

Calcinotto

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civil and structural engineers

114222

The Croft Medical Centre
Barnham Road
Eastergate
Chichester
PO20 3RP

Flood Risk Assessment for Planning
Eastergate, Chichester
Medical Centre

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Revision 1.0

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Flood Risk Assessment for Planning for The Croft Medical Centre, Eastergate, Chichester

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1 Executive Summary

1.1 Calcinotto have been appointed to prepare a Site-Specific Flood Risk Assessment in support of a Planning Application for a redevelopment of the site of the former Hortons Buildings off Goring Street in Goring by Sea. 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 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. There are various localised spots shown at low risk from surface water flooding within the site.

1.3 Reference to the National Planning Policy Framework (NPPF) guidance document classifies the proposed development as 'more vulnerable' from Table 2 Flood Risk Vulnerability. From Table 3 Flood Risk Vulnerability and Flood Risk compatibility, the development is classified as appropriate at this location for Zone 1.

1.4 The assessment in line with the requirement of the NPPF 2019 and its Guidance Document March 2012 has considered flood risk from all potential sources and has concluded the risk to the development is also low or none and there is no increased risk to the existing development in the wider area.

1.5 The surface water drainage strategy for the site is described in Section 7.0. The design adopts an approach of using below ground infiltration within the site to dispose of surface water runoff at source. The surface water drainage system has been designed in accordance with current design criteria for the extreme event of 1 in 100 year with an allowance for climate change of 40%.

1.6 The assessment proves that the proposals for the development can be accommodated with minimal risk of flooding to the development site through existing mitigation of setting new building floor levels to a level that protects the development for its lifetime. In addition, by managing surface water run off on site without increasing further the risk of surface water flooding, as outlined in the report, with no increase in risk of flooding to adjacent properties. Planning should therefore not be withheld on flood risk grounds.

1.7 This document should be read in conjunction with the Drainage Strategy Statement by Calcinotto Ltd.

2 Introduction

2.1 Brief

2.1.1 Calcinotto Ltd have been appointed by PHP Group to prepare a drainage Flood Risk Assessment for development proposed within the land to the west of the existing Croft Medical Centre in Barnham, 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 A.

i. The aim of this NPPF compliant FRA is to identify flood risks to the development site. It will identify the flood risk zone that the site is in, consider potential sources of flood risk and propose measures to mitigate and manage the risks over the lifetime of the development, including climate change. The surface water drainage design which has been presented as part of the assessment and the planning application has been outlined but further detailed description is within the standalone Drainage Strategy Statement produced by Calcinotto Ltd.

ii. To complete this aim, the following points of reference have been used:

- The National Planning Policy Framework (NPPF 2019)
- The NPPF Flood Risk and Coastal change Planning Practice Guidance (PP6)
- Non-Statutory Technical Standards for Sustainable Drainage Systems, DEFRA 2015
- The SuDS Manual (C697) Ciria 2007
- The SuDS Manual (C753) Ciria 2015
- Various Documents and reports listed later within paragraph 3.3.3 by West Sussex Council as LLFA and Arun District Council in paragraph 3.3.4

Points of Consultation

- Southern Water
- West Sussex County Council

2.2 Report Structure

2.2.1 This report has been written to discuss the Flood Risk for the site to comply with the Planning Policy described in Section 3.0. The existing site is described in terms of existing topography, geology, hydrology and hydrogeology in Section 4.0. The scope of this Flood Risk Assessment is defined in Section 5.0. Sources of existing and proposed Flood Risk is discussed in Section 6.0. A detailed description of the development proposals and drainage strategy is provided in Section 7.0. Flood Risk Management measures and Residual Risk is discussed in Sections 8.0 and 9.0.

2.2.2 Information has been obtained from the Environment Agency through the GOV.uk web site and as such has been referenced within this report. Under guidance within the 'Environment Agency Conditional Licence' statutory guidance document the attribution statement states the following:

"Contains Environment Agency information © Environment Agency and/or database right".

2.2.3 Information has also been obtained from West Sussex Council web site as Lead Local Flood Authority.

2.3 Limitations

- 2.3.1 This report has been prepared for exclusive use by PHP Group for the purpose of assisting them in evaluating the potential risk of flooding associated with the site. Calcinotto accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Calcinotto. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole.
- 2.3.2 Calcinotto has endeavoured to assess all information provided to them during this appraisal. The report summarises information from a number of external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.
- 2.3.3 The Flood Risk Assessment addresses the flood risk posed to and from the proposed development. The extent of development is shown by the current planning application boundary, as indicated on the drawing in Appendix A. This report has been undertaken with the assumption that the site will be developed generally in accordance with the above proposals without significant changes. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.
- 2.3.4 A detailed intrusive Site Investigation had been completed by Soils Limited in March 2021 as well as supplementary infiltration testing to inform the surface water drainage design. This report has been used to make an assessment of the potential ground conditions to be encountered within the site.

3 Planning Policy

3.1 National Planning Policy

- 3.1.1 The National Planning Policy Framework (NPPF) July 2019 and the still current Technical Guidance document, published in March 2012 clearly identifies flood risk as a specific material consideration in the Planning process and in the allocation and release of sites for development or re-development.
- 3.1.2 The NPPF of 2019 replaces previous guidance in NPPF 2018 and 2012 and policy set out in PPS 25: Development and Flood Risk, however the technical criteria for Flood Risk Assessments remain largely unchanged. The Framework seeks to strengthen the co-ordination between land-use planning and development planning and the operational delivery of flood and coastal defence strategy. Through the Framework Local Planning Authorities will continue to use their powers to guide, regulate and control development in relation to flooding and flood risk. The NPPF places a presumption in favour of sustainable development whilst meeting the challenge of climate change, flooding, and coastal change. In accordance with Tables 1, 2 and 3 of the Technical Guidance, inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk through application of the Sequential Test.
- 3.1.3 The Water Resources Act 1991 (section 105) also requires the Environment Agency to exercise a general supervision over all flood defence matters, including flood plains and wetlands which accommodate waters during periods of flood. In discharging their functions, the Agency from time to time carries out surveys and flood studies, largely of 'main rivers' within its jurisdiction.
- 3.1.4 The extents of the modelled floodplain and coastal areas are provided to Local Planning Authorities, to enable them to make more informed decisions when considering proposed development in flood-susceptible areas. If development is proposed in a flood-susceptible area, or in an area where there is a history of flooding, the EA, as a statutory consultee in the planning process, will generally recommend that the risk of flooding be formally assessed, in accordance with the National Planning Policy Framework, and that a Flood Risk Assessment report be produced to support the Planning Application. The broader modelled flood extents are also indicated on the EA's Flood Zone Maps, available through the gov.uk website.
- 3.1.5 In this case West Sussex Council as the Lead Local Flood Authority with their Flood Risk Management work within the same guidelines and alongside the Local Environment Agency office to review flood related issues and how they can be addressed and minimised for now and in the future.
- 3.1.6 The Flood and Water Management Act of 2010 ('The Act') was legislation implemented out of the findings of the 'Pitt Review' by Sir Michael Pitt which itself was a review of the extreme flooding in the Summer of 2007. This Act gave the council Lead Local Flood Authority (LLFA) status along with all other upper tier Local Authorities (County Councils and Unitary Authorities).
- 3.1.7 As the LLFA for the area, the Council is responsible for co-ordinating the management of flood risk in the borough and has several duties. Additional duties and powers that the Council have as a LLFA include:
- Co-operation with, and co-ordination of, relevant authorities dealing with flood risk and the establishment of partnership working practices
 - Investigation of flooding incidents and publication of flood incident reports
 - Creation of an asset register of structures and features deemed significant for flood risk management purposes

- Designation of structures and features deemed to be flood risk management assets
- Powers to carry out works to manage flood risk from surface water, groundwater and ordinary watercourses
- Consenting and enforcement regulation of ordinary watercourses
- Statutory consultee for major planning applications with surface water drainage implications.

3.1.8 The statutory consultee role, which commenced in April 2015, superseded the initial requirement of the Act of LLFA's becoming Sustainable Drainage Systems (SuDS) Approving Bodies (SABs). The statutory consultee role gives LLFAs the responsibility of assessing drainage applications for all major developments which have an impact on the drainage of land (major developments being defined in the Town and Country Planning (Development Management Procedure) Order 2010). The Council is very keen to promote sustainable drainage as, amongst other environmental benefits where it can be technically supported. The council's aim is to reduce the amount of surface water flooding generated by impermeable surfaces.

3.1.9 The Flood Risk Regulations (FRR) 2009 translate the 2007 European Union (EU) Floods Directive into law in England and Wales. The FRR required the Councils to produce both a Preliminary Flood Risk Assessment (PFRA) which gathered all the flood risk information known in 2010 and Flood Hazard and Risk Maps which build upon the PFRA to map the hazard and risk of water based on speed, depth and location.

3.2 Local Planning Policy

3.2.1 Arun District Council Local Plan 2018 has three core policies relating to SuDS, water and flood risk. These are DM2 Flood Risk, DM3 Sustainable Urban Drainage Systems and SP1 Water.

3.2.2 These three core policies make reference to ensuring development is directed away from areas at risk of flooding and where appropriate the Sequential or Exception test will need to be applied. Sustainable Drainage Systems are to be used to effectively manage surface water quality and quantity and positively contribute towards the appearance of the area. The respective policies are as given below: -

DM2 – Flood Risk

Development in areas of risk from flooding – identified on the latest Environment Agency flood risk maps and the Council's Strategic Flood Risk Assessment (SFRA), will only be permitted where all of the following criteria have been satisfied.

- a) The sequential test in accordance with the National Planning Policy Guidance has been met.*
- b) A site-specific Flood Risk Assessment demonstrates that the development will be safe, including access and egress, without increasing flood risk elsewhere and reduce flood risk overall.*
- c) The sustainability benefits to the wider community are clearly identified.*
- d) The scheme identifies adaptation and mitigation measures.*
- e) Appropriate flood warning and evacuation plans are in place, and*
- f) New site drainage systems are designed to take account of events which exceed the normal design standard i.e. consideration of flood flow routing and utilising temporary storage areas.*

The reports prepared as part of the criteria above must take into account contingency allowances, taking climate change into account as set out in the Flood Risk Assessments climate change allowances section of the NPPG.

In locations where strategic flood defences or resilient and resistant construction measures are necessary, within the site itself, proposals will be required to demonstrate how measures have been incorporated as an intrinsic part of the scheme in a manner which is compatible with the latest Strategic Flood Risk Assessment.

All development proposals must take account of relevant Surface Water Management Plans, Catchment Flood Management Plans and related Flood Defence Plans and strategies such as the Lower Tidal River Arun Strategy. The council may require financial contributions from development on sites where measures to address flood risk or to improve the environmental quality of watercourses have been identified by these plans and strategies.

DM3 Sustainable Urban Drainage Systems

To increase the levels of water capture and storage and improve water quality, all development must identify opportunities to incorporate a range of Sustainable Urban Drainage Systems (SuDS), appropriate to the size of the development, at an early stage of the design process.

Proposals for both major and minor development proposals must incorporate SuDS within the private areas of the development in order to provide source control features to the overall SuDS design. These features include.

- *Green roofs*
- *Permeable driveways and parking*
- *Soakaways*
- *Water harvesting and storage features including water butts.*

Proposals for major development must also integrate SuDS within public open spaces and road, reflecting discussion with the appropriate bodies. SuDS must therefore be integrated into the overall design of a development and must:

- a) *Contribute positively to the appearance of the area, integrating access to allow maintenance of existing watercourses and the system.*
- b) *Effectively manage water (including its quality)*
- c) *Accommodate and enhance biodiversity by making connections to existing Green Infrastructure Assets and*
- d) *Provide amenity for local residents (ensuring a safe environment)*
- e) *Retain the existing drainage network of the site and the wider area.*
- f) *Be maintained in perpetuity, supported through a Maintenance and Management Plan/Regime, including its financing, agreed with the Local Planning Authority.*

In order to ensure the SuDS discharge water from the development at the same or lesser rate, as prior to construction, developers must:

- g) *Follow the hierarchy of preference for preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations and then SuDS manual produced by CIRIA.*
- h) *Undertake up to six months groundwater modelling within the winter period.*
- i) *Undertake winter percolation testing in accordance with BRE365.*
- j) *The proposed drainage system must be designed to ensure there is no flooding on a 1 in 30-year storm event.*
- k) *The design must also take account of the 1 in 100-year storm event plus 30% allowance for climate change, on stored volumes, to ensure that there is no flooding of properties or the public highway or inundation of the foul sewerage system. Any excess flows must be contained within the site boundary and within designated storage areas.*

SP1 Water

Arun District Council will encourage water efficiency measures in order to protect the Districts water resources and enhance the quality of the water environment with supports a range of habitats and ecosystems. Development will be encouraged to make active use of surface water as a design feature and permitted where it identifies measures to improve and enhance water bodies, coastal habitats or provides additional flood relief.

