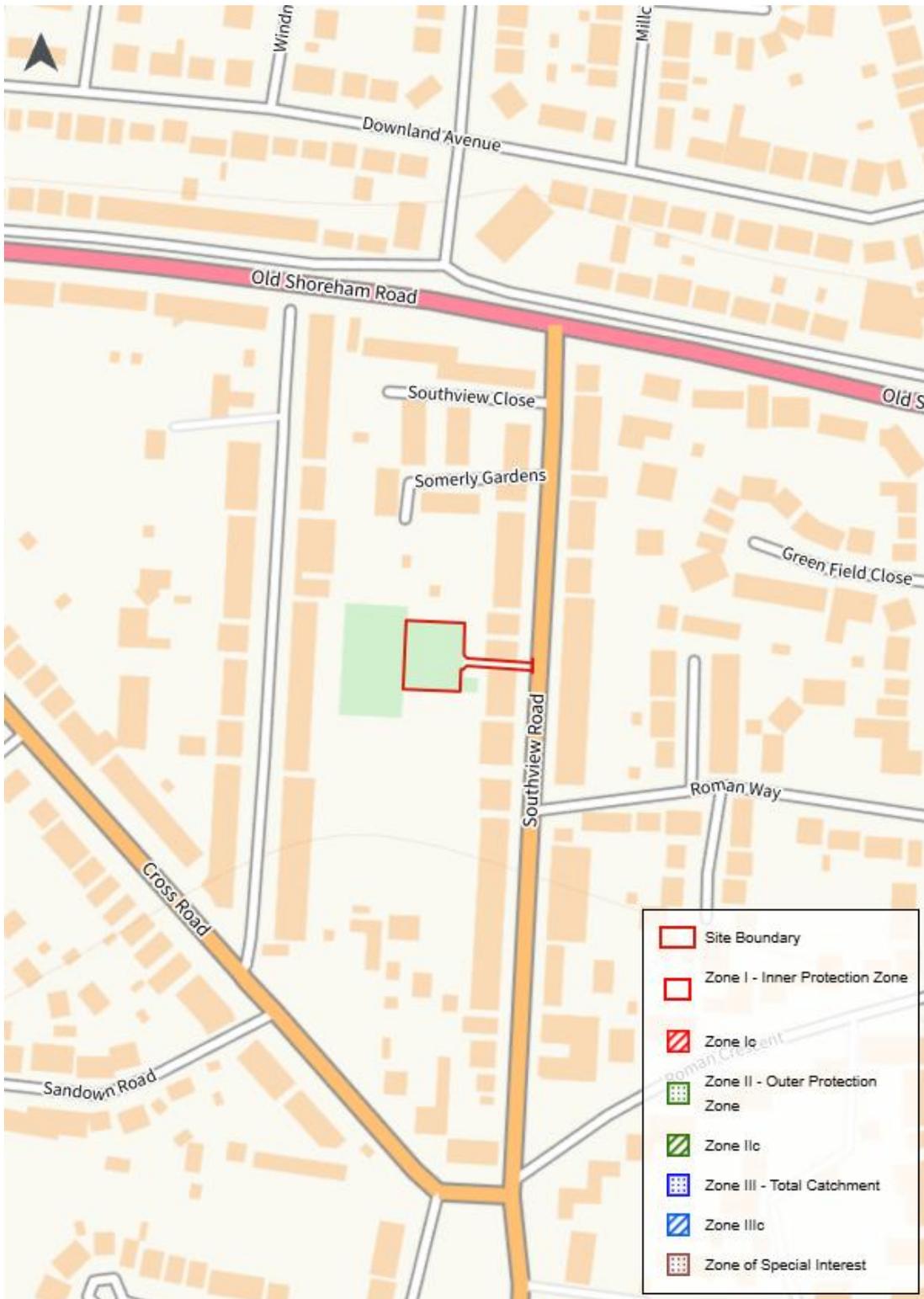
Environment Agency Flood Risk from Reservoirs

The site is clear from the risk of flooding from this source



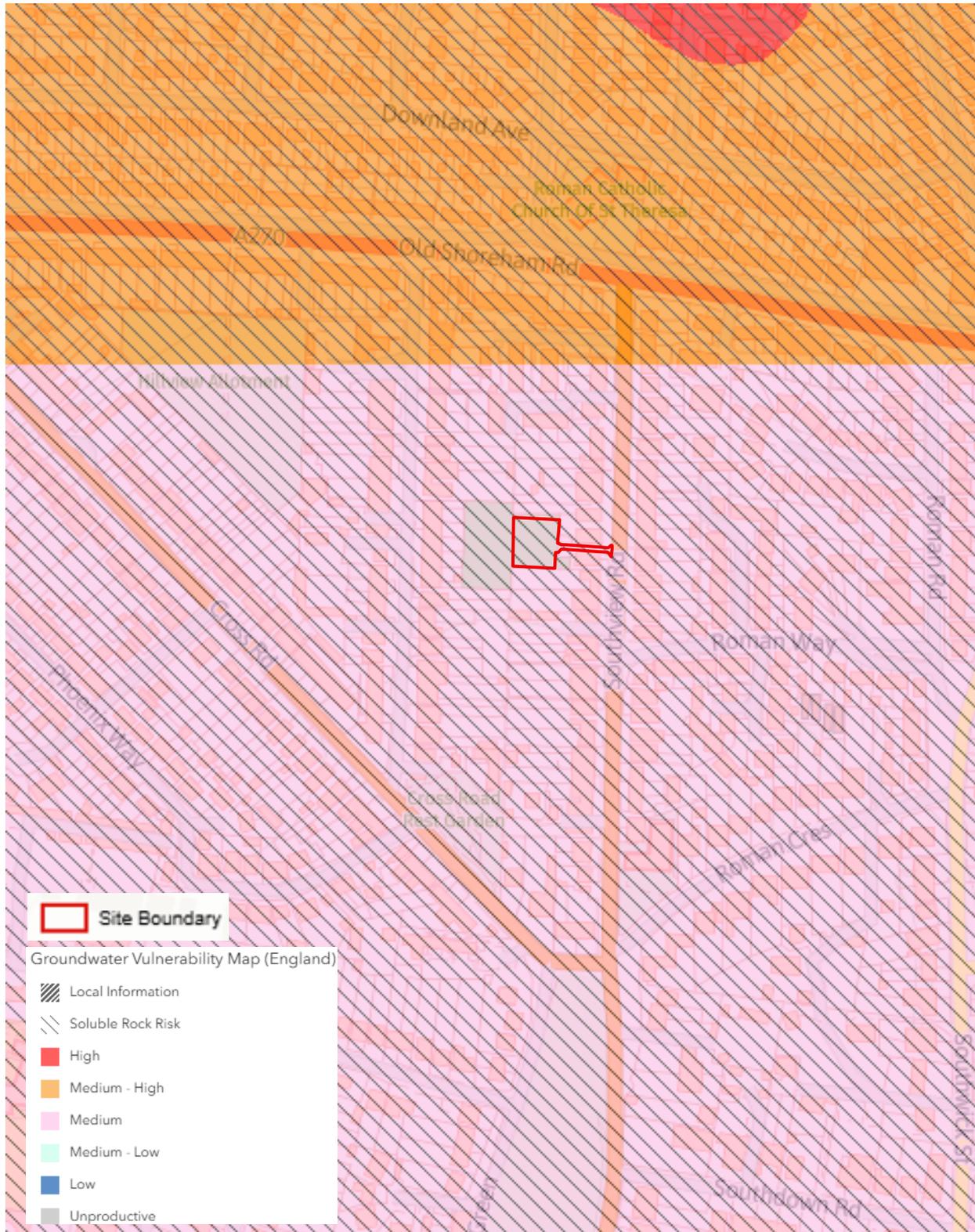
DEFRA Historical Flooding Map

Neither this site nor anywhere in the vicinity has been affected by flooding in the past



Environment Agency Groundwater Source Protection Zones Map

The site is removed from the nearest Groundwater Source Protection Zone

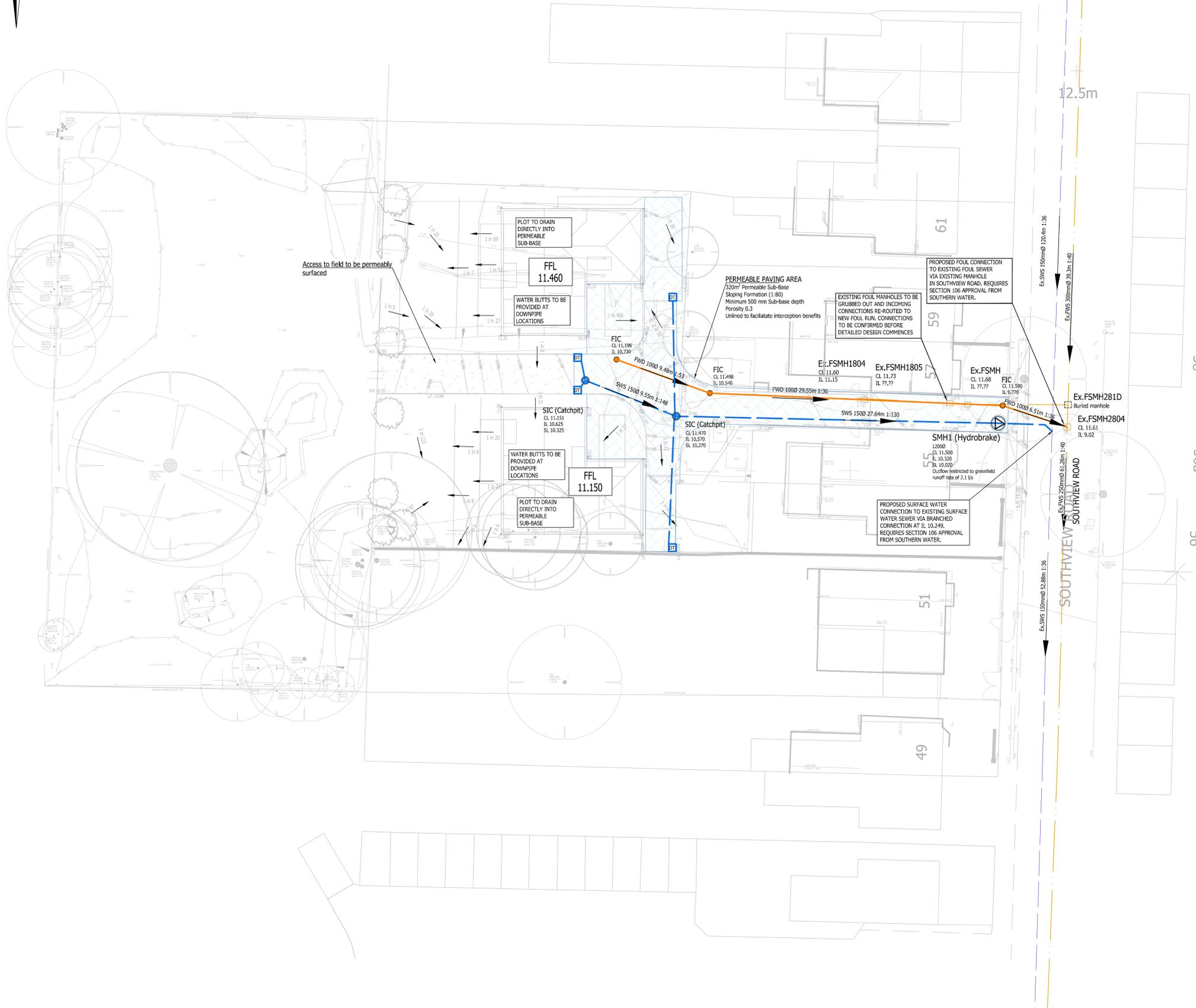


Environment Agency Groundwater Vulnerability Zones Map

The site overlies a Medium Groundwater Vulnerability Zone

Appendix D

Proposed Drainage Strategy Layout

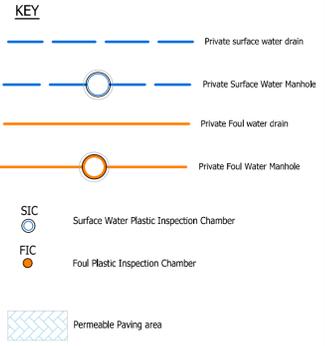


DESIGN NOTES

- RAINWATER STORAGE DESIGN BASED ON 1 IN 100 YR STORM + 45%.
- APPROVAL TO BE GAINED FROM SOUTHERN WATER FOR CONNECTIONS TO FOUL AND SURFACE WATER SEWERS.
- CONTRACTOR TO ALLOW FOR NEW FOUL AND SURFACE WATER SEWER CONNECTIONS INTO SOUTHVIEW ROAD.
- INVERT LEVEL OF STORM SEWER AT PROPOSED POINT OF CONNECTION HAS BEEN INTERPOLATED FROM SEWER RECORDS. CONTRACTOR TO CONFIRM SEWER'S INVERT LEVEL AS EARLY AS POSSIBLE TO INFORM DETAILED DESIGN.

GENERAL NOTES

- The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations, record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. Any discrepancies shall be notified to gta prior to works commencing.
- Tender or billing drawings shall not be used for construction or the ordering of materials.
- Do not scale. All dimensions and levels to be site confirmed.
- This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements.
- Copyright : This drawing must not be copied, amended nor reproduced without the prior written agreement of gta.
- All drawings specifications and recommendations made by gta are subject to Local Authority and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Clients risk. gta hold no responsibility for resulting abortive works or costs.
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- Your attention is also drawn to the fact that the information contained within this file may be subject to alteration at any time, pending technical approval from an approving authority or at the client's instruction. It is therefore strongly recommended that multiple and regular cross checks are made against the current contract drawings.
- It is your responsibility to ensure that the correct issue or revision of the DWG data file is being used and requests for updated information made accordingly.
- Should any apparent discrepancies between the data contained within the DWG file and the current contract drawings become evident, it must be reported back to GTA Civils & Transport as soon as reasonably practicable. Precedence should be given to the current contract drawings (PDF) unless advised otherwise.



