

Calcinotto

Calcinotto

civil and structural engineers

114222

The Croft Medical Centre
Barnham Road ,
Eastergate
Chichester
PO20 3RP

Drainage Strategy Statement for Planning
For the The Croft Medical Centre

May 14th 2021
Revision 1.0

Produced By
Daniel Bott
Senior Civil Engineer

Checked By
Paul Westcott
Associate Director

Content

Drainage Strategy Statement for Planning for The Croft Medical Centre, Eastergate, Chichester

Section	Title	Page
1	Executive Summary	1
2	Introduction	3
2.1	Site Location	3
3	Existing Site	4
3.1	Existing Use	4
3.3	Foul and Surface Water Drainage	4
3.4	Ground Investigation	4
3.5	Geology	5
3.6	Topography	6
4	Public Sewers	7
4.1	Water Authority Apparatus	7
5	Proposed Development Philosophy	8
5.1	Development Proposals Background	8
5.5	Foul Drainage	10
5.6	EA Flood Risk Review	10
5.7	Surface Water Design	11
6	Water Quality	15
7	Conclusion	17
Appendix	Title	
A	Soils Limited Infiltration Test Results	18
B	Architects Site Layout	19
C	Topographical Survey	20
D	Southern Water Sewer Records	21
E	Proposed Drainage Strategy Layouts	22
F	Causeway Flow Surface Water Calculations	23
G	Maintenance and Management Plan	24
H	Greenfield Calculations	25

1 Executive Summary

- 1.1 Calcinotto have been appointed to prepare a Drainage Strategy in support of a full application for a proposed development for a Medical Centre on a greenfield site off Barnham Road in Barnham, Chichester. Post Code PO20 3RP. The development comprises of the following:
- Medical Centre building
 - Access Road and vehicle drop off bays
 - Parking areas including 72 parking bays.
 - Associated Landscaping
- 1.2 The drainage strategy discusses the intended method of disposal for both foul and surface water discharges from the site, into the public sewers outside of the site. The information made in support of the application is to demonstrate that a suitable means of managing and controlling surface water on the site is deliverable. In order to devise a surface water strategy, it is also necessary to consider whether the site is subject to Flood Risk. This statement therefore includes a short reference to Flood Risk.
- 1.3 The site is comprised of mostly undeveloped area with a small proportion of hard standing area currently used for parking situated at the existing access to the site. The site topographical survey does not identify any existing drains or gullies within the site suitable for re-use for the proposed development.
- 1.4 The existing site is 98% permeable of vegetated area, with 2% of impermeable area attributed to a small section of tarmac within the site and existing car parking area/access. An assessment has been made of the existing surface water flows generated by the existing site and leaving the site through the existing points of outfall. As there is no existing positive surface water drainage system suggested by the existing topographical information, the site is predominately assumed to drain via the process of evapotranspiration, with the existing car park impermeable surfacing overflowing into the Barnham Road highway drainage system during heavy rainfall periods.
- 1.5 Reference has been made to the British Geological Survey (BGS) mapping web site and the Environment Agency web site links to GOV.UK. The Geological survey mapping site shows the site is underlain with a Bedrock of London Clay formation. The mapping indicates superficial deposits of River Terrace Deposits consisting of Sand, Silt and Clay.
- 1.6 The GOV.UK flood mapping indicates the site is wholly within Flood Zone 1 and is in majority at very low risk from surface water flooding. A localised small portion of the site near the Eastern boundary is at low to medium risk from surface water flooding, however this can be assumed to be alleviated with the introduction of positively drained hardstanding areas in this location as part of the site proposals.
- 1.7 The existing topography of the site falls from north east to south west at an average of 1 in 33, starting at approximately 15.50mAOD at the northernmost point to 12.70mAOD along the southern boundary of the site at the access road tie-in point along Barnham Road.
- 1.8 Infiltration testing to BRE365 has been undertaken by Soils Limited at several locations within the site, producing favourable rates ranging from 2×10^{-6} m/s to 6.6×10^{-4} m/s, with the majority falling within the mid- 10^{-5} m/s range. The rates recorded confirm that infiltration drainage through the use of geo-cellular soakaways and permeable paving is a suitable method of surface water disposal for the site. Infiltration testing results can be located in Appendix A for reference.

- 1.9 Foul water flows generated by the development will discharge to the existing foul water sewer in Barnham Road to the south of the site via a proposed 150mm connection. There is an area earmarked for potential development to the north of the proposed site, a foul connection stub to the site foul water system is to be provided to avoid potential excavation works at a later date. The pre-application response for the site suggests that there may be limited capacity within the foul water sewer due to recent flooding problems in the area during significant rainfall events, therefore Southern Water will be contacted to confirm the public sewer has sufficient capacity to receive the site discharge.
- 1.10 The design has been examined in line with the current water quality guidelines outlined in Ciria C753 SuDS Manual Version 6 and provides SuDS features to meet these requirements. Further development on these may be made at detailed design stage post planning when co-ordinated with detailed landscape proposals.
- 1.11 The drainage proposals within this statement represent a design / strategy which has been well developed and in sufficient detail on the basis of what information is available to date and proves that a workable solution can be achieved within the constraints that exist for the site. Any drawings and calculations prepared at this time are preliminary only and should not be relied upon as a detailed design information, suitable for construction.
- 1.12 Post Planning consent the drainage details will be developed in greater detail when further investigations are carried out and be co-ordinated with the structural and landscape elements of the project.
- 1.13 This document has been prepared for the sole use of PHP Group to support the planning submission for the development on site. The contents of this report should not be relied upon without the written authority of Calcinotto Ltd.

2 Introduction

2.1 Site Location

2.1.1 Calcinotto Ltd have been appointed by PHP Group to prepare a drainage strategy for development proposed within the land to the west of the existing Croft Medical Centre in Eastergate, Chichester. The site is bounded by the existing Medical Centre to the east, Residential dwellings on Collins Close to the west, Barnham Road to the South and undeveloped land to the north. The site layout is detailed within Appendix B.

2.1.2 The application site has an area of 0.72ha. The site has a postcode of PO20 3RP and national grid reference is SU 94653 05629. The site location can be seen in Figure 1 below.



Figure 1. Site Location

2.1.3 This statement is made in support of a proposed drainage strategy to service development of the site into a 2-storey Medical Centre with associated parking and landscaping. A brief comment on Flood Risk is contained within this statement however as the site is wholly within Flood Zone 1 and is less than 1ha in size, a detailed site-specific Flood Risk Assessment is not required to support a planning application in this instance.

3 Existing Site

3.1 Existing Use

- 3.2 The existing site is largely undeveloped and made up of vegetation covering approximately 92% of the site area. There are small sections of hard surfaced area near both the existing access from Barnham Road, currently used as an overflow car park to the existing Croft Medical Centre building to the east and a small tarmac area near the western boundary of the site.

3.3 Foul and Surface Water Drainage

- 3.3.1 A topographical survey by Hampshire Land Surveys Ltd did not highlight any existing drainage or gullies within the site boundary. A manhole just outside of the site access in Barnham Road was recorded by the topographical survey, which corresponds to the location of the public foul water sewer. This survey was completed in February 2021 and a drawing produced 1142_08_04_01 included in Appendix C.

3.4 Ground Investigation

- 3.4.1 A ground Investigation study was carried out by Soils Limited in February 2021. This exercise included limited infiltration testing at shallow and deeper depths in 4 locations. Installation of Ground water monitoring tubes within 3 of the window sample holes was included.
- 3.4.2 The investigation identified made ground up to a depth of 0.4m described as 'CLAY/Clayey SILT with occasional fragments of concrete, brick, clinker and fine ash'. Beneath the made ground up to a depth of 2m is Brickearth deposits consisting of 'sandy slightly gravelly CLAY.' From depths between 2 and 4m are River Terrace Deposits with Head consisting of 'silty sandy GRAVEL/very gravelly SILT'
- 3.4.3 The test results in this initial investigation were not sufficiently conclusive on which to base a design. A drop in water was recorded in all holes at both depths but the testing was not wholly in accordance with BRE Digest 365.
- 3.4.4 Following discussions with Paul Cann at Arun District council it was suggested that these initial results were not wholly compliant with BRE Digest 365 and therefore more extensive testing should be carried out. A second set of testing was carried out between the 9th and 11th March as agreed with PC which would still sits within the time period that he accepts. The infiltration test results from that second set of testing is in Appendix A.
- 3.4.5 Groundwater monitoring was ongoing at the time of both ground investigations., Groundwater was recorded between 2.37-3.43m depth across the 3 standpipes throughout the site. Table 1 below presents all groundwater recordings to date: -

Trial Hole	Well Depth (m bgl)	Depth to Water (m bgl)			
		10/02/21	25/02/21	09/03/21	11/03/21
WS01	4.00	2.70	3.16	3.40	3.43
WS02	4.00	2.53	3.03	3.32	3.32
WS04	4.00	2.37	2.87	3.15	3.15

Table 1 – Groundwater Monitoring Levels

- 3.4.6 The infiltration rates used within the surface water design relate to the BRE365 complaint second round of testing.

3.5 Geology

3.5.1 Examination of the British Geological Survey web site identifies the general Geology to be as follows:

- Superficial Deposits – The site appears to be in an area of River Terrace Deposits consisting of Sand, Silt and Clay. Refer to Figure 2 below.
- Bedrock Layer - The site is underlain by the London Clay Formation comprising of silty and sandy clayey and sandy silt.

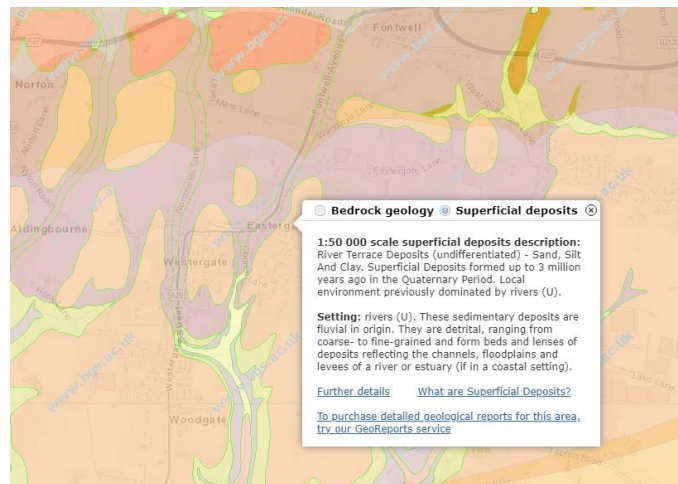


Figure 2 Superficial Geology

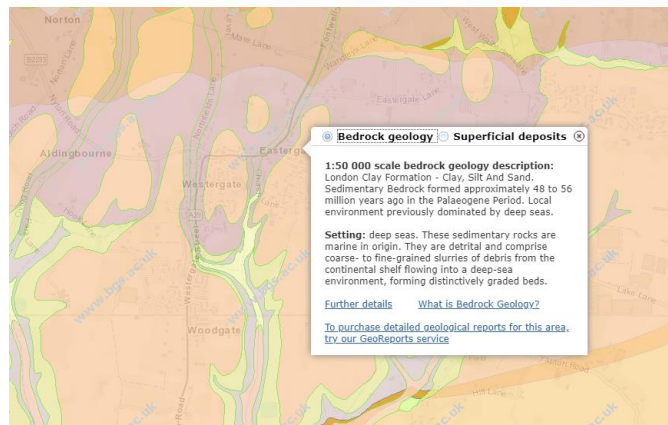


Figure 3 Bedrock Geology

3.5.2 Inspection of the DEFRA Magic map system and the Soilsapes diagram describes the site as Freely Draining slightly acid loamy soils. See Figure 4 below.

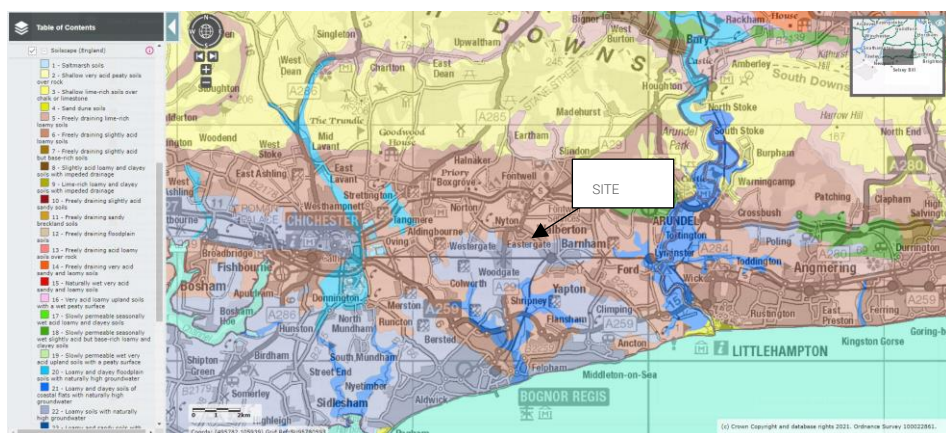


Figure 4 – DEFRA SoilScape Map

3.6 Topography

- 3.6.1 A topographical survey by Hampshire Land Surveys Ltd has been supplied and was undertaken in April 2008. The site levels generally slope from north to south across the site towards Barham Road from approximately 15.50m AOD to 12.80m AOD respectively.
- 3.6.2 The hardstanding areas have been designed to accommodate most of the level difference within the site access road, leaving the main site proposals relatively flat to allow permeable paving to operate efficiently with only localised falls towards parking bays in the car park.
- 3.6.3 A copy of the survey can be found in Appendix C.

4 Public Sewers

4.1 Water Authority Apparatus

4.2 The Public Sewer Record plan obtained from Southern Water highlights the 175mm diameter public foul water sewer in Barham Road which flows to the east. The nearest manhole is just outside of the proposed site access road in Barnham Road at a depth of 1.45m.

4.3 There are no local surface water sewers to serve the proposed site, however BRE365 infiltration testing has recorded favourable infiltration rates between 1.5m and 1.7m depth that will allow the site to dispose of surface water at source via geo-cellular soakaways and permeable paving.

4.4 A copy of the Public Sewer records is within Appendix D.

5 Proposed Development Philosophy

5.1 Development Proposals Background

A breakdown of the proposal is as follows: -

- Medical Centre building
- Access Road and vehicle drop off bays
- Parking areas including 72 parking bays.
- Associated Landscaping

5.1.1 A copy of the Site Layout is within Appendix B.

5.2 Drainage Design Guidelines and Parameters

5.2.1 In accordance with good practice and guidance the surface water system will not interact and is to be kept separate to the foul system.

5.3 All new private drainage will be designed in accordance with Approved Document H of the National Building Regulations 2000:2015 Edition and BS EN 752:2008.

5.4 All new surface water drainage will be designed to comply with current CIRIA design guidance C697 and C753, using the storm return periods listed below and latest climate change allowances as contained within the Guidance Document dated 19th February and updated 12th April 2016 – Flood Risk Assessments: Climate Change Allowances.

- 1 in 1 year no climate change
- 1 in 30 year with 20% climate change
- 1 in 100 year with 40% climate change

5.4.1 Where appropriate, an allowance for Urban Creep can be made, but in this instance, it is very unlikely there would be any possibility of any increase in area to the buildings due to the site being developed for a specific purpose and any future expansion would require a planning approval. Any potential future expansion will have the scope to introduce new separate infiltration drainage measures to deal with the additional runoff independent from the proposed drainage system.

5.4.2 In Accordance with Part H of the Building Regulations the hierarchy for consideration of dealing with surface water run-off is as given in Table 2 below.

Building Regulations Part H3 (2002):

- (1) Adequate provision shall be made for rainwater to be carried from the roof of the building.
- (2) Paved areas around the building shall be so constructed as to be adequately drained.
- (3) Rainwater from a system provided pursuant to sub-paragraphs (1) or (2) shall discharge to one of the following, listed in order of priority:
 - (a) An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
 - (b) A watercourse or, where that is not reasonably practicable,
 - (c) A sewer

Table 2: Part H3 Hierarchy

- 5.4.3 In terms of the SuDS 'Management Train' the drainage strategy for the proposed development seek to address the quality and quantity of run off using the hierarchy points listed below.:
- i) Prevention - to minimise the risk of pollution and introduce measures to cover maintenance of the drainage system for the lifetime of development.
 - ii) Source Control – Control and discharge of run off at its source using infiltration measures to eliminate offsite surface water discharge. Where possible measures have been incorporated to integrate this with landscape features.
 - iii) Site control - The proposed surface water system separates the run-off from the roofs, road, and paved areas for each part of the development and deals with it at source via infiltration methods.
 - iv) Regional control - Management of run off from more than one site at a time but in this is not applicable and so is covered by site control.
- 5.4.4 Exceedance of a system can be caused by blockage, element system failure, or by rainfall events in excess of the design storm events used to size the system. It is important to consider exceedance and to know where the water will travel and to ensure its passage and point of collection will not put property and people at risk. It is further important to ensure exceedance routes are kept clear and protected from any future land changes.
- 5.4.5 Correspondence with the Arun District Council Drainage Engineer after the first round of infiltration testing raised concerns about infiltration rates at shallow depths up to a depth of 1.24m where and lower than 2.0m where poor results have been recorded. It has been recommended following receipt of the second round of testing results that all infiltration structures should look to infiltrate in the region of 1.5-1.7m deep to enable more favourable rates to be used, whilst staying sufficiently above the recorded water table levels.
- 5.4.6 It is anticipated that West Sussex as Lead Local Flood Authority (LLFA) will be consulted through the planning process in relation to the management of surface water generated by this site and to a lesser extent of flood risk. Any comments made will be reviewed and where required addressed at a detailed design. The same applies to comments made by Arun District council drainage engineer.

- 5.4.7 Infiltration recorded at shallower depths is noted and although not relied upon as part of the overall design of the soakaways it will provide limited additional infiltration especially in lesser storm events.

5.5 Foul Drainage

- 5.5.1 The foul drainage network will discharge via 100mm and 150mm diameter pipework surrounding the building by gravity to the public foul water sewer in Barnham Road. A foul water connection to the site area to the north has been allowed for within the design to potentially accommodate further development north of the site without the need for excavation of the proposed access road.
- 5.5.2 The peak foul water flow from the new development will be assessed once population figures have been received. The British Flows and Loads 43 guidance suggest 450 l/person/activity/day for a 'small hospital', which is the closest description within the guidance for a medical centre. It is expected that the flows generated from the development will not exceed the capacity for a 150mm diameter pipe.
- 5.5.3 The proposed foul discharge from the development will be subject to available capacity within the Southern Water public foul sewer network. It is anticipated that this assessment will be ongoing during the determination period of the Planning Application.

5.6 EA Flood Risk Review

- 5.6.1 Before a surface water strategy was developed, an analysis of the EA flood maps was made to determine if certain flood defence/preventative measures would need to be integrated into the design.
- 5.6.2 The nearest fluvial source is the Lidsey Rife Watercourse located approximately 200m West of the site as indicated on Figure 5 below which was taken from the Environment Agency website.