The council will also support development that:

- a) *Is appropriately located, taking account of flood risk and promotes the incorporation of appropriate mitigation measures into new development, particularly Sustainable Drainage Systems that reduces the creation and flow of surface water and improves water quality.*
- b) *Reduces the risk of homes and places of work from flooding whilst increasing biodiversity.*
- c) *Delivers a range of community benefits, including enhancing the quality of life and providing greater resistance to the impact of climate change.*

3.3 Strategic Flood Risk Assessment

- 3.3.1 Local Planning Authorities are required to produce Local Development Frameworks, which are a portfolio of Local Development Documents that collectively deliver the spatial planning strategy for the Authority area. The LDD's undergo a Sustainability Appraisal Planning Authorities in ensuring their policies fulfil the principles of sustainability. Strategic Flood Risk Assessments are one of the documents to be used as the evidence base for planning decisions and are a component of the Sustainability Appraisal process. Therefore, SFRAs should be used in the review or production of LDDs.
- 3.3.2 To assist Local Planning Authorities in their strategic land-use planning, SFRAs should present sufficient information to enable Local Authorities to apply the Sequential Test to their proposed development sites: *"LPA's should use the SFRA to inform their knowledge of flooding, refine the information on the Flood Map and determine the variations in flood risk from all sources of flooding across and from their area. These should form the basis for preparing appropriate policies for flood risk management for these areas"*
- 3.3.3 West Sussex County Council over the years have commissioned a number of reports internally with assistance from external consultants to help inform on a number of elements for the areas of development and their risks from flooding, current and in the future including Climate Change and the affect it will have on those predictions, management of the flood risk and consideration to future flood defence works. A list of those documents is given below: -

- West Sussex preliminary SFRA Volumes I, II, III & IV by Capita Symonds January 2010
- West Sussex preliminary Flood Risk Assessment May 2011
- West Sussex CC Report June 2012 Flood Event
- West Sussex LLFA Local Flood Risk Management Strategy (2013-2018) May 2014
- Ref Water People, Places, a guide for Masterplanning Sustainable Drainage into Developments
- West Sussex LLPA – Policy for the Management of Surface Water Updated November 2018

3.3.4 Arun District Council have commissioned a number of reports in a similar vein to West Sussex County Council for the same reasons and the most current relevant reports are listed below:-

- Arun District Council Level 1 SFRA – Final Report August 2016
- Arun District Council Level 1 and Level 2 SFRA – v5 September 2016
- Arun Strategic Surface Water Management Study – v0.1 October 2016

3.4 Sequential test

3.4.1 The Sequential Approach is outlined in the NPPF and aims to ensure preference is given to development of land within Flood Zone 1 prior to Zones 2 and 3. It also ensures that flood vulnerability of the development proposals is taken into consideration when locating development in Flood Zones 2 and 3.

- Where the Sequential Approach shows that it is not possible to locate development in zones of lower flood risk due to other wider sustainability issues; it may be possible to justify, using the Exception Test, that development is still feasible by the management of flood risk.
- Tables 2 and 3 of the NPPF Technical Guidance defines when the Exception Test is applicable.
- Currently the site is shown on the gov.uk website for the Environment Agency as being at no Risk of flooding.
- From NPPF Table 1 below this type of development is classified as 'More Vulnerable'.

More vulnerable

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Table 1 NPPF Flood Risk Vulnerability Classification

		Low	Medium	High	Very High	Extreme
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception test required	✓	✓
	Zone 3a	Exception test required	✓	x	Exception test required	✓
	Zone 3b Functional Floodplain		✓	x	x	x

Key: ✓ Development is appropriate x Development should not be permitted
NPPF Table 2: Flood Risk Vulnerability and Flood Zone 'Compatibility'

In accordance with Table 2 above from the NPPF Technical Guidance document the development is appropriate for this flood zone.

Climate Change

Section 13 of Technical Guide to NPPF (March 2012) requires that climate change be taken into consideration when considering flood risk. Table 3 in that document has now been superseded by new guidance in a document Flood Risk Assessments: Climate Change Allowances issued in February 2016 which is detailed in the Table below.

For the South East of England, the allowances to be made are as follows

	Small catchments (up to 10km ²)	Medium catchments (10-100km ²)	Large catchments (over 100km ²)
Upper End	10%	20%	40%
Central	5%	10%	20%

Table 3: Peak Rainfall Intensity allowance in small and urban Catchments (Use 1961 to 1990 baseline)

These allowances are to be taken into account when designing for SUDS and drainage systems for the development.

4 Site

4.1 Site Location

4.1.1 Calcinotto Ltd have been appointed by PHP Group to prepare a Flood Risk Assessment for development proposed within the land to the west of the existing Croft Medical Centre in Barnham, 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 A.

4.1.2 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.

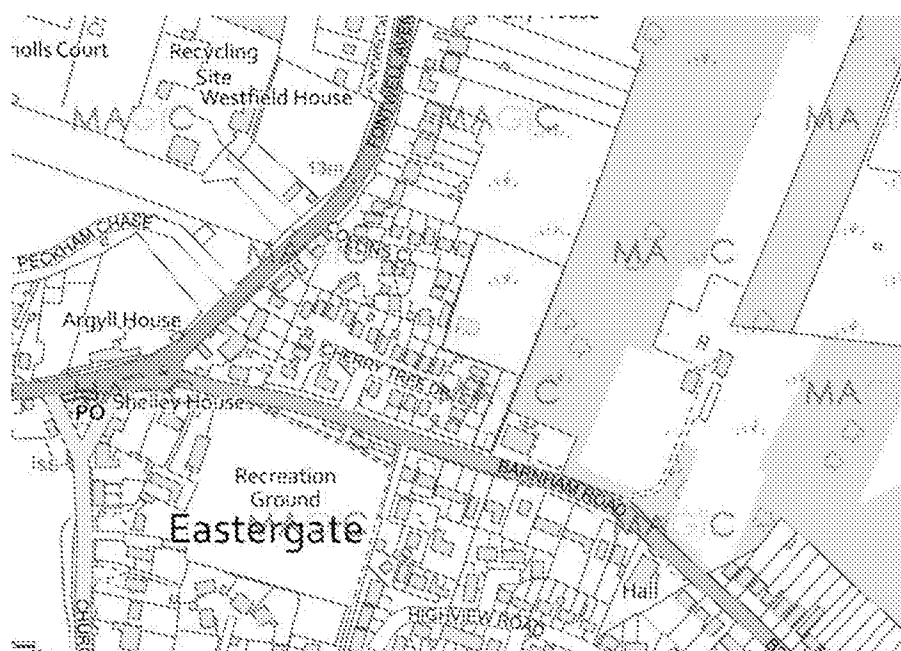


Figure 1. Site Location



Figure 2: Location of the Proposed Development Site

4.2 Site Description

4.3 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.

4.4 Geology and Hydrology

4.5 Published Geology

4.5.1 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 3 below.
- Bedrock Layer - The site is underlain by the London Clay Formation comprising of silty and sandy clayey and sandy silt.

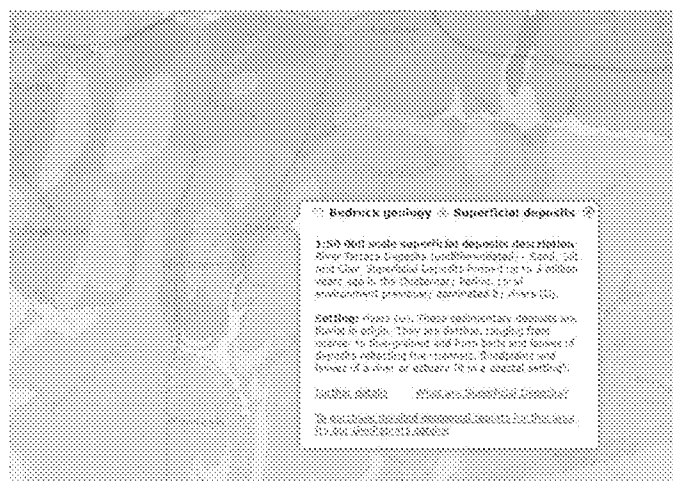


Figure 3 Superficial Geology

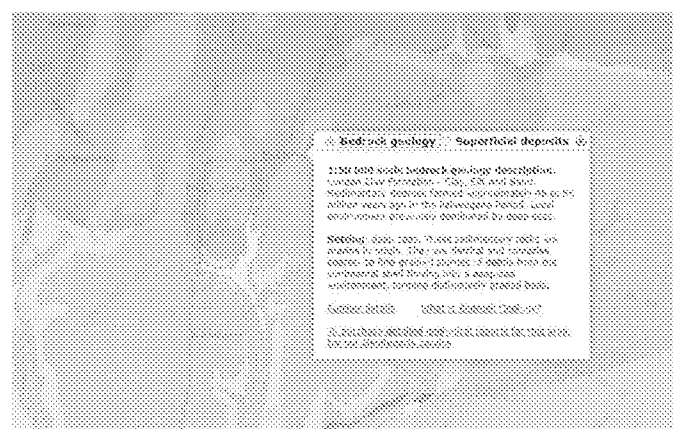


Figure 4 Bedrock Geology

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



Figure 5 – DEFRA SoilScape Map

4.6 Ground Investigation

- 4.6.1 A ground investigation study was carried out by Soils Limited in March 2021. 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'
- 4.6.2 Groundwater monitoring was ongoing at the time of the publication of the ground investigation report, at the time of writing this report, groundwater was recorded between 2.37-3.43m depth across 3 standpipes throughout the site. The table below presents all groundwater recordings to date: -

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

Groundwater Monitoring Levels

Initial infiltration testing was carried out by Soils Limited on 10/02/2021 but was found by Arun District Council not to be BRE365 compliant, therefore further testing was carried out on 07/03/21 which ensured compliance with BRE365. The infiltration rates used within the surface water design relate to the BRE365 complaint second round of testing.

4.7 Hydrology & Hydrogeology

- 4.7.1 The Environment Agency (EA) has produced an aquifer designation system consistent with the requirements of the Water Framework Directive. The designations have been set for superficial and bedrock geologies and are based on the importance of aquifers for potable water supply and their role in supporting surface water bodies and wetland ecosystems. These designations are cross referenced to the Environment Agency (EA) to provide the most adequate descriptions.

- 4.7.2 Study of the Superficial Drift Aquifer Map off the Environment Agency website indicates the site is underlain with Secondary A superficial deposits which by definition are 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'. See Figure 6 below.

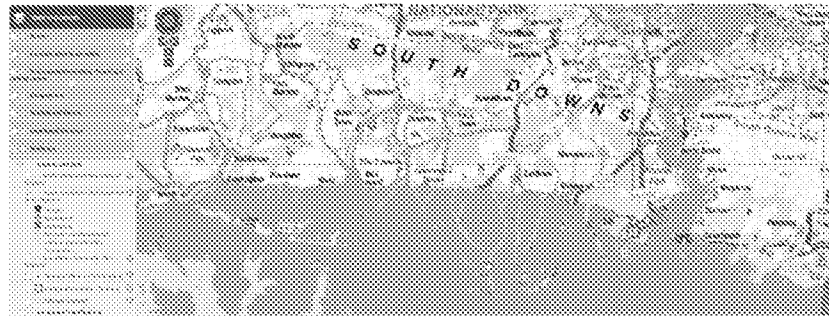


Figure 6 – Aquifer Designation Map (Superficial drift)

- 4.7.3 The Bedrock Aquifer Map highlights the site bedrock layer to consist of unproductive strata which by definition 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.'