P2	Updated to latest layout	14.01.26	NG	FVV
P1	INITIAL ISSUE	03.02.23	AF	JP
Rev	Amendments	Date	Dsn	Chk

Status	PRELIMINARY			
Client	S.D. HOLDINGS LTD			
Architect	CIRCLE25 DESIGN			
Project	LAND TO REAR OF 53-61 SOUTHVIEW ROAD, SOUTHWICK			
Title	SITE DRAINAGE			
Date	FEBRUARY 2023	Scale @ A1	1:200	
Clients Ref.	Project Ref. 12383			



Drawing Number	12383-100	Rev.	P2
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Appendix E

Flow Drainage Calculations

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	1	Maximum Rainfall (mm/hr)	5.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	✓
CV	1.000	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	1.000		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S3	0.069	5.00	11.151	450	524165.488	105888.809	0.505
S2			11.470	450	524173.013	105885.705	0.900
S1			11.504	1200	524205.575	105884.377	1.184
S5			11.417		524209.434	105881.443	1.168

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S3	S2	8.140	0.600	10.646	10.570	0.076	107.1	150	5.14	5.0
1.001	S2	S1	32.589	0.600	10.570	10.320	0.250	130.4	150	5.76	5.0
1.002	S1	S5	4.847	0.600	10.320	10.249	0.071	68.3	150	5.82	5.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.970	17.1	1.3	0.355	0.750	0.069	0.0	27	0.563
1.001	0.878	15.5	1.3	0.750	1.034	0.069	0.0	29	0.529
1.002	1.218	21.5	1.3	1.034	1.018	0.069	0.0	24	0.660

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m ³ /ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	x	Starting Level (m)			

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	45	0	0
30	45	0	0				

Node S1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	10.320	Product Number	CTL-SHE-0066-1500-0450-1500
Design Depth (m)	0.450	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	1.5	Min Node Diameter (mm)	1200

Node S3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	32.000	Depth (m)	0.500
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	10.646	Length (m)	10.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	80.0		

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
180 minute summer	S3	120	10.757	0.111	5.2	4.7377	0.0000	OK
180 minute summer	S2	120	10.756	0.186	3.8	0.0296	0.0000	SURCHARGED
180 minute summer	S1	120	10.754	0.434	2.8	0.4907	0.0000	SURCHARGED
600 minute winter	S5	315	10.276	0.027	1.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
180 minute summer	S3	1.000	S2	3.8	0.686	0.221	0.1284	
180 minute summer	S2	1.001	S1	2.8	0.364	0.182	0.5737	
180 minute summer	S1	1.002	S5	1.5	0.693	0.070	0.0105	15.4

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 98.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
120 minute winter	S3	118	11.029	0.383	15.1	30.8655	0.0000	FLOOD RISK
120 minute winter	S2	118	11.028	0.458	2.9	0.0728	0.0000	SURCHARGED
120 minute winter	S1	118	11.024	0.704	2.6	0.7965	0.0000	SURCHARGED
120 minute winter	S5	118	10.278	0.029	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
120 minute winter	S3	1.000	S2	2.9	0.662	0.167	0.1433	
120 minute winter	S2	1.001	S1	2.6	0.455	0.166	0.5737	
120 minute winter	S1	1.002	S5	1.8	0.731	0.084	0.0120	34.1

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
180 minute winter	S3	176	11.142	0.496	14.0	41.6661	0.0000	FLOOD RISK
180 minute winter	S2	176	11.140	0.570	2.6	0.0907	0.0000	SURCHARGED
180 minute winter	S1	176	11.136	0.816	2.4	0.9227	0.0000	SURCHARGED
180 minute winter	S5	176	10.279	0.030	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
180 minute winter	S3	1.000	S2	2.6	0.650	0.151	0.1433	
180 minute winter	S2	1.001	S1	2.4	0.446	0.155	0.5737	
180 minute winter	S1	1.002	S5	1.9	0.745	0.090	0.0126	42.2

Appendix F

Site Investigation (Winter BRE365 Soakage Testing and Groundwater Monitoring)



**53 & 55 and Land Rear of 53-61 Southview Road
Southwick
West Sussex**

In Situ Infiltration Test Report

Report Beneficiary:

S.D. Holdings Ltd
4A Southview road
Southwick
West Sussex
BN42 4TO

Project Reference: P14278

Report Reference: R13974

Document Control			
Issue No.	Status	Issue Date	Notes
1	Final	10 th December 2019	
Report Section		Prepared By	Approved By
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TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	SITE CONTEXT	2
2.1	Site Location	2
2.2	Geological and Hydrogeological Information	2
3.	SITE WORKS	3
4.	GROUND CONDITIONS	4
4.1	Stratigraphy	4
4.2	Stability	4
4.3	Groundwater Conditions	4
5.	STORMWATER INFILTRATION SYSTEMS	5

FIGURES AND APPENDICES

Figure 1	Site Location Plan
Figure 2	Site Plan
	Exploratory Hole Notes
	Exploratory Hole Records
	Summary of Trial Pit Falling Head Soakage Test Results

1. INTRODUCTION

Ashdown Site Investigation Ltd. was instructed to undertake in situ infiltration testing and groundwater monitoring, to support the design of the drainage strategy being considered for the site at 53 & 55 and the land rear of 51-63 Southview Road, Southwick.

The specific objectives of the works were to:

- a) Investigate the shallow ground and groundwater conditions at the in-situ infiltration test locations;
- b) Provide calculated soil infiltration rates to assist others in undertaking design of soakaways; and
- c) Monitor groundwater levels for a five-month period.

The scope of the works covered by this report, and the terms and conditions under which they were undertaken, were set out within the offer letter Q9127, dated 11th November 2019. The instruction to proceed was received from the client, S. D. Holdings Ltd.

A previous ground investigation has been carried out at the site by Ashdown Site Investigation Ltd, the findings of which are presented in a Combined Geotechnical and Ground Contamination Risk Assessment report¹.

¹ Ashdown Site Investigation Report No. R18-13255, dated 21st November 2018.

2. SITE CONTEXT

2.1 Site Location

The site comprises an irregular shaped plot of land comprising the properties numbered 53 & 55 Southview Road and the land to the rear of nos. 51-63 Southview Road, Southwick, West Sussex. The site is centred on the approximate Ordnance Survey national grid reference TQ 2415 0588. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

2.2 Geological and Hydrogeological Information

2.2.1 Expected Geology and Aquifer Designation

The stratigraphic succession that may be expected to underlie the site is presented in the following table.

Table 1. Expected Strata and Aquifer Designation

Type	Stratum	Aquifer Designation
Superficial	Head	Secondary Undifferentiated Aquifer
Bedrock	White Chalk Subgroup (Tarrant Chalk Member)	Principal Aquifer

The superficial Head is a polymict deposit generally comprising clay and sandy clay with variable amounts of cobbles, sand or gravel. The lithology of the Head reflects the nature of the parent solid strata; the gravel and cobble fraction comprising chalk and flint. The material is likely to have been disturbed by intense frost action in a periglacial environment. It is usually poorly sorted but may be stratified where it has been subject to solifluction and/or hillwash and soil creep. It may form infill to solution features within the chalk.

The White Chalk Subgroup comprises a weak, white chalk locally with flint bands together with scattered nodular flints. It may be expected to have a deeply convoluted upper surface as a result of solution weathering. The presence of natural cavities in the chalk is very rare and solution features, if present, can be expected to be infilled with Quaternary deposits such as the Head.

The infill material may be significantly weaker than the surrounding chalk. Solution features can comprise pipes extending to several metres deep into the chalk or conical depressions and basin shaped structures.

2.2.2 Groundwater Source Protection Zones

The site does not lie within an Environment Agency Source Protection Zone with regard to the protection of the quality of groundwater that is abstracted for potable supply.

3. SITE WORKS

The site works comprised the excavation of five mechanical dug pits (designated TP101 to TP105) to depths of between 1.00m and 3.00m below ground level. The fieldwork was carried out between the 19th and 22nd November 2019. The exploratory hole locations are shown on Figure 2.

Falling head soakage testing was undertaken in each of the trial pits in general accordance with BRE guidance².

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole records which, together with notes to assist in their interpretation, are appended to this report.

Groundwater data loggers were installed on the 19th November 2019 within standpipes previously installed at the positions of boreholes WS01 and WS07 from the original investigation works and the groundwater will be monitored for a period of five months. The data loggers were programmed to collect readings at 15-minute intervals. The results of the groundwater monitoring will be issued separately on completion of the monitoring period. The exploratory hole positions from the previous investigation works are also included on Figure 2.

² Section 3.2.3 of Building Research Establishment (BRE) Digest 365, 2016.
53 & 55 and Land Rear of 53-61 Southview road, Southwick, West Sussex

4. GROUND CONDITIONS

4.1 Stratigraphy

4.1.1 Surface Covering

Each of the exploratory holes was excavated through a surface cover of topsoil some 150mm to 300mm in thickness.

4.1.2 Made Ground

Made ground, generally comprising sandy gravel was recorded within trial pit TP104 to a depth 0.40m below ground level. The gravel fraction comprised variable quantities of brick, flint, crystalline rock, charcoal-like material, clinker-like material and glass.

4.1.3 Head

Underlying the surfacing/made ground, the investigation progressed into undisturbed gravelly sandy clay soils which continued to the full depths of the trial pits TP103, TP104 and TP105 and to a depth of 2.00m within trial pit TP101 and TP102.

Below the clay soils, where penetrated, sand deposits were encountered and recorded to the full depth of the trial pits TP101 and TP102.

These soils are considered to be representative of the Head deposits indicated to underlie the site on the published geological datasets.

4.2 Stability

Each of the exploratory holes was recorded to remain stable during the course of excavation.

4.3 Groundwater Conditions

Groundwater was not encountered during the excavation of the trial pits.

The results of the groundwater monitoring will be issued on completion of the monitoring period.

5. STORMWATER INFILTRATION SYSTEMS

In-situ infiltration testing³ was carried out in trial pits TP101 to TP105. From the test results calculations were made to determine the infiltration rate that could be expected for infiltration systems constructed into the underlying Head soils.

In general, for each test the soil infiltration rate (f) was calculated by dividing the volume of water lost between 75% and 25% of the initial test depth by the sum of the average surface area of the sides of the trial pit in contact with the water during the test monitoring period, and its base area. This figure was then divided by the test duration (time taken for the water level to fall between 75% and 25% of the initial test depth) to give the soil infiltration rate in metres per second.

During the tests performed within trial pits TP101 (Test 1), TP101 (Test 3), TP103 (Test 1) and TP103 (Test 3), the water level within the test pits did not fall below 25% of the initial test depth due to either the water level not being able to be sufficiently raised during filling (TP101) or the pit being filled for another test prior to the 25% level having been met (TP103). Calculation of the soil infiltration rates in accordance with the BRE digest was not possible for these tests. The soil infiltration rate has therefore been calculated by dividing the volume of water lost during the test by the product of the average surface area of the trial pit in contact with water during the test period and the test duration in seconds.

The infiltration rates derived from the tests conducted within the Head deposits are summarised in the following table.

Table 2. Calculated Infiltration Rates

Exploratory Hole	Test Response Zone Depth (m)		Infiltration Rate (f) (m/sec)
	Top	Bottom	
TP101 Test 1	2.70	2.90	2.5×10^{-5}
TP101 Test 2	2.31	2.90	1.4×10^{-4}
TP101 Test 3	2.56	2.90	8.8×10^{-5}
TP102 Test 1	2.03	2.90	8.0×10^{-5}
TP102 Test 2	1.02	2.90	6.7×10^{-5}
TP102 Test 3	0.85	2.90	5.6×10^{-5}
TP102 Test 4	0.53	2.90	4.3×10^{-5}
TP103 Test 1	0.85	3.00	3.5×10^{-5}
TP103 Test 2	0.25	3.00	8.4×10^{-6}
TP103 Test 3	0.92	3.00	8.4×10^{-6}
TP103 Test 4	0.41	3.00	7.6×10^{-6}
TP104 Test 1	0.62	3.00	1.3×10^{-5}
TP104 Test 2	0.26	3.00	1.0×10^{-5}
TP104 Test 3	0.38	3.00	9.0×10^{-6}
TP104 Test 4	0.39	3.00	8.9×10^{-6}
TP105 Test 1	0.00	1.00	3.8×10^{-5}
TP105 Test 2	0.00	1.00	2.4×10^{-5}

³ Conducted in general accordance with the requirements of BRE 365, Soakaway Design.

Exploratory Hole	Test Response Zone Depth (m)		Infiltration Rate (f) (m/sec)
	Top	Bottom	
TP105 Test 3	0.00	1.00	2.3×10^{-5}
TP105 Test 4	0.00	1.00	1.5×10^{-5}

The value 'f' is equivalent to the soil infiltration coefficient 'q' quoted in the Construction Industry Research and Information Association (CIRIA) Report 156.

The results from the infiltration tests indicate that the Head soils possess moderate to good infiltration characteristics. The results from the infiltration tests should be provided to engineers responsible for the design of the drainage system.

To comply with building regulations⁴, point discharging infiltration systems (conventional ring or trench soakaways) are required to be constructed a minimum of 5.0m away from proposed or existing buildings.

Ashdown Site Investigation Ltd.

⁴ The Building Regulations 2010; Part H; Drainage and Waste Disposal
53 & 55 and Land Rear of 53-61 Southview road, Southwick, West Sussex

FIGURES AND APPENDICES

Figure 1 Site Location Plan

Figure 2 Site Plan

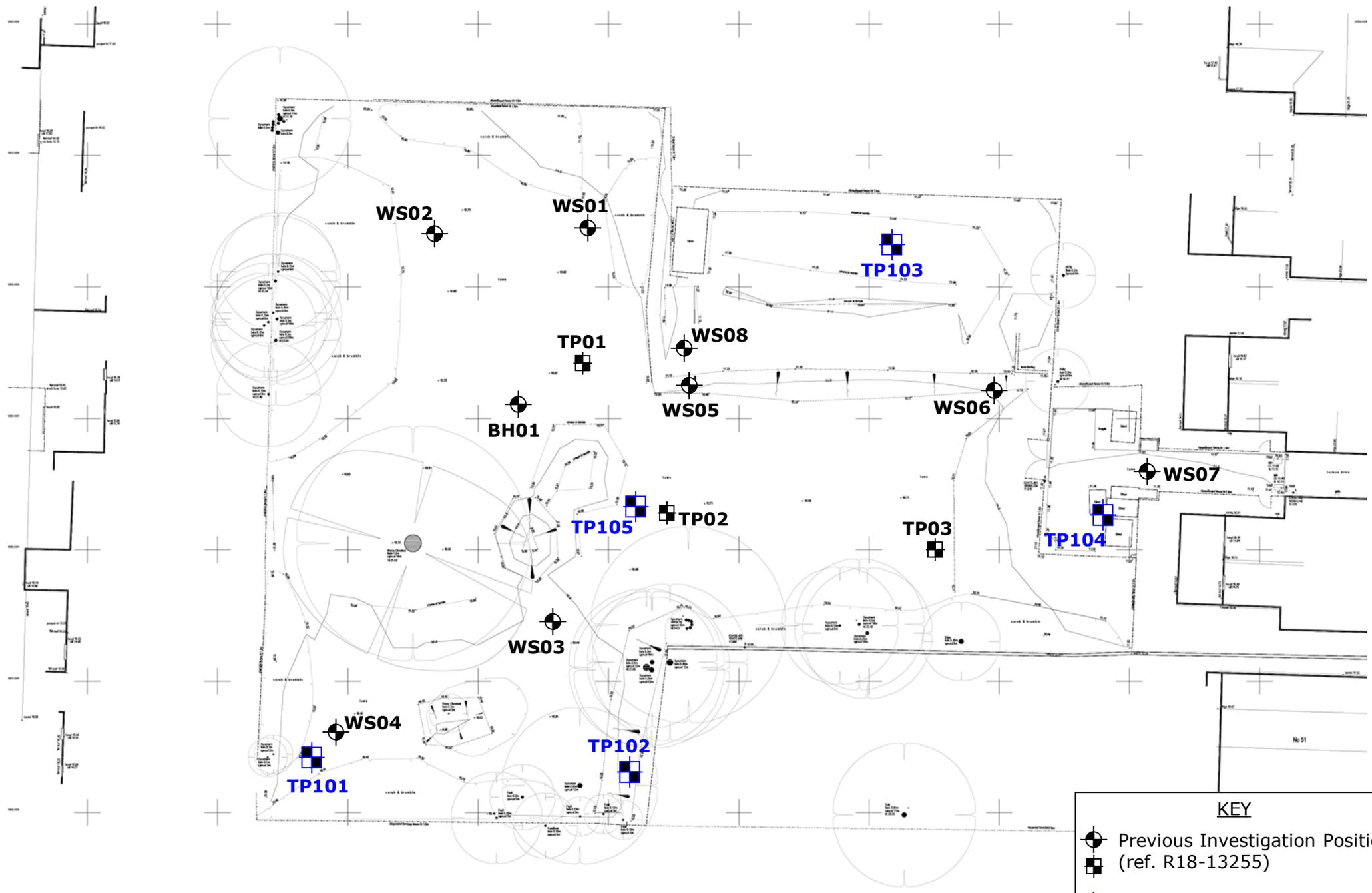
Exploratory Hole Notes

Exploratory Hole Records

Summary of Trial Pit Falling Head Soakage Test Results



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KEY

-  Previous Investigation Positions (ref. R18-13255)
-  Current Investigation Positions

NOTES FOR THE INTERPRETATION OF EXPLORATORY HOLE RECORDS

1 Symbols and abbreviations

Samples

U	'Undisturbed' Sample: - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
U _o	Sample not obtained
U*	Full penetration of sample not obtained
Pi	Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D	Disturbed Sample
R	Root Sample
B	Bulk Disturbed Sample
W	Water Sample
J	Jar Sample (sample taken in amber glass jar fitted with gas tight lid)
T	Tub Sample
Vi	Vial Sample

In situ Testing

S	Standard penetration test (SPT): Using the split spoon sampler.
C	Standard Penetration Test (SPT): using a solid cone instead of the sampler - conducted usually in coarse grained soils or weak rocks.
V	Shear Vane Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
H	Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m ²) shown within the Vane/Pen Test and N Value column.
P	Perth Penetrometer Test: Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column.