Figure 5. Environment Agency Main River Map

- 5.6.3 Figure 6 below, taken directly from the GOV.UK website highlights the site to be within Flood Zone 1 which by definition is designated as Low risk and has a less than 0.1% probability of flooding annually (i.e. <1 in 1000yr). The nearest visible flooding is the Lidsey Rife watercourse which as mentioned above is 200m West of the site.

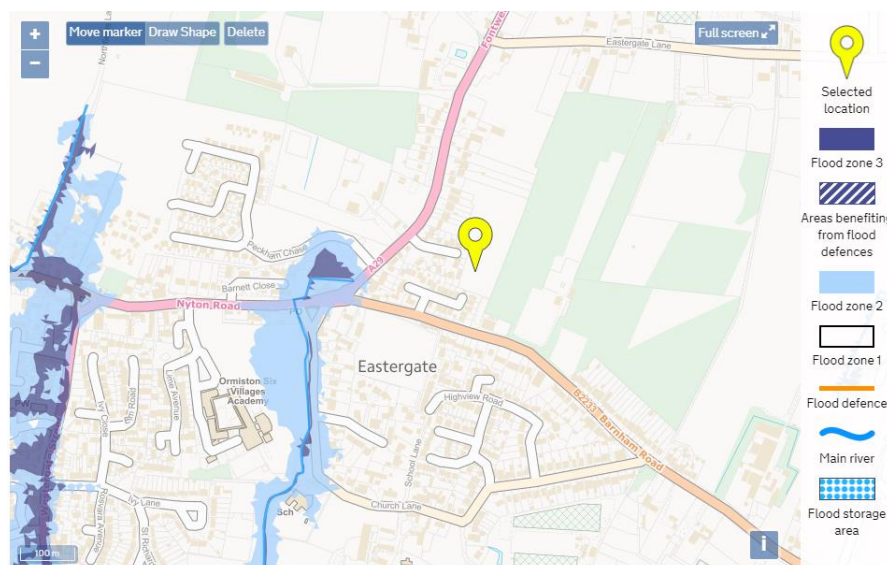


Figure 6. Environment Agency River and Sea flood risk map

- 5.6.4 A review of the GOV.UK website indicates the surface water flood map which can be seen in Figure 7 below shows the majority of the site to be at a “Very Low Risk” probability of surface water flooding which has by definition less than 0.1% annual probability of occurring. However, there is a small, localised spot adjacent to the eastern the eastern boundary of the site identified at low to medium risk from surface water flooding. This area currently has up to 3.3% probability of flooding annually. Analysis of the medium risk surface water flood map shown in Figure 8, highlights an area of up to 300mm flood depth within the site.
- 5.6.5 The localised surface water flooding within the site can be attributed to localised low points within the site topography with no positive surface water drainage outfall from the site. The introduction of the positive drainage system designed to the 100 year + climate change return period and reprofiled site topography will minimise the risk of the surface water flooding within the confines of the site.
- 5.6.6 The Flood Mapping information within this statement ‘Contains Public Sector information licensed under the open Government Licence V3.0.
- 5.7 **Surface Water Design**
- 5.7.1 The surface water strategy has been developed using infiltration rates recorded by Soils Limited after BRE365 compliant infiltration testing in March 2021 with site constraints considered from the topographical survey undertaken by Hampshire Land Surveys in April 2008.
- 5.7.2 Using the existing topographical survey information and current Architectural layout, an assessment of the existing and proposed impermeable areas is as given below.

Existing Impermeable Area	0.014ha
Proposed Impermeable Area	0.475ha

Table 2 – Impermeable Areas

- 5.7.3 Based on the ratio of existing impermeable area to proposed impermeable area, a Q Bar (Urban) value has been generated using the UK SuDS greenfield runoff rate tool. The value proven is 1.45l/s for the urban environment that the application site falls within. The corresponding flow rates are given below in Table 3 below.

Storm	Flow Rate l/s
Q Bar (Urban)	1.45
Q 1 year	1.23
Q 30 year	3.33
Q 100 year	4.62

Table 3 – Greenfield Run-Off Rates

- 5.7.4 Due to the lack of an existing positive surface water drainage system on site, existing brownfield rates from the site were not calculated due to no existing offsite discharge. The existing site is predominately assumed to drain via surface infiltration/evapotranspiration, with the existing car parking impermeable area adjacent to Barnham Road draining into the Barham Road highway drainage system.
- 5.7.5 In accordance with best practice guidelines and in particular Ciria Documents C753, C697 and C687 the new surface water drainage system will be designed using the following design return periods criteria and West Sussex County Council criteria.
- 1 in 1 year no climate change
- 1 in 30 year + 10-20% climate change
- 1 in 100 year + 20-40% climate change
- 5.7.6 Following the above hierarchy in Table 2, infiltration drainage is to be utilised for the site following positive infiltration testing results ranging from $2 \times 10^{-6} \text{m/s}$ to $6.6 \times 10^{-4} \text{m/s}$. Infiltration tests were recorded at 0.6-1.7m depths and therefore all proposed infiltration drainage will be designed to discharge at these depths.
- 5.7.7 Based on the infiltration rates received, it is proposed to drain the site by employing the following features in this design:
- Permeable paving in car park areas linked to below ground geo-cellular soakaways set at approximately 1.7m depth so that a clear path to favourable permeable strata is achieved.
- 5.7.8 The surface water network is composed of pipework ranging from 150mm up to 300mm connected by a series of inspection chambers and catchpits where required. Smart sponges are integrated within the site road gully outlets to allow treatment of water prior to discharge into the SuDS system.
- 5.7.9 The principle infiltration units are the modular crate soakaways under the car park, landscaped garden and access road which provide the required working capacity.

- 5.7.10 Whilst the infiltration within the area of parking bays has not been taken into account in the overall design it is anticipated that for the lower return period storm events it will provide an important function in managing surface water runoff. The inclusion of road gullies in the car park areas ensures that any excess run off in more extreme events will be captured and directed into the principle soakaways which to reiterate have been sized for the run off from all drained roof and paved areas.
- 5.7.11 The surface water system has been designed using Causeway Flow software and has been tested for the guideline storm events set out by the Local Authority of 1 year, 30 year and 100 year in accordance with Building Reg's with their relevant climate change requirements.
- 5.7.12 The private drainage system will provide adequate working capacity and temporary storage on site through the pipework, soakaways and permeable paving to manage the surface water runoff from all roof and hardstanding areas.
- 5.7.13 Exceedance of a system can be caused by blockage, element system failure, or by rainfall events in excess of the design storm events used to size the system. In an exceedance event the surface water would emerge out of the permeable surfacing and gullies within the car park and run onto the proposed site access, eventually finding its way into the highway drainage system in Barnham Road which is approximately 2.7m lower than the site ground levels. Due to the lack of a positive drainage system serving the existing hard surfaced area currently utilised as parking, the existing impermeable areas are assumed to drain unrestricted into the highway drainage system on Barnham Road.
- 5.7.14 A list of the SuDS components considered in the drainage strategy proposed have been compiled in Table 4 below.

SUDS	Viability	Rationale
Living Roofs	No	Living roofs are not being considered for roof areas.
Ponds/Wetlands/Detention Basins	No	Levels, poor infiltration at shallow depth and available area don't allow this option..
Swales/Filter Drains	No	Swale not included due to site landscaping constraints.
Soakaways	Yes	Infiltration testing results and site constraints lend itself to soakaways being the preferred method of surface water disposal for this site.
Porous Paving (Infiltration)	Yes	Infiltration testing results and site constraints lend itself to permeable paving being the preferred method of surface water disposal for car park areas within this site.
Porous Paving (Attenuation)	Yes	The positive infiltration results recorded, porous paving is not being utilised wholly for attenuation storage.
Attenuation/ Source Control	No	Due to the positive infiltration results recorded, attenuation storage prior to an off site discharge is not being considered as there are no available

		reasonable accessible receptors ie public surface water sewer and/or watercourse.
--	--	---

Table 4. SuDS Component Viability and Rationale

- 5.7.15 The surface water drainage outlined is detailed strategy to support this application. There will be a need for more detailed development of the proposal coordinating with other design elements Architecturally and Structurally post planning consent. However, the strategy design shown to date is sufficient to show and prove a workable solution, based on the sites individual site constraints, can be implemented to provide a full working solution.
- 5.7.16 The drainage strategy proposed is shown on drawing 114222-CAL-XX-XX-DR-D-0100 to 102 in Appendix E and full Causeway Flow output calculations to support the proposal in Appendix F.

6 Water Quality

- 6.1.1 Adequate treatment must be delivered to the water run-off to remove pollutants through SuDS devices, which are able to provide pollution mitigation. Pollution Hazards and the SuDS Mitigation have been indexed in the specialised literature CIRIA 753 'The SuDS Manual'. This is determined by the following restriction:

$$\text{Total SuDS Mitigation Index} \geq \text{Pollution Hazard Index}$$

- 6.1.2 The Pollution hazard Indices are summarised in Table 5 – Summary of Pollution Hazard Indices for different land Use Below:

POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS				
Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other Roofs (typically commercial/industrial roofs)	Low	0.3	0.2	0.05
Non-residential car parking with frequent change (e.g. hospitals, retail)	Medium	0.7	0.6	0.7

Table 5 – Summary of Pollution Hazard Indices for different Land Use

- 6.1.3 The Mitigation Indices direct from the CIRIA C753 SuDS Manual Version 6 of the proposed SuDS techniques are summarised in Table 6 – Indicative SuDS Mitigation Indices below.

INDICATIVE SuDS MITIGATION INDICES FOR DISCHARGES TO SURFACE WATER			
SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7
Cellular Soakaway System	-	-	-

Table 6 – Indicative SuDS Mitigation Indices

- 6.1.4 Where there are more than one mitigation indices, the total SuDS mitigation in calculations is as follows:

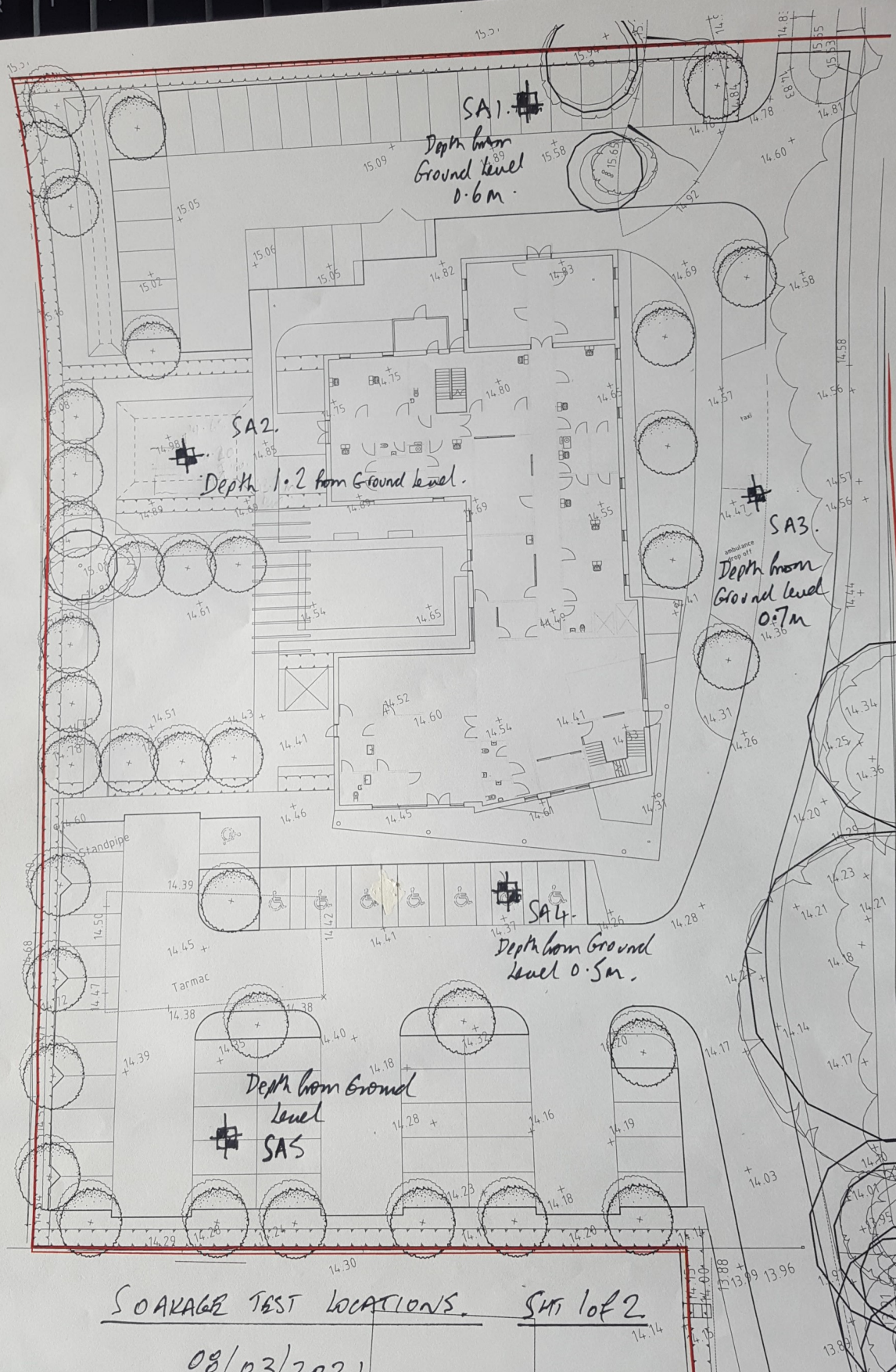
$$\text{Total SuDS Mitigation Index} = \text{Mitigation Index (1)} + 0.5 \text{ Mitigation Index (2)}$$

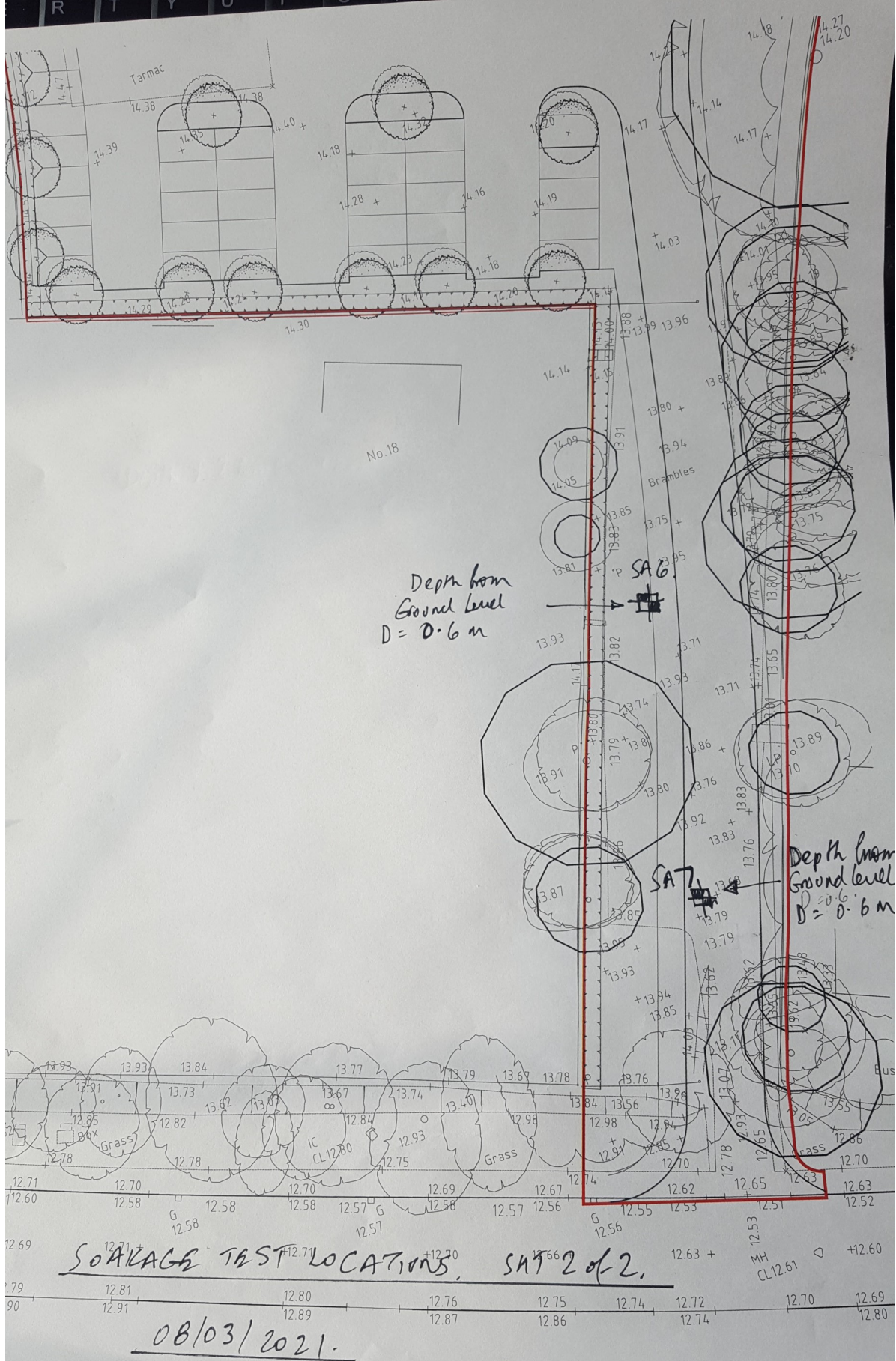
- 6.1.5 In the case of the permeable paving within the hardstanding areas (parking bays), the upper layers of the construction are proven to intercept and break down any possible contaminants from oil and fuel spillages through microbial action.
- 6.1.6 Using the above SuDS features will ensure sufficient protection to the Water Environment by reducing the amount of pollution in run off, as a whole, in line with the Water Framework Directive.
- 6.1.7 The total SuDS mitigation index for the permeable pavement provides sufficient pollution mitigation indices to combat the pollution present for this site.
- 6.2 Management and Maintenance Plan**
- 6.2.1 A list of the principal components to be included in a 'Management and Maintenance Plan' have been put together and are listed in Appendix G. These items and possibly others will be formalised into a fully detailed document at detailed design stage post planning consent.
- 6.2.2 It is anticipated provision of such a document will be requested as part of a drainage condition applied to the development.
- 6.2.3 The final document will be a live one that will be reviewed through the lifetime of the development to ensure that the drainage systems are maintained and continue to work efficiently as designed.
- 6.2.4 The responsibility for the management of the drainage system will be formalised by the building provider / developer post planning consent during the detailed design stage.