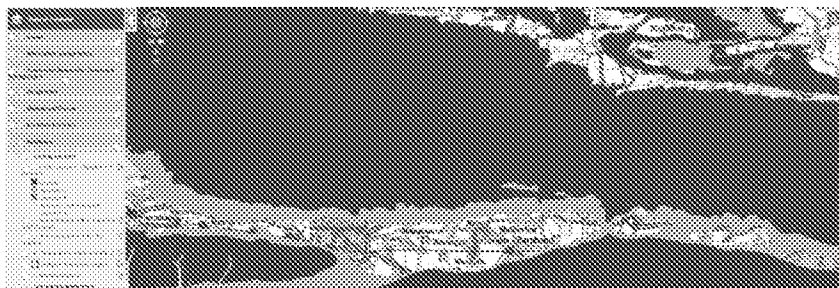


Figure 7– Aquifer Designation Map (Bedrock)

- 4.7.4 General Hydrology and Hydrogeological comment
- The site is not located within a Groundwater Source Protection Zone.
 - The site is not located in a Drinking Water Safeguard zone (Surface Water).
 - The site is not located in a Drinking Water Safeguard Zone (Groundwater)
 - Sites Groundwater Vulnerability classification is 'Low' See Figure 8 below.

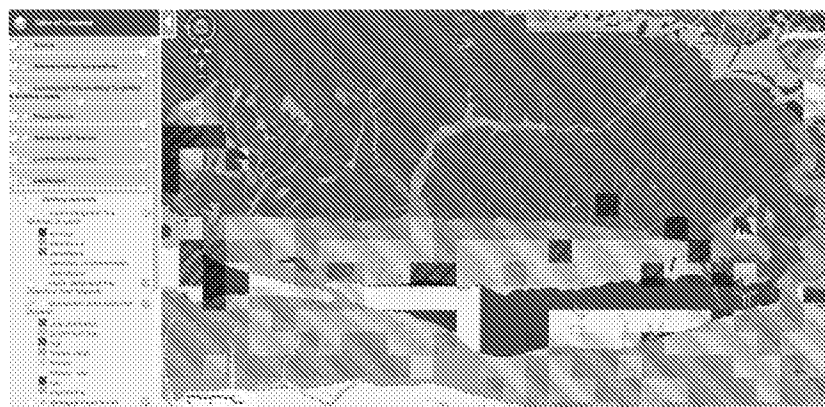


Figure 8 -- DEFRA Groundwater Vulnerability Map

- The closest main River feature is the Lidsey Rife Watercourse. This watercourse is approximately 200m west of the site. See Figure 9 below
- Site is not in an area at risk of flooding from reservoirs, artificial features.

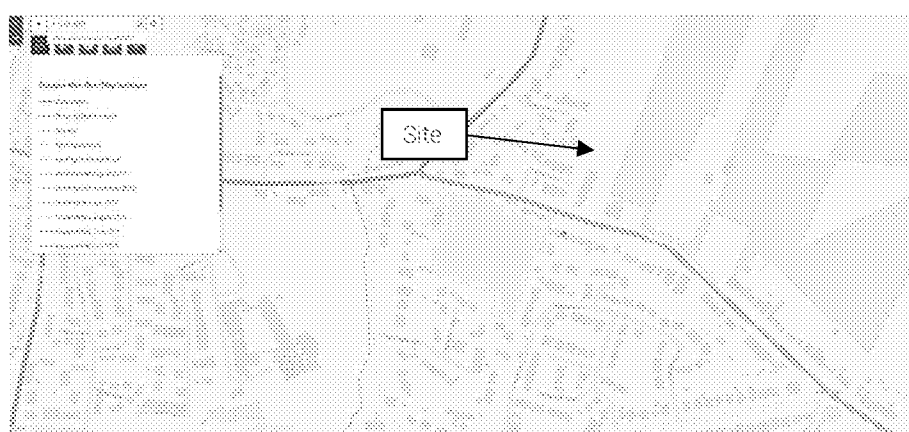


Figure 9 Main Water Features Map

4.8 Historic Flood Records

- 4.8.1 Recording of flooding in the past was the responsibility of the Local Water Company, Local Authority and the Environment Agency or a combination of both. The main responsibility for this has now fallen upon West Sussex County Council who have taken on the role of Lead Local Flood Authority. It is their responsibility with the individual local planning authorities to collate and bring together all information on flooding old and new.
- 4.8.2 References to flooding incidents are generally made within either Surface Water Management Plans, Strategic Flood Risk Assessments, Local Flood Risk Assessments or specific Area Flood Incident Reports produced by the LLFA/LPA.
- 4.8.3 The level 1 and 2 SFRA by JBA Consulting makes reference to historical flooding in the Arun District Council areas. This is covered in paragraph 5.1.
- 4.8.4 The principle events mentioned are:

- **September 1968:** A fluvial flood in Barnham caused several properties to flood and a road to close. The recorded flood level for the road for this event was 5.63m AOD
- **November 1974:** Heavy rainfall resulted in significant surface water and fluvial flooding throughout the district. Tidal flooding also occurred in Arundel when heavy rainfall coincided with a high tide. This caused the river to overtop defences and flood several properties and roads.
- **October 1980:** Fluvial flooding of the Ferring Rife caused several properties to flood on Downview Avenue and Langbury Lane in Ferring
- **1980/81:** Angmering village flooded on three separate occasions: 20 September 1980, 10 October 1980 and 2 June 1981 due to combination of heavy rainfall and blockages of drainage ditches and culverts. The June 1981 flood was the most severe of the three, with sewage being reported to be within the flood water.
- **February 1983:** Flooding of more than 150 properties in Littlehampton following a tidal surge on 1 February 1983.
- **January 2008:** Flooding north of Angmering after heavy rainfall (32mm) resulted in the flooding of two properties in the Hammerpot area
- **May 2009:** District wide flooding reported, but particularly at Yapton, Felpham, Walberton and Bersted. This is reported to have been primarily a surface water flooding issue brought about by intense rainfall, although fluvial flooding issues were also reported.
- **November 2010:** Tide locking of surface water drainage systems and intense rainfall resulted in extensive surface water ponding around the Elmer Sands estate and wider areas within the district. At Elmer Sands estate, soakaway systems and highway drainage were unable to effectively drain the estate and inundation of the foul system was evident. Floodwaters were high in Middleton and there was flooding on the A259 in between Flansham and Felpham, and surface water flooding.

4.8.5 The recorded flooding is shown on the flood incidents plan in Appendix A of the SFRA and shown in Figure 10 below

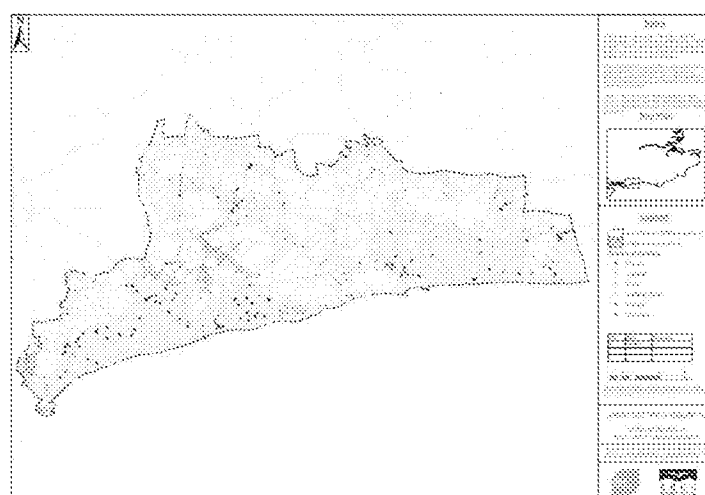


Figure 10 - Arun District Council SFRA Flood Incidents

4.9 Flood Mapping

- 4.9.1 Inspection of the current Environment Agency Flood Mapping places the site in Flood Zone 1, see Figure 11 below. This 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 Lidsay Rife watercourse which as mentioned above is 200m West of the site.
- 4.9.2 The definitions for each of these flood risk zones is given below in Table 4 below. The site by definition has less than 1 in 1000 chance of Annual flooding.

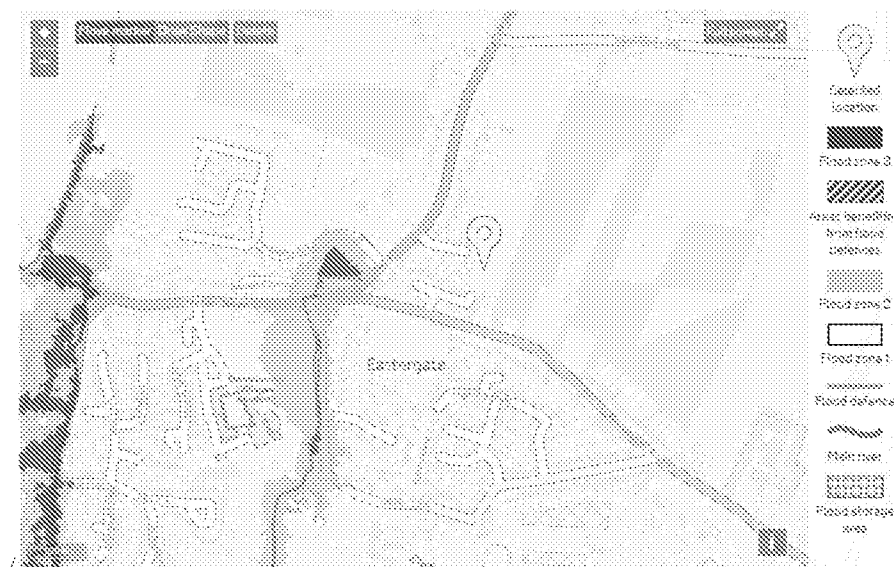


Figure 11: Environment Agency Flood Map

Flood Zone	Annual Probability of Flooding
Flood Zone 1: Low probability	Land assessed as having < 1 in 1000 (<0.1%) AEP
Flood Zone 2 Medium Probability	Land assessed as having between 1 in 1000 (0.1%) and 1 in 100 (1%) for river flooding (Fluvial), 1 in 200 (0.5%) for flooding from the sea.
Flood Zone 3a: High Probability	Land assessed as having > 1 in 100 (>1%) for river flooding and > 1 in 200 (>0.5%) for flooding from the sea.
Flood Zone 3B: Functional Floodplain	Land that: • Would flood with an annual probability of 1 in 20 (5%) or greater in any year, or at another probability to be agreed between the LPA and the Environment Agency, or • is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the EA.

Table 4 -- Flood Zone Definitions

4.9.3 A review of the GOV.UK website indicates the surface water flood map which can be seen in Figure 12 below. This shows the majority of the site to be at a "Very Low Risk" probability of surface water flooding which has by definition has less than 0.1% annual probability of occurring, see Table 5 below. Analysis of the medium risk surface water flood map shown in Figure 12, highlights a localised area of potential flooding up to 300mm depth along the eastern boundary. The majority of the site sits partly in an elevated position above the main road and is proven by the topographic survey. The site ramps down at the front quite markedly to tie in with Barnham Road for access. There also looks to be an area of low risk to the West of the site situated within Cherry Tree Drive. These areas have between 0.1-1% probability of flooding annually.

4.9.4 The description for each coloured layer of risk is as follows in Table 5 below

Flood Risk	Description
 High	High Risk -- means that each year this area has a chance of flooding of greater than 3.3% (1:30)
 Medium	Medium Risk -- means that each year this area has a chance of flooding of between 1% and 3.3% (1 in 100 and 1:30)
 Low Risk	Low Risk -- means that each year this area has a chance of flooding of between 0.1% and 1% (1 in 100 and 1:100)
 Very Low Risk	Very Low Risk -- means that each year this area has a chance of flooding of less than 0.1% (1:1000)

Table 5 – Flood Risk Description

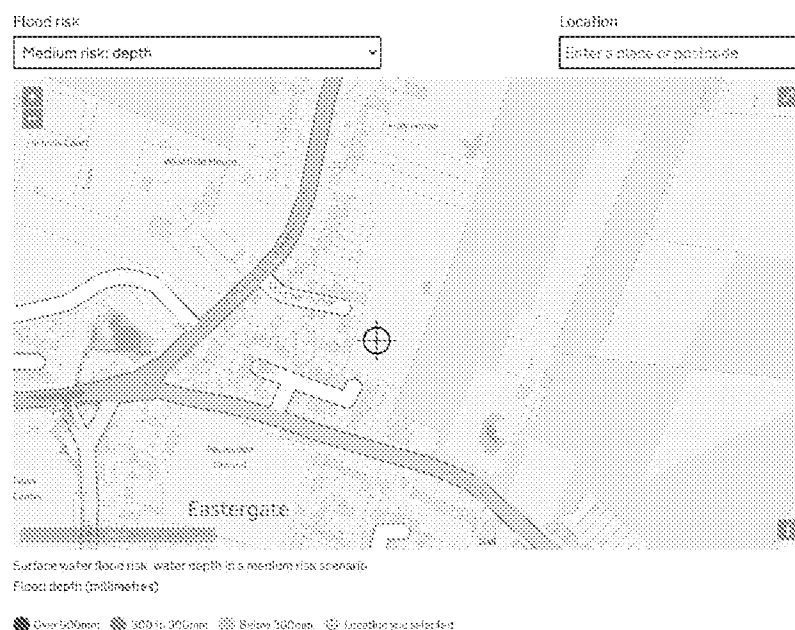


Figure 12: Environment Agency Surface Water Flood Map

4.9.5 The flood Mapping information within this report Contains Public Sector information licensed under the open Government Licence V3.0. Information has been downloaded from the gov.uk website link <https://flood-warning-information.service.co.uk>.