Excavation Method

CP	Cable Percussion Borehole
WLS	Dynamic Sampler Borehole using windowless sampler tubes
WS	Dynamic Sampler Borehole using window sampler tubes
TP	Trial Pit excavated using mechanic excavator
HDP	Trial Pit excavated using hand tools

2 Soil Description

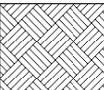
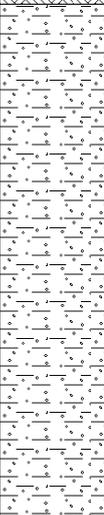
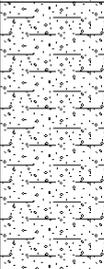
Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1) and Part 2 Principles of classification (BS EN 14688-2) as well as the BS5930 code of Practice for Ground Investigations.

3 Rock Description

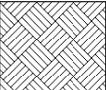
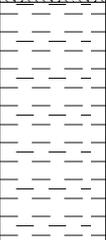
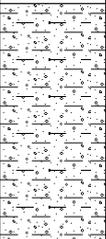
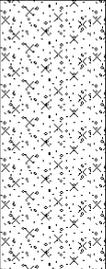
Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1) as well as the BS5930 code of Practice for Ground Investigations. TCR – Total Core Recovery, SCR – Solid Core Recovery, RQD – Rock Quality Designation, NI – Non Intact, If – indicative fracture spacing (min/ave/max), FI – Fracture Index.

4 Chalk Description

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk.

Samples and In Situ Testing			Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result		
				0.00	Topsoil with frequent fine rootlets.
				0.30	Orange brown gravelly slightly sandy CLAY. Gravel is angular to subrounded fine to coarse flint. (Head)
D	1.00				becoming sandy below 1.00m depth.
				2.00	Light orange brown very gravelly clayey fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint. (Head)
D	1.90				
D	2.80			2.90	End of trial pit at 2.90m

Remarks Groundwater: Trial pit dry on completion. Stability: Trial pit stable on completion. Notes: n/a	Excavation Method: HDP
	Pit Length: 2.20m
	Pit Width: 0.70m
	Made By: GR

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
					0.00	Topsoil with occasional fragments of brick and frequent roots and rootlets.
					0.30	Brown slightly gravelly slightly sandy CLAY. Gravel is angular to subangular fine to coarse flint with occasional chalk. Sand is fine to coarse. (Head)
D	1.00				1.10	Orange brown and brown mottled very gravelly sandy CLAY. Gravel is fine to coarse angular to subrounded flint. Sand is fine to coarse. (Head)
D	1.90				2.00	Orange brown gravelly silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint. (Head)
D	2.50				2.90	End of trial pit at 2.90m

<p>Remarks</p> <p>Groundwater: Trial pit dry on completion.</p> <p>Stability: Trial pit stable on completion.</p> <p>Notes: n/a</p>	Excavation Method: HDP
	Pit Length: 2.20m
	Pit Width: 0.60m
	Made By: GR

Site Name: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Job Number: P14278

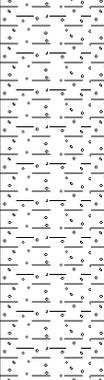
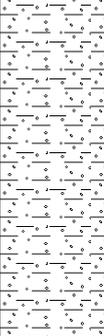
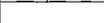
Start Date: 19/11/2019

End Date: 19/11/2019

Trial Pit Number: **TP103**

Samples and In Situ Testing			Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)			
D	1.00			0.00	Topsoil with frequent roots and rootlets.
				0.20	MADE GROUND: Dark brown gravelly sandy clay. Gravel is subangular to subrounded fine to coarse flint, chalk and rare brick fragments.
				0.40	Orange brown and brown mottled very gravelly slightly sandy CLAY. Gravel is angular to subrounded fine to coarse flint and chalk. Sand is fine to coarse. (Head)
D	2.00			1.50	Light brown gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse flint and chalk. (Head)
D	3.00			3.00	End of trial pit at 3.00m

<p>Remarks</p> <p>Groundwater: Trial pit dry on completion.</p> <p>Stability: Trial pit stable on completion.</p> <p>Notes: n/a</p>	Excavation Method: HDP
	Pit Length: 2.20m
	Pit Width: 0.60m
	Made By: GR

Samples and In Situ Testing			Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)			
				0.00	Topsoil.
				0.15	MADE GROUND: Dark brown and black brown very sandy angular to subangular fine to coarse gravel of flint, brick, clinker-like material, charcoal-like material, plastic, glass and crystalline rock. Orange brown and brown gravelly slightly sandy CLAY. Gravel is angular to subrounded fine to coarse flint and chalk. (Head)
				0.40	
D	1.00				
D	2.00				becoming light orange brown and silty with increased chalk gravel below 2.00m depth.
D	3.00			3.00	End of trial pit at 3.00m

<p>Remarks</p> <p>Groundwater: Trial pit dry on completion.</p> <p>Stability: Trial pit stable on completion.</p> <p>Notes: n/a</p>	Excavation Method: HDP
	Pit Length: 2.00m
	Pit Width: 0.60m
	Made By: GR

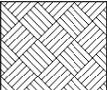
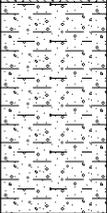
Site Name: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Job Number: P14278

Start Date: 19/11/2019

End Date: 19/11/2019

Trial Pit Number: **TP105**

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
D	1.00				0.00	Topsoil with occasional brick fragments, rootlets and roots.
					0.30	Brown gravelly sandy CLAY with occasional fine rootlets. Gravel is angular to subangular fine to coarse flint. (Head)
					1.00	End of trial pit at 1.00m

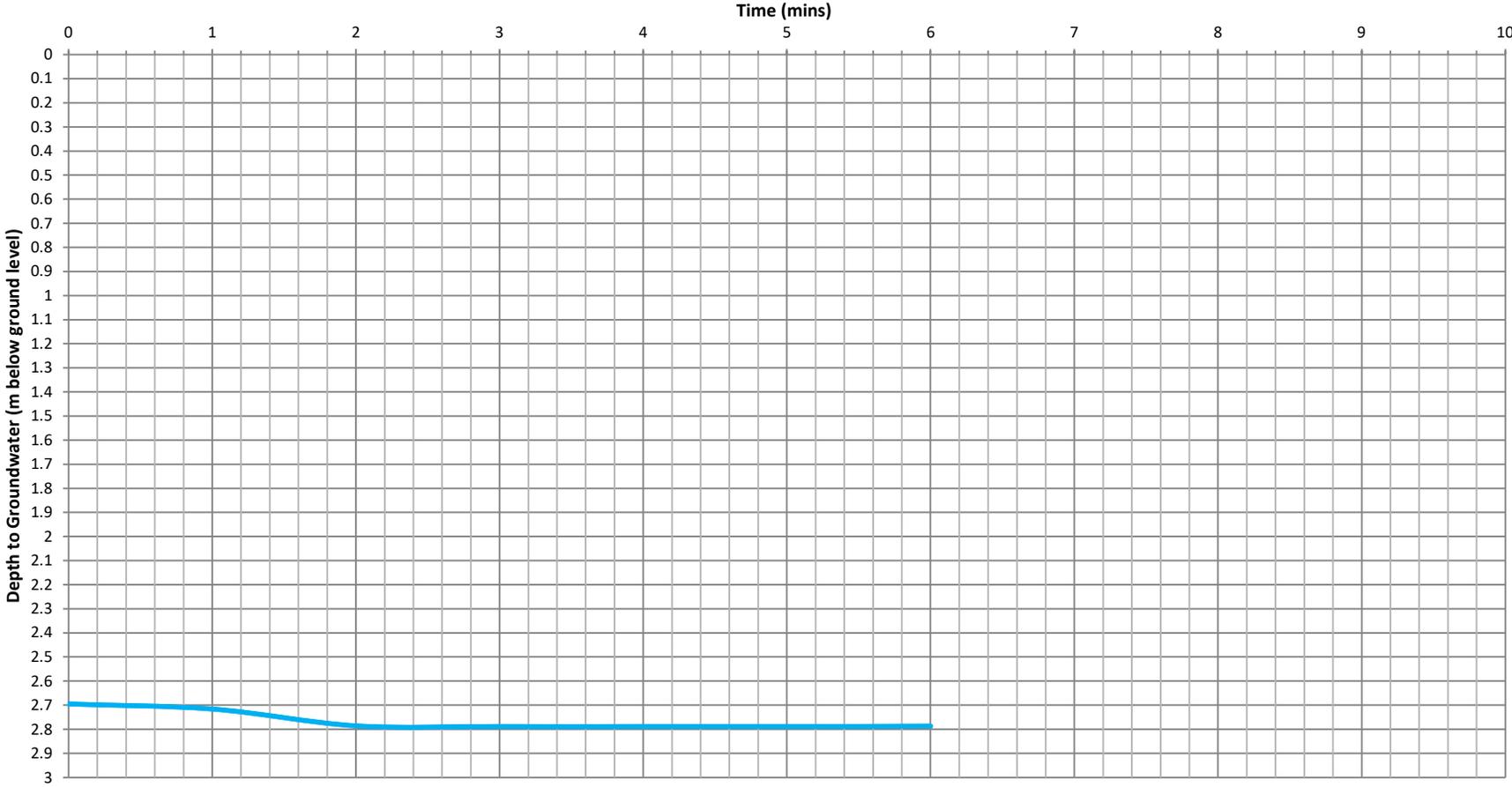
<p>Remarks</p> <p>Groundwater: Trial pit dry on completion.</p> <p>Stability: Trial pit stable on completion.</p> <p>Notes: n/a</p>	Excavation Method: HDP
	Pit Length: 1.30m
	Pit Width: 0.70m
	Made By: GR

Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP101 Test 1

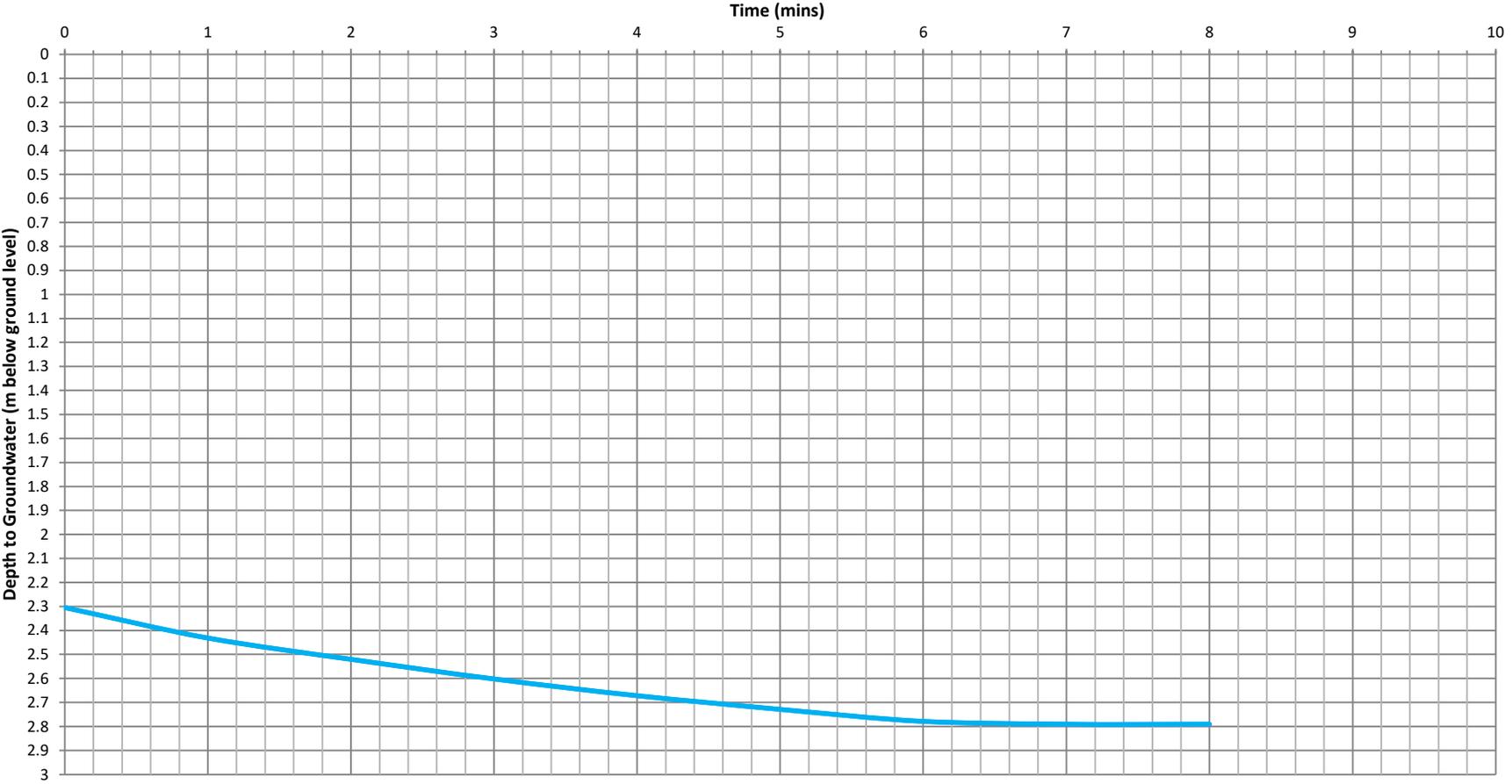


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP101 Test 2

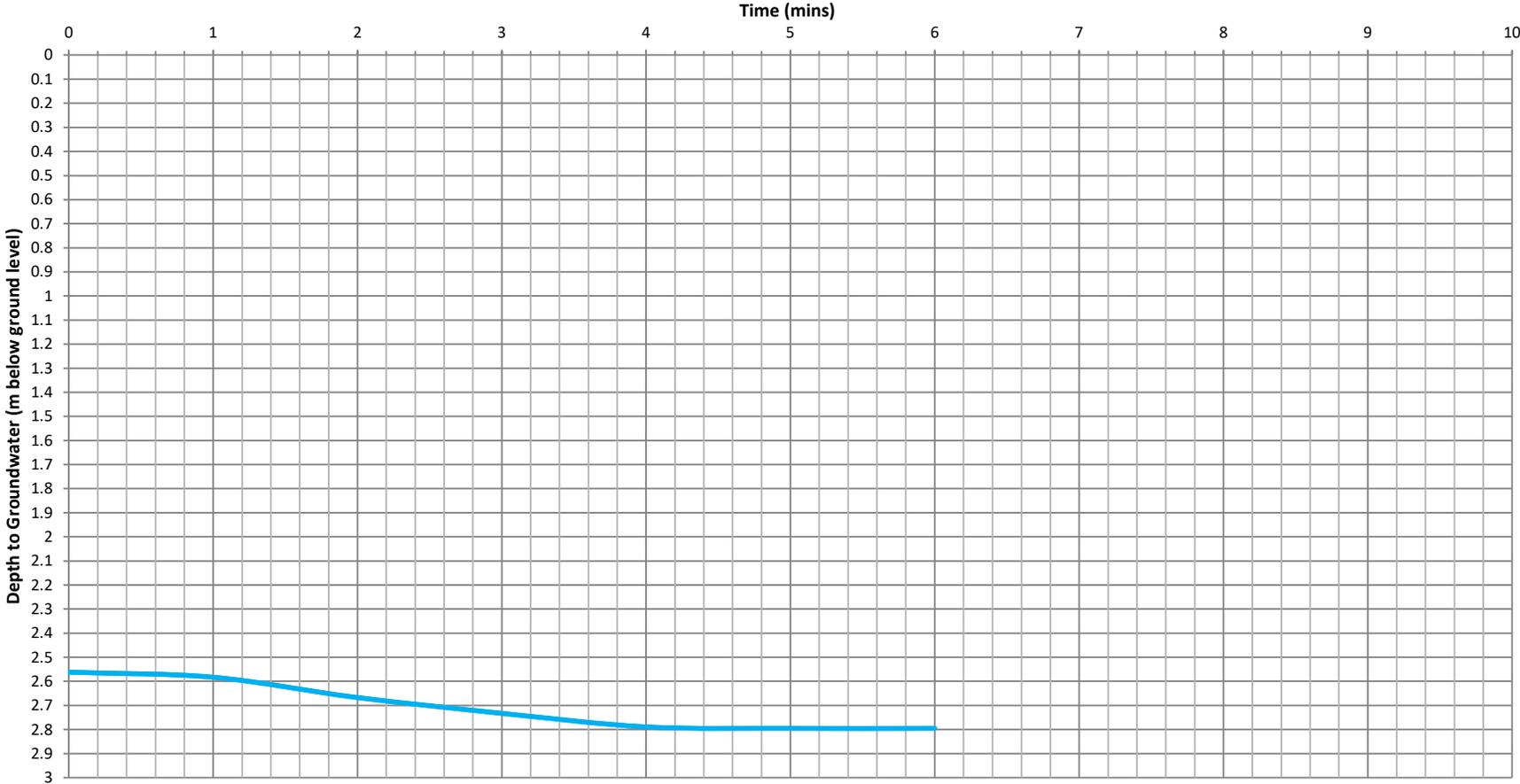


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP101 Test 3

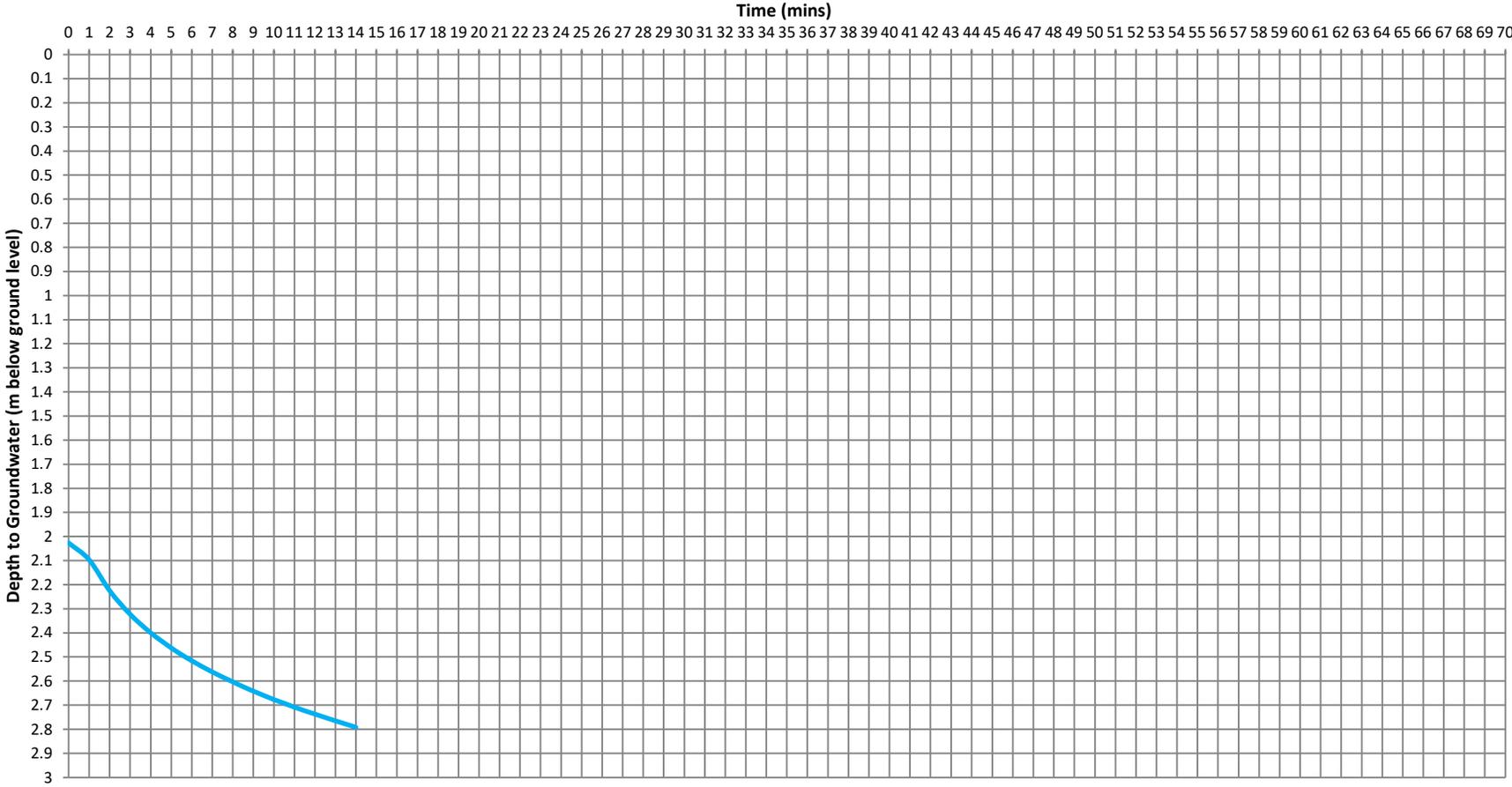


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP102 Test 1

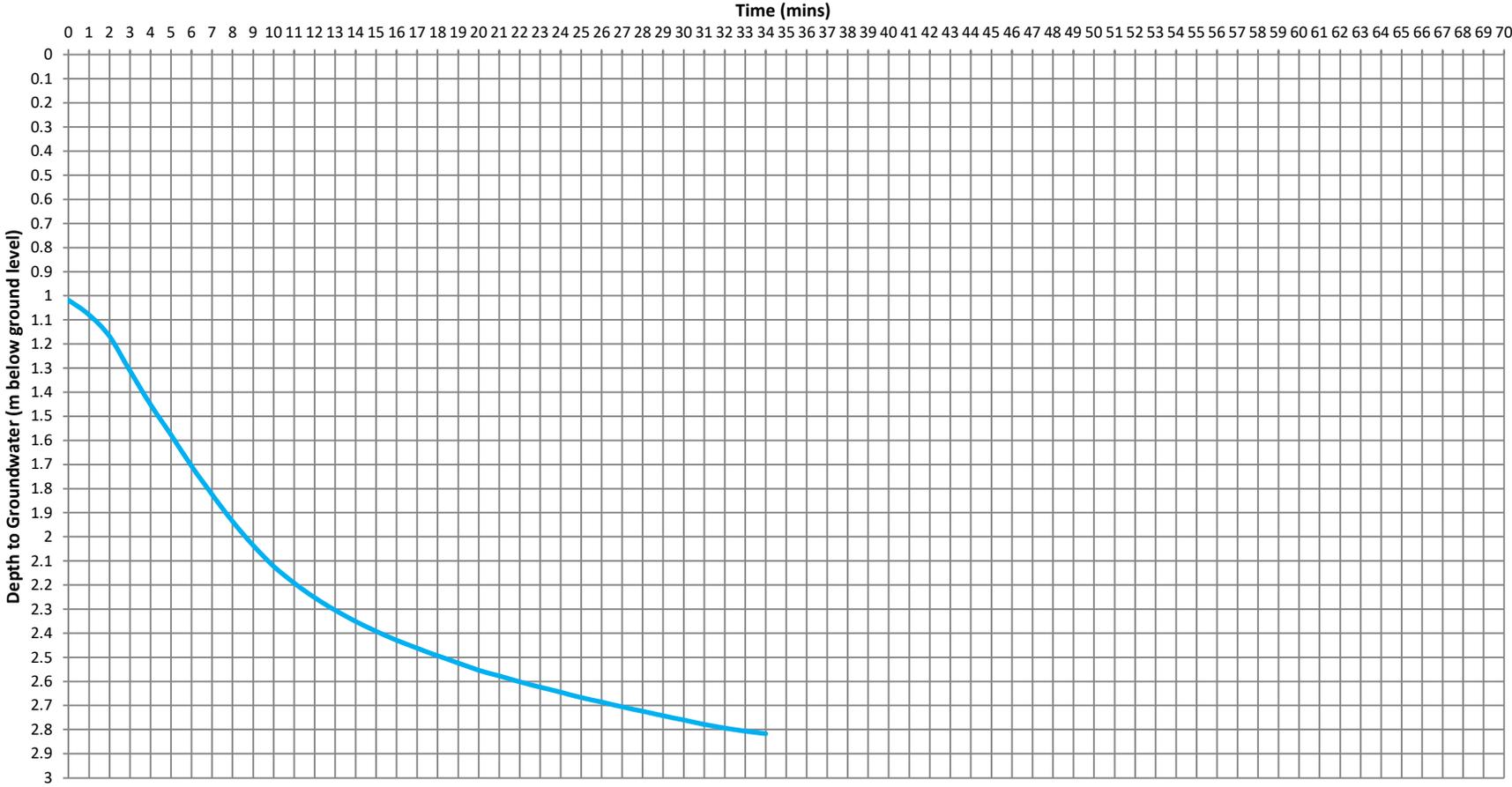


