



HydroGround Civils

Detailed Drainage Strategy

Location: The Platt, Turners Hill Road, Crawley Down, Crawley.

Client: Owen O'Grady

Project: Proposed swimming pool building and tennis court within the curtilage of current property.

Revision: A

Reference: RH112401

Date: 21st December 2025

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Chartered Civil Engineer
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1.0 Introduction

1.01 HydroGround Civils has been instructed by Owen O'Grady to prepare a detailed surface water and foul water drainage design to address Condition 3 of planning (Ref: DM/22/3735) for a proposed residential development at The Platt, Turners Hill Road, RH10 4EY. An extract of the planning condition can be seen in Figure 1.

3. The development hereby permitted shall not commence unless and until details of the proposed foul and surface water drainage and means of disposal have been submitted to and approved in writing by the local planning authority. The building shall not be occupied or brought into use, until all the approved drainage works have been carried out in accordance with the agreed details.

Reason: To ensure that the proposal is satisfactorily drained and to accord with the NPPF requirements, Policy DP41 of the Mid Sussex District Plan 2014 - 2031 and Policy CDNP06 of the Crawley Down Neighbourhood Plan.

Figure 1 - Mid Sussex Council Condition 3

1.02 The proposal consists of developing the site to include a new pool house building and tennis courts.



Figure 2: Existing



Figure 3: Proposed

1.03 The application site measures approximately 5,370 m² (0.537 hectare). It is bounded by the B2028 road to the east, and a track to residential properties and gardens to the north, south and west. The approximate National Grid Reference is TQ 34120 37094 (E 534120, N 137094).

1.04 Site location plan, existing site and proposed site layouts are found in **Appendix A**.

1.05 This report is a statement of proposed drainage design for this scheme.

2.0 Existing Drainage

- 2.01 The application site is a residential property and garden.
- 2.02 From the topographical survey (**Appendix B**), a manhole cover can be identified on site at the site entrance to the south.
- 2.03 Thames Water Asset Location Search (ALS) in **Appendix C** indicates the presence of a foul water on Turner's Hill Road. The manhole cover identified on the topographical survey is part of this public foul sewer system
- 2.04 From the topographical survey it appears that the site drops along the eastern and western boundary. Looking at the gates to the south on Google Streetview one can see a dry ditch with a culvert underneath the access (Figure 4). This culvert can also be seen on the topographical survey (Figure 5).



Figure 4: View of site access (View A)



Figure 5: Southwest view from B2028

- 2.05 The proposed pool house building covers a catchment of 131m² in a site measuring 5,370 m², or a 2.4% catchment area within the application site. Surface water drainage at the site currently appears to occur via natural means such as infiltration and evapotranspiration, with no formal surface water drainage infrastructure observed.

3.0 Geology and Soakage Test

- 3.01 British Geological Survey (BGS) mapping indicates that the site is underlain by Upper Tunbridge Wells Sand-Sandstone and siltstone, interbedded (figure 6), with no superficial deposit recorded at this location. There is also a strip partially covering the site which is underlain by Upper Tunbridge Wells Sand-Mudstone (figure 7).

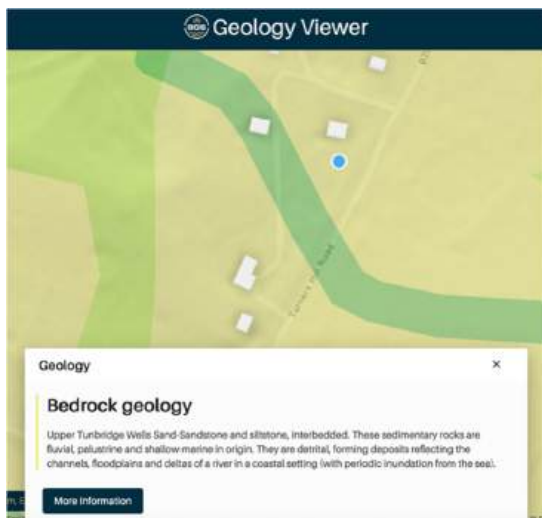


Figure 6 - Bedrock Geology



Figure 7 Bedrock Geology

- 3.02 BGS describes the lithology of this bedrock as *“The unit comprises a complex succession of interbedded deposits with both upward-fining and upward-coarsening cycles. Thinly bedded silty mudstones, siltstones, silty sandstones and fine-grained sandstones are laterally persistent over long distances. Sandstones, which form prominent scarp and dip slope features, are typically fine-grained and quartzose, weathering to a pale yellowish grey or brown colour.”*

- 3.03 Soakage testing was undertaken by the client at three locations to the south (TP1, TP2 and TP3) as shown in Figure 8. The trial pits were excavated to depths of approximately 2.0 m below ground level and testing was carried out during wet weather conditions.

- 3.04 Test results in TP2 and TP3 show poor soakage potential. The test carried out in TP1 yielded better infiltration rates across the three tests (Table 1) at this location.



Figure 8: BRE365 soakage test locations

Table 1: BRE365 Soakage Test Results at TP1 (Design-Governing Location) – **Appendix D.**

Test Location	Infiltration Rate ($\times 10^{-4}$ m/s)	Infiltration Rate (m/h)
Test 1	1.68	0.6045
Test 2	1.36	0.4887
Test 3	1.46	0.5269

- 3.05 The contrasting soakage performance observed across TP1, TP2 and TP3 is consistent with the interbedded nature of the Upper Tunbridge Wells Sand Formation, as shown by BGS mapping. This formation comprises alternating layers of sandstone, siltstone and mudstone, which can result in significant local variability in permeability over short distances. Such variability is typical of the Tunbridge Wells Sand Formation and reinforces the need to base infiltration design on locally proven test results rather than regional mapping alone.
- 3.06 At TP2 and TP3, the soakage tests indicate limited infiltration, which is likely attributable to the presence of mudstone- or clay-rich horizons and/or less permeable near-surface materials, restricting downward percolation of water. These materials are known to exhibit low hydraulic conductivity and can impede infiltration, particularly during wet antecedent conditions.
- 3.07 In contrast, the improved infiltration performance recorded at TP1 suggests that the trial pit intercepted a more permeable sandstone-dominated horizon within the same geological formation. Sandstone layers within the Upper Tunbridge Wells Sand Formation are typically fine-grained and quartzose, and where sufficiently fractured or less cemented, can provide enhanced permeability relative to adjacent mudstone or siltstone beds. The lateral persistence of individual beds means that favourable infiltration conditions may occur locally but not uniformly across the site.
- 3.08 Accordingly, the soakage test results demonstrate that infiltration potential at the site is highly spatially variable, and that infiltration-based drainage should be designed locally, with infiltration features positioned to exploit the more permeable strata identified at TP1, while accounting for less permeable conditions elsewhere through conservative design assumptions and appropriate exceedance routing.
- 3.09 Infiltration-based drainage is therefore considered suitable for the site, subject to detailed design that allows for variable permeability, incorporates appropriate factors of safety, and includes exceedance routing to manage events exceeding the design capacity.

4.0 Proposed Drainage

Surface Water

- 4.01 The proposed development consists of erecting a pool house and a tennis court.
- 4.02 The principal source of surface water runoff requiring formal management is the roof area of the proposed pool building. Roof drainage is collected via gutters and downpipes and conveyed to discrete discharge points, resulting in concentrated inflows that must be appropriately managed through the proposed surface water drainage system. The proposed tennis court is designed as a permeable surface, incorporating a permeable playing surface and underlying permeable sub-base. Rainfall falling onto the court will infiltrate vertically through the surface and be temporarily stored within the sub-base prior to infiltration to the underlying ground. As such, the tennis court functions as a form of source control SuDS, significantly reducing both the rate and volume of surface water runoff generated and therefore does not require connection to the below-ground surface water drainage system under normal operating conditions.
- 4.03 The proposed pool house roof measures approximately 131m² (0.013ha). Causeway Flow hydraulic software was used to model the proposed drainage system at the location and depth of the soakage test at TP1. Using the lowest recorded infiltration rate from TP1 testing (Test 2 – Table 1), providing a conservative basis for design, the hydraulic model output shows the adequacy of the 3.0m x 3.0m x 0.4m (95% porosity) geocellular crate soakaway to accommodate all critical storms up to the 100-year plus 40% climate change allowance (design storm) in accordance with the EA rainfall intensity climate change allowances.
- 4.04 The hydraulic modelling demonstrates that the soakaway achieves at least 50% drain-down within 24 hours, ensuring sufficient available storage capacity for subsequent rainfall events in accordance with BRE365 principles..
- 4.05 The soakaway length to ratio is 7.5 to 1. Given the relatively shallow depth of the soakaway (0.4 m) in comparison to its plan area, infiltration has conservatively been assumed to occur via the base only, with sidewall infiltration excluded from the hydraulic model.
- 4.06 In a scenario where a storm occurs which exceeds the design storm, exceedance flow routes will follow the site topography towards the dry ditches along the eastern and western boundary without increasing flood risk to buildings, boundaries or third-party land.

- 4.07 The proposed development lies outside groundwater Source Protection Zones (Figure 9) and given the scale and nature of this scheme, there is no concern of polluting the environment as this is roof water only.