4.10 Existing Drainage

4.10.1 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 B.

4.10.2 Due to a lack of existing drainage within the site, an existing drainage plan has not been prepared.

5 Scope of Flood Risk Assessment

5.1 Scope of Flood Risk Assessment

The detail and complexity of a Flood Risk Assessment should reflect the level of the risk to the site. Environment Agency Flood Risk Standing Advice (FRSA), available online, indicates the general requirements of a Flood Risk Assessment and provides that Flood Risk Assessment should:

- Be proportionate to the risk and appropriate to the scale, nature and location of the site.
- Consider the risk of flooding arising from development in addition to the risk of flooding to the site
- Take the impacts of climate change into account.
- Consider both the potential adverse and beneficial effects of flood risk management infrastructure including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure.
- Consider the vulnerability of those that could occupy and use the site, taking account of the Sequential and Exception Tests and the vulnerability classification (see national Planning Policy Framework Guidance), including arrangements for safe access.
- Consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and identify flood risk reduction measures, so that assessments are fit for the purpose of the decisions to be made.
- Consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes.
- Include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that this is acceptable for the particular development or land use.
- Consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of development may affect drainage systems;
- Be supported by appropriate data and information, including historical information on previous events.

6 Sources of Flooding

6.1 Fluvial Flooding

- 6.1.1 This type of flooding is from Rivers / Inland Watercourses & Coastal Flooding from the Sea
- 6.1.2 The flood risk to this site is referenced earlier in paragraph 4.9 is designated as Low Risk Land assessed as having < 1 in 1000 (<0.1%) AEP chance of flooding from Fluvial flooding.
- 6.1.3 Within the Arun District Council Level 1 and 2 SFRA by JBA Consulting comment is made in paragraph 5.3 of that report about the risk of Fluvial Flooding. The SFRA makes particular reference to areas of 'primary fluvial flood risk' which are associated with the River Arun, Aldingbourne Rife and Ferring Rife. All of the aforementioned watercourses are not located near the site to pose any flood risk to the development.
- 6.1.4 The nearest source of fluvial flooding to the site is the Lidsey Rife approximately 200m to the east of the site. The flood risk zones associated with the Lidsey Rife do not cross into the site according to mapping information presented in Section 4.9.
- 6.1.5 There is no recorded risk from fluvial flooding for the application site and therefore the risk of flooding from this source is Low risk.

6.2 Tidal Flooding

- 6.2.1 Tidal flooding is caused by extreme tide levels exceeding ground and/or defence levels. The tidal flood risk to the local plan areas has been based on the 2 sources of tidal flood risk within the catchment, which are the English Channel and the lower River Arun.
- 6.2.2 Both the English Channel and lower River Arun are approximately 6km from the site location, with the Flood Zones 2, 3a and 3b.
- 6.2.3 River and tidal flood mapping presented in section 4.9 demonstrates that the tidal flood zones do not encroach within the site.
- 6.2.4 Based on the above, the risk of tidal flooding to the application site is Low risk.

6.3 Flooding from Groundwater

- 6.3.1 Groundwater flooding tends to occur after long periods of sustained high rainfall, however during exceptional rainfall rapid groundwater recharge can occur. Groundwater rising above surface level can result in deep and long-lasting flooding of low lying or below ground areas such as underpasses and basements. Groundwater flooding can be less frequent but more severe when it does occur.
- 6.3.2 It should be noted that changes in groundwater levels do occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a standpipe or piezometer.
- 6.3.3 Groundwater flooding is difficult to predict and challenging to mitigate against. Groundwater flooding can also impact on SUDS features and their effectiveness hence the need to also ensure groundwater levels through the various seasons do not encroach to within 1.0m distance to the base of those features. This is in addition to possible risk from pollution.
- 6.3.4 The Arun District Council SFRA reports that a large part of Arun is predicted to be at risk of groundwater flooding and that susceptibility to groundwater flooding is 'generally high across the district'. The issue is that groundwater flooding is caused by a high water table in mudstones, clays and superficial alluvial deposits in low lying valley areas.

- 6.3.5 The Environment Agency supply data identifying "Areas Susceptible to Groundwater Flooding (AStGWF)". This is coarse scale national mapping showing areas susceptible to groundwater flooding. The mapping breaks each area down into a 1km grid where geological and hydrogeological conditions show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring. The mapping for 'Areas Susceptible to Groundwater Flooding' shows the site within a high (>75%) risk area.
- 6.3.6 The mapping included in Arun District SFRA is in Appendix F of that document. A copy of the Groundwater Flood Risk Mapping is Figure 13 below.

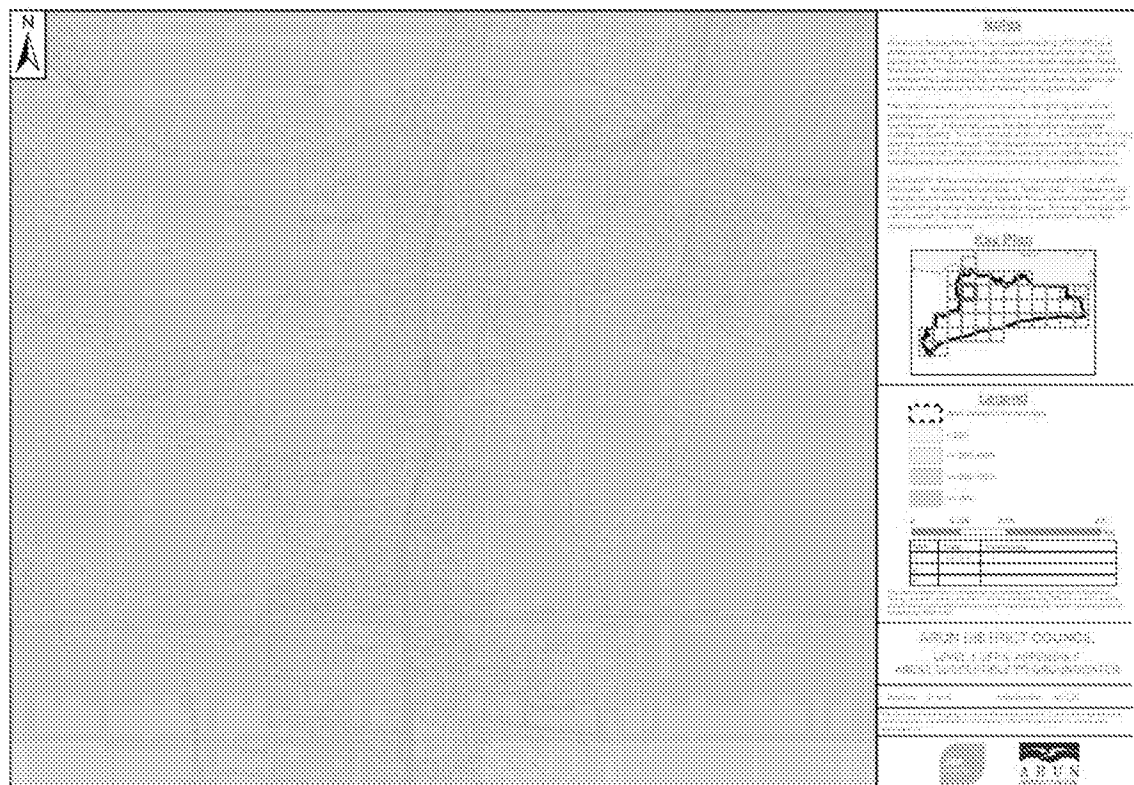


Figure 13 – Arun District Council SFRA Groundwater Flood Risk Mapping

- 6.3.7 Geotechnical investigation data undertaken in February 2021 provides multiple records of groundwater monitoring within the site, which revealed depths of groundwater within the site of between 3.43m-2.37m depth from ground level.
- 6.3.8 Borehole logs provided within the BGS mapping within Barnham Road approximately 150m to the south east of the site for borehole reference SU90NW76 recorded a groundwater level depth of 4m.
- 6.3.9 Taking into account mapping information provided by the EA and the Arun District Council SFRA and intrusive ground investigation records, the groundwater flooding risk at the site is considered to be medium.

6.4 Flooding from the Existing Drainage System

- 6.4.1 Sewer flooding occurs when intense rainfall overloads the sewer system capacity (surface water, foul or combined), and / or when sewers cannot discharge properly to watercourses due to high water levels. Sewer flooding can also be caused when problems such as blockages, collapses or equipment (such as pumps) failure occur in the sewerage system. Surface water inundation of manhole openings, entry of soil or groundwater, and may cause high flows for prolonged periods of time.
- 6.4.2 Since 1980 the Sewers for Adoption guidelines have meant that most new surface water systems have been designed to have capacity for a rainfall event with a 1 in 30yr chance of occurring in any given year (3.33% AEP) , although until recently this did not apply to smaller private systems. This means that even when sewers are built to current specifications they can still be overwhelmed by larger events of the magnitude often considered when looking at river or surface water flooding (eg , a 1 in 100 chance of occurring in any given 1% AEP). Existing sewers can also become overloaded as new development adds to their catchment, even with restrictions in place on permitted discharge, or due to incremental increases in roofed and paved surfaces at the individual property scale (Urban Creep) . Sewer flooding is therefore a problem that could occur in many locations across the boroughs study area.
- 6.4.3 Historical incidents of flooding are detailed by Southern Water through their Sewer Incident Report Form (SIRF) Data. This database records incidents of flooding relating to public foul, combined or surface water sewers and displays which properties suffered flooding. For confidentiality reasons, this data is supplied on a postcode basis from the SIRF hydraulic overloaded database for incidents recorded in Arun District Council SFRA. For the Arun District the Southern water data covers reported incidents of sewer flooding up to 25th February 2016. The SIRF for the local plan can seen in table 5.2 within the SFRA.
- 6.4.4 The SIRF data base indicates a total of 11 recorded flood incidents within the post code attributed to the site. The most frequently flooded postcodes are PO22 7 in the Arun District, contributing to the 315 total of flooding incidents within the district. It is important to recognise that the information does not indicate the cause of the sewer flooding incidents. Also, the register represents a snap shot in time and may become outdated following future rainfall events, when new properties are added. Risk of flooding may be reduced in some locations by capital investment to increase the capacity of the network. As such, the sewer flooding flood risk register is not a comprehensive, at risk register, and updated information should be sought to enhance understanding of flood risk from sewers at a given location.