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP102 Test 2

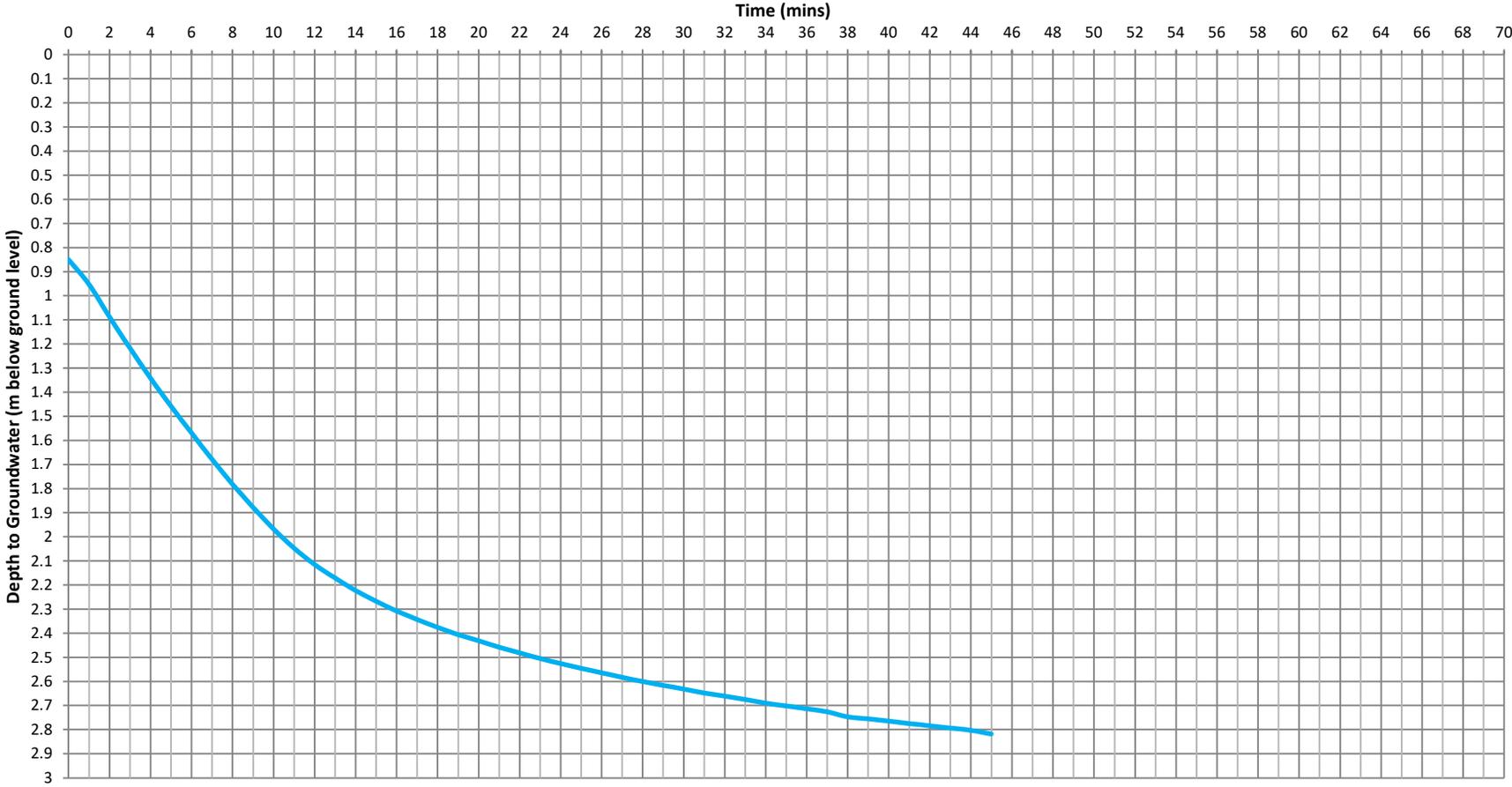


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP102 Test 3

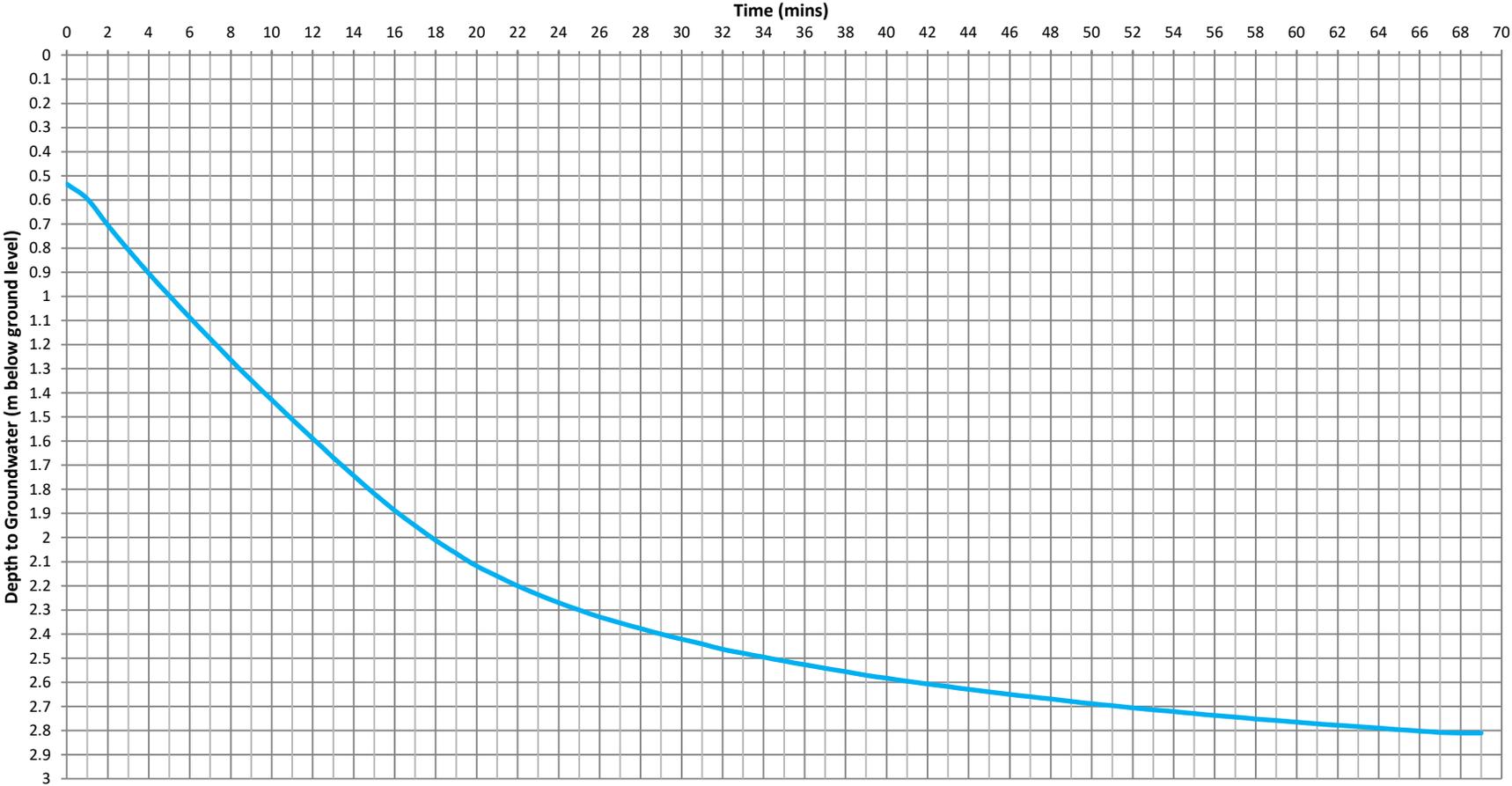


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP102 Test 4

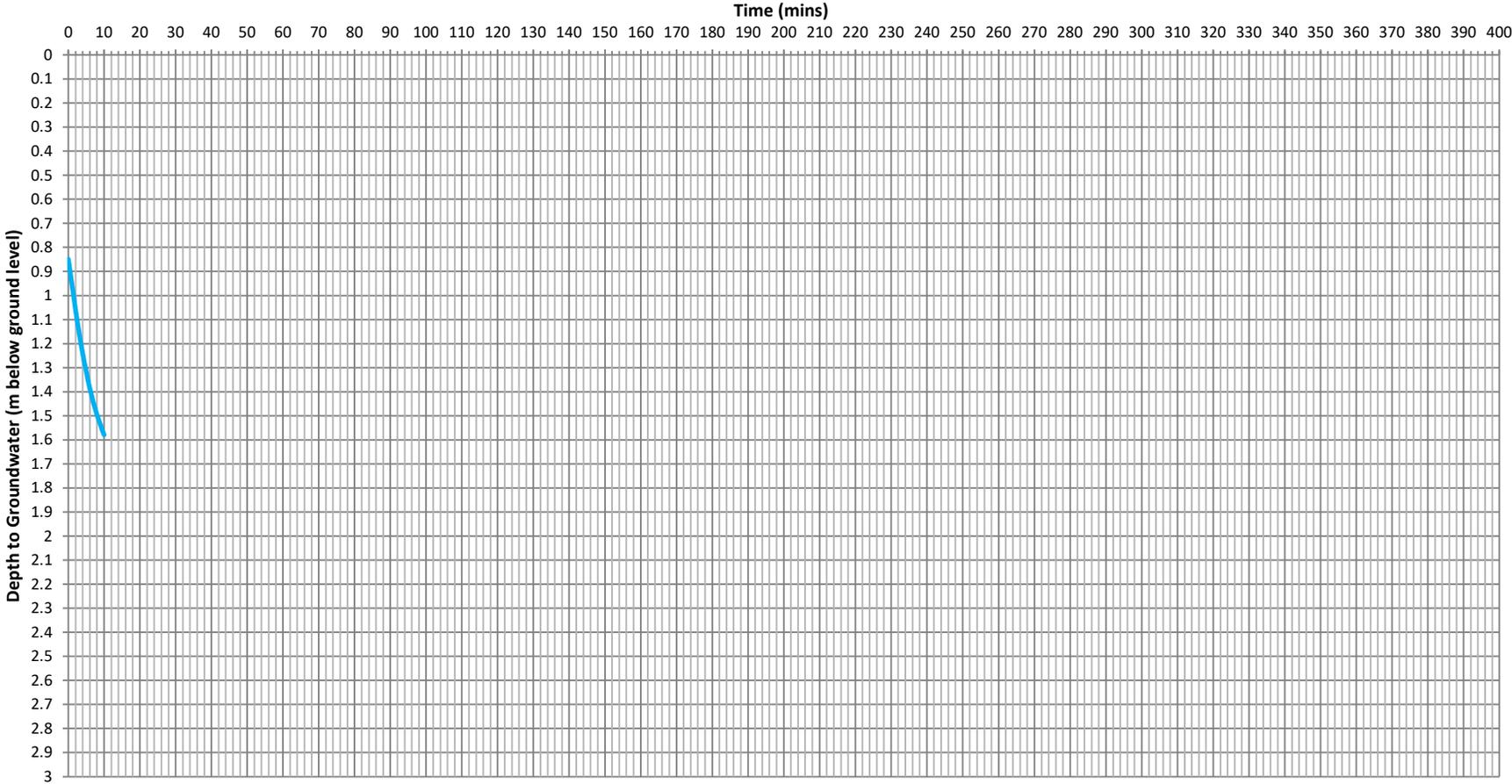


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP103 Test 1

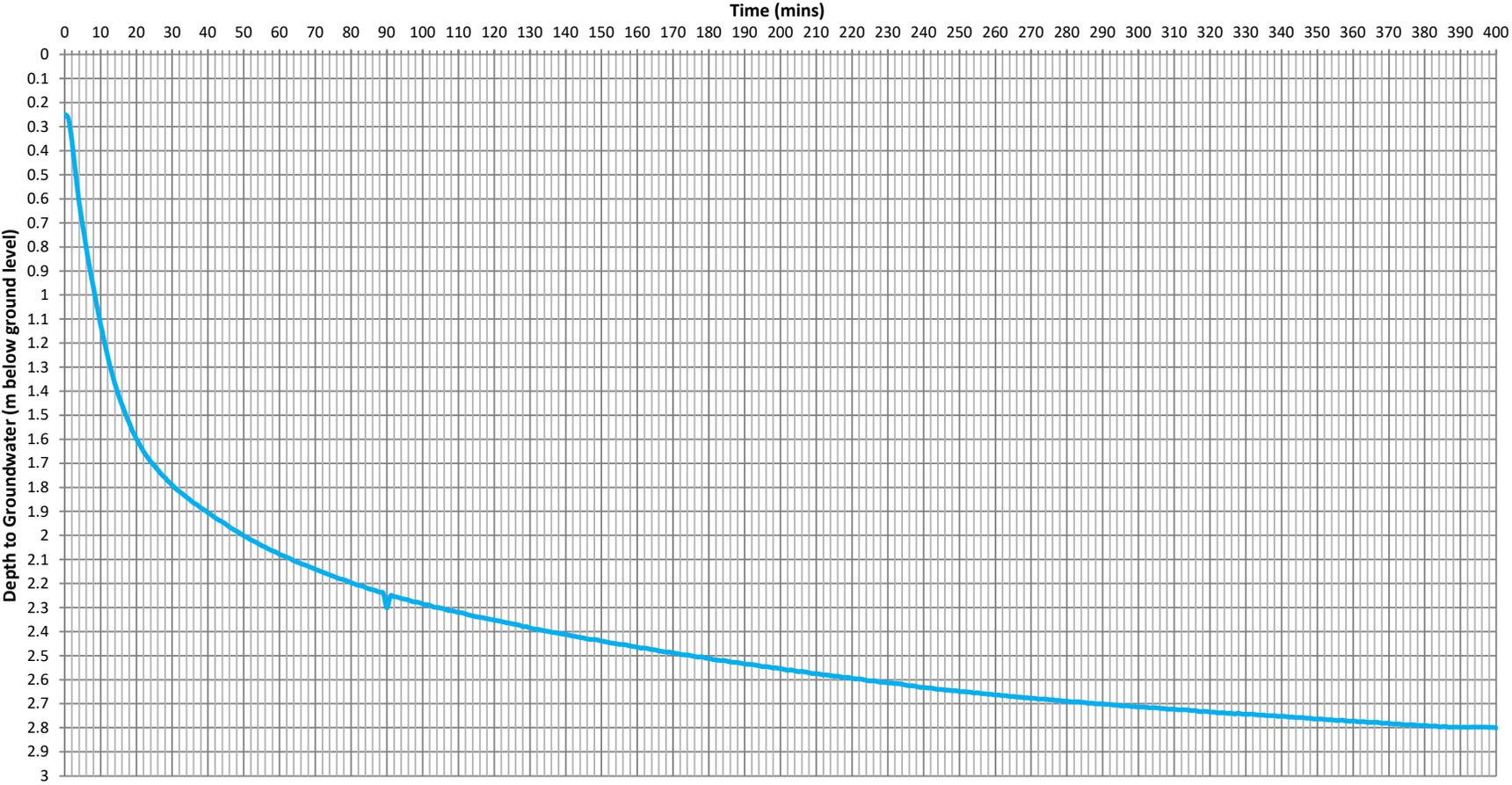