7 Conclusion

- 7.1.1 An outline site specific strategy for both foul and surface water drainage systems at the proposed Croft Medical Centre development in Barnham, Chichester has been prepared and shown on drawing 114222-CAL-XX-XX-DR-D-0100 to 102 in Appendix E.
- 7.2 Infiltration test results compliant with BRE365 undertaken in March 2021 confirm that infiltration is a viable method of surface water disposal for the scheme. Infiltration test results are shown in Appendix A.
- 7.3 The surface water drainage scheme includes proposed features to manage and limit the peak surface water run-off from the new development to a rate which minimises any risk to increasing flood risk downstream and on site. The design for the new Surface Water Drainage System has included an allowance for climate change which has been added to the two extreme events of 1 in 30yr + 20 % and 1 in 100yr + 40%.
- 7.4 The proposals are generally in compliance with all parts of the Non-Statutory technical standards for sustainable drainage systems.
- 7.5 Following Planning Consent, any outstanding discussions to be had with Southern Water following submission of a capacity check during the Planning determination will be finalised on foul water related matters of capacity. West Sussex County Council as LLFA will also be consulted.
- 7.6 Flood Risk has been analysed briefly using the EA Flood Map services within Section 5.6 and concludes the site to be within Flood Zone 1 which by definition is designated as Low risk and has a less than 0.1% probability of flooding annually. The site is at very low risk of surface water flooding over the majority of the site, however, there is a small area adjacent to the Eastern boundary identified at low to medium risk from surface water flooding. For full comment on Flood Risk refer to the standalone Flood Risk Assessment by Calcinotto Ltd.
- 7.7 An assessment on Water Quality has been made in Section 6.0 which concludes there is sufficient SuDS features within the proposed scheme to minimise pollutants within the drainage system. Permeable paving is a well proven technique for intercepting and breaking down pollutants.
- 7.8 The proposal for the redevelopment works would have no adverse effects on the surrounding area and the proposed drainage strategy detailed within this statement for the foul and surface water disposal is sufficiently detailed for this submission and demonstrates a workable solution is achievable whilst ensuring alignment with the local authority is achieved and complied with.
- 7.9 The proposals will be developed further based on the principles outlined in this statement post planning consent. The statement covers how surface water runoff will be managed on site and to comply with current design guidelines and at the same time to minimise the risk of onsite and off-site flooding.
- 7.10 Regular maintenance and inspection of the proposed drainage is imperative to the efficiency and effectiveness of the system and if not carried can put additional strain on the system, causing flooding. The inspection and maintenance regime has been covered in Appendix G.

A Soils Limited Infiltration Test Results





Soakaway Calculations

Soakaway Test No.	TP101 Test 1
Contract:	The Croft
Contract No.	19023

Field Test

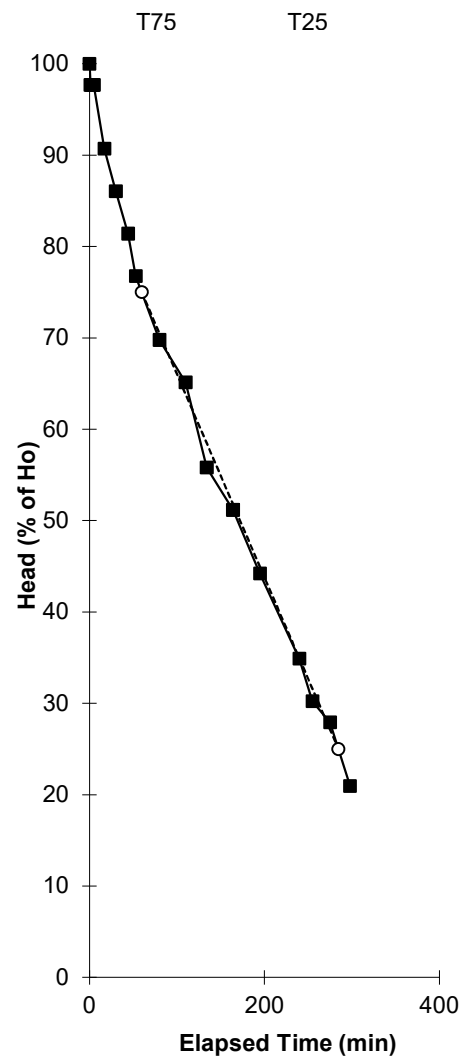
Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	0.70 m
Width of Pit	0.70 m
Length of Pit	1.40 m
Depth of Pit Soaked	0.43 m
ap50	1.883 m ²
Vp75-25	0.2107 m ³
t75-25	224.8 min
water used	0.4214 m ³
f	8.295E-06 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.27	0	100	0.43
0.28	1.0	98	0.42
0.28	2.0	98	0.42
0.28	3.0	98	0.42
0.28	4.0	98	0.42
0.28	5.0	98	0.42
0.31	17.0	91	0.39
0.33	30.0	86	0.37
0.35	44.0	81	0.35
0.37	53.0	77	0.33
0.40	80.0	70	0.30
0.42	110.0	65	0.28
0.46	134.0	56	0.24
0.48	164.0	51	0.22
0.51	195.0	44	0.19
0.55	240.0	35	0.15
0.57	255.0	30	0.13
0.58	275.0	28	0.12
0.61	298.0	21	0.09

T75	59.750	75
T25	284.583	25
T75-25	224.833	Derived from Best Fit



Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP101 Test 2
Contract:	The Croft
Contract No.	19023

Field Test

Trial Pit Log (include details of groundwater):

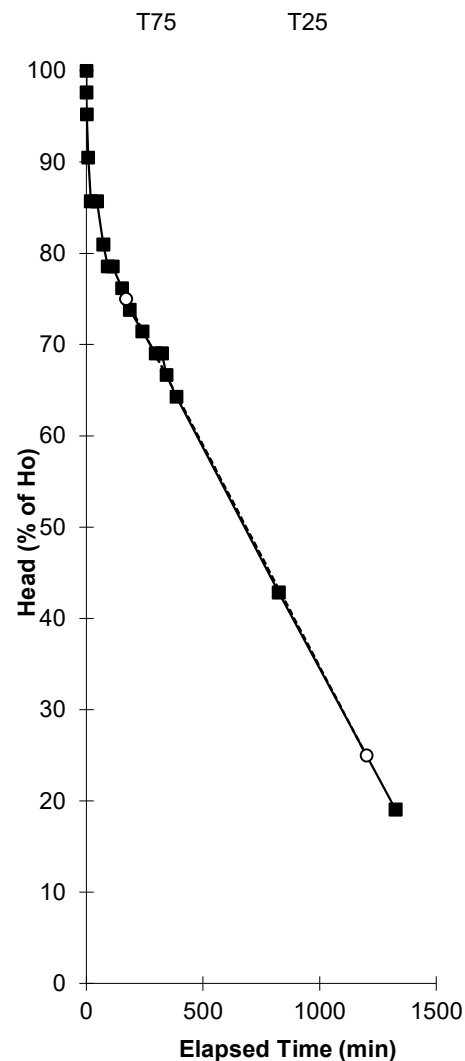
See trial Pit record

Depth of Pit	0.70 m
Width of Pit	0.70 m
Length of Pit	1.40 m
Depth of Pit Soaked	0.42 m
ap50	1.862 m ²
Vp75-25	0.2058 m ³
t75-25	1030.4 min
water used	0.4116 m ³
f	1.788E-06 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.28	0	100	0.42
0.29	0.1	98	0.41
0.30	1.8	95	0.40
0.32	7.8	90	0.38
0.34	18.8	86	0.36
0.34	45.0	86	0.36
0.36	72.0	81	0.34
0.37	91.6	79	0.33
0.37	112.4	79	0.33
0.38	153.0	76	0.32
0.39	186.2	74	0.31
0.40	239.3	71	0.30
0.41	296.2	69	0.29
0.41	323.6	69	0.29
0.42	343.3	67	0.28
0.43	386.5	64	0.27
0.52	825.0	43	0.18
0.62	1325.0	19	0.08

T75	169.608	75
T25	1200.000	25
T75-25	1030.392	Derived from Best Fit



Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221

Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP101 Test 3
Contract:	The Croft
Contract No.	19023

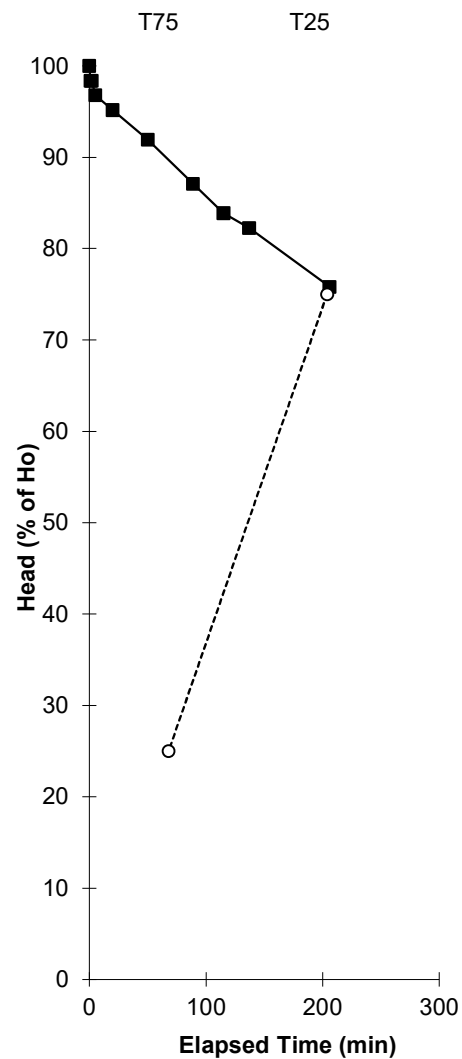
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	0.86 m
Width of Pit	0.70 m
Length of Pit	1.40 m
Depth of Pit Soaked	0.62 m
ap50	2.282 m ²
Vp75-25	0.3038 m ³
t75-25	-135.9 min
water used	0.6076 m ³
f	-1.633E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.24	0	100	0.62
0.25	1.0	98	0.61
0.25	2.0	98	0.61
0.26	5.0	97	0.60
0.27	20.0	95	0.59
0.29	50.0	92	0.57
0.32	89.0	87	0.54
0.34	115.0	84	0.52
0.35	137.0	82	0.51
0.39	206.0	76	0.47



Comments

Insufficient fall in head noted during monitoring period to allow infiltration rate to be calculated.

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP102 Test 1
Contract:	The Croft
Contract No.	19023

Field Test

Trial Pit Log (include details of groundwater):

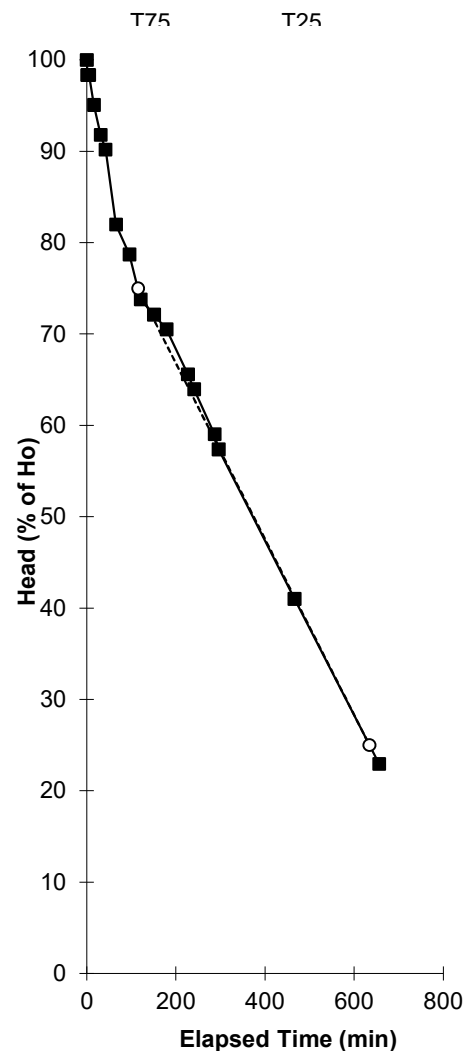
See trial Pit record

Depth of Pit	1.24 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.61 m
ap50	3.026 m ²
Vp75-25	0.4392 m ³
t75-25	519.7 min
water used	0.8784 m ³
f	4.655E-06 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.63	0	100	0.61
0.64	1.0	98	0.60
0.64	2.0	98	0.60
0.64	3.0	98	0.60
0.64	4.0	98	0.60
0.64	5.0	98	0.60
0.66	16.0	95	0.58
0.68	31.0	92	0.56
0.69	42.0	90	0.55
0.74	66.0	82	0.50
0.76	96.0	79	0.48
0.79	121.0	74	0.45
0.8	151.0	72	0.44
0.81	179.0	70	0.43
0.84	227.0	66	0.40
0.85	241.0	64	0.39
0.88	287.0	59	0.36
0.89	296.0	57	0.35
0.99	466.0	41	0.25
1.10	656.0	23	0.14

T75	114.750	75
T25	634.409	25
T75-25	519.659	Derived from Best Fit



Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

**Newton House, Cross Road, Tadworth
Surrey, KT20 5SR**

Telephone: 01737 814 221

Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP102 Test 2
Contract:	The Croft
Contract No.	19023

Field Test

Trial Pit Log (include details of groundwater):

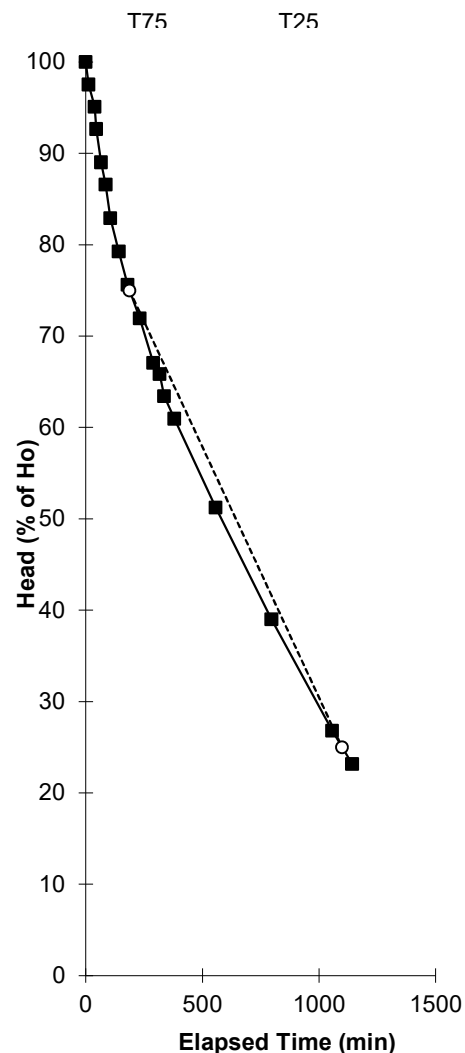
See trial Pit record

Depth of Pit	1.24 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.82 m
ap50	3.572 m2
Vp75-25	0.5904 m3
t75-25	911.0 min
water used	1.1808 m3
f	3.024E-06 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.42	0	100	0.82
0.44	11.9	98	0.80
0.46	37.5	95	0.78
0.48	45.2	93	0.76
0.51	65.3	89	0.73
0.53	84.9	87	0.71
0.56	104.6	83	0.68
0.59	141.1	79	0.65
0.62	178.8	76	0.62
0.65	231.3	72	0.59
0.69	288.7	67	0.55
0.70	316.0	66	0.54
0.72	335.8	63	0.52
0.74	379.0	61	0.50
0.82	556.0	51	0.42
0.92	796.0	39	0.32
1.02	1056.0	27	0.22
1.05	1141.0	23	0.19

T75	187.508	75
T25	1098.500	25
T75-25	910.992	Derived from Best Fit



Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221

Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP102 Test 3
Contract:	The Croft
Contract No.	19023

Field Test

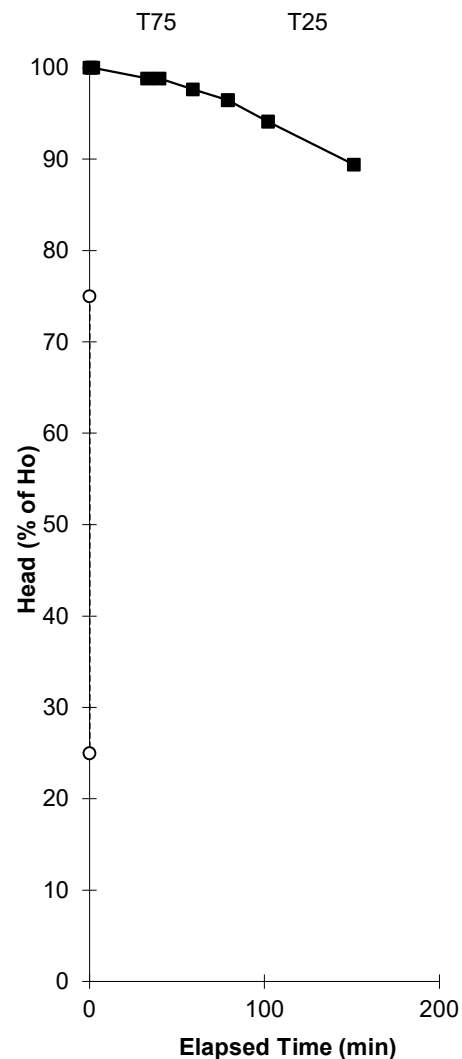
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	1.24 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.85 m
ap50	3.65 m ²
Vp75-25	0.612 m ³
t75-25	min
water used	1.2240 m ³
f	m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.39	0	100	0.85
0.39	1.0	100	0.85
0.39	2.0	100	0.85
0.40	33.0	99	0.84
0.40	40.0	99	0.84
0.41	59.0	98	0.83
0.42	79.0	96	0.82
0.44	102.0	94	0.80
0.48	151.0	89	0.76



Comments

Insufficient fall in head noted during monitoring period to allow infiltration rate to be calculated.