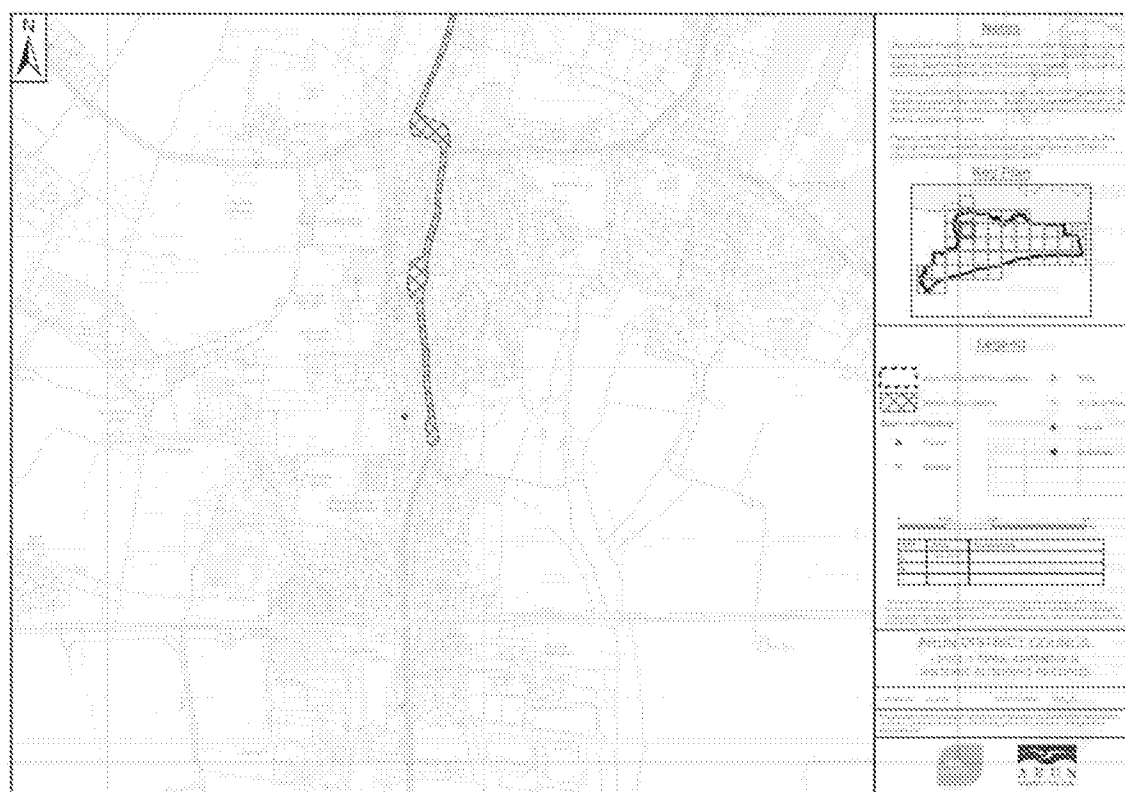


Figure 14 – Historic Flood Event Areas

6.4.5 Due to the lack of existing drainage systems within the site, the topography of the site in relation to Barnham Road and the recorded information and data available at this time, the risk of flooding from existing drainage systems is deemed as low

6.5 Reservoirs, Canals and other Artificial Sources

6.5.1 Reservoir failure can cause significant damage due to the large volume of stored water, which can be released, at a high velocity and in a very short time span. Reservoir floods can be deep locally and spread over wide areas however, the probability of failure causing a flood is very low because of the nature of the reservoir management in the UK.

6.5.2 Canal failure can include a breach or overtopping of a canal system due to the effects if a high intensity rainfall event or structural failure that is not associated with a rainfall event. Such failure can be very dangerous as it can involve the rapid release of large volumes of water at high velocity however, it is typically limited to reaches of canal that are raised above the surrounding ground level on one or both sides or where watercourses or other structures pass beneath the canal. The size and nature of the canals themselves can also have hydraulic control on the mechanisms of flooding associated with a failure, resulting in a rapid peak in flow followed by a gradual reduction as the flow becomes restricted by the capacity of the canal itself to rapidly pass flow to the breach or failure point.

6.5.3 The Arun District SFRA confirms that there are no large reservoirs and a single disused canal within the Arun District. However the outline mapping from the National Reservoir Inundation Mapping (NRIM) shows that the Arun District is impacted by three reservoirs within the Solent and South Downs area.

6.5.4 The nearest Reservoir flooding extent is shown near Bilsharn approximately 3.8km south east of the site.

6.5.5 The risk of flooding from any of the above sources is considered as very low to none.

6.6 Assessment of Flooding Consequences

6.6.1 It is considered that the possibility of flooding from the above and consequences of flooding are as recorded in the table 6 below. The majority are Low risk or none. The only source that will need to be considered further is Groundwater Post Planning when on site geotechnical investigations will provide more data for the assessment of risk from this source.

Source of Flooding		Risk Assessment
Fluvial	Main River	Low
	Ordinary Watercourses	Low
Sea / Tidal		Low
Surface Water		Low
Groundwater		Medium
Canal / Reservoir		Low/ None
Sewers		Low
Artificial Drainage		Low
Watermains		Low

Table 6 – Flooding Consequences Risk

7 Development Proposals and Drainage Strategy

7.1 Development Life Span

Based on the typical life span for a residential development of 100 years the contingency allowances for climate change set out in Table 3 from the Guidance Note 'Flood Risk Assessments: Climate Change Allowances' the peak rainfall intensity increase is notated as follows:

- Upper End – 40%
- Central – 20%

7.2 Proposed Scheme

- The development comprises of the following:
- Medical Centre building
- Access Road and vehicle drop off bays
- Parking areas including 72 parking bays.
- Associated Landscaping

7.3 Drainage Strategy Requirements

7.3.1 The proposed surface water drainage strategy should as a minimum reduce the risk to any off-site flooding either in the immediate vicinity or further downstream and minimise the risk from inundation on site with a scheme designed to the appropriate and current design standards applicable at the time of compiling the report.

7.3.2 All new private drainage will be designed in accordance with Approved Document H of the National Building Regulations 2000:2002 Edition and BS EN 752:2008

7.3.3 All new surface water drainage will be designed to comply with current design guidance using the following storm return periods and latest climate change allowances as contained within the Guidance document dated 19th February 2016 – Flood Risk Assessments – Climate Change Allowances.

- 1 in 1 year no climate change
- 1 in 30 year + 20-10% climate change
- 1 in 100 year + 40-20% climate change

7.3.4 West Sussex County Council have their own guidance which is contained within the document titled 'West Sussex LLFA Policy for the Management of Surface Water'. Detailed design should also use and follow the CIRIA C753 guidance document.

7.4 Proposed Surface Water Drainage Strategy

7.4.1 The requirement from West Sussex County Council and Arun District Council Policies is new development should where possible and technically supportable, include "Sustainable drainage systems into the proposals. The discharge destination should be prioritised using one of the hierarchies listed within Part H3 of Approved Document H disposal of Surface Water. The options should be reviewed in the order given in Table 7 below which has been based on text within Part H and referenced within Ciria Guidance Documents.

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 7: Part H3 Hierarchy

7.4.2 The surface water strategy has been developed using the findings of the of the surveys carried out by Hampshire Land Surveys highlighting the site topography, existing sewer depths and any services. This information has been combined with the intrusive site investigation, infiltration testing and groundwater monitoring by Soils Limited in February 2021 focused primarily on the site in question to reach a feasible solution for a site of this nature.

7.4.3 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 8 -- impermeable Areas

7.4.4 Based on the ratio of existing impermeable area to proposed impermeable area, a Q Bar (Urban) value has been generated using Windes. 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 9 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 9 -- Greenfield Run-Off Rates

7.4.5 Due to the lack of any existing positive drainage system within the site as highlighted by the Hampshire Land Surveys topographical information, brownfield rate calculations have not been undertaken for the site.

7.4.6 In accordance with best practice guidelines and in particular Cima Documents C753, C697 and C687 the new surface water drainage system will be designed using the following design return periods criteria and West Sussex 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

7.4.7 Following positive BRE365 compliant infiltration testing results recorded following testing undertaken in March 2021, the surface water drainage proposals for the site are to dispose of runoff wholly via infiltration using a network of geo-cellular soakaways and permeable paving systems. Results presented in Appendix E demonstrates infiltration rates ranging from $2 \times 10^{-4} \text{m/s}$ to $6.6 \times 10^{-4} \text{m/s}$, with the more favourable rates present in tests undertaken at 15-1.7m depth from ground level where ground conditions are described as 'Off white, gravelly sandy CHALK HEAD'. Shallow infiltration tests undertaken at 600mm depth presented worse results but still within the range for full infiltration permeable paving systems.

7.4.8 Based on the recorded groundwater levels within the site, infiltration structures proposed within the site surface water drainage system are to be located as close as possible to maintaining a minimum of 1m depth from the top of the highest recorded ground water level to the underside of the infiltration feature, in this case crate soakaways.

7.4.9 The surface water network is composed of pipework ranging from 100mm up to 300mm connected by a series of inspection chambers and catchpits where required. Permeable Paving systems are used throughout the car park areas with permeable surfacing situated within the parking bays with the permeable subbase extended below the lanes which are to be impermeable surfacing. All parts of the surface water network are linked to geo-cellular soakaways which have been designed to accommodate up to the 1 in 100 year + 40% climate change design storm using worst case recorded infiltration rates with a factor of safety of 3 applied. Road gullies have been specified at strategic locations around the areas of car park area to capture any excess run off that is unable to infiltrate quick enough through the porous sub base and into the ground and will be directed to the modular crate soakaways.

7.4.10 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.

7.4.11 The Causeway Flow surface water network calculations presented in Appendix D demonstrate that there is no recorded flooding for all storm events up to and including the 100 year + 40% storm event.

7.4.12 The private drainage system will provide adequate working capacity and storage on site through the pipework, soakaways, and permeable paving to manage the surface water runoff from all roof and hardstanding areas. Any exceedance should be contained within the site without having any adverse effect on the site and surrounding areas.

7.4.13 For a more detailed description of the Drainage proposals refer to the standalone Drainage Strategy Statement by Calcinotto dated May 14th 2021.

7.5 Foul Drainage

7.5.1 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.

- 7.5.2 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.
- 7.5.3 The proposed foul discharge from the development will be subject to available capacity within the Southern Water public foul sewer. It is anticipated that this assessment will be ongoing through the determination period of the application.

7.6 Adoptions/Approvals

- 7.6.1 Consideration will be given for the final lateral foul connection from the site to be adopted up to the final demarcation manhole via either a Section 104 / Section 106 sewer connection agreement.
- 7.6.2 The remainder of the new foul and surface water network on site will remain private.

7.7 Drainage Strategy and Contamination Risk

- 7.7.1 The development type poses a low risk to surface water contamination given the proposed use of the site. The integration of measures such as permeable paving and smart sponge gullies seek to further minimise risk of oil contamination within the car parking areas. More comment on Water Quality has been made within the Drainage Strategy Statement by Calcinotto Ltd.

8 Flood Risk Management Measures

8.1 Existing Flood Mitigation

- 8.1.1 The site is already in an area designated as being at a Low Risk of flooding according to information on the GOV.UK web site and from comment made within local studies and reports and assessments carried out by West Sussex County, the Lead Local Flood Authority and Arun District Council.
- 8.1.2 The Sequential and Exception tests on that basis related to Flood Risk are satisfied and not relevant respectively.

8.2 Post Development Flood Mitigation

- 8.2.1 The site is not located near any tidal influences and therefore there is not a need for later flood mitigation through the lifetime of the development from this source.
- 8.2.2 The on-site surface water drainage strategy is designed to provide sufficient working capacity to ensure the extreme event of up to and including the 1 in 100yr event plus an allowance of 20-40% for climate change so that the buildings on the site are not compromised for the lifetime of the development.
- 8.2.3 Any overland flood routes identified within the design to allow run-off to bypass sensitive areas of the development shall be kept clear to allow free movement of run-off into the non-sensitive areas. The car park areas are generally set lower than the building therefore minimising any risk from temporary surface water run off ponding in those areas.
- 8.2.4 The main route into and out of the building is via a footpath which is carried through as a table top feature(where paving levels are raised up above surrounding paved areas)in the junction of the entrance to the front car park and the access road and therefore provides a safe dry route out for pedestrians if required.

9 Residual Risk

9.1 Flood Related Residual Risks

9.1.1 In the event of exceedance i.e., a storm event occurring which is greater than what the on-site surface water drainage system has been designed, for excess run-off not able to enter the drainage system will be directed overland bypassing the buildings principally down the access road and onto Barnham Road.

9.1.2 The depths of water and velocity of flood water will be considered to further ensure the risk to site users and property is minimised. The depth of water shall be minimised to ensure no danger to site users.

9.2 Residual Risks Management

9.2.1 The new foul and surface water drainage systems will be managed and maintained through the adoption of a 'Site Specific Maintenance Plan'. A Maintenance and Management Plan will be produced as a standalone document post-planning consent however the main maintenance items and methods has been incorporated within the Drainage Strategy Statement by Calcinotto Ltd.

9.2.2 This will ensure both systems continue to work as designed through the lifetime of the development to minimise and manage any future 'risks' that may occur through the lifetime of the development.