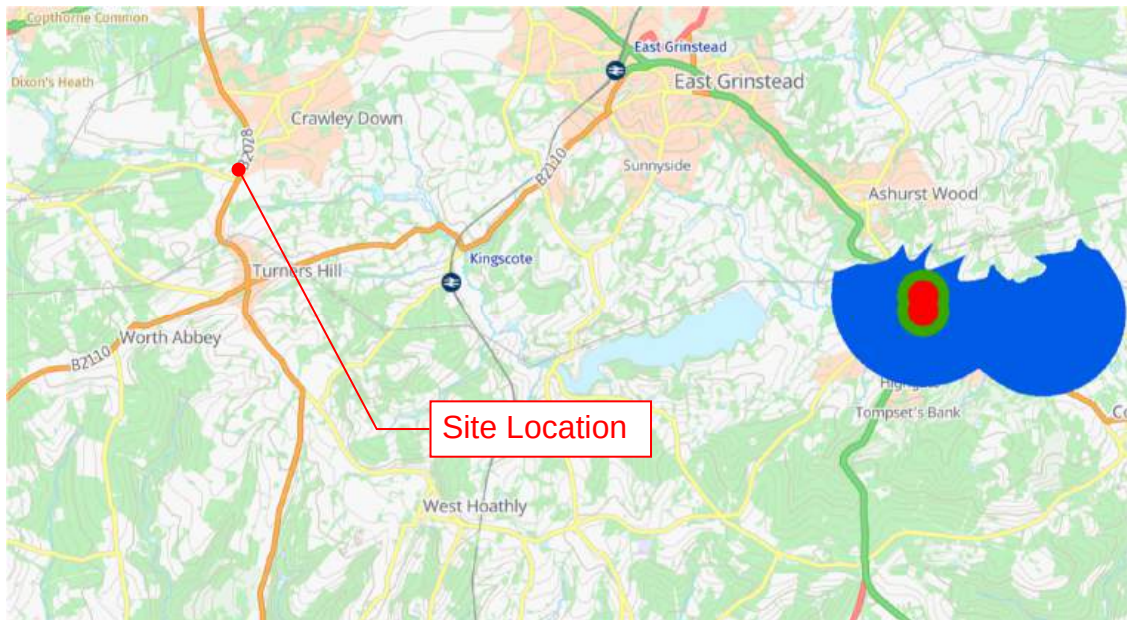


Figure 9: Groundwater Source Protection Zones (Defra MAGIC map)

Foul Water

- 4.08 Foul water drainage will be constructed in accordance with Building Regulations Part H.
- 4.09 It is proposed to discharge foul water to the existing public foul water sewer manhole near the site entrance to the south. There is an existing chamber near The Platt dwelling; however, this chamber is on higher ground which would require a pumped solution, therefore gravity connection to the public foul sewer chamber is preferable.
- 4.10 Proposed drainage layout and Causeway Flow hydraulic model output can be found in **Appendix E**.

5.0 Maintenance Plan

- 5.01 To ensure the long-term effectiveness of the soakaway tank asset, sediments that may enter and accumulate within this SuDS system must periodically be removed upstream to prevent them from entering the geocellular units and slowing the functionality of the system. The frequency of this maintenance operation will vary depending on the density of the site, vegetation, design of the drainage system, other permeable areas and if the site is pre or post construction.
- 5.02 Replacement of the geocellular units may be required if the system becomes blocked with silt. Effective monitoring upstream will provide a warning of potential failure in the long term and enable acting sooner to mitigate this risk.
- 5.03 Maintenance responsibility should be placed with the homeowner (or future estate management body, if applicable), and maintenance schedules and operations are to be carried out in accordance with the manufacturer's recommendations. A typical maintenance plan is given in Table 2.

Table 2: Geocellular Crate Soakaway - Typical Maintenance Plan

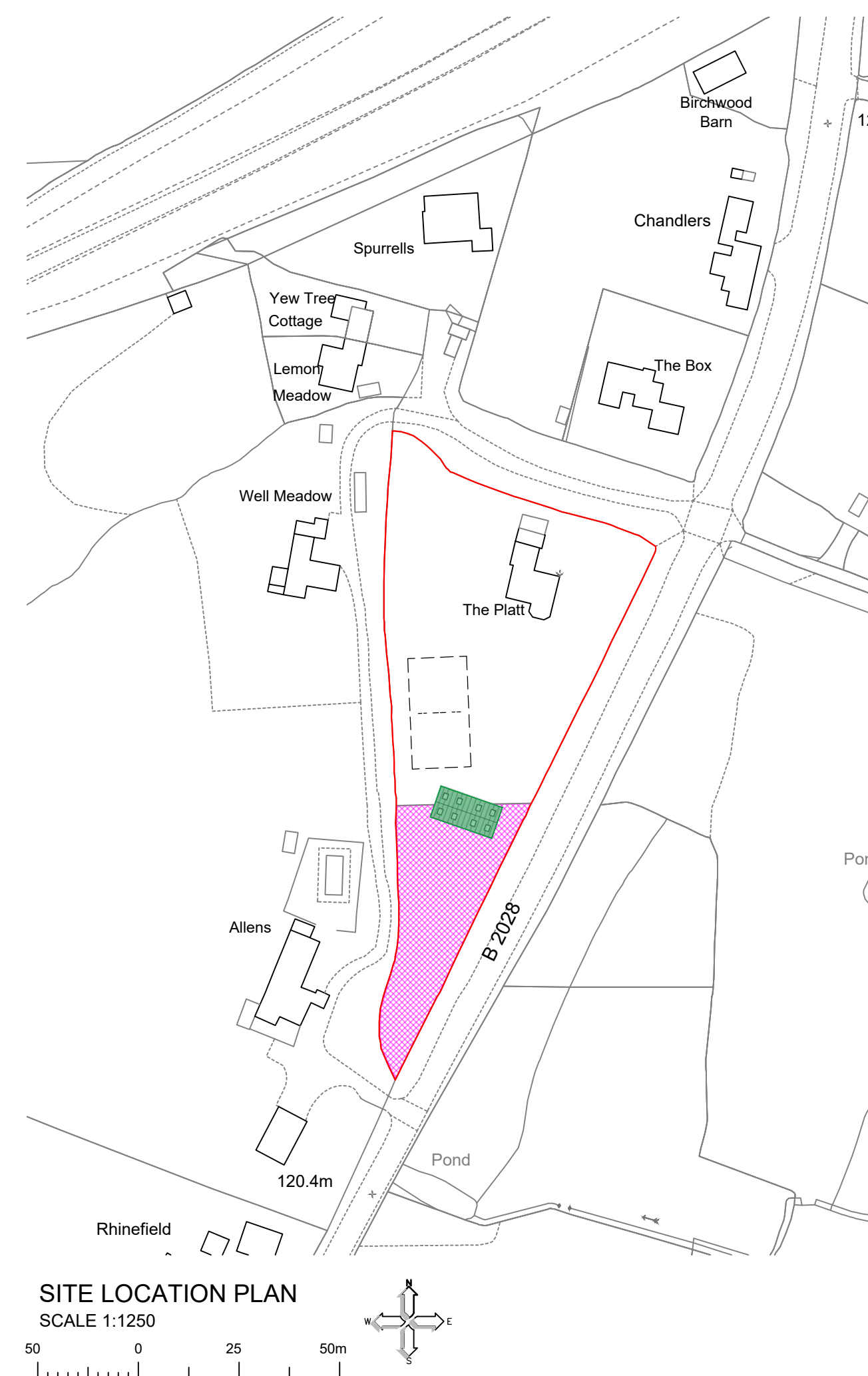
Maintenance Activity	Inspection Frequency
Inspection for sediments and debris in pre-treatment components and floor of inspection tube or chamber	Annually (or as required based on inspections)
Cleaning of gutters and any filters on downpipes	
Trimming any roots that may be causing blockages	
Remove sediments and debris from pre-treatment components and floor of inspection tube or chamber	As required, based on inspections
Reconstruct tank and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
Replacement of deteriorated liner (will require reconstruction of tank)	
Inspect silt traps/catchpits and note rate of sediment accumulation	Annually



Appendix A

Site location plan, existing site and proposed site layouts





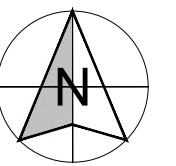
Drawing No
21-077-P-04-G



Appendix B

Topographical Survey







Appendix C

Thames Water ALS



Asset location search



Property Searches

SWG Designs South East Ltd
HASTINGS
TN35 4QY

Search address supplied The Platt
The Platt
Turners Hill Road
Crawley Down
RH10 4EY

Your reference 21-077

Our reference ALS/ALS/24/2023_4809885

Search date 5 April 2023

Notification of Price Changes

From 1st April 2023 Thames water Property Searches will be increasing the prices of its CON29DW, CommercialDW Drainage & Water Enquiries and Asset Location Searches. Historically costs would rise in line with RPI but as this currently sits at 14.2%, we are capping it at 10%.

Customers will be emailed with the new prices by January 1st 2023.