SOILS LIMITED

**Newton House, Cross Road, Tadworth
Surrey, KT20 5SR**

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP103 Test 1
Contract:	The Croft
Contract No.	19023

Field Test

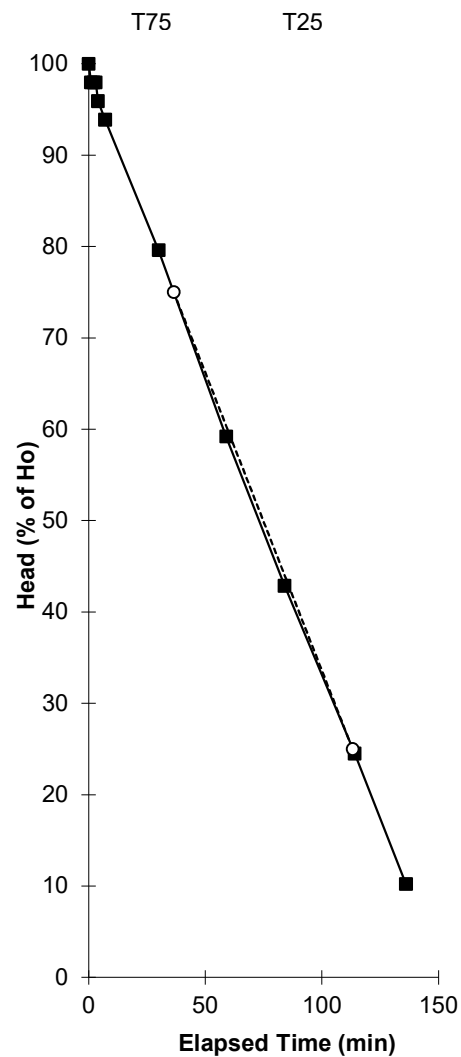
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	0.80 m
Width of Pit	0.80 m
Length of Pit	1.90 m
Depth of Pit Soaked	0.49 m
ap50	2.843 m ²
Vp75-25	0.3724 m ³
t75-25	76.6 min
water used	0.7448 m ³
f	2.849E-05 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.31	0	100	0.49
0.32	1.0	98	0.48
0.32	2.0	98	0.48
0.32	3.0	98	0.48
0.33	4.0	96	0.47
0.34	7.0	94	0.46
0.41	30.0	80	0.39
0.51	59.0	59	0.29
0.59	84.0	43	0.21
0.68	114.0	24	0.12
0.75	136.0	10	0.05



T75	36.525	75
T25	113.167	25
T75-25	76.642	Derived from Best Fit

Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221

Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP103 Test 2
Contract:	The Croft
Contract No.	19023

Field Test

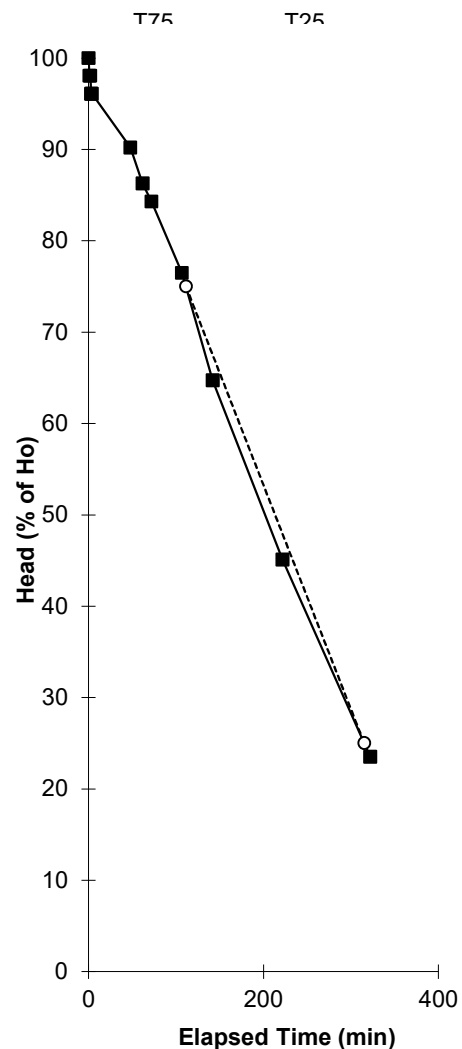
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	0.80 m
Width of Pit	0.80 m
Length of Pit	1.90 m
Depth of Pit Soaked	0.51 m
ap50	2.897 m ²
Vp75-25	0.3876 m ³
t75-25	203.8 min
water used	0.7752 m ³
f	1.094E-05 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.29	0	100	0.51
0.30	1.0	98	0.50
0.30	2.0	98	0.50
0.31	3.0	96	0.49
0.31	4.0	96	0.49
0.34	48.0	90	0.46
0.36	62.0	86	0.44
0.37	72.0	84	0.43
0.41	107.0	76	0.39
0.47	142.0	65	0.33
0.57	222.0	45	0.23
0.68	322.0	24	0.12
T75	111.375	75	
T25	315.182	25	
T75-25	203.807	Derived from Best Fit	



Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP103 Test 3
Contract:	The Croft
Contract No.	19023

Field Test

Trial Pit Log (include details of groundwater):

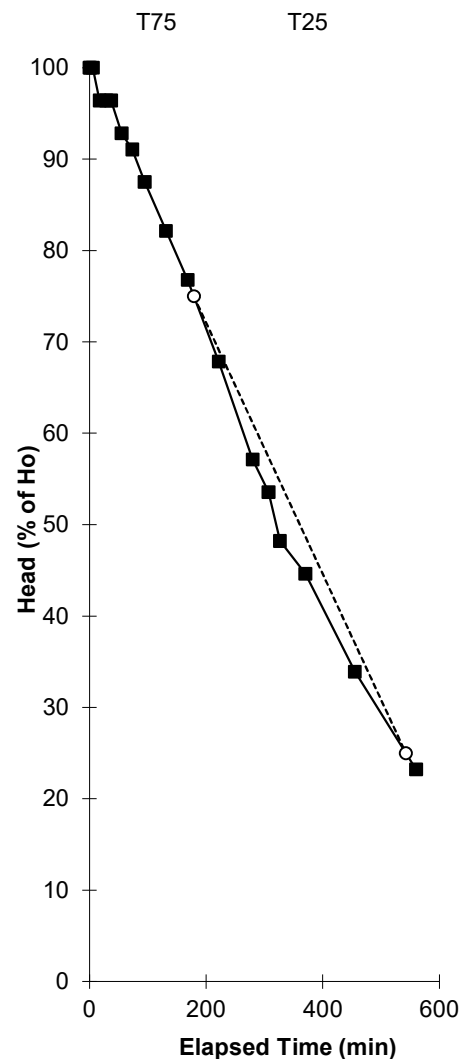
See trial Pit record

Depth of Pit	0.80 m
Width of Pit	0.80 m
Length of Pit	1.90 m
Depth of Pit Soaked	0.56 m
ap50	3.032 m ²
Vp75-25	0.4256 m ³
t75-25	363.6 min
water used	0.8512 m ³
f	6.435E-06 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.24	0	100	0.56
0.24	1.4	100	0.56
0.24	5.4	100	0.56
0.26	17.2	96	0.54
0.26	28.4	96	0.54
0.26	36.8	96	0.54
0.28	54.8	93	0.52
0.29	73.6	91	0.51
0.31	94.6	88	0.49
0.34	131.2	82	0.46
0.37	168.3	77	0.43
0.42	221.6	68	0.38
0.48	279.7	57	0.32
0.50	307.0	54	0.30
0.53	326.7	48	0.27
0.55	369.9	45	0.25
0.61	455.0	34	0.19
0.67	560.0	23	0.13

T75	178.950	75
T25	542.500	25
T75-25	363.550	Derived from Best Fit



Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221

Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP104 Test 1
Contract:	The Croft
Contract No.	19023

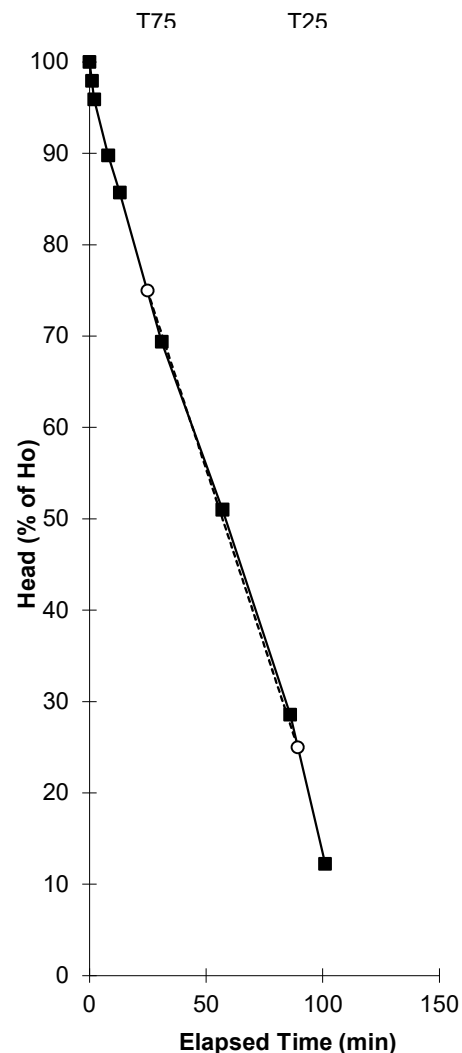
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	0.80 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.49 m
ap50	2.714 m ²
Vp75-25	0.3528 m ³
t75-25	64.5 min
water used	0.7056 m ³
f	3.361E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.31	0	100	0.49
0.32	1.0	98	0.48
0.33	2.0	96	0.47
0.36	8.0	90	0.44
0.38	13.0	86	0.42
0.46	31.0	69	0.34
0.55	57.0	51	0.25
0.66	86.0	29	0.14
0.74	101.0	12	0.06



T75	24.812	75
T25	89.281	25
T75-25	64.469	Derived from Best Fit

Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP104 Test 2
Contract:	The Croft
Contract No.	19023

Field Test

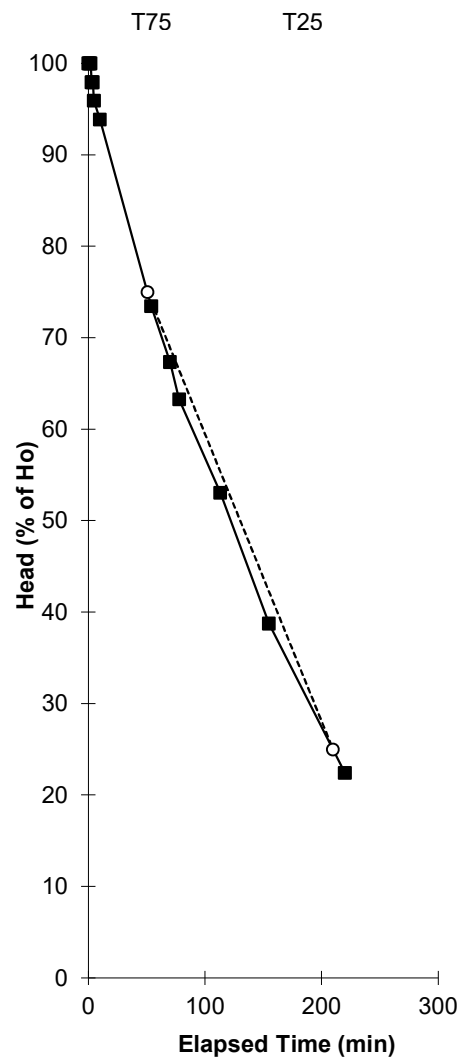
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	0.80 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.49 m
ap50	2.714 m ²
Vp75-25	0.3528 m ³
t75-25	159.1 min
water used	0.7056 m ³
f	1.361E-05 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.31	0	100	0.49
0.31	1.0	100	0.49
0.31	2.0	100	0.49
0.32	3.0	98	0.48
0.32	4.0	98	0.48
0.33	5.0	96	0.47
0.34	10.0	94	0.46
0.44	54.0	73	0.36
0.47	70.0	67	0.33
0.49	78.0	63	0.31
0.54	113.0	53	0.26
0.61	155.0	39	0.19
0.69	220.0	22	0.11



T75	50.700	75
T25	209.844	25
T75-25	159.144	Derived from Best Fit

Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP104 Test 3
Contract:	The Croft
Contract No.	19023

Field Test

Trial Pit Log (include details of groundwater):

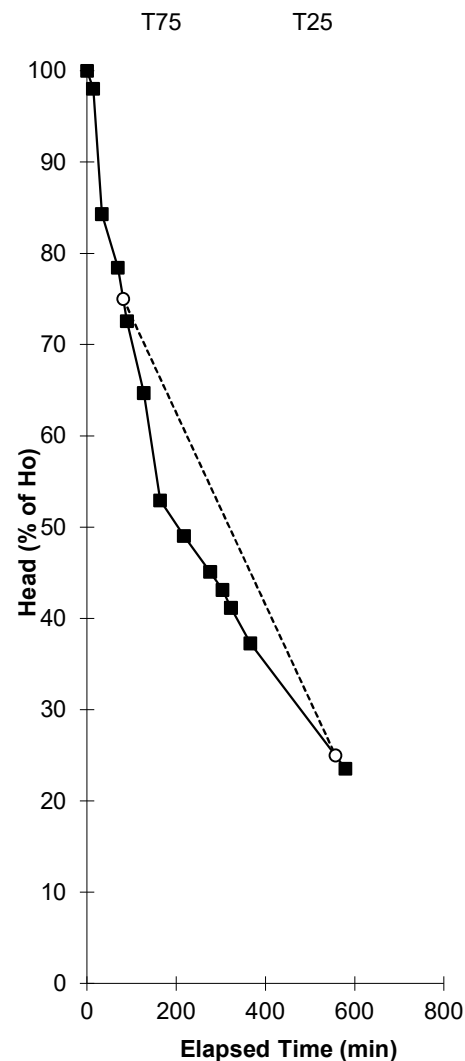
See trial Pit record

Depth of Pit	0.80 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.51 m
ap50	2.766 m ²
Vp75-25	0.3672 m ³
t75-25	475.9 min
water used	0.7344 m ³
f	4.649E-06 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.29	0	100	0.51
0.30	13.5	98	0.50
0.37	33.8	84	0.43
0.40	69.1	78	0.40
0.43	89.9	73	0.37
0.47	127.5	65	0.33
0.53	163.5	53	0.27
0.55	217.8	49	0.25
0.57	276.3	45	0.23
0.58	303.5	43	0.22
0.59	323.2	41	0.21
0.61	366.5	37	0.19
0.68	580.0	24	0.12

T75	81.244	75
T25	557.127	25
T75-25	475.882	Derived from Best Fit



Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP105 Test 1
Contract:	The Croft
Contract No.	19023

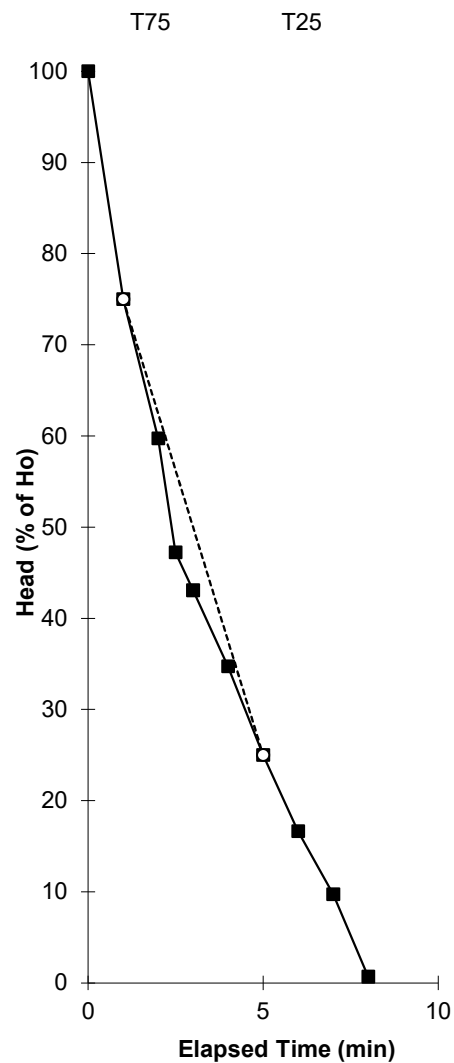
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	1.59 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.72 m
ap50	3.312 m ²
Vp75-25	0.5184 m ³
t75-25	4.0 min
water used	1.0368 m ³
f	6.522E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.87	0	100	0.72
1.05	1.0	75	0.54
1.16	2.0	60	0.43
1.25	2.5	47	0.34
1.28	3.0	43	0.31
1.34	4.0	35	0.25
1.41	5.0	25	0.18
1.47	6.0	17	0.12
1.52	7.0	10	0.07
1.59	8.0	1	0.01



T75	1.000	75
T25	5.000	25
T75-25	4.000	Derived from Best Fit

Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP105 Test 2
Contract:	The Croft
Contract No.	19023

Field Test

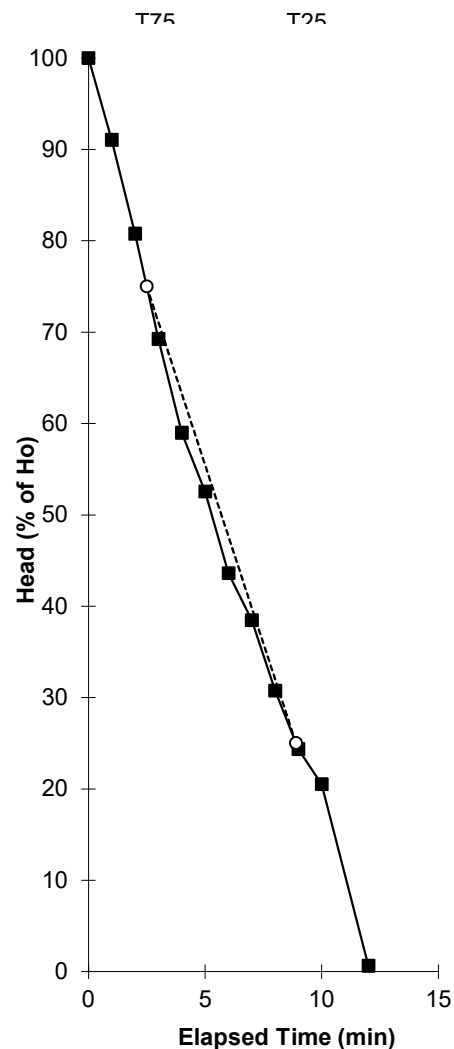
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	1.59 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.78 m
ap50	3.468 m ²
Vp75-25	0.5616 m ³
t75-25	6.4 min
water used	1.1232 m ³
f	4.217E-04 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.81	0	100	0.78
0.88	1.0	91	0.71
0.96	2.0	81	0.63
1.05	3.0	69	0.54
1.13	4.0	59	0.46
1.18	5.0	53	0.41
1.25	6.0	44	0.34
1.29	7.0	38	0.30
1.35	8.0	31	0.24
1.40	9.0	24	0.19
1.43	10.0	21	0.16
1.59	12.0	1	0.01



T75	2.500	75
T25	8.900	25
T75-25	6.400	Derived from Best Fit

Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221

Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP105 Test 3
Contract:	The Croft
Contract No.	19023

Field Test

Trial Pit Log (include details of groundwater):