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP103 Test 2

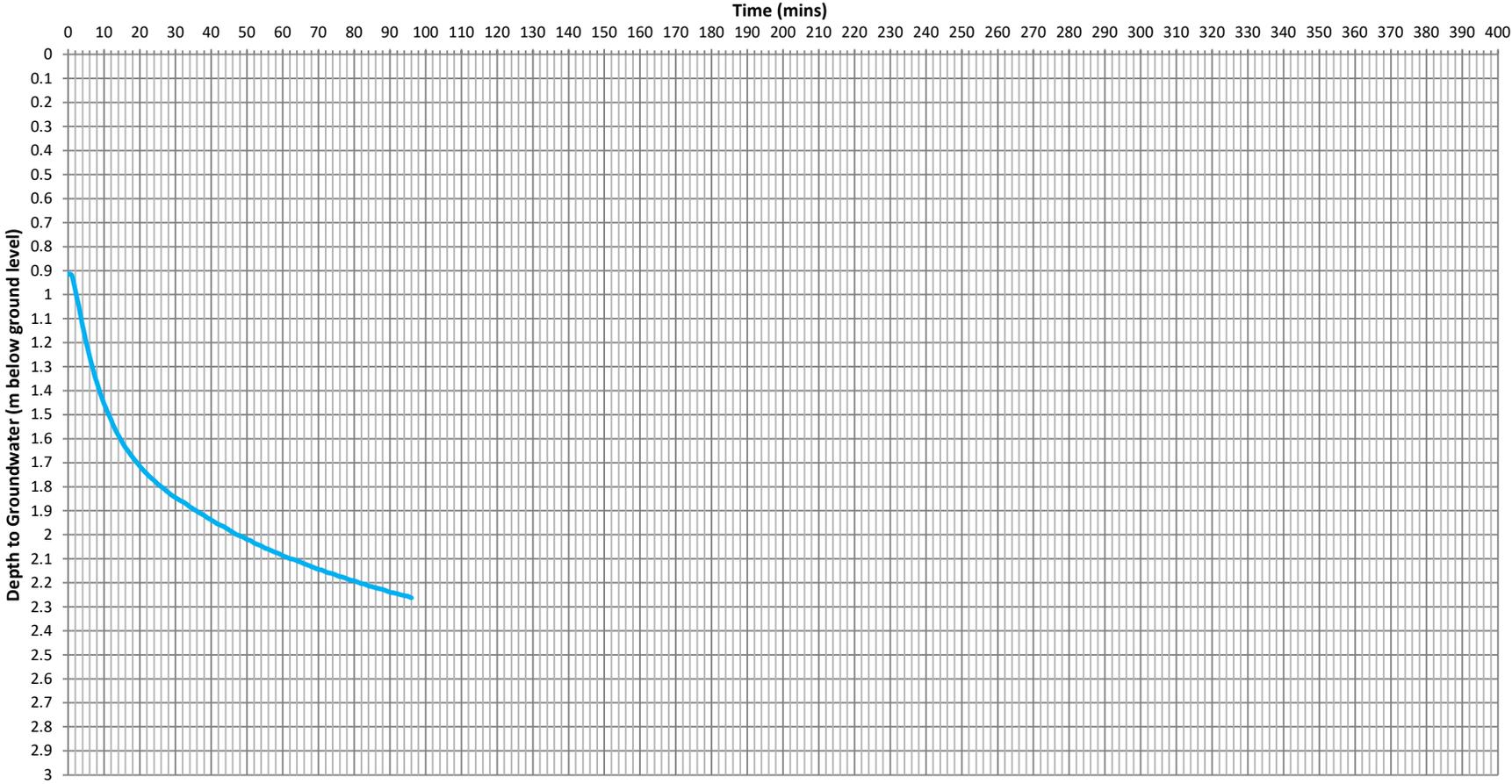


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP103 Test 3

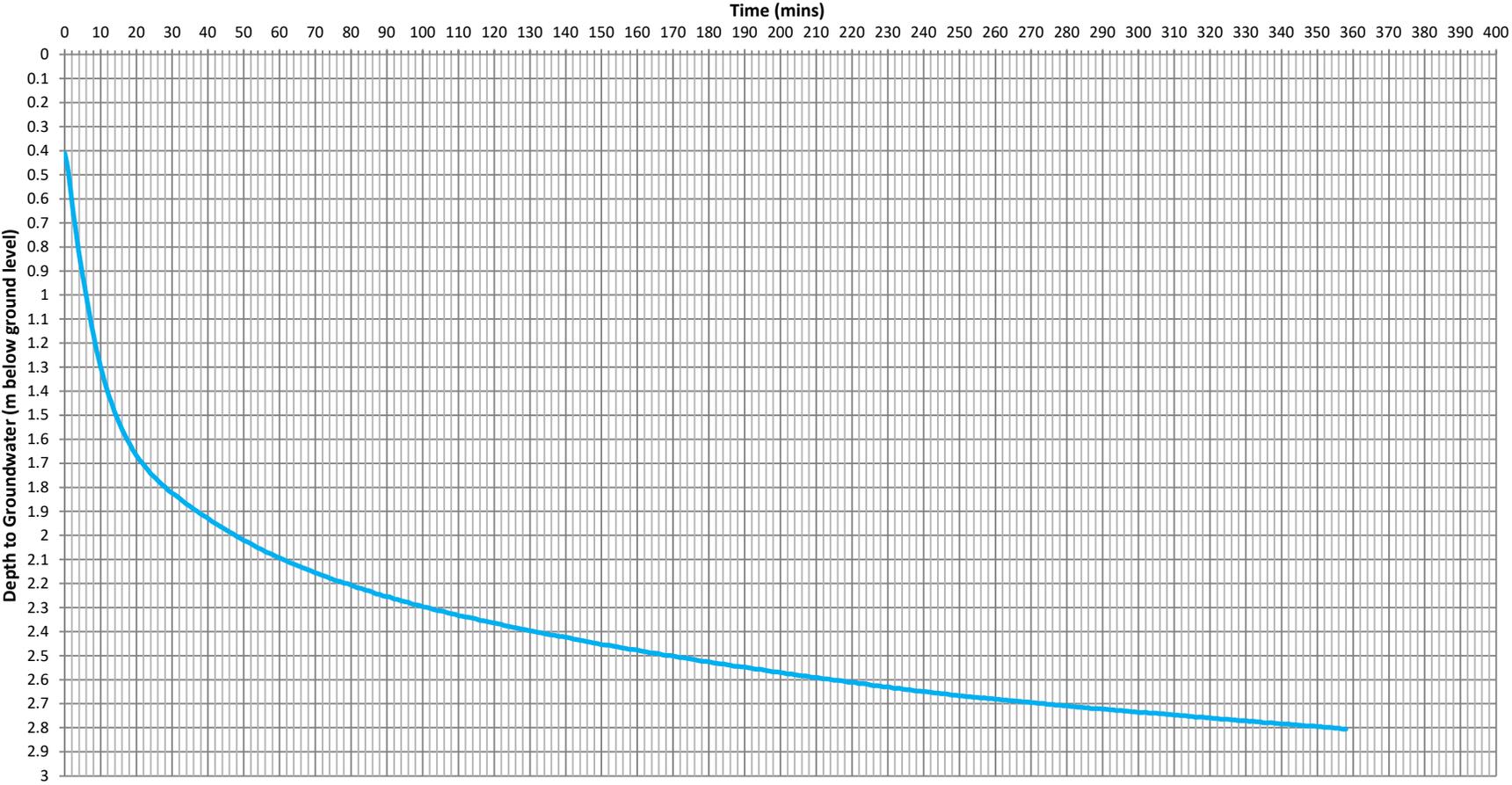


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP103 Test 4

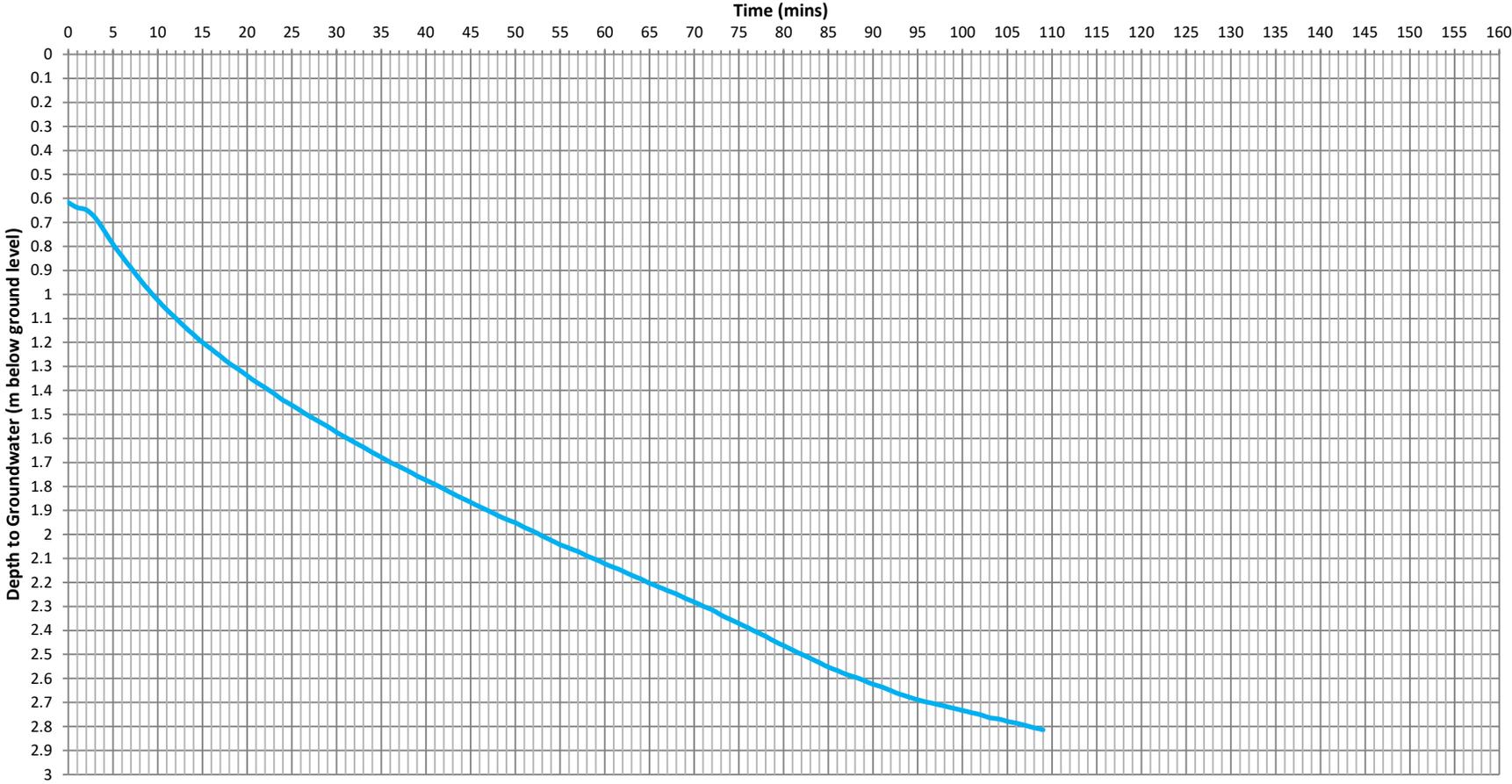


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

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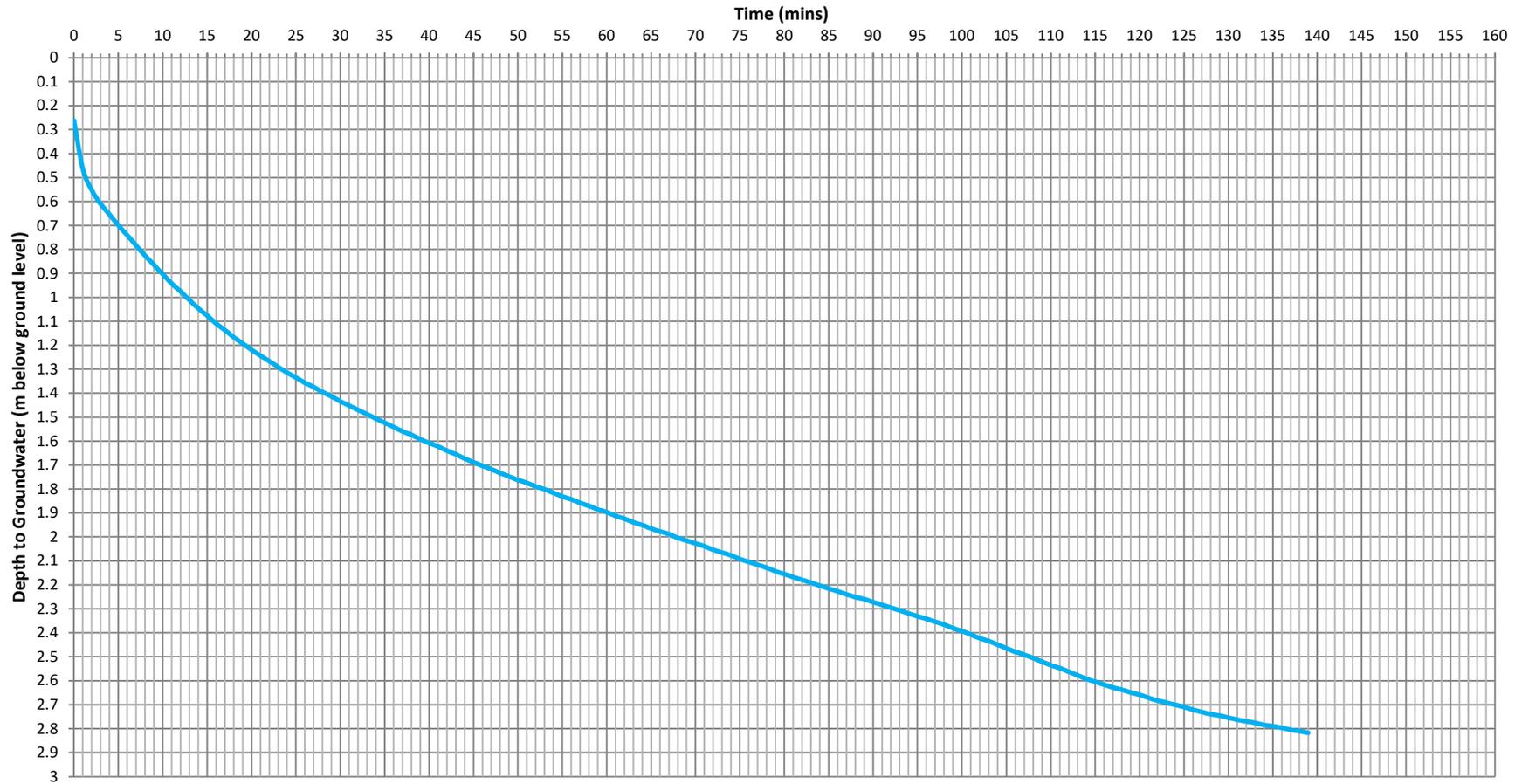