- 10 Conclusions**
- 10.1 This site-specific Flood Risk Assessment has been produced to support an application for the proposed development of the Croft Medical Centre in Eastergate, Chichester.
- 10.2 Inspection of the Environment Agency Flood Mapping identifies the application site as within Flood Zone 1 which is classified as low Risk and has an annual probability of less than 0.1% (1 in 1000) chance of flooding from fluvial and / or tidal sources.
- 10.3 From the National Planning Policy Framework Guidance Document Table 2 – Flood Risk Vulnerability Classification classifies the building used for Residential as 'More Vulnerable'. From the same document Table 3 Flood Zone Vulnerability and Flood Zone Compatibility identifies 'More Vulnerable' development in Flood Zone 1 as appropriate.
- 10.4 The risk of flooding from other sources has been considered to be 'low' to 'none'. The only source that has been highlighted as a Medium risk at this time is Groundwater. Mapping with the Arun District Council SFRA suggest the site could be at risk of experiencing high ground water levels. Geo-technical investigations undertaken in February 2021 recorded groundwater levels ranging between 3.43m-2.37m below ground level. Further groundwater monitoring is currently ongoing at the time of writing this report.
- 10.5 BRE365 Infiltration testing carried out within the site in March 2021 demonstrates that infiltration drainage is a viable method of disposing surface water for the proposed development. Testing results ranging between 2×10^{-6} m/s to 6.6×10^{-4} m/s were recorded, with more favourable rates being achieved at depths of 1.5-1.7m below ground level.
- 10.6 The surface water strategy for the new development is based around managing and controlling the surface water run-off generated by the site. The scheme includes proposed features to manage surface water runoff at source via infiltration, which eliminates 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%.
- 10.7 A drainage strategy has been prepared and shown on drawings 114222-CAL-XX-XX-DR-D-0100 to 0102 in Appendix C.
- 10.8 Water quality will be addressed fully within the detailed design to ensure compliance within the requirements of CIRIA C753 SUDS manual. This element has been addressed within the Standalone Drainage Strategy Statement by Calcinotto Ltd. Due to the low level of pollution indices of the roof, access road and parking areas mitigation proposals will be acceptable in terms of Water Quality.
- 10.9 By utilising infiltration measures to dispose of surface water runoff within the site, it can be demonstrated that flood risk is not increased offsite as a result of the disposal of surface water runoff.
- 10.10 This site-specific Flood Risk Assessment provides a detailed proposal for Surface Water Drainage Strategy and shows a clear intent how all the possible flooding issues and drainage can be addressed to prove the site is developable at no risk to existing and new buildings on and off site.
- 10.11 It is expected that there will be Drainage Conditions applied to the Consent and therefore there will be dialogue with West Sussex County Council as Lead Local Flood Authority and Southern Water whilst the final detailed design and coordination takes place post planning consent.
- 10.12 A more detailed explanation of the proposed drainage is outlined in a site-specific Drainage Strategy Statement produced by Calcinotto Ltd and issued as a separate document in support of a Planning Submission for the proposals.
- 10.13 On the basis of the site-specific Flood Risk Assessment and its findings a Planning Consent for the

proposals should not be withheld on Flood Risk grounds.

A Architects Layout



NOTES:

OTHER THAN FOR THE PURPOSES OF PLANNING, DO NOT SCALE THESE DRAWINGS.
USE WRITTEN DIMENSIONS ONLY. ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF WORK.

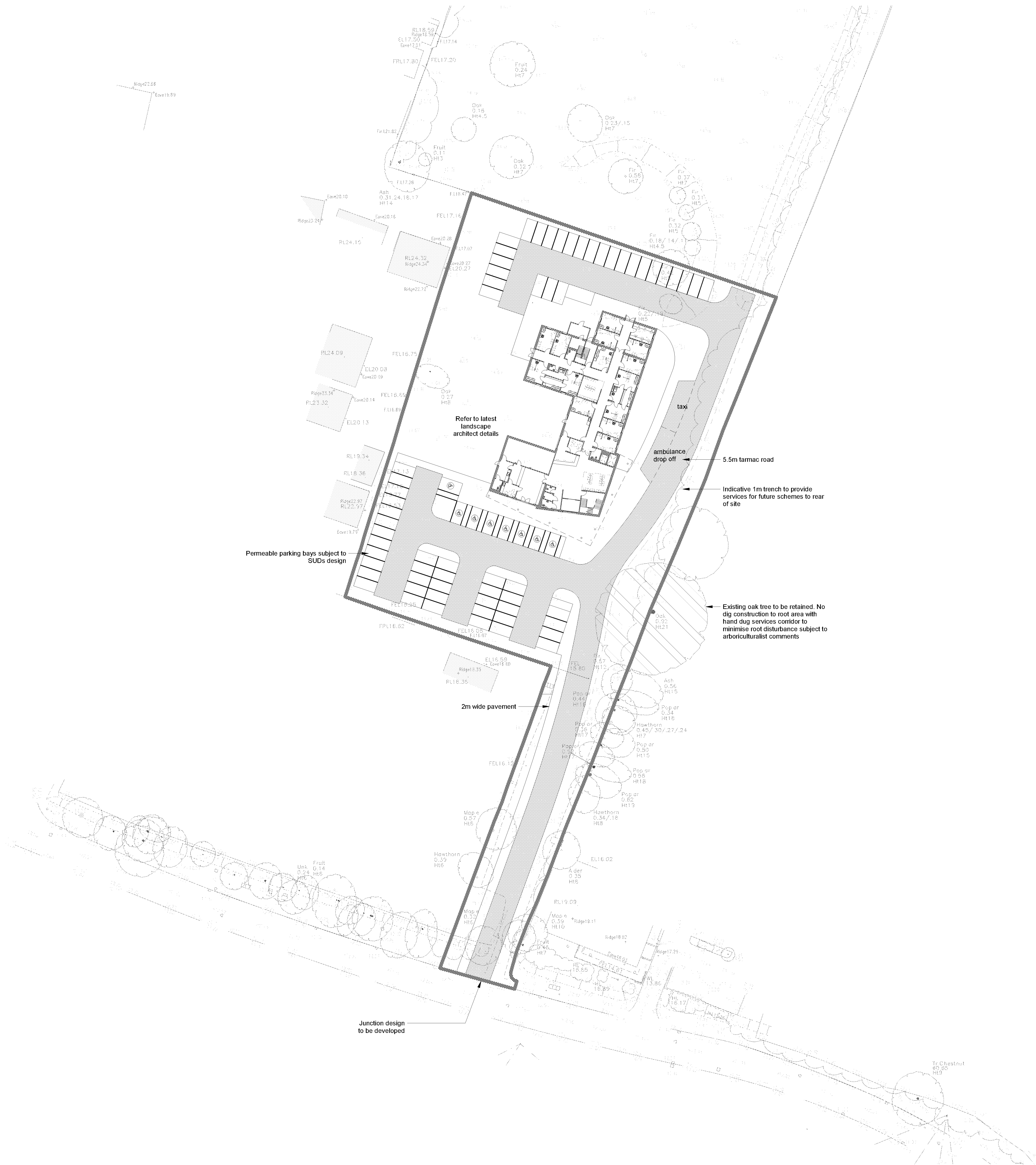
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REVISION CLOUD



Notes:

Drawing is based on information on OS Data by others.
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Boundary line is indicative and subject to confirmation.

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

Drawing Status				
PRELIMINARY				

Client

Principal contractor

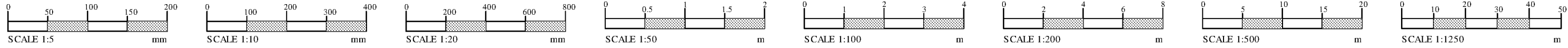
Design Consultant
 67A HIGH STREET LYNDHURST HAMPSHIRE SO43 7BE T: 023 80 283798 F: 023 80 283688 E: sha@simpsonhilder.co.uk

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
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B Topographic Survey

NOTES

DO NOT SCALE FROM DRAWING
ALL DIMENSIONS TO BE CHECKED ON SITE

NOTES:

ALL MEASUREMENTS ARE TAKEN TO EXISTING
SURFACE FINISHES UNLESS STATED OTHERWISE

ALL HEIGHTS ARE IN M

ALL ARROWS POINT UP

ARBITRARY GRID

ALL LEVELS IN METRES AND RELATE TO
ORDNANCE SURVEY BENCH MARK
Location: Swanmore Barnham Road
Height: 14.06m

[illegible]

Fence Details			
Borr	Barrier	IntLF	Interwoven
BWF	Barbed Wire	LUF	Lorch Lap
CBF	Close Board	P	Post
CF	Concrete Fence	PCF	Post & Chain
CF	Corrugated Iron	PWF	Post & Rail
CL	Chain Link	PWF	Post & Wire
CPF	Chestnut Paling	PWF	Post & Wire Mesh
IRF	Iron Railings	-	-

Wall Details			
EFW	Brick and Flint Wall	Drainage Survey Bench Mark	 GSM
BLW	Brick Wall		
EW	Brick Wall	Temporary Bench Mark	 TBM
CM	Concrete Wall		
FW	Flint Wall		
RW	Retaining Wall	Drainhole	
SLM	Sloping Masonry		
W	Wall		

HAMPSHIRE LAND SURVEYS LTD
Land, Building and Engineering Surveys

18 SHETLAND RISE
WHITELEY
FAREHAM

Tel. 01489 565558
Fax. 01489 565559
Mobile 07721 423330

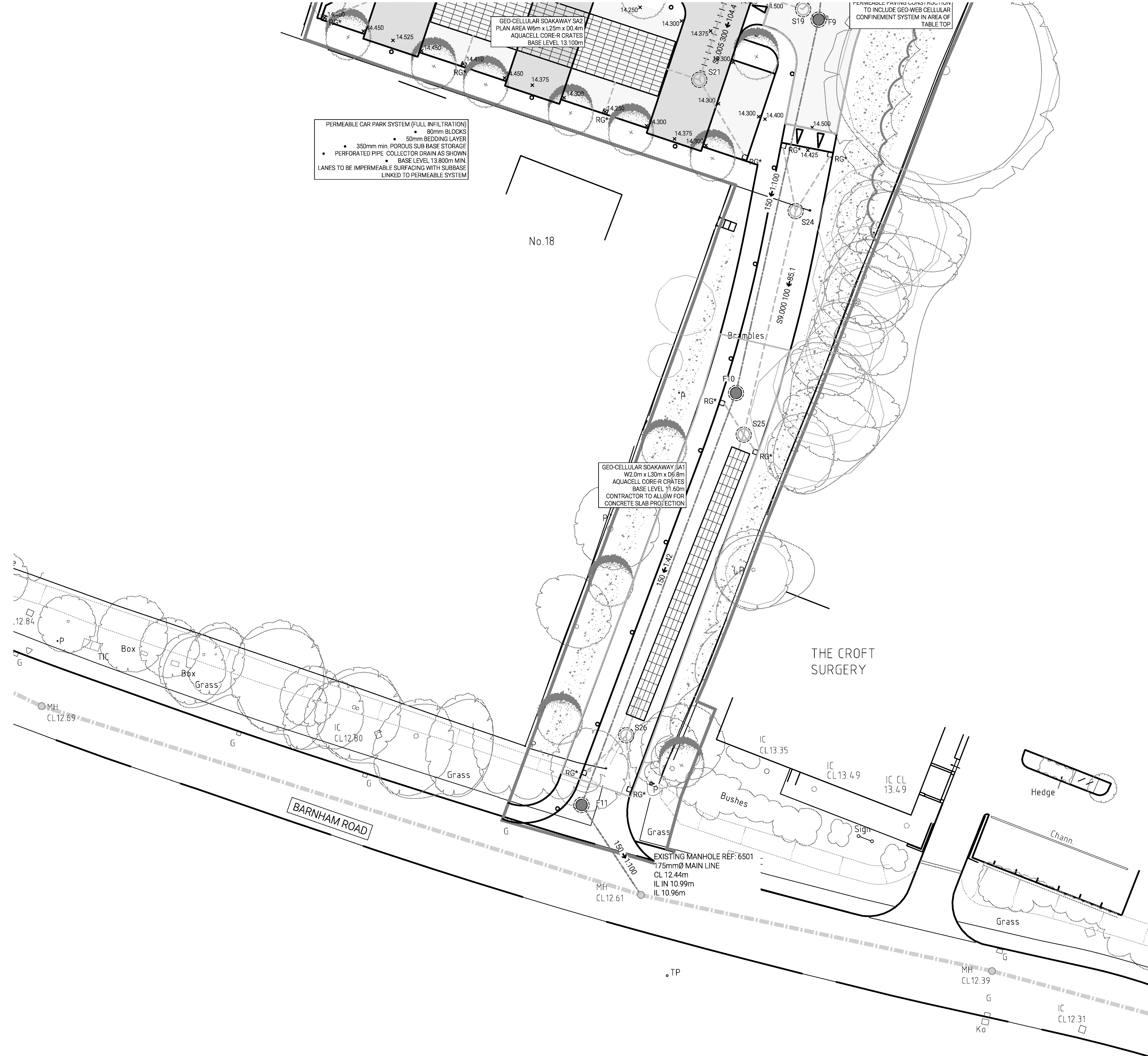
Land adjacent to Croft Practice
Eostergate