See trial Pit record

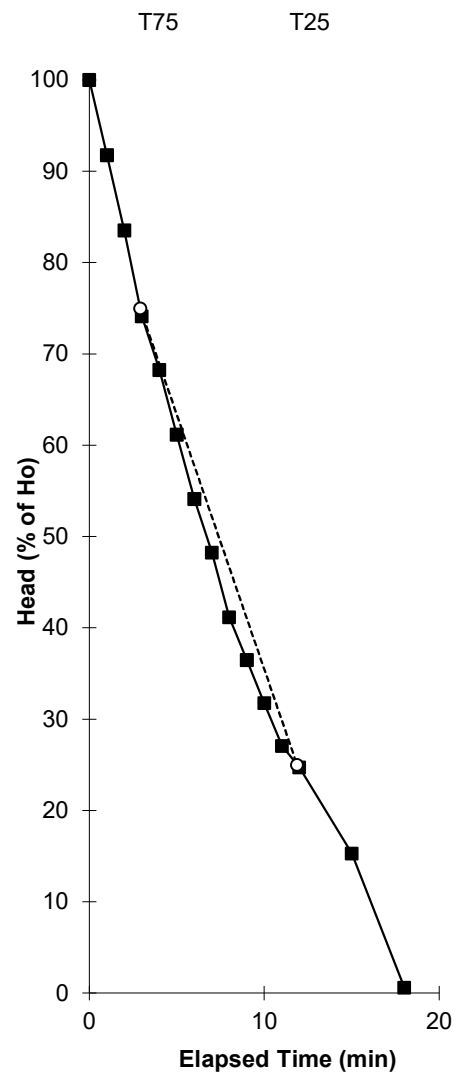
Depth of Pit	1.59 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.85 m
ap50	3.65 m ²
Vp75-25	0.612 m ³
t75-25	9.0 min
water used	1.2240 m ³
f	3.116E-04 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.74	0	100	0.85
0.81	1.0	92	0.78
0.88	2.0	84	0.71
0.96	3.0	74	0.63
1.01	4.0	68	0.58
1.07	5.0	61	0.52
1.13	6.0	54	0.46
1.18	7.0	48	0.41
1.24	8.0	41	0.35
1.28	9.0	36	0.31
1.32	10.0	32	0.27
1.36	11.0	27	0.23
1.38	12.0	25	0.21
1.46	15.0	15	0.13
1.59	18.0	1	0.01

T75	2.906	75
T25	11.875	25
T75-25	8.969	Derived from Best Fit

Comments



SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP106 Test 1
Contract:	The Croft
Contract No.	19023

Field Test

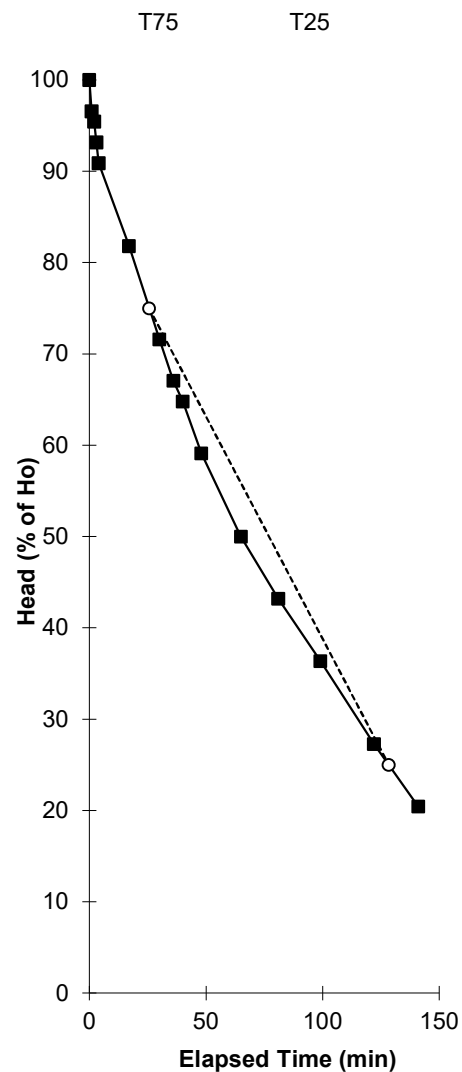
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	1.52 m
Width of Pit	0.80 m
Length of Pit	1.60 m
Depth of Pit Soaked	0.88 m
ap50	3.392 m ²
Vp75-25	0.5632 m ³
t75-25	102.7 min
water used	1.1264 m ³
f	2.695E-05 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.64	0	100	0.88
0.67	1.0	97	0.85
0.68	2.0	95	0.84
0.70	3.0	93	0.82
0.72	4.0	91	0.80
0.80	17.0	82	0.72
0.89	30.0	72	0.63
0.93	36.0	67	0.59
0.95	40.0	65	0.57
1.00	48.0	59	0.52
1.08	65.0	50	0.44
1.14	81.0	43	0.38
1.2	99.0	36	0.32
1.28	122.0	27	0.24
1.34	141.0	20	0.18



T75	25.667	75
T25	128.333	25
T75-25	102.667	Derived from Best Fit

Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221

Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP106 Test 2
Contract:	The Croft
Contract No.	19023

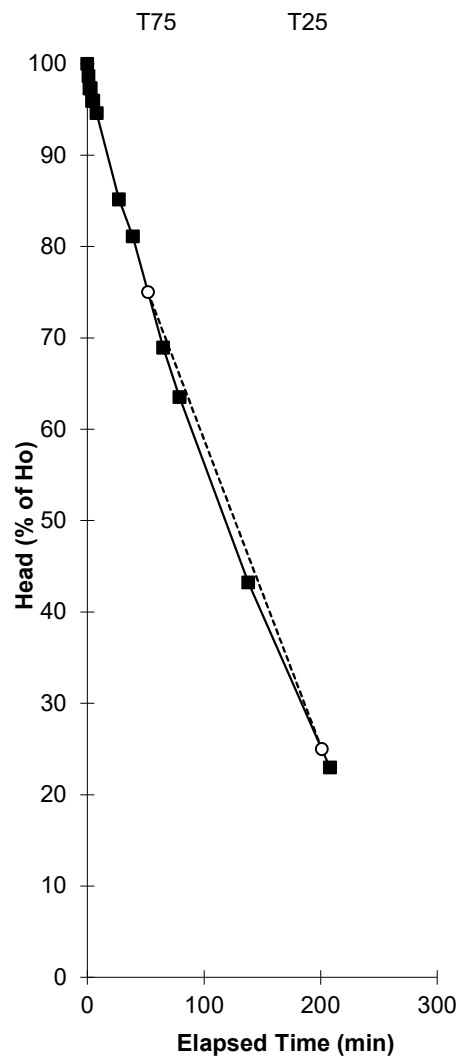
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	1.52 m
Width of Pit	0.80 m
Length of Pit	1.60 m
Depth of Pit Soaked	0.74 m
ap50	3.056 m ²
Vp75-25	0.4736 m ³
t75-25	149.0 min
water used	0.9472 m ³
f	1.733E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.78	0	100	0.74
0.79	1.0	99	0.73
0.80	2.0	97	0.72
0.80	3.0	97	0.72
0.81	4.0	96	0.71
0.81	5.0	96	0.71
0.82	8.0	95	0.70
0.89	27.0	85	0.63
0.92	39.0	81	0.60
1.01	65.0	69	0.51
1.05	79.0	64	0.47
1.20	138.0	43	0.32
1.35	208.0	23	0.17



T75	52.000	75
T25	201.000	25
T75-25	149.000	Derived from Best Fit

Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP107 Test 1
Contract:	The Croft
Contract No.	19023

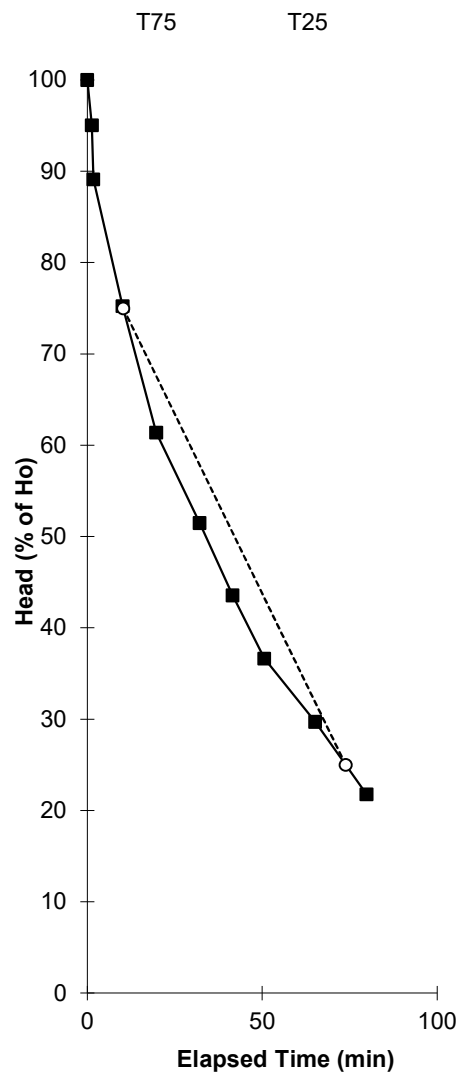
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	1.60 m
Width of Pit	0.70 m
Length of Pit	1.95 m
Depth of Pit Soaked	1.01 m
ap50	4.0415 m ²
Vp75-25	0.689325 m ³
t75-25	63.6 min
water used	1.3787 m ³
f	4.473E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.59	0	100	1.01
0.64	1.3	95	0.96
0.70	1.7	89	0.90
0.84	10.1	75	0.76
0.98	19.7	61	0.62
1.08	32.1	51	0.52
1.16	41.5	44	0.44
1.23	50.6	37	0.37
1.30	65.1	30	0.30
1.38	79.7	22	0.22



Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP107 Test 2
Contract:	The Croft
Contract No.	19023

Field Test

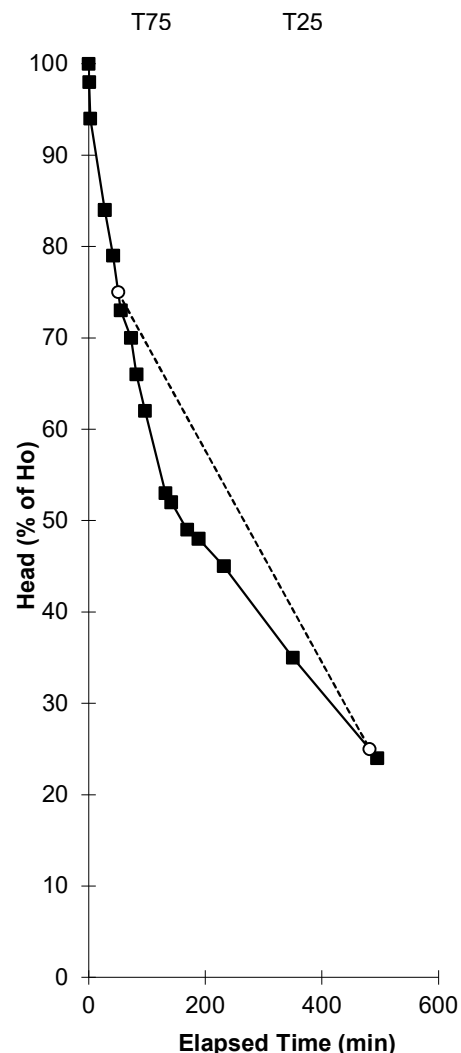
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	1.60 m
Width of Pit	0.70 m
Length of Pit	1.95 m
Depth of Pit Soaked	1.00 m
ap50	4.015 m ²
Vp75-25	0.6825 m ³
t75-25	431.2 min
water used	1.3650 m ³
f	6.570E-06 m/sec.

Field Data

Depth to	Elapsed	Head of	Head of
Water	Time	Water	Water
(m)	(min)	(% of Ho)	(m)
0.60	0	100	1.00
0.62	0.9	98	0.98
0.66	2.9	94	0.94
0.76	28.0	84	0.84
0.81	41.9	79	0.79
0.87	54.9	73	0.73
0.90	72.8	70	0.70
0.94	82.0	66	0.66
0.98	96.6	62	0.62
1.07	131.8	53	0.53
1.08	141.5	52	0.52
1.11	168.8	49	0.49
1.12	188.5	48	0.48
1.15	231.8	45	0.45
1.25	350.0	35	0.35
1.36	495.0	24	0.24



T75	50.589	75
T25	481.818	25
T75-25	431.229	Derived from Best Fit

Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221

Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP107 Test 3
Contract:	The Croft
Contract No.	19023

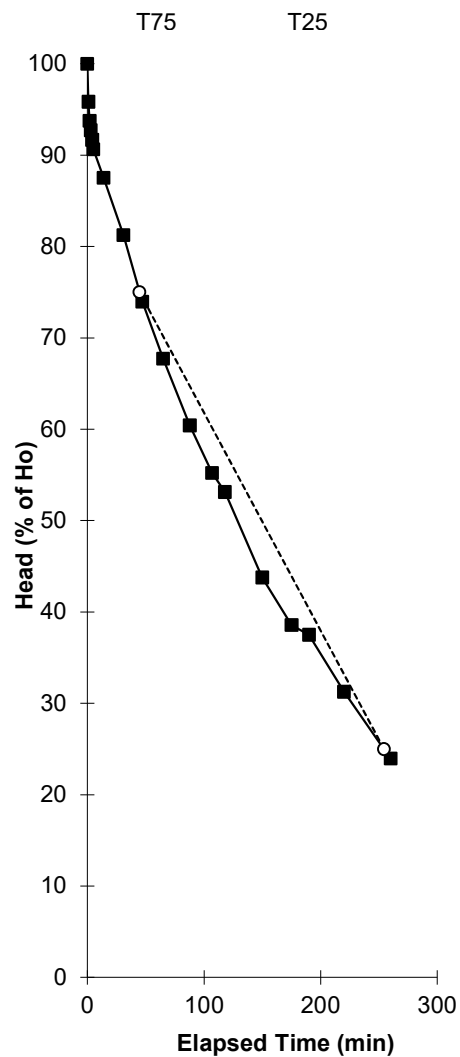
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	1.60 m
Width of Pit	0.70 m
Length of Pit	1.95 m
Depth of Pit Soaked	0.96 m
ap50	3.909 m ²
Vp75-25	0.6552 m ³
t75-25	209.6 min
water used	1.3104 m ³
f	1.333E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.64	0	100	0.96
0.68	1.0	96	0.92
0.70	2.0	94	0.90
0.71	3.0	93	0.89
0.72	4.0	92	0.88
0.73	5.0	91	0.87
0.76	14.0	88	0.84
0.82	31.0	81	0.78
0.89	47.0	74	0.71
0.95	65.0	68	0.65
1.02	88.0	60	0.58
1.07	107.0	55	0.53
1.09	118.0	53	0.51
1.18	150.0	44	0.42
1.23	175.0	39	0.37
1.24	190.0	38	0.36
1.30	220.0	31	0.30
1.37	260.0	24	0.23



T75	44.714	75
T25	254.286	25
T75-25	209.571	Derived from Best Fit

Comments

Data shown in blue is extrapolated as drainage was outside of site working hours. Results to be used with caution

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP108 Test 1
Contract:	The Croft
Contract No.	19023

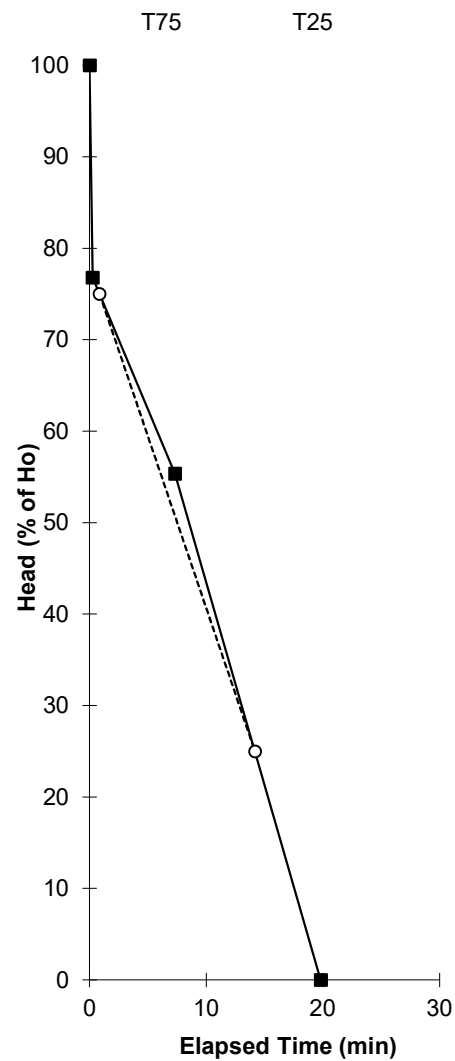
Field Test

Trial Pit Log (include details of groundwater):
See trial Pit record

Depth of Pit	1.70 m
Width of Pit	0.70 m
Length of Pit	2.10 m
Depth of Pit Soaked	1.12 m
ap50	4.606 m ²
Vp75-25	0.8232 m ³
t75-25	13.3 min
water used	1.6464 m ³
f	2.237E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.58	0	100	1.12
0.84	0.3	77	0.86
1.08	7.3	55	0.62
1.70	19.8	0	0.00



T75	0.854	75
T25	14.172	25
T75-25	13.317	Derived from Best Fit

Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP108 Test 2
Contract:	The Croft
Contract No.	19023

Field Test

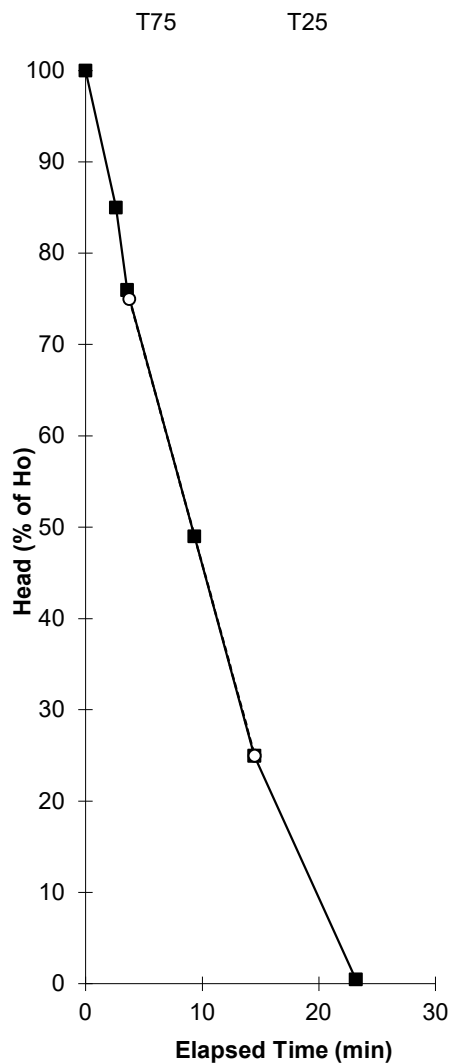
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	1.70 m
Width of Pit	0.70 m
Length of Pit	2.10 m
Depth of Pit Soaked	1.00 m
ap50	4.27 m ²
Vp75-25	0.735 m ³
t75-25	10.7 min
water used	1.4700 m ³
f	2.672E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.70	0	100	1.00
0.85	2.6	85	0.85
0.94	3.5	76	0.76
1.21	9.3	49	0.49
1.45	14.5	25	0.25
1.70	23.2	0	0.00