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP104 Test 2

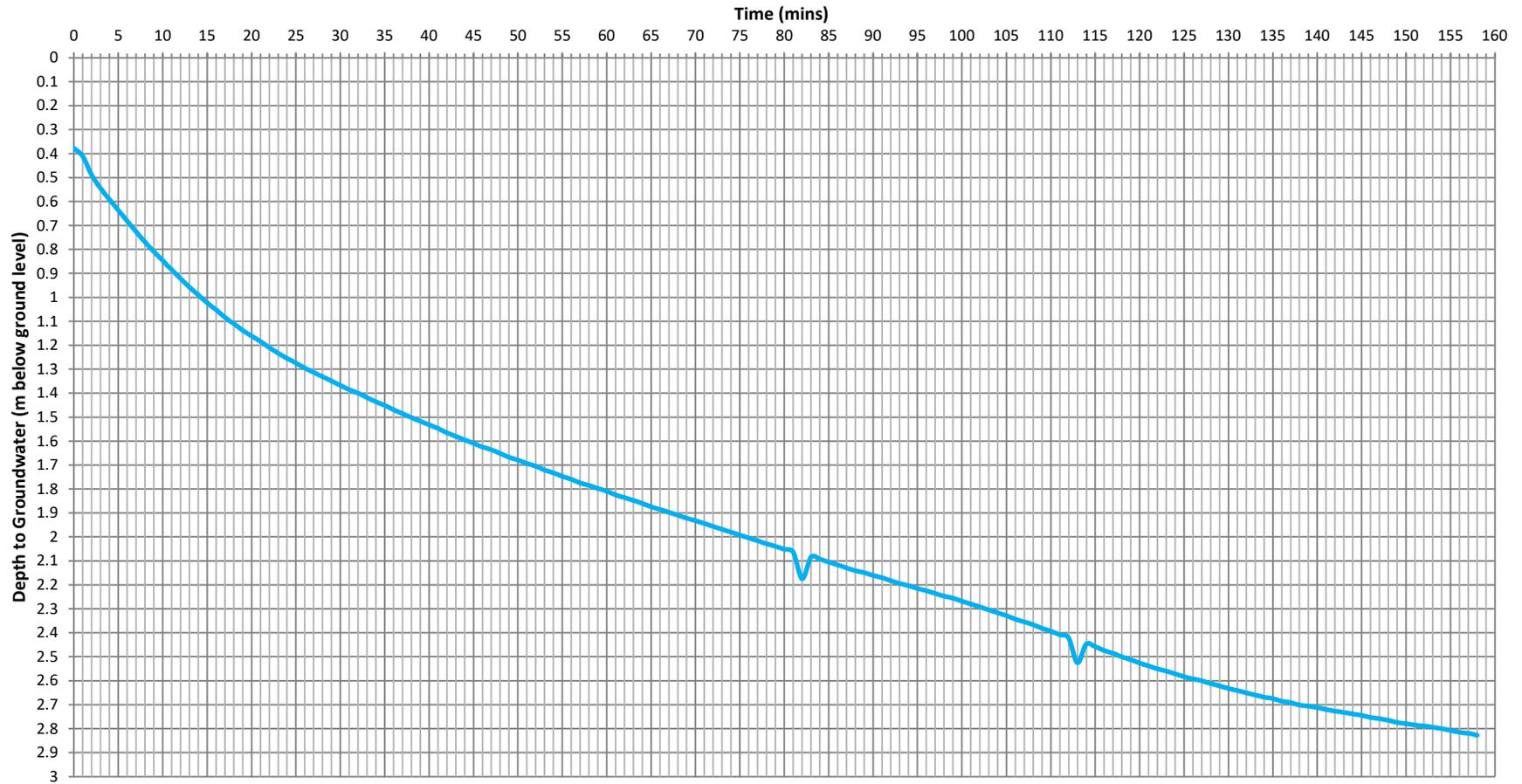


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP104 Test 3

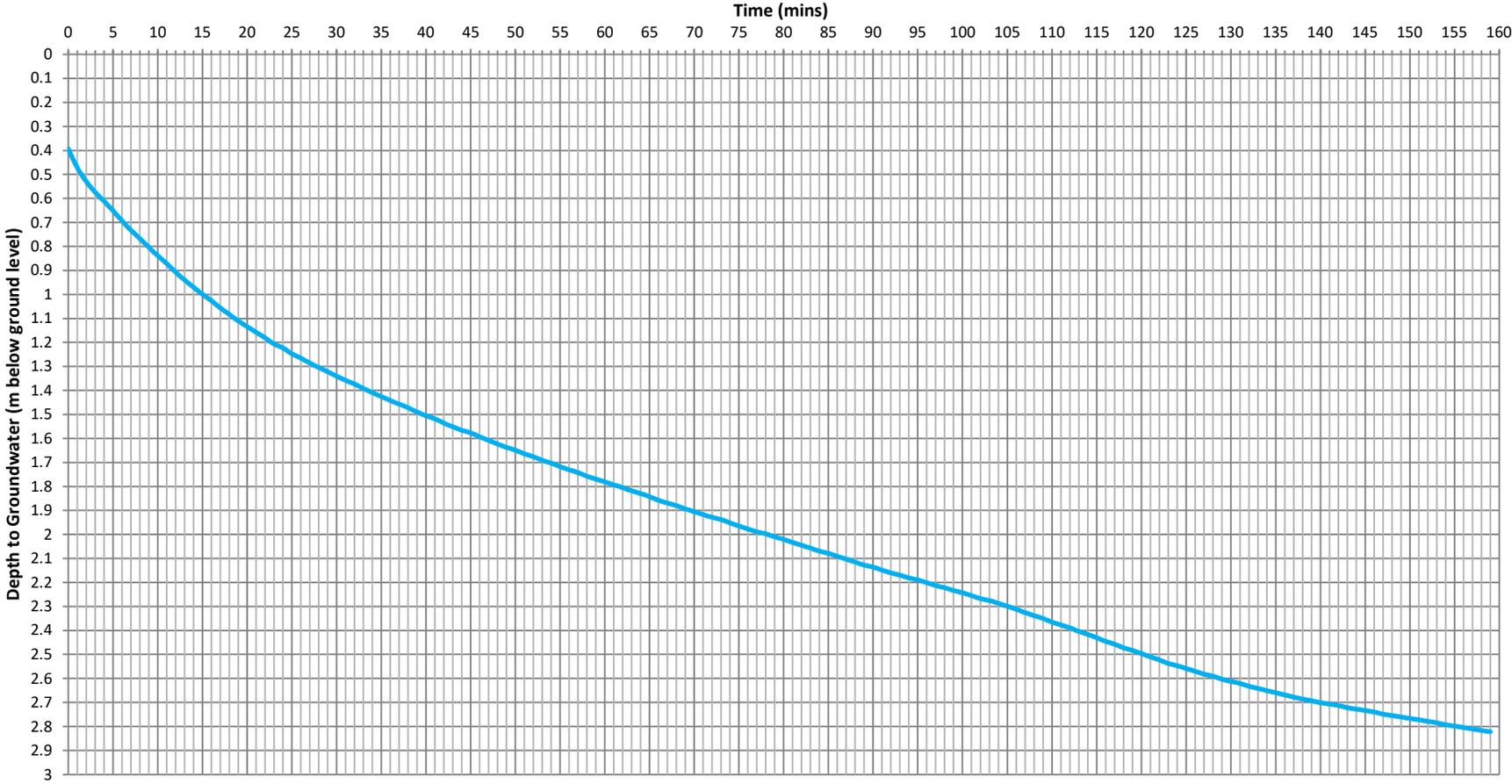


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP104 Test 4

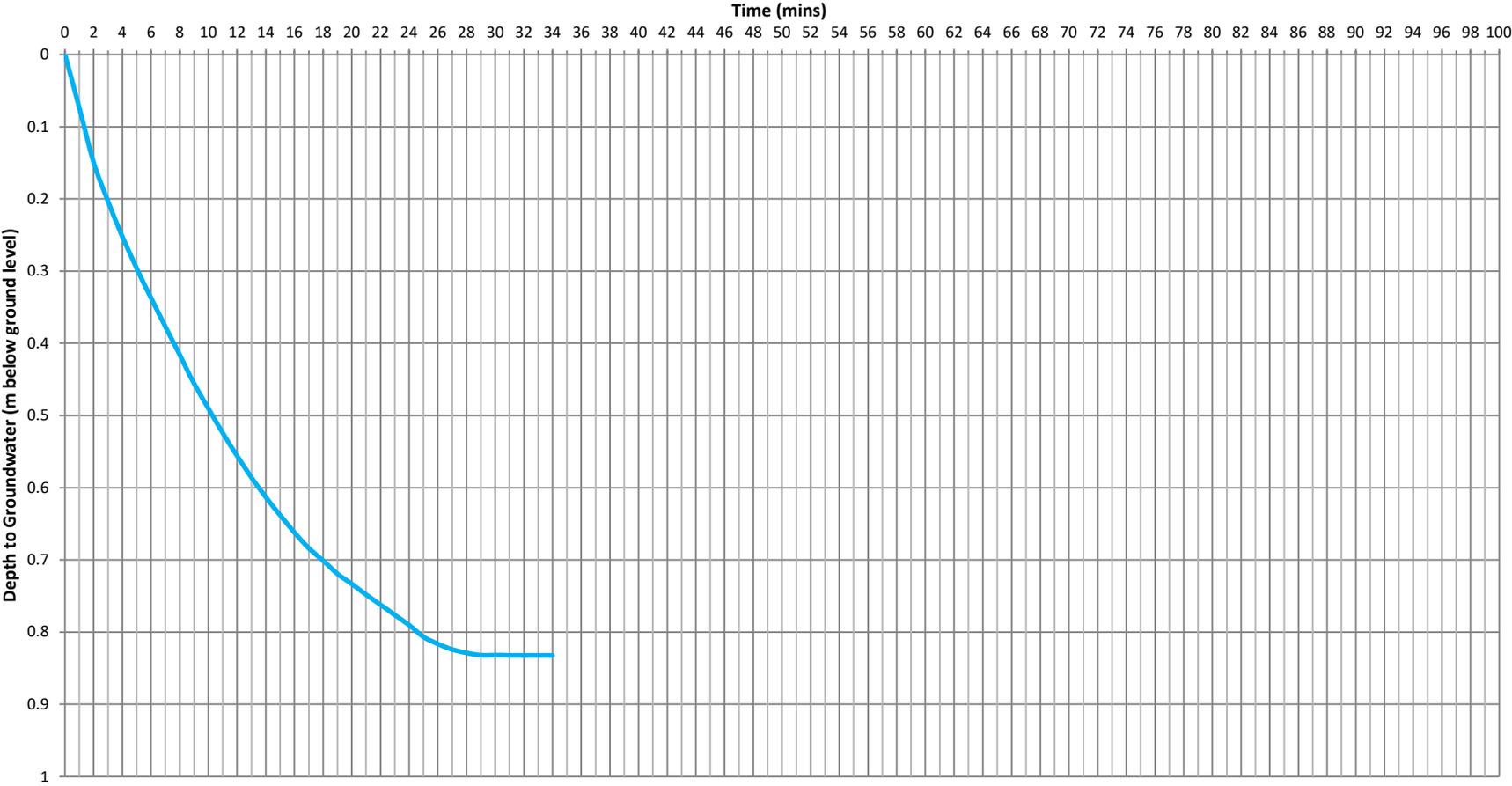


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP105 Test 1

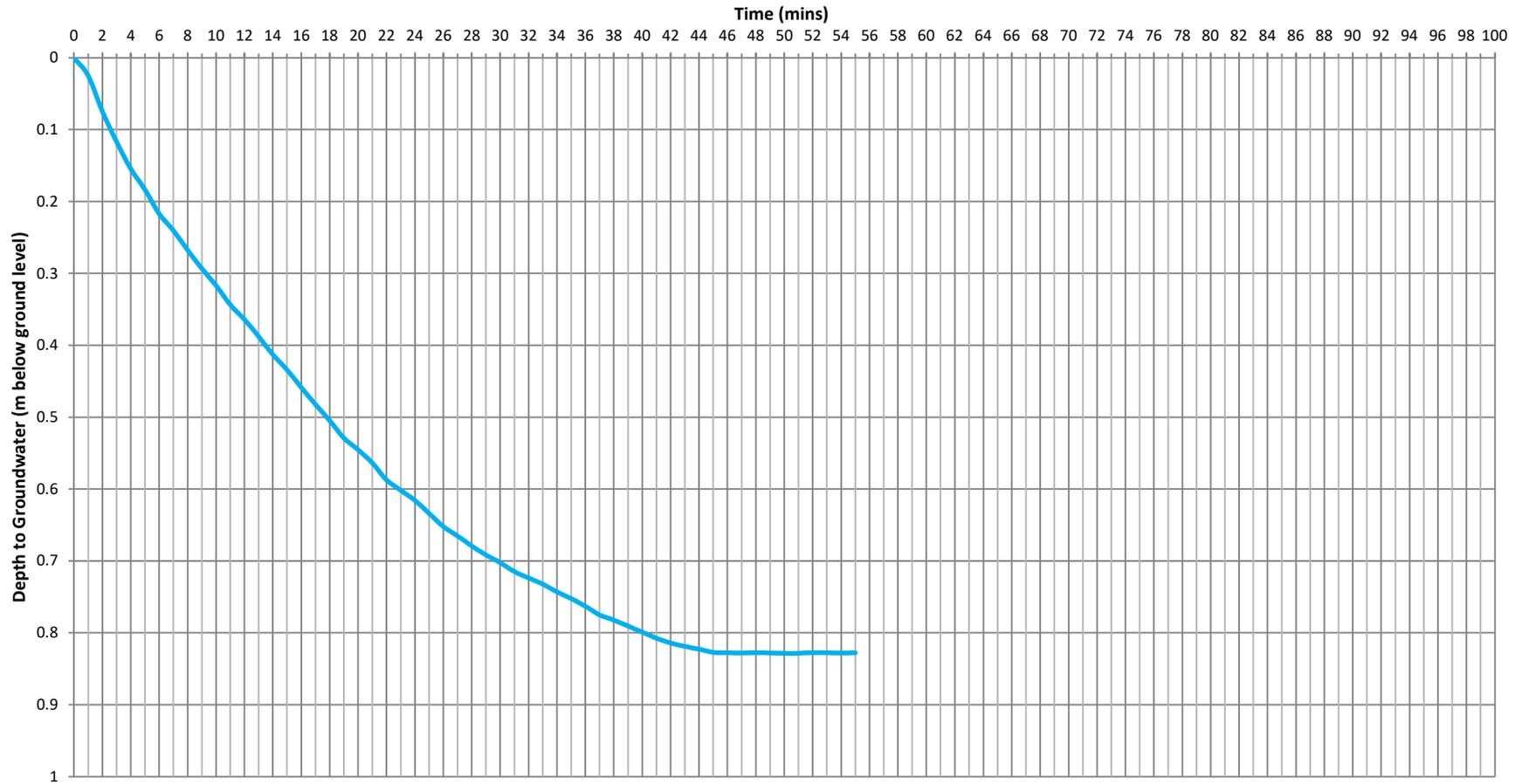


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP105 Test 2

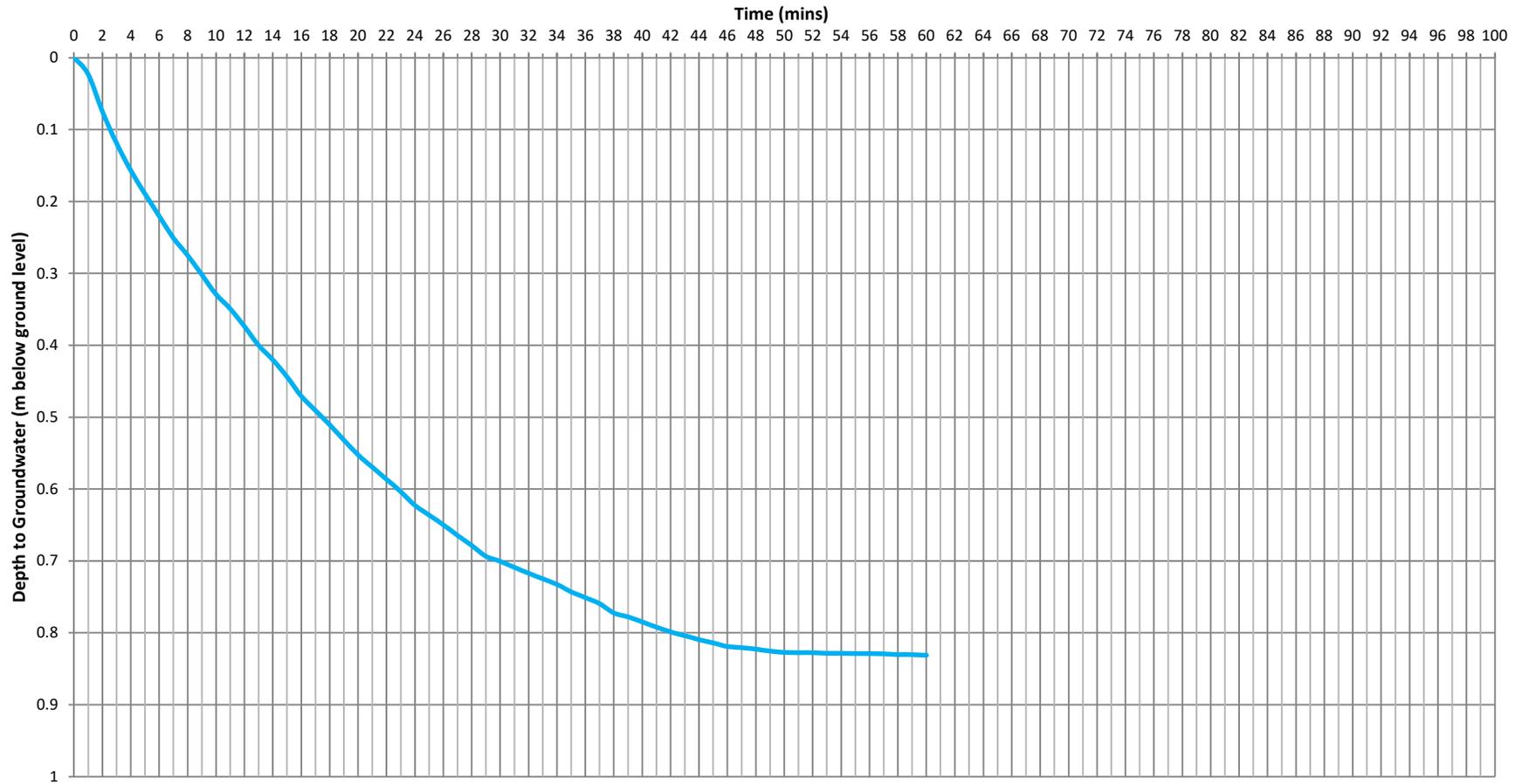


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Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP105 Test 3