DRG No.	1142_08_04_01	REV.	A
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C Drainage Layout Plan



114222-CAL-XX-XX-DR-D-110



Legend

Proposed SW Sewer (& Manhole)

Proposed FW Sewer (& Manhole)

RG* 450Ø P.C.C. Road Gully with Smart Sponge Filter

RE Rodding Eye (Refer to plan for invert level)

RWP Rainwater Collection Pipe

Existing Public Foul Sewer

SVP Soil & Vent Pipe

Perforated Distributor / Collection Pipe

Geo-Cellular Soakaway

Permeable Paving System - Surfacing material as specified on drawing

Impermeable Car Park Surfacing - Sub Base Linked to Permeable Paving System

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

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- 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.
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- 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

Client:
PHP Group

Project Title:
The Croft Medical Centre Chichester

Drawing Title:
External Works Layout
Sheet 2 of 3

Drawing Details:
Planning

Geographic No:
114222

Rev No:
DB

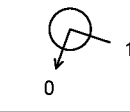
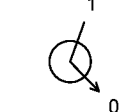
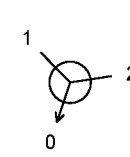
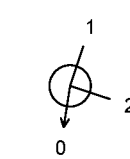
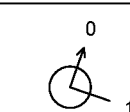
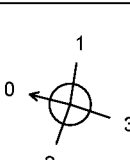
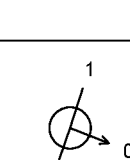
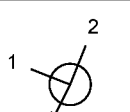
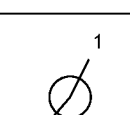
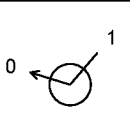
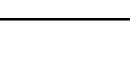
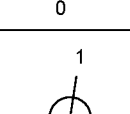
Drawn By:
PW

Date:
1:200 @A1

Project No:
114222-CAL-XX-XX-DR-D-1101

Revision:
P02

ARUN DISTRICT COUNCIL 09/02/21/PL

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 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 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 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 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 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	 1 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

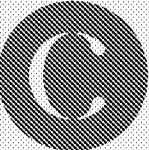
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P02 13/05/21 Design amended.

P01 09/04/21 First Issue

Rev Date Description



Order Ref: 114222
Client: PHP Group
Address: 114222
Phone: 01323 614100
Email: info@phpgroup.co.uk
Website: www.phpgroup.co.uk

Client: PHP Group

Project Title: The Croft Medical Centre Chichester

Drawing Title: External Works Layout Sheet 3 of 3

Drawing Status: Planning

Generator No:	Rev No:	Drawn By:	Scale:
114222	DB	PW	1:200 @A1

Project Ref: 114222-CAL-XX-XX-DR-D-1102

Revision: P02

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

D 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

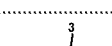
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.003	1.006	40.0	20.1	0.954	1.041	0.106	0.0
3.000	1.676	29.6	1.5	0.625	0.991	0.008	0.0
1.004	1.896	75.4	21.6	1.041	1.091	0.114	0.0
4.000	1.051	18.6	1.5	0.625	0.763	0.008	0.0
4.001	1.688	29.8	1.5	0.763	1.041	0.008	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

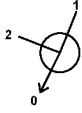
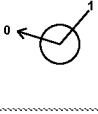
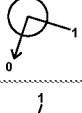
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	34.105	150.0	225	Circular	14.850	14.000	0.625	14.750	13.773	0.752
1.001	9.440	150.0	225	Circular	14.750	13.773	0.752	14.750	13.710	0.815
1.002	7.232	113.0	100	Circular	14.750	13.710	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	17.321	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	7.000	13.725	150
							2	6.000	13.725	150
							0	6.001	13.725	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	8.000	13.543	225
							2	6.001	13.618	150
							0	6.002	13.543	225
18	-16.165	-18.337	14.500	1.055	1200		1	6.002	13.445	225
							0	6.003	13.445	225
19	-29.831	-34.197	14.500	1.254	1200		1	6.003	13.321	225
							0	6.004	13.246	300
20	-37.499	-31.838	14.500	1.302	1200		1	6.004	13.198	300
							0	6.005	13.198	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	9.000	12.650	150
							0	9.001	12.575	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

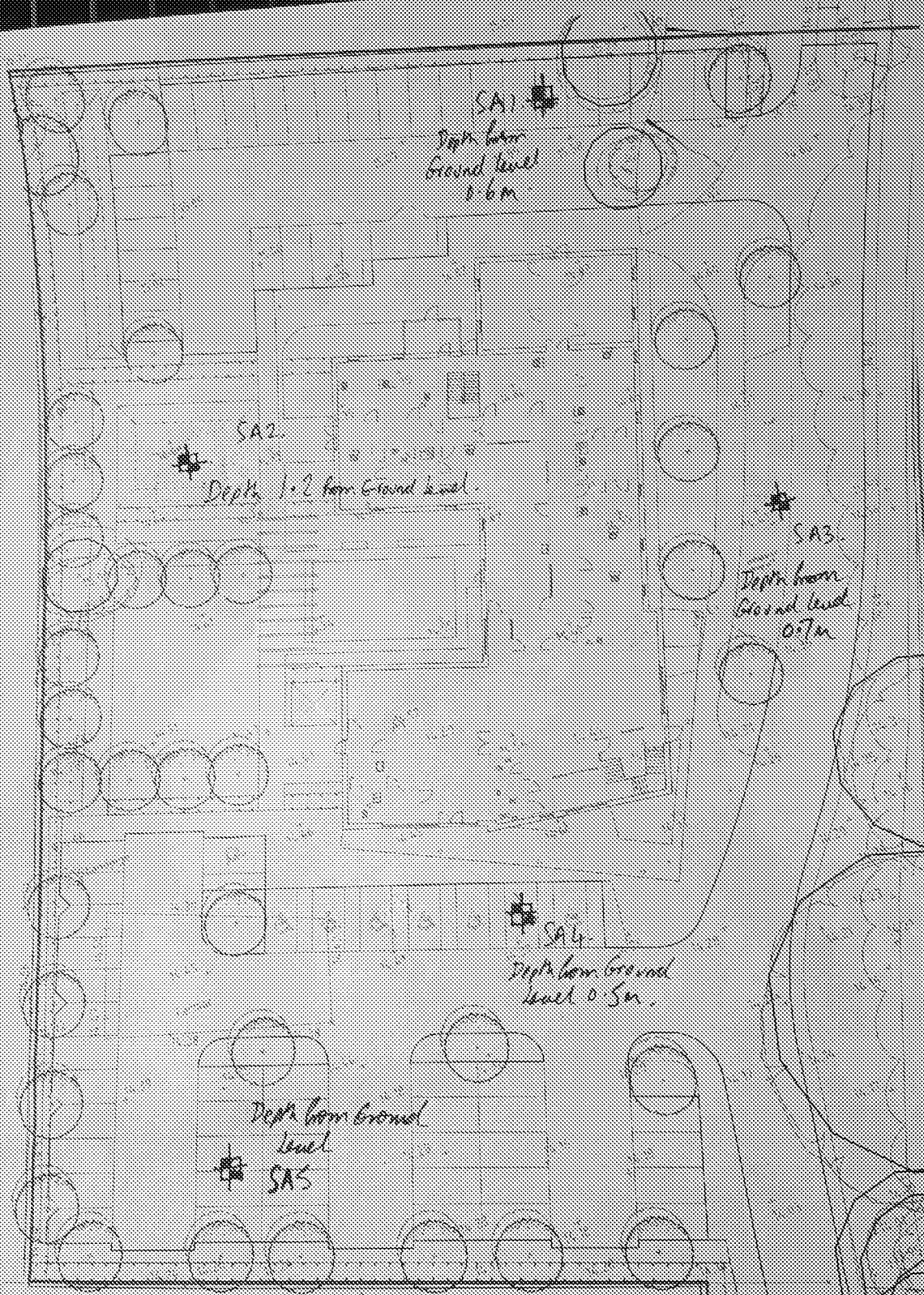
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	1	1.000	2	30.5	0.768	0.721	1.3564
15 minute winter	2	1.001	3	41.5	1.044	0.981	0.3754
30 minute winter	3	1.002	5	12.7	1.620	2.234	0.0560
30 minute winter	3	Infiltration		0.2			
15 minute 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

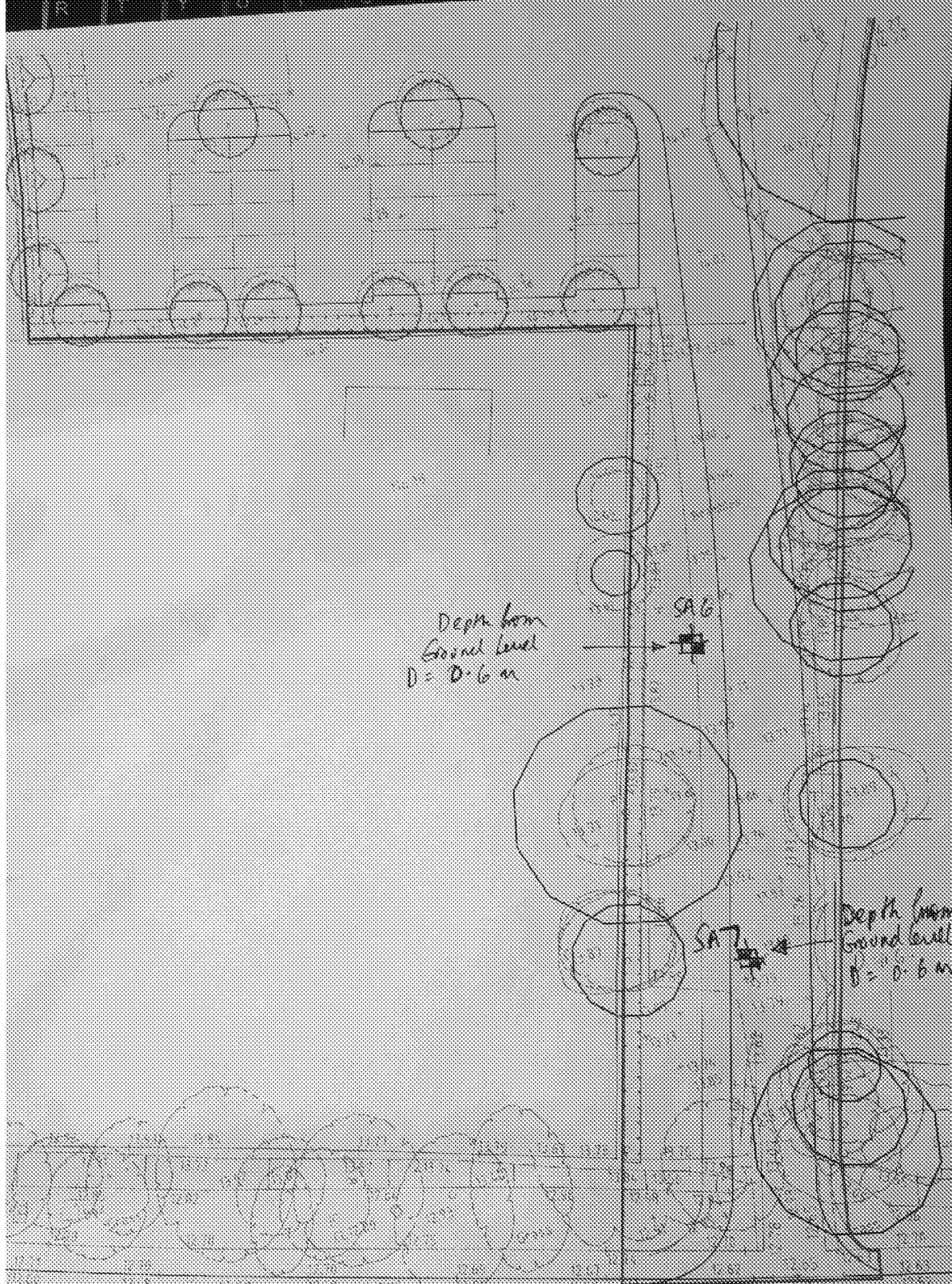
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
600 minute winter	24	Infiltration		0.3			

E Infiltration Test Results



SOAKAGE TEST LOCATIONS Sheet 1 of 2

08/03/2021



SOAKAGE TEST LOCATIONS SAT 2 of 2.