T75	3.764	75
T25	14.500	25
T75-25	10.736	Derived from Best Fit

Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

Soakaway Calculations

Soakaway Test No.	TP108 Test 3
Contract:	The Croft
Contract No.	19023

Field Test

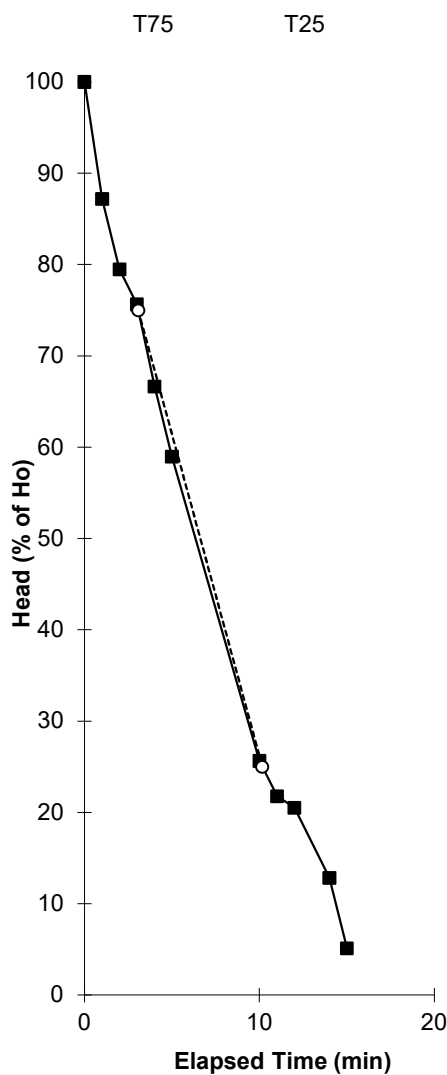
Trial Pit Log (include details of groundwater):

See trial Pit record

Depth of Pit	1.70 m
Width of Pit	0.70 m
Length of Pit	2.10 m
Depth of Pit Soaked	0.78 m
ap50	3.654 m2
Vp75-25	0.5733 m3
t75-25	7.1 min
water used	1.1466 m3
f	3.686E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.92	0	100	0.78
1.02	1.0	87	0.68
1.08	2.0	79	0.62
1.11	3.0	76	0.59
1.18	4.0	67	0.52
1.24	5.0	59	0.46
1.50	10.0	26	0.20
1.53	11.0	22	0.17
1.54	12.0	21	0.16
1.60	14.0	13	0.10
1.66	15.0	5	0.04



T75	3.072	75
T25	10.167	25
T75-25	7.095	Derived from Best Fit

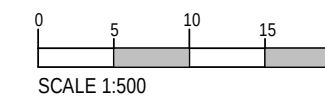
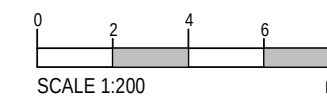
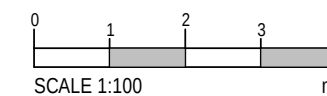
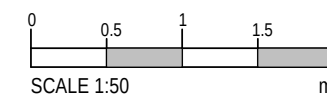
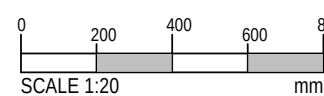
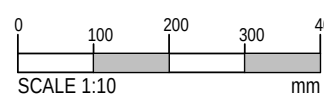
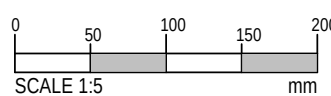
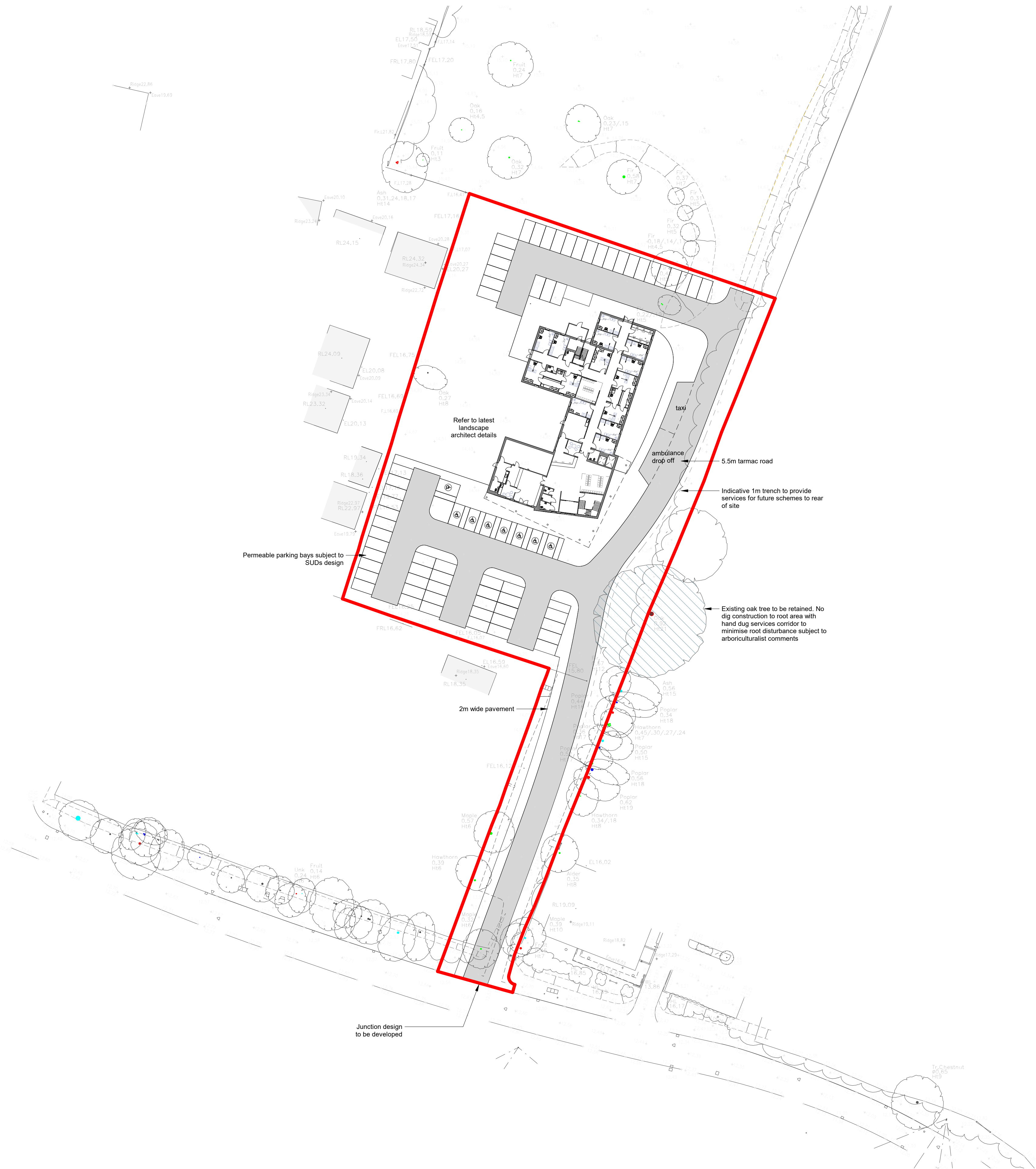
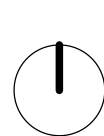
Comments

SOILS LIMITED

Newton House, Cross Road, Tadworth
Surrey, KT20 5SR

Telephone: 01737 814 221
Facsimile: 01737 812 557

B Architects Site Layout



Notes:

Drawing is based on information on OS Data by others.
Ref. Ordnance Survey. (c) Crown Copyright 2019.
License number 100022432. Additional detail within site
provided by Hampshire Land Survey Ltd Ref. HLS 1142
_08_04_01.

Boundary line is indicative and subject to confirmation.

C	17/02/21	Updates to site plan	TW	*
B	10/02/21	Updated site plan	TW	*
A	04/02/21	Sketch Developed	TW	*
Rev	Date	Description	By	Chkd

Drawing Status

PRELIMINARY

Client

Principal contractor

Design Consultant



67A HIGH STREET
LYNDHURST
HAMPSHIRE
SO43 7BE
T: 023 80 283798
F: 023 80 283688
E: sha@simpsonhilder.co.uk

Project Title

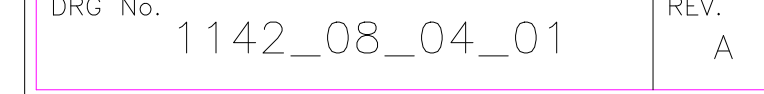
THE CROFT MEDICAL CENTRE
BARNHAM ROAD
EASTERGATE
WEST SUSSEX PO20 3RP

Drawing Title

CONCEPT SITE
ARRANGEMENT

Scale (@ A1 SIZE) 1 : 500			Size: A1	
Drawn TW	Date FEB21	Checked *	Date FEB21	
Drawing No. 9226-SK014			Revision. C	

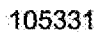
C Topographical Survey



1142_08_04_01	A
---------------	---

D Southern Water Sewer Records

105619



494979

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
4501X	11.94	10.4	150	VC	CIRC																		
5301X	12.46	11.28	150	VC	CIRC																		
5302X	12.58	12.09	150	VC	CIRC																		
5303X	12.87	12.35	100	VC	CIRC																		
5306X	12.87	12.02	150	VC	CIRC																		
5401X	12.72	11.97	150	VC	CIRC																		
5404X	13.38	11.54	150	VC	CIRC																		
5405X	13.4	11.52	150	VC	CIRC																		
5501X	13.93	12.04	150	VC	CIRC																		
5502X	12.61	11.7	150	VC	CIRC																		
5503X	14.22	11.81	150	VC	CIRC																		
5504X	12.75	11.35	150	VC	CIRC																		
5505X	12.72	11.23	175	VC	CIRC																		
5507X	13.67	11.33	150	VC	CIRC																		
5601X	13.57	12.47	150	VC	CIRC																		
6301X	12.03	11.39	150	PF	CIRC																		
6401X	12.54	12.16	150	PF	CIRC																		
6402X	12.68	12.03	150	PF	CIRC																		
6403X	12.6	11.93	150	PF	CIRC																		
6404X	12.37	11.97	150	PF	CIRC																		
6405X	12.87		150	VC	CIRC																		
6501X	12.64	10.96	175	VC	CIRC																		
6502X	12.42	10.8	175	VC	CIRC																		
6503X	13.84	12.02	150	VC	CIRC																		
6506X	13.7	11.45	150	PVC	CIRC																		
7301X	12.03	11.19	150	PF	CIRC																		
7302X	12.82	10.92	175	VC	CIRC																		
7304X	12.43	11.13	175	VC	CIRC																		
7305X	12.15	10.59	175	VC	CIRC																		
7306X	12.24	10.45	175	VC	CIRC																		
7403X	12.22	10.26	175	VC	CIRC																		
7501X	12.2	10.68	175	VC	CIRC																		
8301X	11.92	9.79	175	VC	CIRC																		
8302X	12.04	9.98	175	VC	CIRC																		

EXCOURT ONLY
23 MAY 2009
8500760

LINE STYLES / COLOURS	MATERIALS	LEGEND - SEWERS
Brown ----- Road Styptic Sewer ----- Road Vacuum Main ----- Road Rising Main ----- Combined ----- Combined Syphonic Sewer ----- Combined Rising Main ----- Lateral Drop	AK Asphalt BAQ Bitumen Subbase Cement BRD Brick (Common) BRE Brick (Engineering) CD Concrete Box Culvert CI Cast Iron CO Concrete (in situ) CP Concrete (Pre-Cast) CS Concrete (Segmental) CSU Concrete (Segmental) (Uncoated) DI Ductile Iron GRD Glass Reinforced Plastic GRP Glass Reinforced Plastic MAZ Masonry in regular Courses MAH Masonry in random Courses PE Polyethylene PF Pitch Fibre PP Polypropylene PVC Polyvinyl Chloride RPM Reinforced Plastic Main SI Spun Iron ST Steel VC Vitrified Clay ZZZ Other	Manhole (SW) Manhole (FAC) Lamp hole (SW) Lamp hole (FAC) Pumping Station (SW) Pumping Station (FAC) Side entry manhole (SW) Side entry manhole (FAC) Blind shaft (SW) Blind shaft (FAC) Ejector station (SW) Ejector station (FAC) Waterlight shaft (SW) Waterlight shaft (FAC) Flushing ch. Man (SW) Flushing ch. Man (FAC) Flushing ch. No. (SW) Flushing ch. No. (FAC) Demolition Chamber Whodown (SW) Whodown (FAC) Rising Eye (SW) Rising Eye (FAC) Gauging point (SW) Gauging point (FAC) Intercept chamber (SW) Intercept chamber (FAC) Storm Tank (SW) Storm Tank (FAC) Vortex chamber (SW) Vortex chamber (FAC) Label slope Dumery/S24 manhole Outlet Penstock chamber Demolition Storm Overhead Backdrop manhole Other (S) Other Change in sewer (S) Robur valve Flap valve Gate Airlock Valve Closed Valve Air Valve Hatch box (SW) Hatch box (FAC) Direction arrow Emptying valve Catchpit Soakaway Joint Reference Point Whodown treatment works Marine treatment works Outlet treatment works Vent Vent column Total storage tank Stack end Head of Public Sewer Mini Pumping Station

Drawn by: StickIA

Title: The Croft Surgrey

Date: 28/05/2009

Southern
Water

SHAPES (S)
A. Anded
B. Berril
C. Chubul
E. Egg
H. Horseshoe
K. Kew
R. Rectangular
S. Square
T. Triangular
U. U-shape
X. X-shape
Z. Z-shape

NODE REFERENCING SYSTEM
1st digit: Inverted main working identifier
2nd digit: Inverted main working identifier
3rd digit: Inverted main working identifier
4th digit: Inverted main working identifier

E Proposed Drainage Strategy Layouts



Notes:

- This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.
- All setting out to be in accordance with the schedules. any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.
- All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of approved document H of the building regulations (2015 Edition).
- Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hapworth 'Supersieve' or equivalent.
- Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osma or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
- Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
- All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
- All materials for adoptable drainage are to be Kitemarked as appropriate.
- All adoptable manhole covers and frames are to be 150mm deep minimum and the covers badged as appropriate i.e. 'FW' or 'SW'.
- Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
- Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
- Where pipelines pass within 1.0m of buildings or walls the foundations are to be taken down below the bottom of the trench. Where pipelines are more than 1.0m away from foundations the trench shall be backfilled with concrete up to a point that meets a 45° angle line taken from the bottom corner of the nearest foundation.
- Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.
- Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.
- Where pipelines cross, each is to be surrounded with grade ST4 mass concrete for a distance not less than 1.0m centred on the crossing point. Length of surround to be extended as necessary to within 150mm of the next nearest flexible joints.
- For private drainage, concrete protection is to be provided where the effective cover to the crown of the pipe(s) is less than 1.2m in trafficked areas and 0.6m in soft landscaped or pedestrianised areas.
- The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.
- The top run of each private foul drainage network is to be laid to falls no steeper than 1:40, the head of each run is to be vented to atmosphere in accordance with approved document H.
- All surface water drainage to be min 100mm dia, laid at a gradient no steeper than 1:80. And all foul water drainage to be min 100mm dia, unless stated otherwise.
- The contractor is to ensure that all pipework connections are arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections inside the manhole benching where sufficient room exists or the pipelines on oblique connections are arranged outside the chamber to be able to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable. Where possible the main channel flow shall be from any connections with WC's to ensure a flush through the main channel is achieved.
- The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base, this should be achieved by incorporating long radius bends outside of the manhole.
- The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.
- Where new connections are to be made into existing manholes or sewers, all invert levels, pipe orientation and sizes should be checked on-site prior to the commencement of the works, with any variance reported to the engineer once identified. Where new connections are to be made either on or off-site, the contractor is to check the line and level of any existing services / mains, to ensure that no clashes exist prior to the works commencing.
- Any and all new connections into a public sewer are to be inspected by the local water authority and carried out fully in accordance with their requirements. The contractor is to allow for obtaining the appropriate 'Section Agreements' as well as paying all necessary fees.
- The contractor is to allow for obtaining the appropriate road opening licence's from the local highway authority and paying all necessary fees. All reinstatement works within the public highway are to be carried out in accordance with the requirements of the local highway authority.
- Permeable paving surface finish to the architects spec. Any alteration to the extents of the permeable paving may have an adverse effect upon the Surface water drainage design and must therefore be discussed with the engineer.
- Modular grate soakaway system(s) to be 'Wavin Aquacell' or 'Polypipe Polystorm'. Any other system offered will need to be provided with a separate warranty for design and installation.
- Contractor to allow for threshold channel drainage to building access points where required.

P02	13/05/21	Design amended.
P01	09/04/21	First Issue

Rev.	Date	Description

Calnotts
Jonathan House
41 Commercial Rd
Plymouth PL4 8PU
01202 227237
info@calnotts.co.uk
www.calnotts.co.uk

Client:
PHP Group

Project Title:
The Croft Medical Centre Chichester

Drawing Title:
**External Works Layout
Sheet 1 of 3**

Drawing Status:
Planning

Originator No.	Rev by	Chk by	Scale
114222	DB	PW	1:200 @A1

PROJECT / ORIGINATOR / ZONE / LEVEL / TYPE / ROLE / NO.	Revision:
114222-CAL-XX-XX-DR-D-1100	P02

PRELIMINARY SUBJECT TO
DETAILED DESIGN AND
CO-ORDINATION
POST-PLANNING



Notes:

- This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.
- All setting out to be in accordance with the schedules. any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.
- All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of approved document H of the building regulations (2015 Edition).
- Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hapworth 'Supersieve' or equivalent.
- Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osma or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
- Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
- All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
- All materials for adoptable drainage are to be Kitemarked as appropriate.
- All adoptable manhole covers and frames are to be 150mm deep minimum and the covers badged as appropriate i.e. 'FW' or 'SW'.
- Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
- Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
- Where pipelines pass within 1.0m of buildings or walls the foundations are to be taken down below the bottom of the trench. Where pipelines are more than 1.0m away from foundations the trench shall be backfilled with concrete up to a point that meets a 45° angle line taken from the bottom corner of the nearest foundation.
- Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.
- Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.
- Where pipelines cross, each is to be surrounded with grade ST4 mass concrete for a distance not less than 1.0m centred on the crossing point. Length of surround to be extended as necessary to within 150mm of the next nearest flexible joints.
- For private drainage, concrete protection is to be provided where the effective cover to the crown of the pipe(s) is less than 1.2m in trafficked areas and 0.6m in soft landscaped or pedestrianised areas.
- The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.
- The top run of each private foul drainage network is to be laid to falls no slacker than 1:40, the head of each run is to be vented to atmosphere in accordance with approved document H.
- All surface water drainage to be min 100mm dia, laid at a gradient no slacker than 1:80. And all foul water drainage to be min 100mm dia, unless stated otherwise.
- The contractor is to ensure that all pipework connections are arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections inside the manhole trenching where sufficient room exists or the pipelines on oblique connections are arranged outside the chamber to be able to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable. Where possible the main channel flow shall be from any connections with WC's to ensure a flush through the main channel is achieved.
- The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base, this should be achieved by incorporating long radius bends outside of the manhole.
- The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.
- Where new connections are to be made into existing manholes or sewers, all invert levels, pipe orientation and sizes should be checked on-site prior to the commencement of the works, with any variance reported to the engineer once identified. Where new connections are to be made either on or off-site, the contractor is to check the line and level of any existing services / mains, to ensure that no clashes exist prior to the works commencing.
- Any and all new connections into a public sewer are to be inspected by the local water authority and carried out fully in accordance with their requirements. The contractor is to allow for obtaining the appropriate 'Section Agreements' as well as paying all necessary fees.
- The contractor is to allow for obtaining the appropriate road opening licence's from the local highway authority and paying all necessary fees. All reinstatement works within the public highway are to be carried out in accordance with the requirements of the local highway authority.
- Permeable paving surface finish to the architects spec. Any alteration to the extents of the permeable paving may have an adverse effect upon the Surface water drainage design and must therefore be discussed with the engineer.
- Modular crate soakaway system(s) to be 'Wavin Aquacell' or 'Polypipe Polystorm'. Any other system offered will need to be provided with a separate warranty for design and installation.
- Contractor to allow for threshold channel drainage to building access points where required.