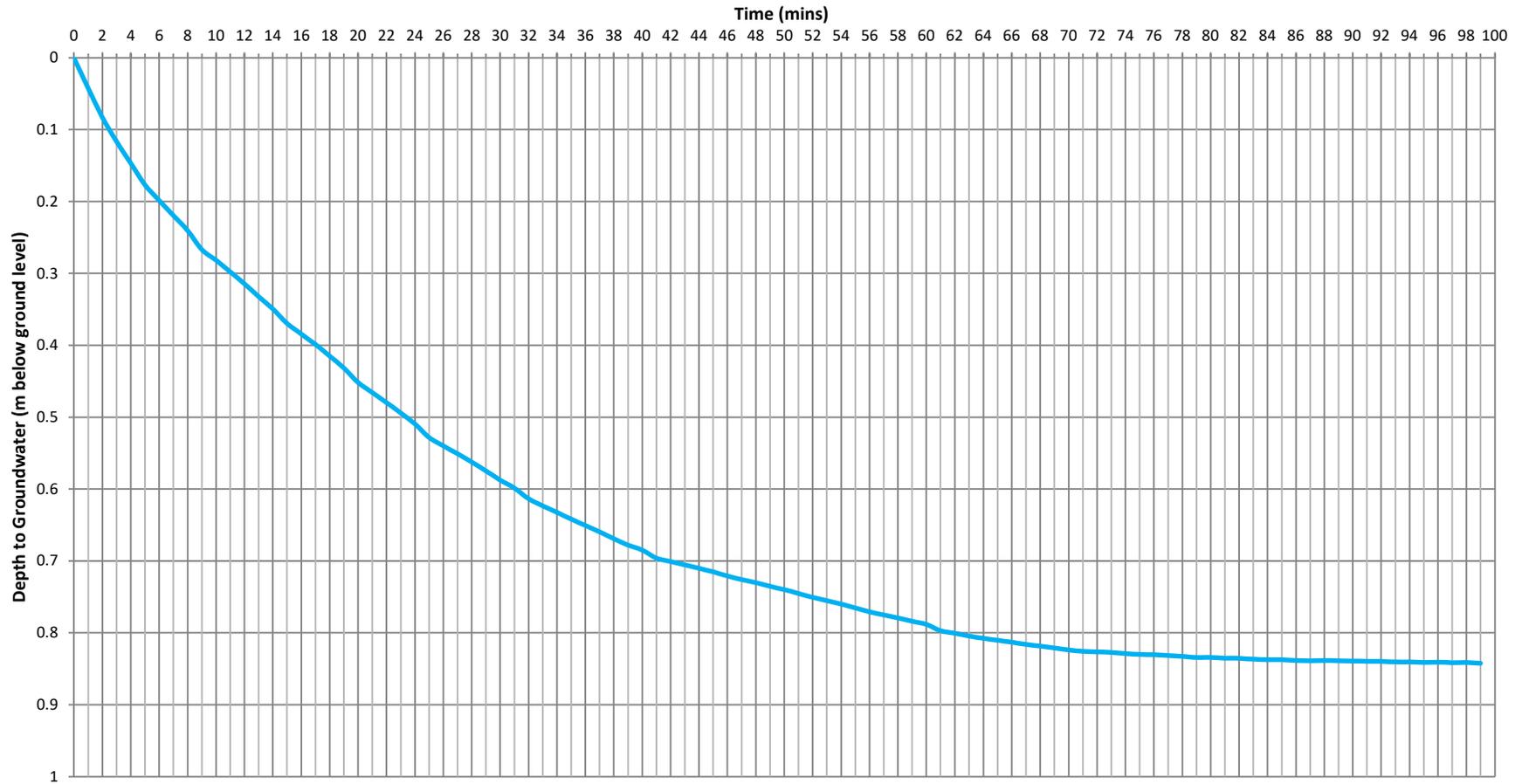


Ashdown Site Investigation Limited

Site: 53 & 55 and Land Rear of 51-63 Southview Road, Southwick, West Sussex

Report No. P14278

Groundwater Monitoring Results - TP105 Test 4



Appendix G

Conclusions from Waterco's Hydraulic Modelling Report

Conclusions

Waterco has been commissioned to undertake a detailed hydraulic modelling study in support of the FRA being prepared for the proposed residential development along Southview Road, Southwick, Brighton, BN42 4TS.

A new 2D pluvial hydraulic model of the study area has been developed to assess the existing pluvial flood risk to the site and quantify the change in flood risk elsewhere as a result of the proposed development (if any).

The results of the hydraulic modelling show that during the existing scenario the site experiences flooding during all simulated events.

When the development levels are considered, the proposed buildings are flood free during all simulated events.

The proposed development has no significant impact on offsite flood risk.

Appendix H

Southern Water Correspondence



John Roberts
GTA Civils Ltd
Gloucester House
66a Church Walk
Burgess Hill
West Sussex
RH15 9AS

Your ref

Our ref
DS_CC_PDE-117055

Date
15 May 2020

Contact

Tel 0330 303 0119

Dear Mr Roberts,

Site: 53 and 55 Southview Road, Southwick, Brighton, West Sussex, BN42 4TS.

We have completed the capacity check for the above development site and the results are as follows:

Surface Water

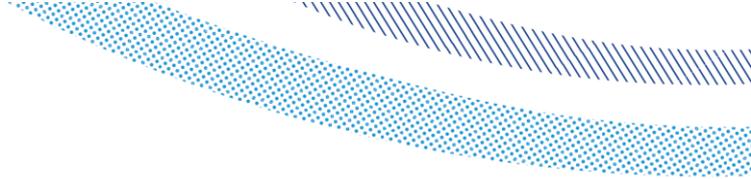
Following initial investigations, there is currently adequate capacity in the local surface network to accommodate a surface water flow of **2 l/s** for the above development at manhole reference TQ2405**2850**. Any excess surface water flows should be disposed of by an alternative means i.e. Soakaways, or any local drainage watercourses, subject to all interested parties' approval.

It should be noted that although the above assessment indicates that there is capacity available for your proposed surface water flows the LLFA (Local Lead Flood Authority) may impose/request that a lower flow is discharged to the public surface water sewer.

If the excess surface water flows are to be attenuated on site, it could have a significant effect on any proposed Section 104 Agreements. Any attenuation proposals should be agreed before any works are implemented on site. Where capacity is limited/restricted, agreement should be sought if you are to include any highway drainage within your proposals as Southern Water is not obligated to accept highway flows.

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal S106 connection application is required to be completed and approved by Southern Water Services. Please see the link below:

southernwater.co.uk/ConnectiontoPublicSewer/ApplicationForm



Should you require any further information, please contact us at the above-mentioned phone number or address shown in the footer.

Yours sincerely,



Joff Edevane
Growth Planning Lead
Business Channels

Please note: - The information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.

Annex

Drainage Management & Maintenance Plan

1. Introduction & Maintenance Responsibilities

It is the overarching responsibility of each site owner to ensure the Drainage Infrastructure is maintained in accordance with this Maintenance Plan.

The responsibility of maintenance, repair, renewal and replacement of the surface water drainage system will be conferred on to the property owners with all costs shared on an equal basis. These arrangements will be administered in the Transfer Document TP1 of each property at the point of sale with the same responsibilities transferring with each property to the successors in title.

This Plan sets out the framework for the management of the proposed sustainable drainage systems (SuDS) and foul drainage network. The document will be updated with further information through the next stage of detailed design and coordination. At this stage, the level of detail proposed herein is sufficient to demonstrate the viability of the proposed SuDS and foul drainage maintenance regime.

Additional reference has been made to currently established best practice and guidance documents such as The SuDS Manual (CIRIA C753, 2015) and other resources available at the susdrain website (www.susdrain.org).

2. Health and Safety

All those responsible for and involved in the maintenance of the site drainage systems should be safety-conscious and comply with the relevant health and safety legislation. This includes:

- The Health and Safety at Work etc Act 1974
- The Management of Health and Safety at Work Regulations 1999
- The Workplace (Health, Safety and Welfare) Regulations 1992

Each freeholder is responsible for suitable risk assessment and management to ensure safe working conditions and practices. Measures to protect potential visitors also need to be considered.

Specialist contractors used should work to industry guidelines and be able to demonstrate safe working practices.

Employers have a duty to employees to inform them about the risks of their work environment and to decrease the risk as far as reasonably practicable. Appropriate personal protective equipment (PPE) should be provided and practices/policies implemented based on risk assessments.

Operatives should be trained for working near water. Risks of contaminated water should be considered. Checking for open cuts and using nitrile gloves, waterproof plasters etc. is advised.

Entry of pipes, chambers and culverts should be avoided. Work should be carried out from the surface using appropriate equipment. In the event that entry cannot be avoided to perform a critical task, the required safety training, protection measures and precautions must be implemented prior to entry. Lone working should never be attempted.

For further information refer to Section 36 of The SuDS Manual (CIRIA C753).

3. Contamination or Dilution of Spillage

The Environment Agency would prefer all spillages on any highway to be contained to prevent any downstream contamination. However, this cannot always be achieved, depending on the nature of the spillage. In all circumstances involving the spillage of substances on the highway it is important that the Environment Agency are notified as soon as possible so that they can provide advice and take appropriate action.

Prompt action following a spillage can prevent or reduce its effects, whilst inappropriate action may cause or worsen the pollution effects. In the design of the drainage on this site, a number of measures have been put in place to prevent any pollution entering the groundwater such as Green roofs and permeable paving. The permeable paving sub-base is lined with a geotextile fabric.

In the event of a spillage on site it is the responsibility of the freeholders to clear up any spillage before it enters the drainage system. The primary method of dealing with any spillage of Hydrocarbons should be to use sand to soak up the leak and prevent any Hydrocarbons entering the drainage system. Once sand has been contaminated it should not be washed into the drainage system but disposed of by a Licensed Contractor.

4. Schedule A – Sewers, Manholes, Gullies, Channel Drains

Regular inspection and maintenance are required to ensure the effective long-term operation of private drains, manholes, gullies & channel drains.

Post Completion: a CCTV survey to be carried out on all new and retained existing drainage systems and any downstream receiving systems, prior to connection with adopted sewers.

The survey report will be used to prove the integrity of the as-built drainage system prior to issue of practical completion certificate and will be handed over to the Client & Management Company for future reference.

Ongoing maintenance responsibility for any sewers is by Southern Water and for any adopted highway (maintainable at public expense) drainage is by West Sussex County Council. All other private gullies and drainage are private and to be maintained by the Estate Management Company in shared areas and by each homeowner within conveyed land. Operation and maintenance requirements for all sewers, manholes, gullies and channel drains are described in the following table:

Schedule	Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	6 Monthly intervals.
	Hard standing areas to be swept clear of debris, to prevent possibility of blockages to the receiving drainage systems.	Monthly.
	Debris removal from gullies & channel drains (where may cause risks to performance).	Monthly intervals, after autumn leaf fall, or as required based on specific observations.
	Lift and inspect receiving manholes to check for any blockages.	Monthly
Remedial Actions	Repair any damaged gully or channel drain gratings.	As required.
	Replace / fix any loose channel drain covers	As required.

Monitoring	Carry out full CCTV survey to confirm ongoing integrity of all drains. Inspect all gullies and silt pits & drainage channels during the survey	10-yearly intervals.
------------	--	----------------------

Where appropriate refer also to specialist drainage manufacturer's information and maintenance requirements. In all instances, inspection and cleaning should be carried out only by a specialist contractor and in accordance with the guidelines given in 'Safe Working in Sewers and at Sewage Works' published by National Joint Health and Safety Committee for the Water Services.

5. Schedule B – Inspection Chambers, Manholes / Catchpits

Inspection Frequency and Maintenance Requirements: as per table below:

Schedule	Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove sediment from catchpits	Half yearly or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect/check all inlets & outlets, to ensure they are in good condition and operating properly	Annually
	Survey inside for sediment build-up and remove if necessary	Every 5 years or as required

6. Schedule C – Permeable Pavements

Regular inspection and maintenance are important for the effective operation of porous paved areas.

The surfaces should be kept clear of debris and/or cleaned as necessary.

Damaged surfaces should be repaired as soon as possible. Please contact the contractor who installed the surfacing. Subbase storage and the associated inflow distribution boxes and outflow connection is not accessible from the surface other than the pipes within adjacent gullies, channels and chambers, or visual inspection of the surface for any indications of structural subbase failure. Maintenance would only

be carried out where there was signs of subbase failure or a clear blockage not resolvable from access to the surface inlets and pipes.

Inspection Frequency and Maintenance Requirements: as per table below:

Schedule	Action	Frequency
Regular Maintenance	Standard road sweeper.	Annually after autumn leaf fall
Remedial Actions	Pavement repairs including patching and repairs of cracks. Localised subbase repairs.	As required
Monitoring	Initial inspection Inspection for signs of settlement indicating subbase failure.	Monthly for first three months Annually

7. Flow Control Device (Hydro-Brake)

Little maintenance is usually required as there are no moving parts within the Hydro-Brake flow control. If blockages occur, they may do so at the intake.

Following installation of the Hydro-Brake flow control it is vitally important that any extraneous material i.e. building materials are removed from the unit and the chamber. After the system is made live, it is recommended that the unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required.

All Hydro-Brake flow control units are typically manufactured from grade 304 Stainless Steel, and if required they can also be manufactured in grade 316 Stainless Steel. Both materials have an estimated life span in excess of the design life of drainage systems.

The maintenance frequencies set out in this plan shall be carried out. This will help prevent future blockages. The silt sump of the control manhole shall be treated in the same way as silt/catchpits in the table above.

The flow control device's bypass door shall be inspected every year and greased / replaced as necessary.

8. Foul Drainage

Inspection frequency: annually.

Maintenance Requirements: Visual inspection of chambers & manholes is to be completed on a 5-yearly basis and any signs of blockage / waste build up should be jet washed or removed by a Licensed Effluent Disposal Contractor.

A CCTV Drainage Survey should be completed every 10 Years and any of blockage/waste build up should be jet washed or removed by a Licensed Effluent Disposal Contractor.

9. Contamination or Dilution of Spillage

In the event of a spillage, it is the responsibility of the landowner to clear up any spillage before it enters the drainage system. The primary method of dealing with any spillage of hydrocarbons should be using sand to soak up the leak and prevent any hydrocarbons entering the drainage system. Once sand has been contaminated it should not be washed into the drainage system but disposed of by a Licensed Contractor.

Environment Agency – Emergency Contact Number: In the event of a spillage the Environment Agency should be contacted to notify the event and seek advice. The Environment Agency Incident Hotline is 0800 80 70 60 (Freephone 24hrs).

- End of Plan -



Civil Engineering - Transport Planning - Flood Risk

GTA Civils & Transport, Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD
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