Any orders received with a higher payment prior to the 1st April 2023 will be non-refundable. For further details on the price increase please visit our website at www.thameswater-propertysearches.co.uk



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0800 009 4540

Search address supplied: The Platt, The Platt, Turners Hill Road, Crawley Down, RH10 4EY

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

With regard to the fresh water supply, this site falls within the boundary of another water company. For more information, please redirect your enquiry to the following address:

South East Water
Rocfort Road
Snodland

Kent
ME6 5AH

Tel: 0845 301 0845

www.southeastwater.co.uk.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

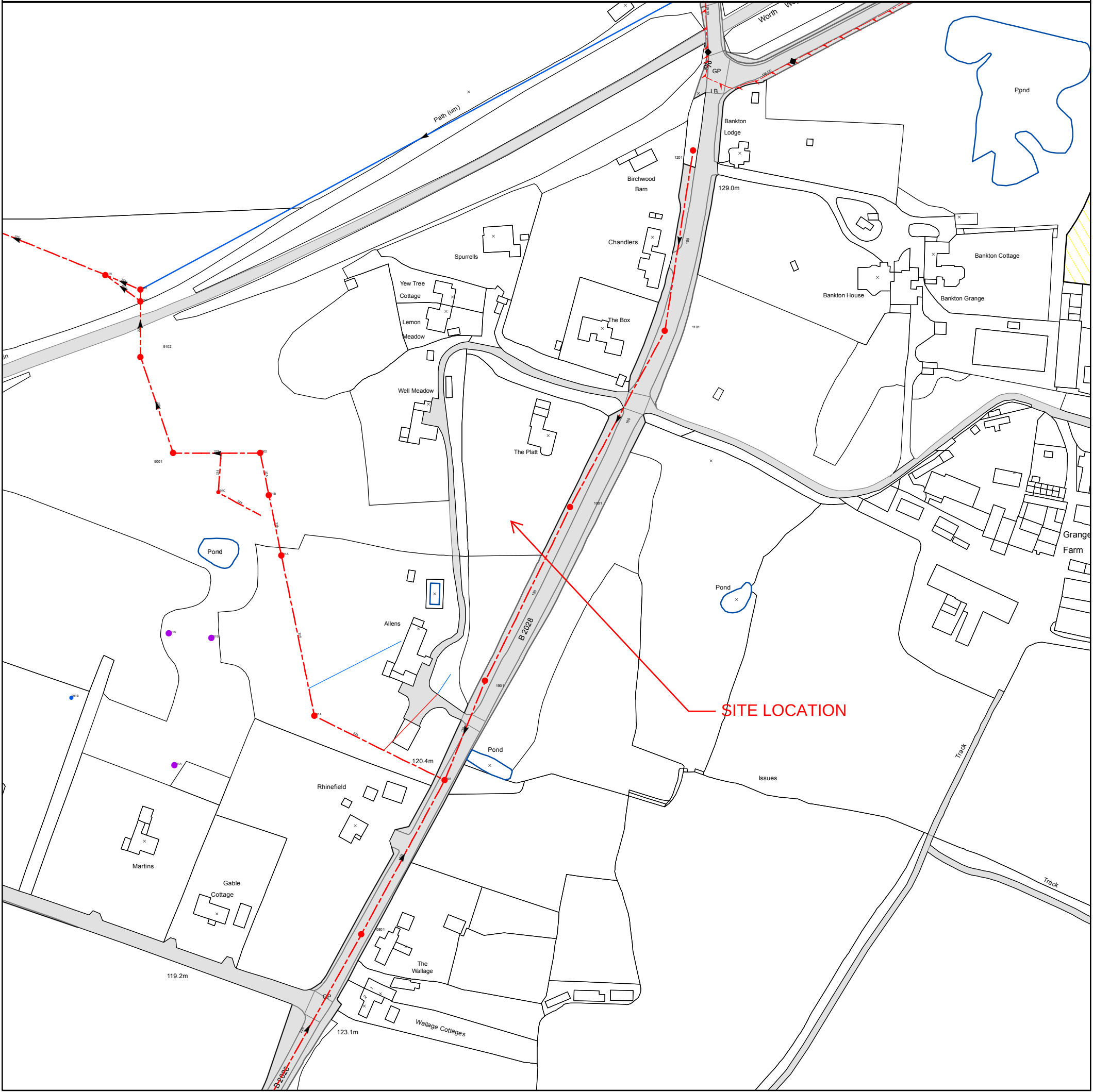
Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk



0 10 20 40 60 80
Meters

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified before any works are undertaken. Crown copyright Reserved

Scale: 1:1791
Width: 500m
Printed By: Krishna1
Print Date: 05/04/2023
Map Centre: 534129,137051
Grid Reference: TQ3437SW

Comments:

ALS/ALS/24/2023_4809885

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL
1201	129.03	127.46
0801	122.08	118.34
1901	120.55	119.18
991A		
991B		
001A		
001B		
9001	111.61	110.07
9101	114.05	109.69
911A		

REFERENCE	COVER LEVEL	INVERT LEVEL
1001	123.92	122.53
1101	127.8	126.205
9102	112.25	109.86
901A		
901B		
091A		
0901	120.64	117.85
9002	113.14	110.59
811A		
901C		



Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

	Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
	Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
	Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
	Storm Sewer
	Sludge Sewer
	Foul Trunk Sewer
	Surface Trunk Sewer
	Combined Trunk Sewer
	Foul Rising Main
	Surface Water Rising Main
	Combined Rising Main
	Vacuum
	Thames Water Proposed
	Vent Pipe
	Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

	Sewer
	Culverted Watercourse
	Proposed
	Decommissioned Sewer
	Content of this drainage network is currently unknown
	Ownership of this drainage network is currently unknown

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

	Air Valve		Meter
	Dam Chase		Vent
	Fitting		

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

	Ancillary		Drop Pipe
	Control Valve		Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

	Inlet		Outfall
	Undefined End		

Other Symbols

Symbols used on maps which do not fall under other general categories.

	Change of Characteristic Indicator		Public / Private Pumping Station
	Invert Level		Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Chamber
	Operational Site

Ducts or Crossings

	Casement	Ducts may contain high voltage cables. Please check with Thames Water.
	Conduit Bridge	
	Subway	
	Tunnel	

5) 'na' or '0' on a manhole indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Payment Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking
Please Call 0800 009 4540 quoting your invoice number starting CBA or ADS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.



Appendix D

BRE365 Soakage Test Results



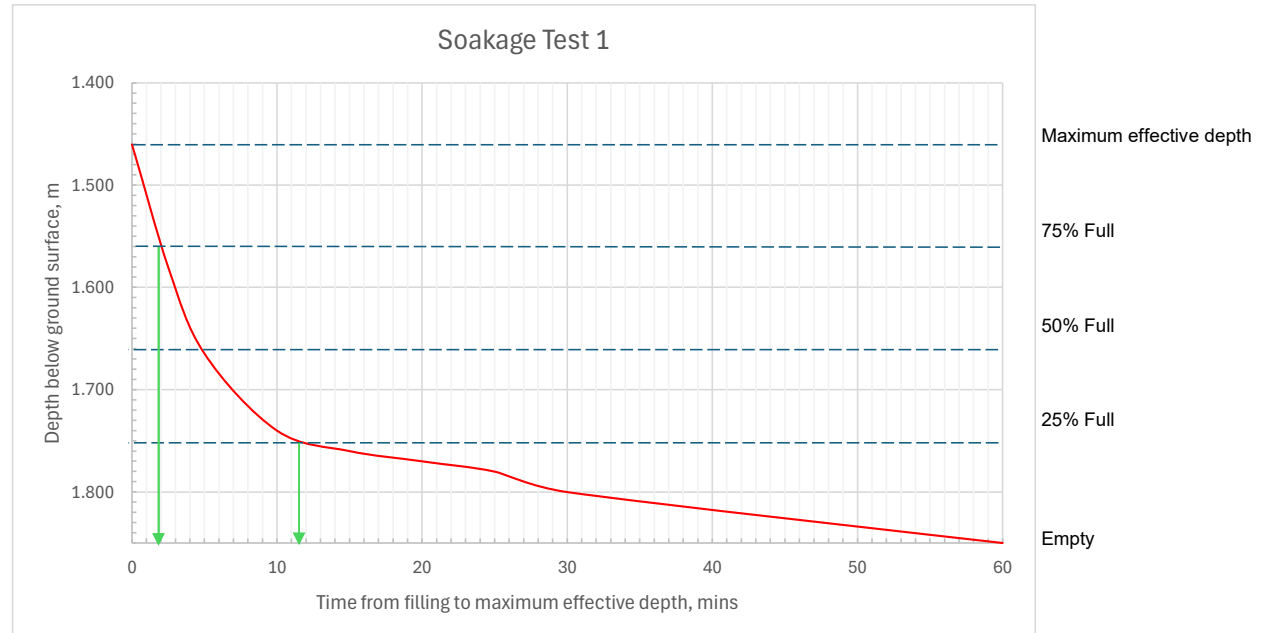


The Platt, Turners Hill Road - BRE365 Soakage Test

Test Pit Dimensions	Length (m)	Width (m)	Depth (m)
	2	0.500	1.850
Invert Level depth (mbgl)	1.460		