P02 13/05/21 Design amended.
P01 09/04/21 First Issue

Rev. Date Description



Calnotts
Jensen House
41 Commercial Road
Pocklington YO41 1JL
01902 237237
info@calnotts.co.uk
www.calnotts.co.uk

Client
PHP Group

Project Title
The Croft Medical Centre Chichester

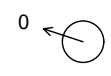
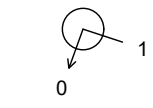
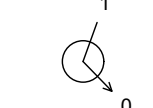
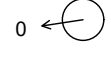
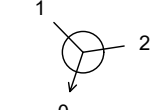
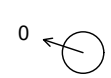
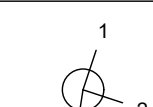
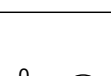
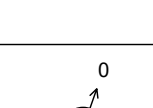
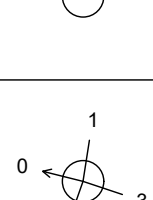
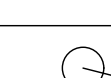
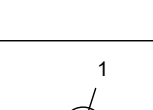
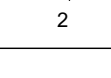
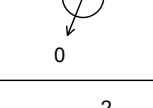
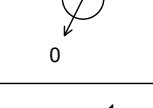
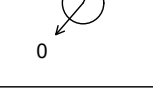
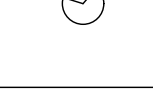
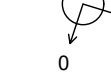
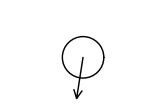
Drawing Title
External Works Layout
Sheet 2 of 3

Designation
Planning

Originator No	Dev by	Chk by	Scale
114222	DB	PW	1:200 @A1

PROJECT ORIGINATOR ZONE LEVEL TYPE ROLE NO	Revision
114222-CAL-XX-XX-DR-D-1101	P02

PRELIMINARY SUBJECT TO
DETAILED DESIGN AND
CO-ORDINATION
POST-PLANNING

Node ID	CL (m)	Depth (m)	Dia (mm)	MH Type	Connections	Link ID	IL (m)	Dia (mm)
S1	14.850	0.850	1200	PCC Type B Catchpit	 0	S1.000	14.000	225
S2	14.750	0.977	1200	PCC Type B Catchpit	 1 0	S1.000 S1.001	13.773 13.773	225 225
S3	14.750	1.040	1200	PCC Type B Catchpit	 1 0	S1.001 S1.002	13.710 13.710	225 100
S4	14.700	0.775	150	Rodding Eye	 0	S2.000	13.925	150
S5	14.700	1.179	600	Polypropelyne Inspection Chamber	 1 2 0	S1.002 S2.000 S1.003	13.646 13.596 13.521	100 150 225
S6	14.700	0.775	150	Rodding Eye	 0	S3.000	13.925	150
S7	14.700	1.266	600	Polypropelyne Inspection Chamber	 1 2 0	S1.003 S3.000 S1.004	13.434 13.559 13.434	225 150 225
S8	14.700	0.775	150	Rodding Eye	 0	S4.000	13.925	150
S9	14.700	0.913	600	Polypropelyne Inspection Chamber	 0 1	S4.000 S4.001	13.787 13.787	150 150
S10	14.700	0.775	150	Rodding Eye	 0	S5.000	13.925	150
S11	14.540	1.316	1200	PCC Type B Catchpit	 1 2 3 0	S1.004 S4.001 S5.000 S1.005	13.224 13.349 13.299 13.224	225 150 150 225
S12	14.500	1.379	1200	PCC Type B Catchpit	 1	S1.005	13.121	225
S13	14.700	0.750	150	Rodding Eye	 0	S6.000	13.950	150
S14	14.700	0.750	150	Rodding Eye	 0	S7.000	13.950	150
S15	14.700	0.975	600	Polypropelyne Inspection Chamber	 1 2 0	S6.000 S7.000 S6.001	13.725 13.725 13.725	150 150 150
S16	14.820	1.049	1200	PCC Type B Catchpit	 0	S8.000	13.771	225
S17	14.580	1.037	1200	PCC Type B Catchpit	 1 2 0	S6.001 S8.000 S6.002	13.618 13.543 13.543	150 225 225
S18	14.500	1.055	1200	PCC Type B Catchpit	 1 0	S6.002 S6.003	13.445 13.445	225 225
S19	14.500	1.254	1200	PCC Type B Catchpit	 1 0	S6.003 S6.004	13.321 13.246	225 300
S20	14.500	1.302	1200	PCC Type B Catchpit	 1 0	S6.004 S6.005	13.198 13.198	300 300
S21	14.300	1.200	1200	PCC Type B Catchpit	 1	S6.005	13.100	300
S22	14.420	1.125	1200	PCC Type B Catchpit	 1	TANK	13.295	225
S23	14.450	1.350	1200	PCC Type B Catchpit	 1	TANK	13.100	225
S24	14.300	1.350	1200	PCC Type B Catchpit	 0	S9.000	12.950	100
S25	14.000	1.425	1200	PCC Type B Catchpit	 1 0	S9.000 S9.001	12.650 12.575	100 150
S26	13.400	1.200	1200	PCC Type B Catchpit	 1	S9.001	12.200	150

Node ID	CL (m)	Depth (m)	Dia (mm)	MH Type	Invert (m)	Dia (mm)
F1	14.650	0.750	450	Polypropelyne Inspection Chamber	13.887	100
F2	14.650	0.866	450	Polypropelyne Inspection Chamber	13.707	100
F3	14.650	1.186	450	Polypropelyne Inspection Chamber	13.464	150
F4	14.650	1.345	450	Polypropelyne Inspection Chamber	13.305	150
F5	14.650	1.477	450	Polypropelyne Inspection Chamber	13.173	150
F6	14.650	0.750	450	Polypropelyne Inspection Chamber	13.654	150
F7	14.650	0.983	450	Polypropelyne Inspection Chamber	13.279	150
F8	14.650	1.621	450	Polypropelyne Inspection Chamber	13.029	150
F9	14.600	2.040	1200	PCC Rings Type B	12.560	150
F10	13.900	1.740	1200	PCC Rings Type B	12.160	150
F11	12.700	1.630	1200	PCC Rings Type B	11.070	150

Notes:

- This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.
- All setting out to be in accordance with the schedules. any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.
- All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of approved document H of the building regulations (2015 Edition).
- Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hapworth 'Supersieve' or equivalent.
- Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osma or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
- Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
- All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
- All materials for adoptable drainage are to be Kitemarked as appropriate.
- All adoptable manhole covers and frames are to be 150mm deep minimum and the covers badged as appropriate i.e. 'FW' or 'SW'.
- Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
- Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
- Where pipelines pass within 1.0m of buildings or walls the foundations are to be taken down below the bottom of the trench. Where pipelines are more than 1.0m away from foundations the trench shall be backfilled with concrete up to a point that meets a 45° angle line taken from the bottom corner of the nearest foundation.
- Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.
- Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.
- Where pipelines cross, each is to be surrounded with grade S14 mass concrete for a distance not less than 1.0m centred on the crossing point. Length of surround to be extended as necessary to within 150mm of the next nearest flexible joints.
- For private drainage, concrete protection is to be provided where the effective cover to the crown of the pipe(s) is less than 1.2m in trafficked areas and 0.6m in soft landscaped or pedestrianised areas.
- The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.
- The top run of each private foul drainage network is to be laid to falls no slacker than 1:40, the head of each run is to be vented to atmosphere in accordance with approved document H.
- All surface water drainage to be min 100mm dia, laid at a gradient no slacker than 1/80. And all foul water drainage to be min 100mm dia. unless stated otherwise.
- The contractor is to ensure that all pipework connections are arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections inside the manhole benching where sufficient room exists or the pipelines on oblique connections are arranged outside the chamber to be able to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable. Where possible the main channel flow shall be from any connections with WC's to ensure a flush through the main channel is achieved.
- The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base. this should be achieved by incorporating long radius bends outside of the manhole.
- The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.
- Where new connections are to be made into existing manholes or sewers, all invert levels, pipe orientation and sizes should be checked on-site prior to the commencement of the works, with any variance reported to the engineer once identified. Where new connections are to be made either on or off-site, the contractor is to check the line and level of any existing services / mains, to ensure that no clashes exist prior to the works commencing.
- Any and all new connections into a public sewer are to be inspected by the local water authority and carried out fully in accordance with their requirements. The contractor is to allow for obtaining the appropriate 'Section Agreements' as well as paying all necessary fees.
- The contractor is to allow for obtaining the appropriate road opening licence's from the local highway authority and paying all necessary fees. All reinstatement works within the public highway are to be carried out in accordance with the requirements of the local highway authority.
- Permeable paving surface finish to the architects spec'. Any alteration to the extents of the permeable paving may have an adverse affect upon the Surface water drainage design and must therefore be discussed with the engineer.
- Modular crate soakaway system(s) to be 'Wavin Aquacell' or 'Polypipe Polystorm'. Any other system offered will need to be provided with a separate warranty for design and installation.
- Contractor to allow for threshold channel drainage to building access points where required.

P02 13/05/21 Design amended.

P01 09/04/21 First Issue

Rev. Date Description



Calcroft
Jensen House
41 Commercial Rd
Pocklington YO41 1JL
www.calcroft.co.uk

01202 227237
info@calcroft.co.uk
www.calcroft.co.uk

Client

PHP Group

Project Title
The Croft Medical Centre Chichester

Drawing Title
External Works Layout
Sheet 3 of 3

Designation

Planning

Originator No	Rev by	Chk by	Scale
114222	DB	PW	1:200 @A1

PROJECT ORIGINATOR ZONE LEVEL TYPE ROLE NO	Revision
114222-CAL-XX-XX-DR-D-1102	P02

PRELIMINARY SUBJECT TO
DETAILED DESIGN AND
CO-ORDINATION
POST-PLANNING

F Causeway Flow Surface Water Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	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)	0.600
CV	0.750	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)
1	0.052	5.00	14.850	1200	-10.653	26.648	0.850
2	0.019	5.00	14.750	1200	-43.035	37.351	0.977
3			14.750	1200	-46.236	28.470	1.040
4	0.024	5.00	14.700	150	-28.928	25.127	0.775
5	0.011	5.00	14.700	600	-41.188	23.291	1.179
6	0.008	5.00	14.700	150	-33.184	5.265	0.775
7			14.700	600	-45.796	9.416	1.266
8	0.008	5.00	14.700	150	-40.587	-19.401	0.775
9			14.700	600	-52.525	-15.302	0.913
10	0.024	5.00	14.700	150	-36.482	-4.158	0.775
11	0.003	5.00	14.540	900	-47.349	-0.507	1.316
12			14.500	900	-64.161	3.701	1.379
13		5.00	14.700	150	-11.957	21.835	0.750
14	0.044	5.00	14.700	150	-20.803	-5.414	0.750
15			14.700	600	-18.792	0.387	0.975
16	0.074	5.00	14.820	1200	-0.311	17.595	1.049
17			14.580	1200	-8.809	-3.526	1.037
18			14.500	1200	-16.165	-18.337	1.055
19			14.500	1200	-29.831	-34.197	1.254
20	0.135	5.00	14.500	1200	-37.499	-31.838	1.302
21			14.300	1200	-40.676	-41.565	1.200
22		5.00	14.300	1200	-31.351	-51.220	1.350
23	0.062	5.00	14.000	1200	-35.208	-76.459	1.425
24			13.400	1200	-47.548	-107.870	1.200

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	1	2	34.105	0.600	14.000	13.773	0.227	150.0	225	5.53	50.0
1.001	2	3	9.440	0.600	13.773	13.710	0.063	150.0	225	5.68	50.0
1.002	3	5	7.232	0.600	13.710	13.646	0.064	113.0	100	5.85	50.0
2.000	4	5	12.397	0.600	13.925	13.596	0.329	37.7	150	5.13	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)
1.000	1.065	42.3	9.8	0.625	0.752	0.052	0.0
1.001	1.065	42.3	13.4	0.752	0.815	0.071	0.0
1.002	0.722	5.7	13.4	0.940	0.954	0.071	0.0
2.000	1.644	29.1	4.6	0.625	0.954	0.024	0.0

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)
1.003	5	7	14.620	0.600	13.521	13.434	0.087	168.0	225	6.09	50.0
3.000	6	7	13.278	0.600	13.925	13.559	0.366	36.3	150	5.13	50.0
1.004	7	11	10.044	0.600	13.434	13.224	0.210	47.8	225	6.18	50.0
4.000	8	9	12.622	0.600	13.925	13.787	0.138	91.5	150	5.20	50.0
4.001	9	11	15.674	0.600	13.787	13.349	0.438	35.8	150	5.35	50.0
5.000	10	11	11.464	0.600	13.925	13.299	0.626	18.3	150	5.08	50.0
1.005	11	12	17.331	0.600	13.224	13.121	0.103	168.3	225	6.47	50.0
6.000	13	15	22.511	0.600	13.950	13.725	0.225	100.0	150	5.37	50.0
7.000	14	15	6.140	0.600	13.950	13.725	0.225	27.3	150	5.05	50.0
6.001	15	17	10.722	0.600	13.725	13.618	0.107	100.0	150	5.55	50.0
8.000	16	17	22.766	0.600	13.771	13.543	0.228	100.0	225	5.29	50.0
6.002	17	18	16.537	0.600	13.543	13.445	0.098	168.7	225	5.83	50.0
6.003	18	19	20.936	0.600	13.445	13.321	0.124	168.8	225	6.17	50.0
6.004	19	20	8.023	0.600	13.246	13.198	0.048	167.1	300	6.28	50.0
6.005	20	21	10.233	0.600	13.198	13.100	0.098	104.4	300	6.39	50.0
9.000	22	23	25.532	0.600	12.950	12.650	0.300	85.1	150	5.39	50.0
9.001	23	24	33.748	0.600	12.575	12.200	0.375	90.0	150	5.92	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)
1.003	1.006	40.0	20.1	0.954	1.041	0.106	0.0
3.000	1.676	29.6	1.5	0.625	0.991	0.008	0.0
1.004	1.896	75.4	21.6	1.041	1.091	0.114	0.0
4.000	1.051	18.6	1.5	0.625	0.763	0.008	0.0
4.001	1.688	29.8	1.5	0.763	1.041	0.008	0.0
5.000	2.364	41.8	4.5	0.625	1.091	0.024	0.0
1.005	1.005	40.0	28.1	1.091	1.154	0.148	0.0
6.000	1.005	17.8	0.0	0.600	0.825	0.000	0.0
7.000	1.935	34.2	8.3	0.600	0.825	0.044	0.0
6.001	1.005	17.8	8.3	0.825	0.812	0.044	0.0
8.000	1.307	52.0	14.1	0.824	0.812	0.074	0.0
6.002	1.003	39.9	22.4	0.812	0.830	0.118	0.0
6.003	1.003	39.9	22.4	0.830	0.954	0.118	0.0
6.004	1.213	85.7	22.4	0.954	1.002	0.118	0.0
6.005	1.538	108.7	48.1	1.002	0.900	0.254	0.0
9.000	1.090	19.3	0.0	1.200	1.200	0.000	0.0
9.001	1.060	18.7	11.8	1.275	1.050	0.062	0.0

Pipeline Schedule

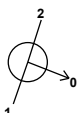
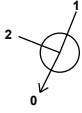
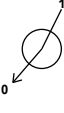
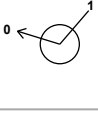
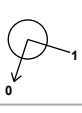
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	34.105	150.0	225	Circular	14.850	14.000	0.625	14.750	13.773	0.752
1.001	9.440	150.0	225	Circular	14.750	13.773	0.752	14.750	13.710	0.815
1.002	7.232	113.0	100	Circular	14.750	13.710	0.940	14.700	13.646	0.954
2.000	12.397	37.7	150	Circular	14.700	13.925	0.625	14.700	13.596	0.954
1.003	14.620	168.0	225	Circular	14.700	13.521	0.954	14.700	13.434	1.041
3.000	13.278	36.3	150	Circular	14.700	13.925	0.625	14.700	13.559	0.991
1.004	10.044	47.8	225	Circular	14.700	13.434	1.041	14.540	13.224	1.091
4.000	12.622	91.5	150	Circular	14.700	13.925	0.625	14.700	13.787	0.763
4.001	15.674	35.8	150	Circular	14.700	13.787	0.763	14.540	13.349	1.041
5.000	11.464	18.3	150	Circular	14.700	13.925	0.625	14.540	13.299	1.091
1.005	17.331	168.3	225	Circular	14.540	13.224	1.091	14.500	13.121	1.154
6.000	22.511	100.0	150	Circular	14.700	13.950	0.600	14.700	13.725	0.825
7.000	6.140	27.3	150	Circular	14.700	13.950	0.600	14.700	13.725	0.825
6.001	10.722	100.0	150	Circular	14.700	13.725	0.825	14.580	13.618	0.812
8.000	22.766	100.0	225	Circular	14.820	13.771	0.824	14.580	13.543	0.812
6.002	16.537	168.7	225	Circular	14.580	13.543	0.812	14.500	13.445	0.830
6.003	20.936	168.8	225	Circular	14.500	13.445	0.830	14.500	13.321	0.954
6.004	8.023	167.1	300	Circular	14.500	13.246	0.954	14.500	13.198	1.002
6.005	10.233	104.4	300	Circular	14.500	13.198	1.002	14.300	13.100	0.900
9.000	25.532	85.1	150	Circular	14.300	12.950	1.200	14.000	12.650	1.200
9.001	33.748	90.0	150	Circular	14.000	12.575	1.275	13.400	12.200	1.050

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	5	600	Manhole	Adoptable
2.000	4	150	Manhole	Adoptable	5	600	Manhole	Adoptable
1.003	5	600	Manhole	Adoptable	7	600	Manhole	Adoptable
3.000	6	150	Manhole	Adoptable	7	600	Manhole	Adoptable
1.004	7	600	Manhole	Adoptable	11	900	Manhole	Adoptable
4.000	8	150	Manhole	Adoptable	9	600	Manhole	Adoptable
4.001	9	600	Manhole	Adoptable	11	900	Manhole	Adoptable
5.000	10	150	Manhole	Adoptable	11	900	Manhole	Adoptable
1.005	11	900	Manhole	Adoptable	12	900	Manhole	Adoptable
6.000	13	150	Manhole	Adoptable	15	600	Manhole	Adoptable
7.000	14	150	Manhole	Adoptable	15	600	Manhole	Adoptable
6.001	15	600	Manhole	Adoptable	17	1200	Manhole	Adoptable
8.000	16	1200	Manhole	Adoptable	17	1200	Manhole	Adoptable
6.002	17	1200	Manhole	Adoptable	18	1200	Manhole	Adoptable
6.003	18	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
6.004	19	1200	Manhole	Adoptable	20	1200	Manhole	Adoptable
6.005	20	1200	Manhole	Adoptable	21	1200	Manhole	Adoptable
9.000	22	1200	Manhole	Adoptable	23	1200	Manhole	Adoptable
9.001	23	1200	Manhole	Adoptable	24	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	-10.653	26.648	14.850	0.850	1200		0	1.000	14.000	225
2	-43.035	37.351	14.750	0.977	1200		1	1.000	13.773	225
						0	1.001	13.773	225	
3	-46.236	28.470	14.750	1.040	1200		1	1.001	13.710	225
						0	1.002	13.710	100	
4	-28.928	25.127	14.700	0.775	150		0	2.000	13.925	150
5	-41.188	23.291	14.700	1.179	600		1	2.000	13.596	150
						2	1.002	13.646	100	
						0	1.003	13.521	225	
6	-33.184	5.265	14.700	0.775	150		0	3.000	13.925	150
7	-45.796	9.416	14.700	1.266	600		1	3.000	13.559	150
						2	1.003	13.434	225	
						0	1.004	13.434	225	
8	-40.587	-19.401	14.700	0.775	150		0	4.000	13.925	150
9	-52.525	-15.302	14.700	0.913	600		1	4.000	13.787	150
						0	4.001	13.787	150	
10	-36.482	-4.158	14.700	0.775	150		0	5.000	13.925	150
11	-47.349	-0.507	14.540	1.316	900		1	5.000	13.299	150
						2	4.001	13.349	150	
						3	1.004	13.224	225	
						0	1.005	13.224	225	
12	-64.161	3.701	14.500	1.379	900		1	1.005	13.121	225
13	-11.957	21.835	14.700	0.750	150		0	6.000	13.950	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
14	-20.803	-5.414	14.700	0.750	150		0	7.000	13.950	150
15	-18.792	0.387	14.700	0.975	600		1 2 0	7.000 6.000 6.001	13.725 13.725 13.725	150 150 150
16	-0.311	17.595	14.820	1.049	1200		0	8.000	13.771	225
17	-8.809	-3.526	14.580	1.037	1200		1 2 0	8.000 6.001 6.002	13.543 13.618 13.543	225 150 225
18	-16.165	-18.337	14.500	1.055	1200		1 0	6.002 6.003	13.445 13.445	225 225
19	-29.831	-34.197	14.500	1.254	1200		1 0	6.003 6.004	13.321 13.246	225 300
20	-37.499	-31.838	14.500	1.302	1200		1 0	6.004 6.005	13.198 13.198	300 300
21	-40.676	-41.565	14.300	1.200	1200		1	6.005	13.100	300
22	-31.351	-51.220	14.300	1.350	1200		0	9.000	12.950	150
23	-35.208	-76.459	14.000	1.425	1200		1 0	9.000 9.001	12.650 12.575	150 150
24	-47.548	-107.870	13.400	1.200	1200		1	9.001	12.200	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

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 %)
30	20	0	0
100	40	0	0

Node 21 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.58600	Invert Level (m)	13.100	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.58600	Time to half empty (mins)	54	Inf Depth (m)	
Safety Factor	3.0	Pit Width (m)	6.000	Number Required	1
Porosity	0.95	Pit Length (m)	25.000		

Node 12 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.80500	Invert Level (m)	13.121	Depth (m)	0.800
Side Inf Coefficient (m/hr)	0.80500	Time to half empty (mins)	72	Inf Depth (m)	
Safety Factor	3.0	Pit Width (m)	8.500	Number Required	1
Porosity	0.95	Pit Length (m)	10.000		

Node 20 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.01674	Invert Level (m)	13.800	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.01674	Time to half empty (mins)	14	Depth (m)	0.500
Safety Factor	3.0	Width (m)	4.800	Inf Depth (m)	0.350
Porosity	0.30	Length (m)	63.400		

Node 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00644	Invert Level (m)	14.000	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00644	Time to half empty (mins)	0	Depth (m)	0.500
Safety Factor	3.0	Width (m)	4.800	Inf Depth (m)	0.350
Porosity	0.30	Length (m)	57.400		

Node 24 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Invert Level (m)	12.200	Depth (m)	0.800
Side Inf Coefficient (m/hr)	0.03600	Time to half empty (mins)	1332	Inf Depth (m)	
Safety Factor	3.0	Pit Width (m)	2.000	Number Required	1
Porosity	0.95	Pit Length (m)	30.000		

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.49%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	14.130	0.130	21.4	0.3053	0.0000	OK
15 minute winter	2	12	14.094	0.321	27.5	0.4895	0.0000	SURCHARGED
15 minute winter	3	14	14.076	0.366	26.6	4.2996	0.0000	SURCHARGED
15 minute winter	4	10	13.989	0.064	10.1	0.0412	0.0000	OK
15 minute winter	5	10	13.657	0.136	25.6	0.0636	0.0000	OK
15 minute winter	6	10	13.959	0.034	3.3	0.0077	0.0000	OK
15 minute winter	7	10	13.537	0.103	28.7	0.0290	0.0000	OK
15 minute winter	8	10	13.970	0.045	3.3	0.0099	0.0000	OK
15 minute winter	9	10	13.820	0.033	3.3	0.0094	0.0000	OK
15 minute winter	10	10	13.974	0.049	9.8	0.0310	0.0000	OK
15 minute winter	11	6	13.452	0.228	42.7	0.1552	0.0000	SURCHARGED
60 minute winter	12	53	13.440	0.319	27.0	25.9802	0.0000	OK
15 minute winter	13	12	13.961	0.011	0.3	0.0002	0.0000	OK
15 minute winter	14	11	14.047	0.097	18.2	0.1151	0.0000	OK
15 minute winter	15	11	13.959	0.234	17.8	0.0662	0.0000	SURCHARGED
15 minute winter	16	11	13.898	0.127	30.8	0.3230	0.0000	OK
15 minute winter	17	11	13.839	0.296	45.3	0.3350	0.0000	SURCHARGED
15 minute winter	18	11	13.683	0.238	44.4	0.2692	0.0000	SURCHARGED
15 minute winter	19	6	13.507	0.261	44.1	0.2955	0.0000	OK
15 minute winter	20	6	13.510	0.312	97.5	1.0037	0.0000	SURCHARGED
60 minute winter	21	57	13.454	0.354	53.0	50.8038	0.0000	OK
15 minute summer	22	1	12.950	0.000	0.0	0.0000	0.0000	OK
15 minute winter	23	11	12.927	0.352	25.7	0.7042	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	1	1.000	2	19.5	0.710	0.460	1.0843
15 minute winter	2	1.001	3	26.6	0.669	0.628	0.3754
15 minute winter	3	1.002	5	11.7	1.490	2.055	0.0560
15 minute winter	3	Infiltration		0.2			
15 minute winter	4	2.000	5	10.0	1.443	0.344	0.0859
15 minute winter	5	1.003	7	25.5	1.194	0.637	0.3115
15 minute winter	6	3.000	7	3.3	1.086	0.110	0.0398
15 minute winter	7	1.004	11	28.6	1.037	0.379	0.2701
15 minute winter	8	4.000	9	3.3	0.890	0.175	0.0465
15 minute winter	9	4.001	11	3.2	0.876	0.107	0.1110
15 minute winter	10	5.000	11	9.8	1.118	0.233	0.1156
15 minute winter	11	1.005	12	42.7	1.749	1.069	0.5557
60 minute winter	12	Infiltration		7.2			
15 minute winter	13	6.000	15	-0.3	0.029	-0.016	0.2043
15 minute winter	14	7.000	15	17.8	1.313	0.522	0.0909
15 minute winter	15	6.001	17	16.3	1.020	0.920	0.1888
15 minute winter	16	8.000	17	30.4	0.910	0.586	0.7151
15 minute winter	17	6.002	18	44.4	1.116	1.112	0.6577
15 minute winter	18	6.003	19	44.1	1.161	1.105	0.7644
15 minute winter	19	6.004	20	44.3	0.800	0.517	0.5436
15 minute winter	20	6.005	21	97.0	2.335	0.892	0.5725
15 minute winter	20	Infiltration		0.0			
60 minute winter	21	Infiltration		9.3			
15 minute summer	22	9.000	23	0.0	0.000	0.000	0.2247
15 minute winter	23	9.001	24	22.7	1.591	1.210	0.5908

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.49%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	24	690	12.635	0.435	2.0	25.2692	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
720 minute winter	24	Infiltration		0.3			

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.49%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	14.317	0.317	32.4	0.7419	0.0000	SURCHARGED
15 minute winter	2	11	14.180	0.407	41.8	0.6198	0.0000	SURCHARGED
30 minute winter	3	24	14.137	0.427	32.1	9.3916	0.0000	SURCHARGED
15 minute winter	4	10	14.005	0.080	15.2	0.0518	0.0000	OK
15 minute winter	5	11	13.698	0.177	33.6	0.0828	0.0000	OK
15 minute winter	6	10	13.968	0.043	5.0	0.0096	0.0000	OK
60 minute winter	7	61	13.677	0.243	25.6	0.0688	0.0000	SURCHARGED
15 minute winter	8	10	13.981	0.056	4.9	0.0123	0.0000	OK
15 minute winter	9	10	13.828	0.041	4.8	0.0115	0.0000	OK
15 minute winter	10	10	13.987	0.062	14.8	0.0386	0.0000	OK
60 minute winter	11	62	13.670	0.446	36.9	0.3038	0.0000	SURCHARGED
60 minute winter	12	64	13.663	0.542	35.7	44.0988	0.0000	OK
15 minute winter	13	12	14.430	0.480	4.8	0.0086	0.0000	FLOOD RISK
15 minute winter	14	12	14.560	0.610	27.6	0.7255	0.0000	FLOOD RISK
15 minute winter	15	12	14.426	0.701	23.8	0.1983	0.0000	FLOOD RISK
15 minute winter	16	12	14.378	0.607	46.6	1.5445	0.0000	SURCHARGED
15 minute winter	17	12	14.234	0.691	58.3	0.7811	0.0000	SURCHARGED
60 minute winter	18	59	14.087	0.642	38.2	0.7256	0.0000	SURCHARGED
60 minute winter	19	60	14.084	0.838	37.7	0.9483	0.0000	SURCHARGED
60 minute winter	20	60	14.084	0.886	80.3	25.8244	0.0000	SURCHARGED
60 minute winter	21	60	14.083	0.983	78.4	58.1832	0.0000	OK
15 minute winter	22	12	13.394	0.444	7.3	0.5026	0.0000	SURCHARGED
15 minute winter	23	12	13.398	0.823	39.0	1.6468	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	1	1.000	2	30.5	0.768	0.721	1.3564
15 minute winter	2	1.001	3	41.5	1.044	0.981	0.3754
30 minute winter	3	1.002	5	12.7	1.620	2.234	0.0560
30 minute winter	3	Infiltration		0.2			
15 minute winter	4	2.000	5	15.2	1.499	0.522	0.1347
15 minute winter	5	1.003	7	32.7	1.257	0.817	0.5021
15 minute winter	6	3.000	7	4.9	1.219	0.167	0.0709
60 minute winter	7	1.004	11	25.6	0.991	0.340	0.3995
15 minute winter	8	4.000	9	4.8	0.991	0.261	0.0619
15 minute winter	9	4.001	11	4.8	0.632	0.160	0.1681
15 minute winter	10	5.000	11	14.7	1.113	0.353	0.1400
60 minute winter	11	1.005	12	35.7	1.310	0.894	0.6893
60 minute winter	12	Infiltration		7.8			
15 minute winter	13	6.000	15	-4.8	-0.296	-0.272	0.3963
15 minute winter	14	7.000	15	23.8	1.353	0.696	0.1081
15 minute winter	15	6.001	17	21.6	1.229	1.219	0.1888
15 minute winter	16	8.000	17	39.7	0.998	0.764	0.9054
15 minute winter	17	6.002	18	58.2	1.463	1.458	0.6577
60 minute winter	18	6.003	19	37.7	1.129	0.945	0.8326
60 minute winter	19	6.004	20	36.3	0.667	0.424	0.5650
60 minute winter	20	6.005	21	78.4	1.641	0.721	0.7206
60 minute winter	20	Infiltration		0.5			
60 minute winter	21	Infiltration		9.5			
15 minute winter	22	9.000	23	-7.3	-0.413	-0.378	0.4495
15 minute winter	23	9.001	24	29.4	1.671	1.571	0.5941

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.49%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	24	585	12.884	0.684	3.5	39.7408	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
600 minute winter	24	Infiltration		0.3			

G Maintenance and Management Plan

SuDS Components Operation and Maintenance Activities

Operation and Maintenance Activity	SuDS Component												
	NOTE: Only components highlighted in BLUE are relevant to this project.												
	Pond	Wetland	Detention Basin	Infiltration Basin	Soakaway	Infiltration Trench	Filter Drain	Modular Storage	Permeable Paving	Swale / Bioretention / Trees	Filter Strip	Green Roofs	Proprietary Treatment Systems
Regular Maintenance													
Inspection	●	●	●	●	●	●	●	●	●	●	●	●	●
Litter and Debris Removal	●	●	●	●	○	●	●	○	●	●	●		○
Grass Cutting	●	●	●	●	○	●	●	○	○	●	●		
Weed and Invasive Plant Control	○	○	○	○		○	○		○		○	●	
Shrub Management (Including Pruning)	○	○	○	○					○	○	○		
Shoreline Vegetation Management	●	●	○										
Aquatic Vegetation Management	●	●	○										
Occasional Maintenance													
Sediment Management ¹	●	●	●	●	●	●	●	●	●	●	●		●
Vegetation Replacement	○	○	○	○						○	○	●	
Vacuum Sweeping and Brushing									●				
Remedial Maintenance													
Structure Rehabilitation / Repair	○	○	○	○	○	○	○	○	○	○	○	○	
Infiltration Surface Reconditioning				○	○	○	○		○	○	○		

¹ Sediment should be collected and managed in pre-treatment systems, upstream of the main device

Legend: ● Will be required ○ May be required

Pump Stations' (Foul and Surface Water)

Pump Station(s) Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Physical inspection and service of the pump station(s) including all mechanical parts. Maintenance works to be carried out as required	Annually or as required
	All electrical equipment such as alarms control panels, kiosks and management systems to be serviced. Maintenance works to be carried out as required.	Annually or as required
Remedial Maintenance	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
	When the telemetry system detects a fault within the pump station, the assigned maintenance company is to be called out to conduct repairs (within 8 hours of the initial alarm notification) The pump station is to then be emptied and the fault repaired.	As required
	In the event of power failure, a suitable maintenance company is to be called out within 12 hours to restore power to the pump station(s). If power cannot be restored, then an assigned contractor will need to empty the pump station manually via tanker every 8 hours and dispose of the waste off-site.	As required
Monitoring	Inspect/check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed.	Annually and after large storm events
Structure Rehabilitation/Repair	Regular maintenance and monitoring to identify if repair and/or replacement of features or pipework is required.	As required

Permeable Pavements

Permeable Pavement Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface). Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material if present. Any lost material should be replaced	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations – pay particular attention to areas where water runs from adjacent impermeable areas, as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weed or management using glyphosate applied directly to the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structured performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration and filtration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, forty-eight hours after large rainfall events in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually
The SuDS Manual Table 20.15: Operation and maintenance requirements for pervious pavements		

Cellular/Modular Storage

Cellular Storage Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action.	Monthly for three months, then annually.
	Remove debris from catchment surface (where may cause risks to performance)	Annually or as required
Remedial Maintenance	Repair/rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storm events
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
Structure Rehabilitation/Repair	Regular maintenance and monitoring to identify if repair and/or replacement of storage units is required.	As required
The SuDS Manual Table 21.3: Operation and maintenance requirements for attenuation storage tanks.		

General Foul and Surface Water Drainage Maintenance

Piped Network/Chambers Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	The entire on-site foul and surface water drainage system should be visually inspected by lifting all manhole covers and checking the silt traps of catchpits, sump units and gullies.	Every six months
	The entire on-site foul and surface water drainage system should be CCTV surveyed to identify any damage, blockages or silt build-up. Any obstructions to be jet cleaned and any damage repaired.	Every 5 Years
Remedial Maintenance	Any identified blockages within the drainage system to inspected via a CCTV survey, jet cleaned and repaired if necessary.	As required

Piped Network/Chambers

Piped Network/Chambers Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action.	Monthly for three months, then six monthly.
	Debris removal from catchment surface/gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair/rehabilitation of gratings, inlets and outlets.	As required
Monitoring	Inspect/check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed.	Annually and after large storm events
Structure Rehabilitation/Repair	Regular maintenance and monitoring to identify if repair and/or replacement of features or pipework is required.	As required

H

Greenfield Calculations



Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Daniel Bott
Site name:	Croft Medical Centre
Site location:	Barnham

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	50.84250° N
Longitude:	0.65694° W
Reference:	2756186836
Date:	Apr 13 2021 12:34

Runoff estimation approach

Site characteristics

Total site area (ha):	0.72
-----------------------	-----------------------------------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	761	761
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	1.45	1.45
1 in 1 year (l/s):	1.23	1.23
1 in 30 years (l/s):	3.33	3.33
1 in 100 year (l/s):	4.62	4.62
1 in 200 years (l/s):	5.41	5.41