Test 1

Time (min)	Depth (mbgl)
0.00	1.460
2.50	1.580
5.00	1.665
10.00	1.740
15.00	1.760
20.00	1.770
25.00	1.780
30.00	1.800
60.00	1.850



$$V_{75-25} = 2.0\text{m} \times 0.5\text{m} \times 0.195\text{m} = 0.195\text{m}^3$$

$$A_{75-25} = (2.0\text{m} \times 0.5\text{m}) + 2 (2.0\text{m} \times 0.195\text{m}) + 2 (0.5\text{m} \times 0.195\text{m}) = 1.975\text{m}^2$$

$$T_{75-25} = 11.8\text{ min} - 2.0\text{ min} = 9.8\text{ min}$$

$$f = V / 60AT$$

$$f = 1.68 \times 10^{-4} \text{ m/s}$$

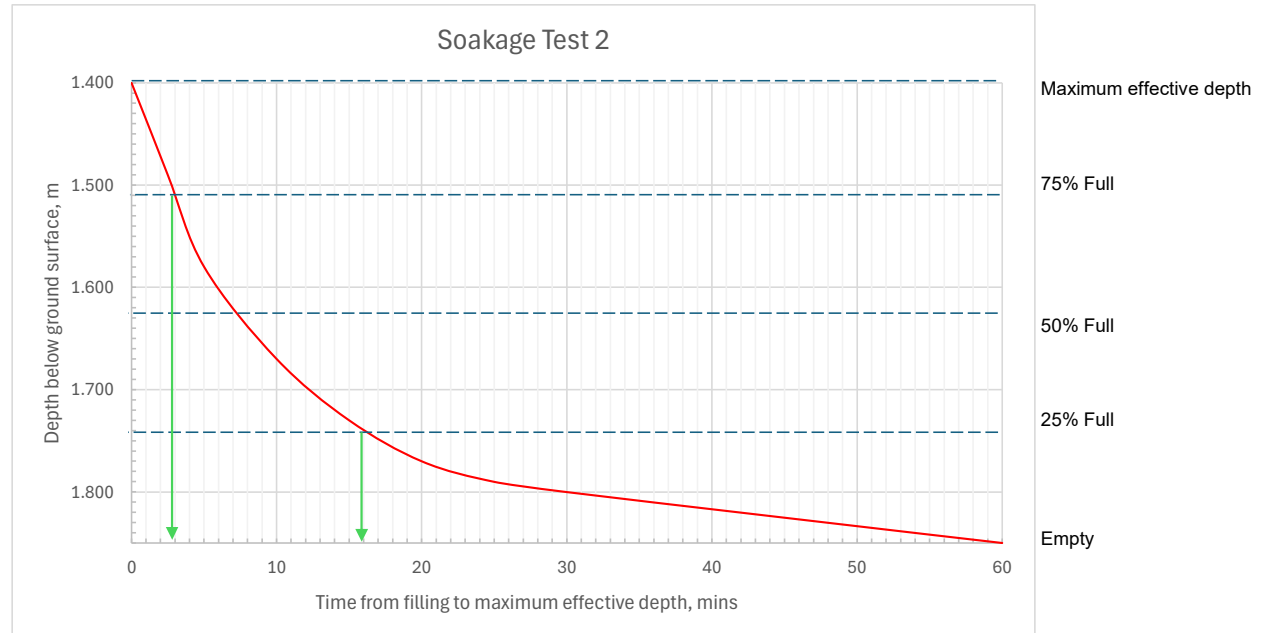


The Platt, Turners Hill Road - BRE365 Soakage Test

	Length (m)	Width (m)	Depth (m)
Test Pit Dimensions	2.000	0.500	1.850
Invert Level depth (mbgl)	1.400		

Test 2

Time (min)	Depth (mbgl)
0.00	1.400
2.50	1.490
5.00	1.580
10.00	1.670
15.00	1.730
20.00	1.770
25.00	1.790
30.00	1.800
60.00	1.850



$$V_{75-25} = 2.0\text{m} \times 0.5\text{m} \times 0.225\text{m} = 0.225\text{m}^3$$

$$A_{75-25} = (2.0\text{m} \times 0.5\text{m}) + 2 (2.0\text{m} \times 0.225\text{m}) + 2 (0.5\text{m} \times 0.225\text{m}) = 2.125\text{m}^2$$

$$T_{75-25} = 16.0\text{ min} - 3.0\text{ min} = 13\text{ min}$$

$$f = V / 60AT$$

$$f = 1.36 \times 10^{-4} \text{ m/s}$$

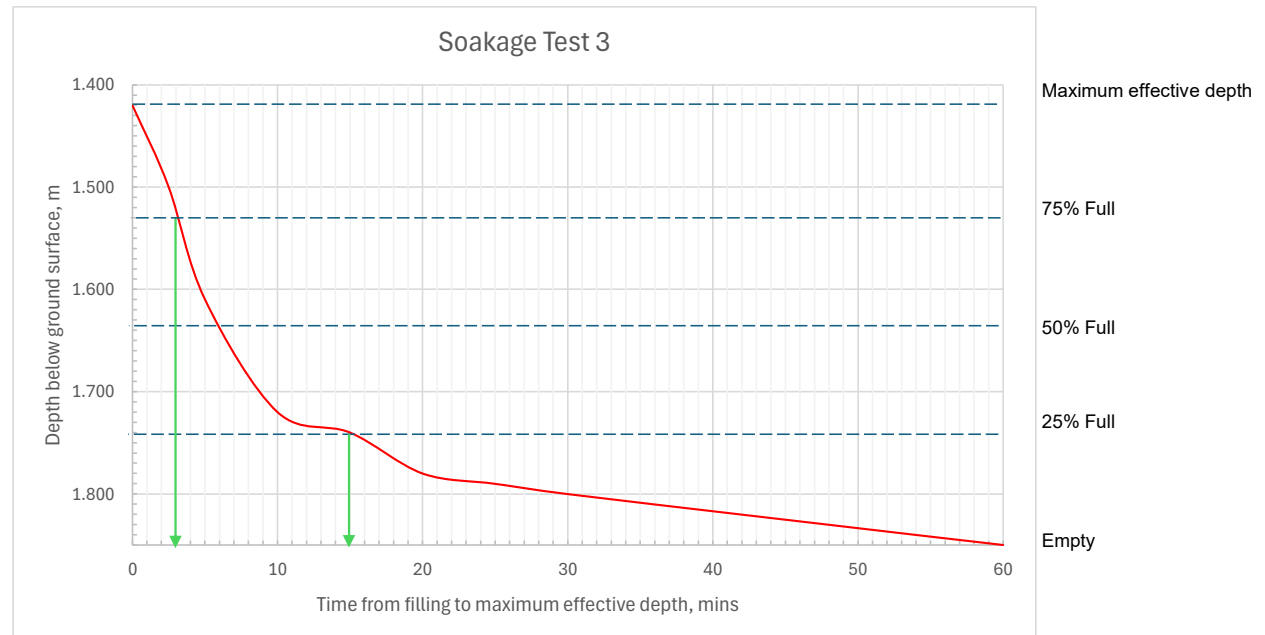


The Platt, Turners Hill Road - BRE365 Soakage Test

	Length (m)	Width (m)	Depth (m)
Test Pit Dimensions	2.000	0.500	1.850
Invert Level depth (mbgl)	1.420		

Test 3

Time (min)	Depth (mbgl)
0.00	1.420
2.50	1.500
5.00	1.610
10.00	1.720
15.00	1.740
20.00	1.780
25.00	1.790
30.00	1.800
60.00	1.850



$$V_{75-25} = 2.0\text{m} \times 0.5\text{m} \times 0.215\text{m} = 0.215\text{m}^3$$

$$A_{75-25} = (2.0\text{m} \times 0.5\text{m}) + 2 (2.0\text{m} \times 0.215\text{m}) + 2 (0.5\text{m} \times 0.215\text{m}) = 2.075\text{m}^2$$

$$T_{75-25} = 15.0\text{ min} - 3.2\text{ min} = 11.8\text{ min}$$

$$f = V / 60AT$$

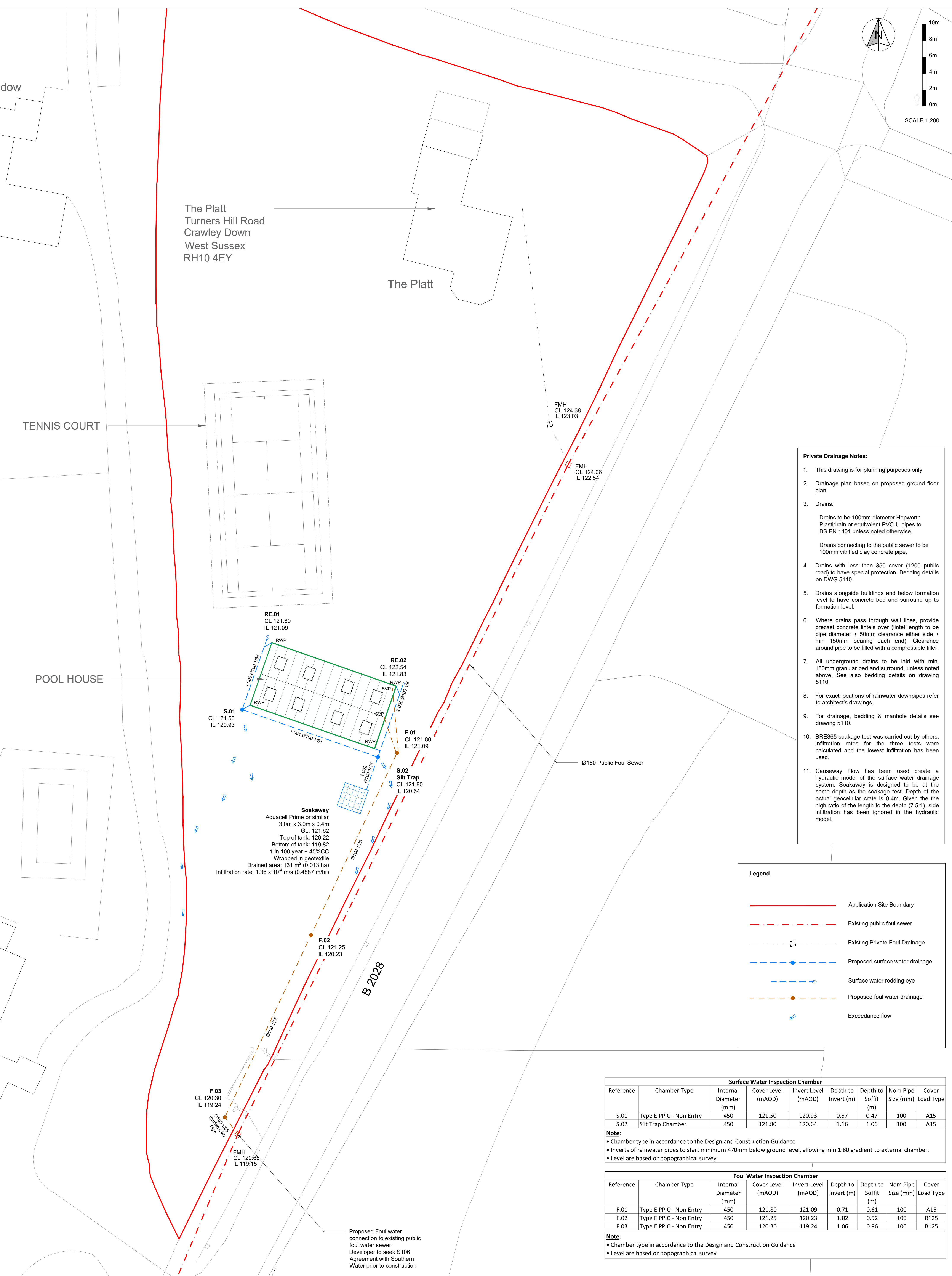
$$f = 1.46 \times 10^{-4} \text{ m/s}$$



Appendix E

Proposed Drainage Layout & Causeway Flow Hydraulic Model





- Private Drainage Notes:**
- This drawing is for planning purposes only.
 - Drainage plan based on proposed ground floor plan
 - Drains:

Drains to be 100mm diameter Hepworth Plastidrain or equivalent PVC-U pipes to BS EN 1401 unless noted otherwise.

Drains connecting to the public sewer to be 100mm vitrified clay concrete pipe.
 - Drains with less than 350 cover (1200 public road) to have special protection. Bedding details on DWG 5110.
 - Drains alongside buildings and below formation level to have concrete bed and surround up to formation level.
 - Where drains pass through wall lines, provide precast concrete lintels over (lintel length to be pipe diameter + 50mm clearance either side + min 150mm bearing each end). Clearance around pipe to be filled with a compressible filler.
 - All underground drains to be laid with min. 150mm granular bed and surround, unless noted above. See also bedding details on drawing 5110.
 - For exact locations of rainwater downpipes refer to architect's drawings.
 - For drainage, bedding & manhole details see drawing 5110.
 - BRE365 soakage test was carried out by others. Infiltration rates for the three tests were calculated and the lowest infiltration has been used.
 - Causeway Flow has been used create a hydraulic model of the surface water drainage system. Soakaway is designed to be at the same depth as the soakage test. Depth of the actual geocellular crate is 0.4m. Given the high ratio of the length to the depth (7.5:1), side infiltration has been ignored in the hydraulic model.

- Legend**
- Application Site Boundary
 - Existing public foul sewer
 - Existing Private Foul Drainage
 - Proposed surface water drainage
 - Surface water rodding eye
 - Proposed foul water drainage
 - Exceedance flow

Surface Water Inspection Chamber								
Reference	Chamber Type	Internal Diameter (mm)	Cover Level (mAOD)	Invert Level (mAOD)	Depth to Invert (m)	Depth to Soffit (m)	Nom Pipe Size (mm)	Cover Load Type
S.01	Type E PPIC - Non Entry	450	121.50	120.93	0.57	0.47	100	A15
S.02	Silt Trap Chamber	450	121.80	120.64	1.16	1.06	100	A15
Note:								
• Chamber type in accordance to the Design and Construction Guidance								
• Inverts of rainwater pipes to start minimum 470mm below ground level, allowing min 1:80 gradient to external chamber.								
• Level are based on topographical survey								

Foul Water Inspection Chamber								
Reference	Chamber Type	Internal Diameter (mm)	Cover Level (mAOD)	Invert Level (mAOD)	Depth to Invert (m)	Depth to Soffit (m)	Nom Pipe Size (mm)	Cover Load Type
F.01	Type E PPIC - Non Entry	450	121.80	121.09	0.71	0.61	100	A15
F.02	Type E PPIC - Non Entry	450	121.25	120.23	1.02	0.92	100	B125
F.03	Type E PPIC - Non Entry	450	120.30	119.24	1.06	0.96	100	B125
Note:								
• Chamber type in accordance to the Design and Construction Guidance								
• Level are based on topographical survey								

GENERAL NOTES			
1. This drawing is to be read in conjunction with all relevant architects, engineers drawings & specifications.			
2. The contractor is to be responsible for all dimensions & for the correct setting out of the works on site.			
3. Do not scale from this drawing.			
REV	BY	DATE	Revision Notes

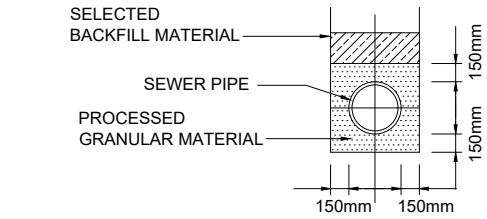
P01	CM	21 Dec 2025	First Issue
REV	BY	DATE	Revision Notes

PROJECT NAME			
The Platt Turners Hill Road Crawley Down RH10 4EY			
Revision	Prepared	CM	Approved CM
Original	Approved	CM	Date 21 Dec 2025
STATUS	For Planning		

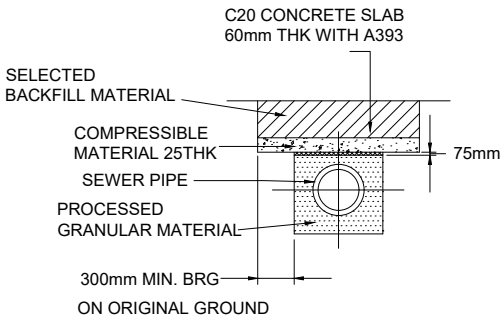
PROJECT DESCRIPTION		
Proposed Drainage Layout Surface Water and Foul Water		
Scale:	Dwg No:	REVISION
1:200 [A1]	RH112401/5100	P01



NOMINAL SIZE (DN)	PIPE BEDDING REQUIREMENTS (mm)
100 to 150	10 OR 14 NOMINAL SINGLE SIZE OR 14 TO 15 GRADED
225 to 525	10, 14 OR 20 NOMINAL SINGLE SIZE OR 14 TO 5 GRADED OR 20 TO 5 GRADED
600 and above	10, 14, 20 OR 40 NOMINAL SIZE CRUSHED ROCK OR 14 TO 5 GRADED OR 20 TO 5 GRADED OR 40 TO 5 GRADED

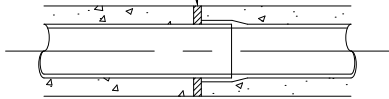


CLASS 'S' BEDDING
360° GRANULAR BED AND SURROUND

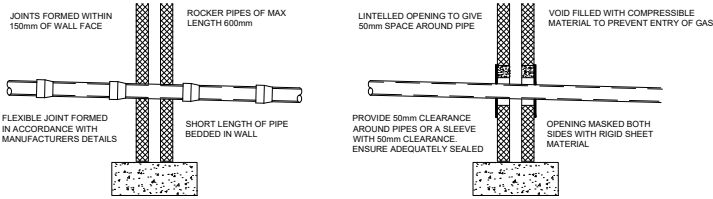
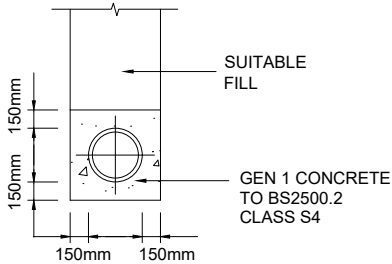


PIPE PROTECTION LAID AT SHALLOW DEPTHS

150mm MINIMUM CONCRETE SURROUND DIVIDED WITH 25mm THICK COMPRESSIBLE BOARD AT EACH JOINT. PROTECT PIPE FROM INGRESS OF CONCRETE BY WRAPPING JOINT WITH POLYTHENE SHEET AND ADHESIVE TAPE

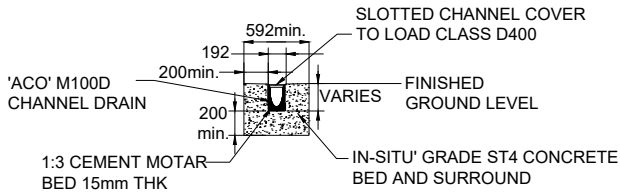


TYPE Z BEDDING

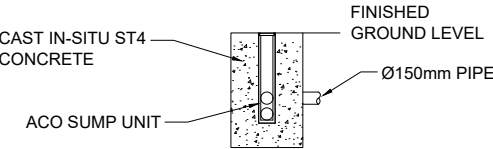


DRAINAGE PIPE THROUGH WALL (ROCKER JOINTS)

PIPES PASSING THROUGH WALL (LINTEL)

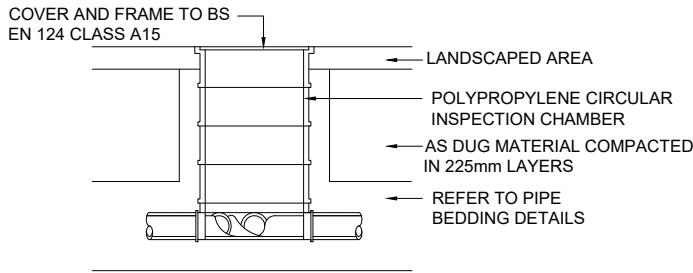


LINEAR DRAIN & SUMP UNIT



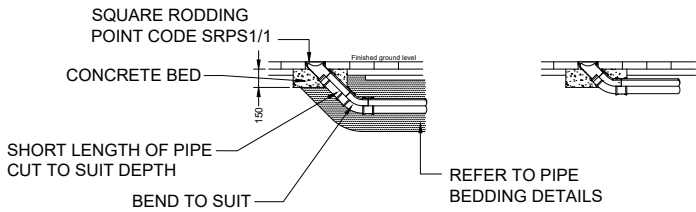
THE MINIMUM DEPTH TO THE CROWN OF GRAVITY PIPES WITHOUT PROTECTION SHOULD BE AS FOLLOWS:

- 0.35m - DOMESTIC GARDENS AND PATHWAYS WITHOUT ANY POSSIBILITY OF VEHICULAR ACCESS.
- 0.50m - DOMESTIC DRIVEWAYS, PARKING AREAS AND YARDS WITH HEIGHT RESTRICTIONS TO PREVENT ENTRY BY VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES.
- 0.90m - DOMESTIC DRIVEWAYS, PARKING AREAS AND NARROW STREETS WITHOUT FOOTWAYS (e.g. MEWS DEVELOPMENT) WITH LIMITED ACCESS FOR VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES.
- 0.90m - AGRICULTURAL LAND AND PUBLIC OPEN SPACE.
- 1.20m - OTHER HIGHWAYS AND PARKING AREAS WITH UNRESTRICTED ACCESS TO VEHICLES WITH A GROSS VEHICLE WEIGHT IN EXCESS OF 7.5 TONNES.

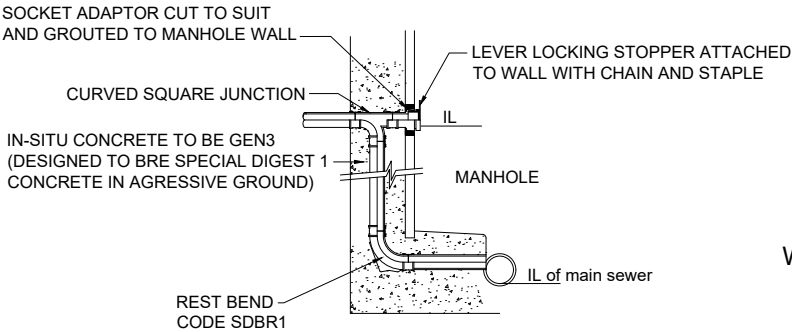


POLYPROPYLENE INSPECTION CHAMBER (PPIC)
TYPE E NON-ENTRY

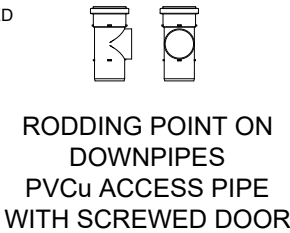
(LOCATED WITHIN PRIVATE AREAS INACCESSIBLE TO MOTOR VEHICLES FOR DEPTHS TO INVERT NOT GREATER THAN 2.00m)



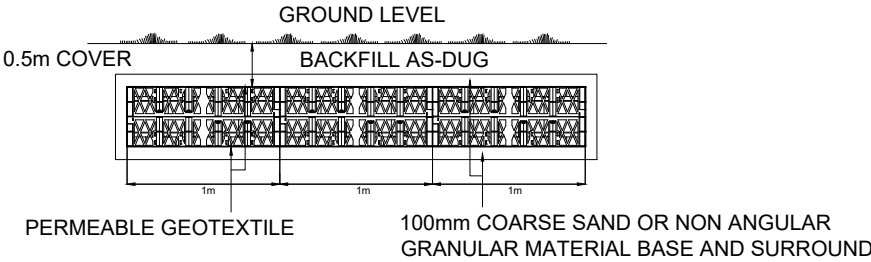
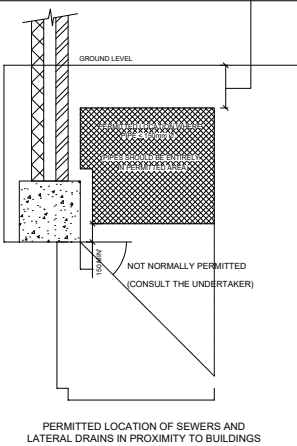
RODDING POINT



BACK DROP DETAIL
FOR CONNECTION TO DEEP MANHOLE



RODDING POINT ON DOWNPIPES
PVCu ACCESS PIPE WITH SCREWED DOOR



NOTE:
0.3m MINIMUM COVER, BUT 0.5M COVER IS RECOMMENDED TO PREVENT ACCIDENTAL DAMAGE.

TYPICAL DOMESTIC SOAKAWAY

GENERAL NOTES

- This drawing is to be read in conjunction with all relevant architects, engineers drawings & specifications.
- Inidicative details. Details to be confirmed with Building Regulations Part H.
- Do not scale from this drawing.

P01	CM	21 Dec 2025	First Issue
REV	BY	DATE	Revision Notes

PROJECT NAME
The Platt
Turners Hill Road
Crawley Down
RH10 4EY

Revision	Prepared	CM	Approved	CM
Original	Approved	CM	Date	21 Dec 2025
STATUS	For Planning			

PROJECT DESCRIPTION
Standard Drainage Details

Scale:	Dwg No:	REVISION
1:NTS [A1]	RH112401/5110	P01



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.610
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
RE.01	0.003	5.00	121.800		534105.267	137051.489	0.710	121.090
S.01	0.003	5.00	121.500	450	534102.175	137042.672	0.570	120.930
RE.02	0.003	5.00	122.540		534121.849	137045.709	0.710	121.830
S.02	0.004	5.00	121.800	450	534118.779	137036.853	1.160	120.640
Soakaway			121.620		534115.259	137029.612	1.800	119.820
No Outfall			121.620		534114.638	137028.380	1.824	119.796

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	RE.01	S.01	9.343	0.600	121.090	120.930	0.160	58.4	100	5.15	50.0
1.001	S.01	S.02	17.594	0.600	120.930	120.640	0.290	60.7	100	5.45	50.0
2.000	RE.02	S.02	9.373	0.600	121.830	120.654	1.176	8.0	100	5.06	50.0
1.002	S.02	Soakaway	8.051	0.600	120.640	120.090	0.550	14.6	100	5.52	50.0
1.003	Soakaway	No Outfall	1.380	0.600	119.820	119.796	0.024	57.5	100	5.54	50.0

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	1.010	7.9	0.5	0.610	0.470	0.003	0.0	18	0.569
1.001	0.990	7.8	1.1	0.470	1.060	0.006	0.0	25	0.698
2.000	2.755	21.6	0.5	0.610	1.046	0.003	0.0	11	1.179
1.002	2.029	15.9	2.3	1.060	1.430	0.013	0.0	26	1.459
1.003	1.018	8.0	2.3	1.700	1.724	0.013	0.0	37	0.884

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	9.343	58.4	100	Circular	121.800	121.090	0.610	121.500	120.930	0.470
1.001	17.594	60.7	100	Circular	121.500	120.930	0.470	121.800	120.640	1.060
2.000	9.373	8.0	100	Circular	122.540	121.830	0.610	121.800	120.654	1.046
1.002	8.051	14.6	100	Circular	121.800	120.640	1.060	121.620	120.090	1.430

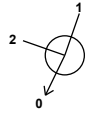
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE.01		Junction		S.01	450	Manhole	Adoptable
1.001	S.01	450	Manhole	Adoptable	S.02	450	Manhole	Adoptable
2.000	RE.02		Junction		S.02	450	Manhole	Adoptable
1.002	S.02	450	Manhole	Adoptable	Soakaway		Junction	

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.003	1.380	57.5	100	Circular	121.620	119.820	1.700	121.620	119.796	1.724

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.003	Soakaway		Junction		No Outfall		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
RE.01	534105.267	137051.489	121.800	0.710			0	1.000	121.090	100
S.01	534102.175	137042.672	121.500	0.570	450		1	1.000	120.930	100
							0	1.001	120.930	100
RE.02	534121.849	137045.709	122.540	0.710			0	2.000	121.830	100
S.02	534118.779	137036.853	121.800	1.160	450		1	2.000	120.654	100
							2	1.001	120.640	100
							0	1.002	120.640	100
Soakaway	534115.259	137029.612	121.620	1.800			1	1.002	120.090	100
							0	1.003	119.820	100
No Outfall	534114.638	137028.380	121.620	1.824			1	1.003	119.796	100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	1440
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0

Node No Outfall Online Depth/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 119.796

Depth (m)	Flow (l/s)
0.100	0.000

Node Soakaway Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.48870	Invert Level (m)	119.820	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	55	Inf Depth (m)	0.400
Safety Factor	2.0	Pit Width (m)	3.000	Number Required	1
Porosity	0.95	Pit Length (m)	3.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE.01	11	121.107	0.017	0.5	0.0015	0.0000	OK
30 minute summer	S.01	18	120.954	0.024	1.0	0.0064	0.0000	OK
30 minute summer	RE.02	18	121.841	0.011	0.5	0.0009	0.0000	OK
15 minute summer	S.02	11	120.666	0.026	2.2	0.0058	0.0000	OK
30 minute summer	Soakaway	23	119.898	0.078	2.2	0.6666	0.0000	OK
30 minute summer	No Outfall	22	119.898	0.102	1.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	RE.01	1.000	S.01	0.5	0.429	0.063	0.0110	
30 minute summer	S.01	1.001	S.02	1.0	0.665	0.128	0.0263	
30 minute summer	RE.02	2.000	S.02	0.5	1.118	0.023	0.0042	
15 minute summer	S.02	1.002	Soakaway	2.2	1.409	0.138	0.0126	
30 minute summer	Soakaway	1.003	No Outfall	1.2	0.413	0.147	0.0099	
30 minute summer	Soakaway	Infiltration		0.6				
30 minute summer	No Outfall	Depth/Flow		0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE.01	11	121.117	0.027	1.3	0.0023	0.0000	OK
15 minute summer	S.01	11	120.970	0.040	2.6	0.0106	0.0000	OK
15 minute summer	RE.02	11	121.847	0.017	1.3	0.0014	0.0000	OK
15 minute summer	S.02	10	120.683	0.043	5.7	0.0097	0.0000	OK
60 minute summer	Soakaway	47	120.069	0.249	3.9	2.1296	0.0000	SURCHARGED
60 minute summer	No Outfall	48	120.069	0.273	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	RE.01	1.000	S.01	1.3	0.558	0.164	0.0219	
15 minute summer	S.01	1.001	S.02	2.6	0.853	0.334	0.0538	
15 minute summer	RE.02	2.000	S.02	1.3	1.142	0.060	0.0126	
15 minute summer	S.02	1.002	Soakaway	5.7	1.825	0.356	0.0251	
60 minute summer	Soakaway	1.003	No Outfall	0.9	0.410	0.109	0.0108	
60 minute summer	Soakaway	Infiltration		0.6				
60 minute summer	No Outfall	Depth/Flow		0.0				0.0

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE.01	10	121.122	0.032	1.8	0.0027	0.0000	OK
15 minute summer	S.01	10	120.978	0.048	3.6	0.0127	0.0000	OK
15 minute summer	RE.02	10	121.850	0.020	1.8	0.0017	0.0000	OK
15 minute summer	S.02	10	120.691	0.051	7.7	0.0116	0.0000	OK
60 minute winter	Soakaway	57	120.201	0.381	3.8	3.2566	0.0000	SURCHARGED
60 minute winter	No Outfall	57	120.201	0.405	0.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	RE.01	1.000	S.01	1.8	0.605	0.225	0.0276	
15 minute summer	S.01	1.001	S.02	3.5	0.917	0.455	0.0679	
15 minute summer	RE.02	2.000	S.02	1.8	1.122	0.083	0.0172	
15 minute summer	S.02	1.002	Soakaway	7.7	1.966	0.481	0.0314	
60 minute winter	Soakaway	1.003	No Outfall	0.6	0.444	0.081	0.0108	
60 minute winter	Soakaway	Infiltration		0.6				
60 minute winter	No Outfall	Depth/Flow		0.0				0.0

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE.01	10	121.121	0.031	1.7	0.0027	0.0000	OK
15 minute summer	S.01	10	120.977	0.047	3.4	0.0123	0.0000	OK
15 minute summer	RE.02	10	121.849	0.019	1.7	0.0016	0.0000	OK
15 minute summer	S.02	10	120.689	0.049	7.3	0.0112	0.0000	OK
60 minute summer	Soakaway	52	120.181	0.361	4.8	3.0875	0.0000	SURCHARGED
60 minute summer	No Outfall	52	120.181	0.385	0.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	RE.01	1.000	S.01	1.7	0.597	0.212	0.0264	
15 minute summer	S.01	1.001	S.02	3.3	0.903	0.429	0.0650	
15 minute summer	RE.02	2.000	S.02	1.7	1.116	0.078	0.0163	
15 minute summer	S.02	1.002	Soakaway	7.3	1.941	0.456	0.0302	
60 minute summer	Soakaway	1.003	No Outfall	0.7	0.444	0.084	0.0108	
60 minute summer	Soakaway	Infiltration		0.6				
60 minute summer	No Outfall	Depth/Flow		0.0				0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE.01	10	121.128	0.038	2.4	0.0032	0.0000	OK
15 minute summer	S.01	10	120.988	0.058	4.8	0.0152	0.0000	OK
15 minute summer	RE.02	10	121.853	0.023	2.4	0.0019	0.0000	OK
60 minute winter	S.02	60	120.872	0.232	5.1	0.0528	0.0000	SURCHARGED
60 minute winter	Soakaway	60	120.871	1.051	5.1	3.4243	0.0000	SURCHARGED
60 minute winter	No Outfall	60	120.871	1.075	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	RE.01	1.000	S.01	2.4	0.648	0.301	0.0344	
15 minute summer	S.01	1.001	S.02	4.7	0.980	0.610	0.0852	
15 minute summer	RE.02	2.000	S.02	2.4	1.116	0.110	0.0231	
60 minute winter	S.02	1.002	Soakaway	5.1	1.775	0.320	0.0630	
60 minute winter	Soakaway	1.003	No Outfall	1.6	0.477	0.197	0.0108	
60 minute winter	Soakaway	Infiltration		0.6				
60 minute winter	No Outfall	Depth/Flow		0.0				0.0

1.0 GENERAL REQUIREMENTS

All drainage systems must comply with:

- Building Regulations Part H (2015 Edition)
- BS EN 752:2008 - Drain and sewer systems outside buildings
- BS 12056:2000 - Gravity drainage systems inside buildings

• Design and Construction Guidance (DCG, 2020) for adoptable sewers

• BS EN 1610:2015 - Construction and testing of drains and sewers

• NHBC Standards Chapter 5.3 - Drainage below ground

Products used must be Kitemarked or CE marked, where applicable, and installed as per manufacturers' guidelines.

HydroGround Civils Ltd is the Designer under the Construction (Design and Management) Regulations 2015. The Principal Designer role is to be appointed by the Client or Principal Contractor as required.

2.0 PIPES

• Pipe Materials:

- Vitrified clay (VC) to BS EN 295 or BS 65, extra strength, Kitemarked.
- uPVC (PVC-U) to BS EN 1401-1, SN4 for private drainage; and SN8 where adoptable.
- Concrete pipes to BS EN 1916 / BS 5911-1, strength class M.

• Bedding Classes:

- Class S (granular bedding with selected backfill surround).
- Class Z (concrete bedding and surround) only used where cover is insufficient, see pipe protection.

• Pipe Protection:

Where depth to crown is <1.2m in vehicular areas or <0.6m in landscaped areas, provide concrete protection (150mm min. surround) - Refer to Site/Soil Investigation Report by others for appropriate concrete mix.

• Rocker Pipes:

These must be provided adjacent to fixed structures and manholes: 600mm length for drains ≤600mm diameter.

Surface water drainage should be kept separate from foul water drainage.

All pipes to be laid soffit to soffit unless noted otherwise.

Drains are to be 100mm nominal diameter laid at a gradient no flatter than 1 in 80 for surface water, and 1 in 70 for foul water, unless shown otherwise. Foul drains without at least one WC connected are to be laid no flatter than 1 in 30.

Soil Vent Pipes (SVPs) and Stub Stacks (SSs) to be provided with a roddable access point, otherwise connection must be made to an external chamber.

Lond radius bends to be used at the base of all soil stacks.

Location of all drainage connections in the building and rainwater pipes are to be set out from the Architects and MEP drawings.

3.0 INSPECTION CHAMBERS & MANHOLES

- Polypropylene Inspection Chambers (PPIC) must comply with BS EN 13598-1/2. ≤1.2m deep: 450mm diameter PPIC allowed. For 1.2m to 3.0m deep PPIC, reduced access type (max 350mm shaft) with concrete collar.

• Installation Requirements:

- For depths <1.5m: install on compacted granular bedding, backfilled with as-dug or granular material.
- For depths >1.5m or in poor ground: surround with GEN3 concrete (sulphate resisting cement) -- Refer to Site/Soil Investigation Report by others in available.
- Chambers must be installed strictly in accordance with manufacturer's installation guidance, including the use of appropriate shingle surround or base bedding to support structural loads.

• Covers and Frames: to BS EN 124

- A15: landscaped/pedestrian use only
- B125: private driveways, areas where other mechanical equipment might be used
- D400: highways, adoptable roads

• Precast Concrete Manholes:

- To BS EN 1917 and BS 5911-3/4, minimum 675mm cover opening, GEN3 concrete surround -- Refer to Site/Soil Investigation Report by others if available.
- Benching 1:10 to 1:30 slope, smooth finish; step irons per BS EN 13101

4.0 SURFACE WATER STORAGE TANKS

Refer to manufacturer guidance for installation. Following guidance is based on Wavin Aquacell Units:

4.1 Soakaway

1. Excavate the trench to the required depth ensuring that the plan area is slightly greater than that of the AquaCell units.
2. Lay 100mm bed of coarse sand or non-angular granular material, level and compact.
3. Lay the geotextile* over the base and up the sides of the trench.
4. Lay the AquaCell units parallel with each other. In multiple layer applications, wherever possible, continuous vertical joints should be avoided. AquaCell units can be laid in a 'brick bonded' formation (i.e. to overlap the joints below). For single layer applications use the AquaCell Clips and for multi layers use the AquaCell Clips and the AquaCell Shear Connectors (vertical rods).
5. Fix the Adaptors to the AquaCell units as required and connect pipework.
6. In order to prevent silt from entering the tank, clogging inlet pipework and reducing storage capacity, it is recommended that the Domestic Silt Trap (6LB300) or one of the standard Silt Traps (6LB600, 6LB625, 6LB630) is installed prior to the inlet pipework.
7. Wrap and overlap the geotextile covering the entire AquaCell structure.
8. Lay 100mm of coarse sand or non-angular granular material between the trench walls and the AquaCell structure and compact.
9. Lay 100mm of coarse sand or non-angular granular material over the geotextile and compact.
10. Backfill with suitable material.

4.2 Attenuation Tank

1. Excavate the trench to the required depth ensuring that the plan area is slightly greater than that of the AquaCell units.
2. Lay 100mm bed of coarse sand or non-angular granular material, level and compact.
3. Lay the geotextile* over the base and up the sides of the trench.
4. Lay the geomembrane on top of the geotextile over the base and up the sides of the trench.
5. Lay the AquaCell units parallel with each other. In multiple layer applications, wherever possible, continuous vertical joints should be avoided. AquaCell units can be laid in a 'brick bonded' formation (i.e. to overlap the joints below). For single layer applications use the AquaCell Clips and for multi layers use the AquaCell Clips and the AquaCell Shear Connectors (vertical rods).
6. Wrap the geomembrane around the AquaCell structure and seal to manufacturers recommendations*
7. If side connections into the AquaCell units is required, (other than the preformed socket), use the appropriate Flange Adaptor (6LB104 or 6LB106). Fix the flange adaptor to the unit using self-tapping screws. Drill a hole through the Flange Adaptor and connect the pipework. (6LB106 should not be used with AquaCell Eco).
8. In order to prevent silt from entering the tank, clogging inlet pipework and reducing storage capacity, it is recommended that the Domestic Silt Trap (6LB300) or the standard Silt Trap (6LB600) is installed prior to the inlet pipework.
9. Wrap and overlap the geotextile covering the entire AquaCell structure, to protect the geomembrane.
10. Lay 100mm of coarse sand or non-angular granular material between the trench walls and the AquaCell structure and compact.
11. Lay 100mm of coarse sand or non-angular granular material over the geotextile/geomembrane and compact.
12. Backfill with suitable material.

* For protective geotextiles CIRIA C753 - The SuDS Manual recommends a geotextile of at least 2mm thick and 300gsm.

* The geomembrane should be designed to survive the rigours of construction, this is typically at least 0.5mm thick. Joints should be sealed using proprietary welding techniques.

NB: A storage tank must be vented, and it is recommended that one vent pipe, 110mm in diameter is provided per 7,500 square metres of impermeable catchment area on a site.

5.0 GULLIES

5.1 Road Gullies

- Type: Road gullies shall be proprietary trapped road gully pots or precast concrete trapped gullies, complying with BS EN 124 and BS EN 1917 where applicable.
- Size: Typically 450mm dia. pot with 900mm-1050mm depth, to suit hydraulic and maintenance requirements.
- Grating and Frame:
 - Ductile iron gully grates and frames to BS EN 124 Class D400 for carriageways.
 - Locking grates required on highways or trafficked areas.
- Connections:
 - Gully pot to be connected to carrier drain via a 150mm diameter outlet pipe, minimum.
 - All connections shall be flexible, watertight, and provide smooth flow transition.

- Traps:
 - All gullies shall be permanently trapped to prevent the passage of odours.
 - Traps shall be integral or proprietary u-bend connections.
- Installation:
 - Road gullies shall be bedded and surrounded in C16/20 concrete to minimum 150mm thickness, or as otherwise recommended based on soil report.
 - Concrete surround: Refer to Site/Soil Investigation Report by others.
 - Installed level with road surface; grating shall be flush with finished tarmac to avoid ponding.

- Silt Bucket:
 - Provide removable silt bucket for maintenance access.
- Installation:
 - Road gullies shall be bedded and surrounded in C16/20 concrete to minimum 150mm thickness, or as otherwise recommended based on soil report.
 - Concrete surround: Refer to Site/Soil Investigation Report by others.
 - Installed level with road surface; grating shall be flush with finished tarmac to avoid ponding.

5.2 Yard Gullies

- Type:
 - Yard gullies shall be shallow, trapped polypropylene or concrete gullies, suitable for paved areas and private driveways.
 - Must comply with BS EN 752 and BS EN 1253.
- Size:
 - 300mm dia. chamber or proprietary gully trap with a 100mm or 150mm outlet.
 - Depth to suit local gradients and connection levels.
- Grating and Cover:
 - Galvanised steel or ductile iron gratings depending on loading.
 - Class A15 (non-trafficked), B125 (driveways), or C250 (lightly trafficked) to BS EN 124.
- Traps:
 - All gullies shall incorporate a built-in water trap (minimum 50mm seal) to prevent odour.
- Connections:
 - Yard gullies to be connected via 100mm diameter pipes (unless otherwise required), with sealed and flexible joints.
- Installation:
 - Gullies shall be bedded and surrounded in concrete (minimum 100mm thickness) or granular sub-base material if in soft landscaping.
 - Refer to Site/Soil Investigation Report by others for appropriate concrete type. Always refer to BRE SD1 guidance and match the concrete class accordingly.
- Cover Level:
 - Top of gully grating shall be level with finished ground/paving and installed to match slope.

6.0 LINEAR DRAINS

All channel drains to be ACO MultiDrain M100D, or similar, sloping invert drainage channel. Channel to drain via trapped roddable sump units connected to drain using 100mm diameter pipework. Channels & sump units to have galvanised edge rails & be fitted with class C250 lockable 'Heelguard' ductile iron gratings. Slot drains to be ACO HexDrain Brickslot for non-vehicular access and ACO MultiDrain MD for vehicular access.

Installation to be fully compliant with the manufacturer

7.0 WORKMANSHIP

- Work must be carried out to a high standard, using competent operatives under appropriate supervision.
- Pipes and fittings must be protected from damage during handling, storage, and installation. All ends shall be temporarily capped to prevent ingress of debris.
- Pipes must be laid true to line and level, on a firm and even bed. Deviations should be avoided unless clearly shown on design drawings or approved on site.
- Granular bedding materials shall be free from contaminants and conform to specified grading (e.g., 10mm-20mm for standard installations). Bedding shall be hand-tamped around and under the haunch of the pipe to provide uniform support.
- Trench backfilling must proceed in layers ≤150mm thickness and be compacted adequately to prevent settlement. No mechanical compaction shall be carried out within 300mm above the crown of pipes
- Where pipework is installed near buildings or foundations, ensure rocker pipes are provided and that differential settlement is prevented by careful re-compaction
- All unused inlets to chambers must be securely blanked with proprietary stoppers.
- All pipe joints within manholes must have a minimum 100mm clearance inside the wall to allow for settlement and re-bedding if required
- Any concrete surround or bed (e.g. GEN3 or FND4) must be specified only where required and subject to confirmation from the Site/Soil Investigation Report by others, especially regarding sulphate resistance needs.
- Where precast components are used, all joints must be sealed using proprietary mortar, bitumen sealant, or mastic to provide watertightness.
- Work must be carried out to a high standard, using competent operatives under appropriate supervision.
- Pipes and fittings must be protected from damage during handling, storage, and installation. All ends shall be temporarily capped to prevent ingress of debris.
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- Trench backfilling must proceed in layers ≤150mm thickness and be compacted adequately to prevent settlement. No mechanical compaction shall be carried out within 300mm above the crown of pipes
- Where pipework is installed near buildings or foundations, ensure rocker pipes are provided and that differential settlement is prevented by careful re-compaction
- Manholes and inspection chambers must be vertically plumb, bedded on appropriate bases (granular or concrete as required), and installed with benching shaped to guide flows smoothly to the outlet.
- All unused inlets to chambers must be securely blanked with proprietary stoppers.
- All pipe joints within manholes must have a minimum 100mm clearance inside the wall to allow for settlement and re-bedding if required
- Any concrete surround or bed (e.g. GEN3 or FND4) must be specified only where required and subject to confirmation from the Site/Soil Investigation Report by others, especially regarding sulphate resistance needs.
- Where precast components are used, all joints must be sealed using proprietary mortar, bitumen sealant, or mastic to provide watertightness.

7.0 TEST

- All pipework to be tested in accordance with BS EN 1610.
- Preferred method: air testing to 100mm water gauge pressure, held for 3 minutes with no loss.
- If air test is not practicable or fails, water test is permitted:
 - Fill section with water, leave to stabilise, then top up to original level after 30 minutes (allowing for evaporation).
- Joints to be visually inspected for leakage during testing.
- Test each pipe run between manholes, chambers or fittings.

8.0 REDUNDANT / ABANDONED DRAINAGE / SEWERS

Where existing drainage or sewer infrastructure is no longer required:

- Private Drainage (non-adopted):
 - Short sections (<3m): remove and backfill with compacted material
 - Longer sections:
 - Grout in place with cementitious or foam concrete mix; or
 - Remove entirely if interfering with structures or new works
- Public Sewers (adopted or ex-adopted):
 - Require written approval from sewerage undertaker
 - Typically capped and grouted unless removal is specified
 - Manholes to be broken out or sealed with reinforced concrete slabs
- Minimum Abandonment Requirements:
 - Cap all connections with stoppers or plugs
 - Flush/clean foul systems before grouting
 - Record abandoned sections clearly on as-builts
 - Confirm invert levels to prevent backfall risk

GENERAL NOTES 1. This drawing is to be read in conjunction with all relevant architects, engineers drawings & specifications. 2. The contractor is to be responsible for all dimensions & for the correct setting out of the works on site. 3. Do not scale from this drawing.					PROJECT NAME The Platt Turners Hill Road Crawley Down RH10 4EY				PROJECT DESCRIPTION Drainage Specification Notes				HGC HydroGround Civils					
									Revision		Prepared			CM	Approved	CM		
									Original		Approved			CM	Date	21 Dec 2025		
									STATUS		For Planning							
				P01	CM	21 Dec 2025	First Issue						Scale:		Dwg No:		REVISION	
				REV	BY	DATE	Revision Notes						NTS [A1]		RH112401/5120		P01	