08/03/2021

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
q_{50}	1.883 m ²
V_{p75-25}	0.2107 m ³
t_{75-25}	224.8 min
water used	0.4214 m ³
f	8.295E-06 m/sec.

Field Data

Depth to Water	Elapsed Time	Head of Water	Head of Water
(m)	(min)	(% of H ₀)	(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

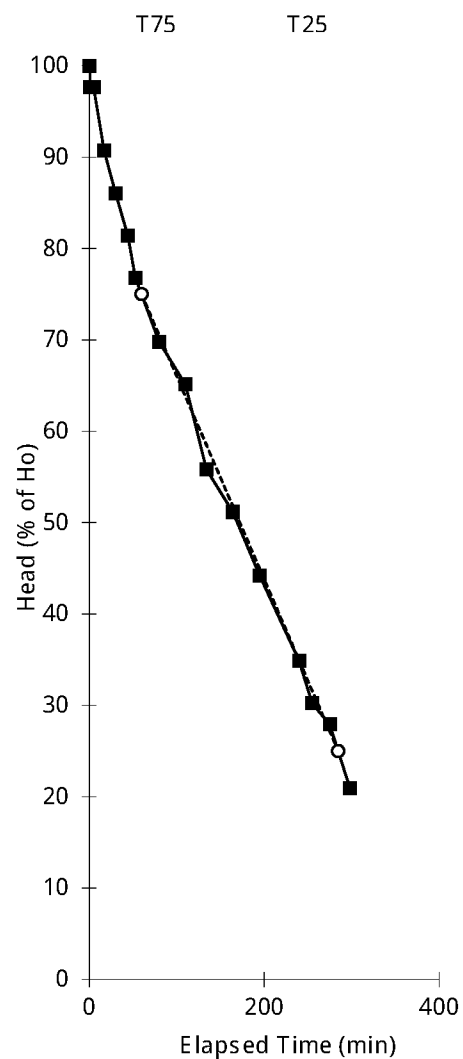
[illegible]

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



Soakaway Calculations

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

Field Test

Trial Pit Log (include details of groundwater):

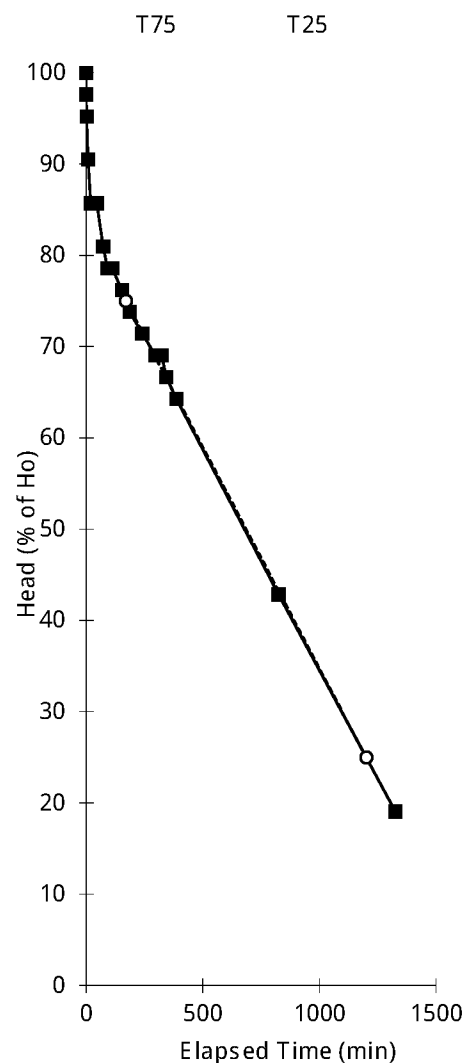
See trial Pit record

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
q_{50}	1.862 m ²
V_{p75-25}	0.2058 m ³
t_{75-25}	1030.4 min
water used	0.4116 m ³
f	1.788E-06 m/sec.

Field Data

Depth to Water	Elapsed Time	Head of Water	Head of Water
(m)	(min)	(% of H ₀)	(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

Soakaway Calculations

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

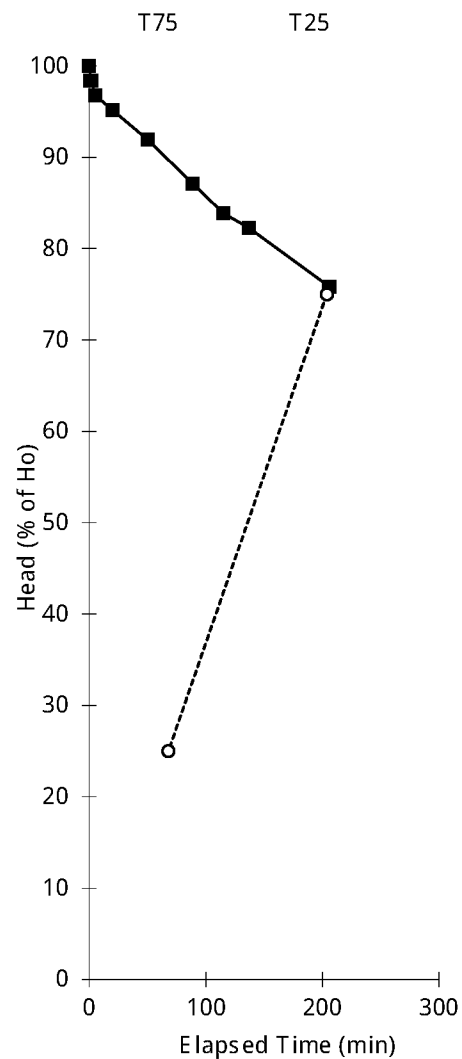
Field Test

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
ap_{50}	2.282 m ²
V_{p75-25}	0.3038 m ³
t_{75-25}	-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



T75	203.809	75
T25	67.936	25
T75-25	-135.872	Derived from Best Fit

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

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

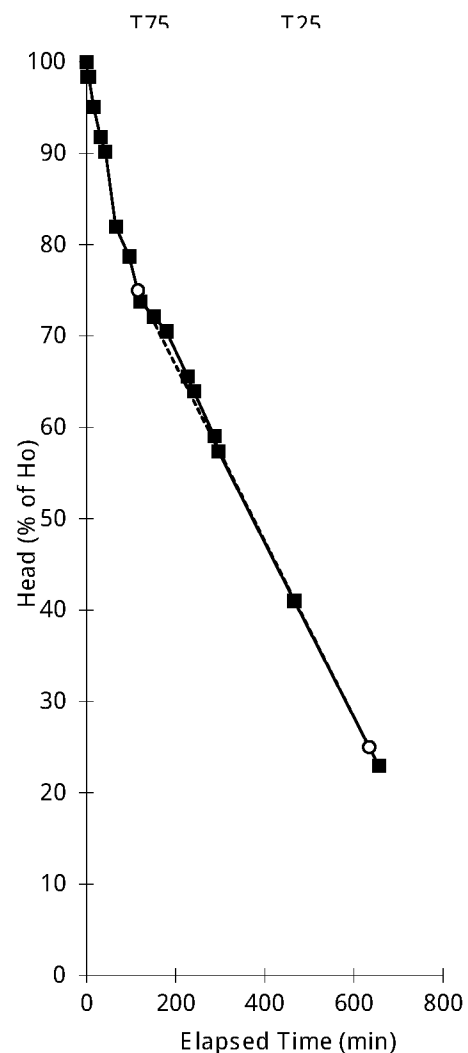
Depth of Pit	1.24 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.61 m
q_{50}	3.026 m ²
V_{p75-25}	0.4392 m ³
t_{75-25}	519.7 min
water used	0.8784 m ³
f	4.655E-06 m/sec.

Field Data

Depth to Water	Elonged Time	Head of Water	Head of Water
(m)	(min)	(% of H ₀)	(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

[illegible]

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

Soakaway Calculations

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

Field Test

Trial Pit Log (include details of groundwater):

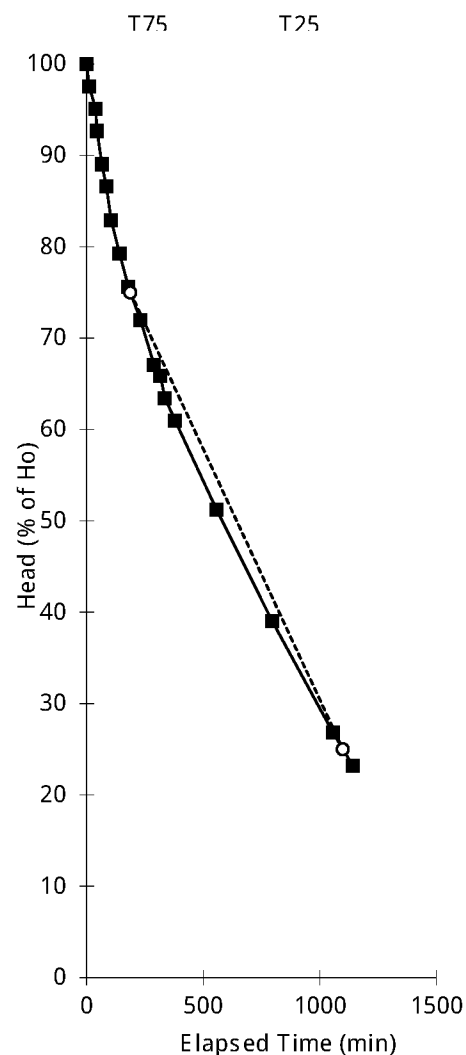
See trial Pit record

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
q_{50}	3.572 m ²
V_{p75-25}	0.5904 m ³
t_{75-25}	911.0 min
water used	1.1808 m ³
f	$3.024E-06$ m/sec.

Field Data

Depth to Water	Elapsed Time	Head of Water	Head of Water
(m)	(min)	(% of H ₀)	(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

Soakaway Calculations

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

Field Test

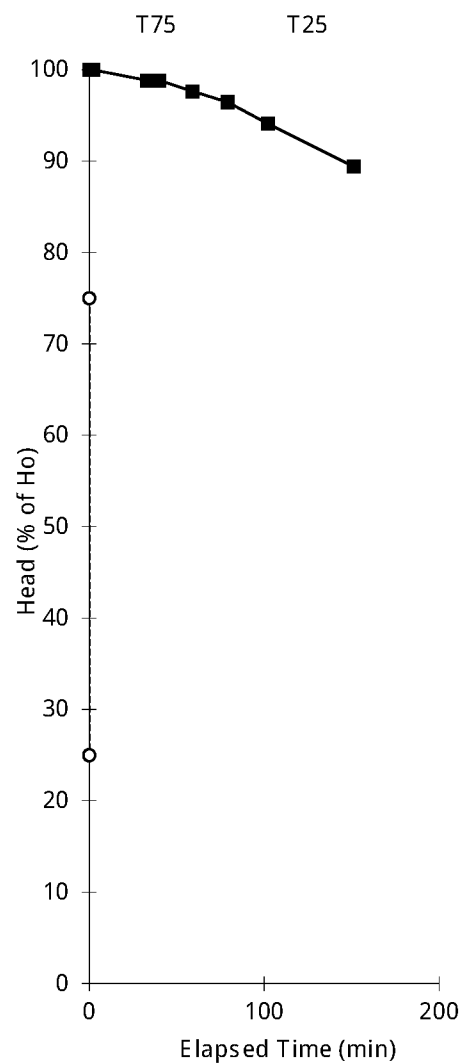
Trial Pit Log (include details of groundwater):

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 Water	Elapsed Time	Head of Water	Head of Water
(m)	(min)	(% of H ₀)	(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

Soakaway Calculations

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

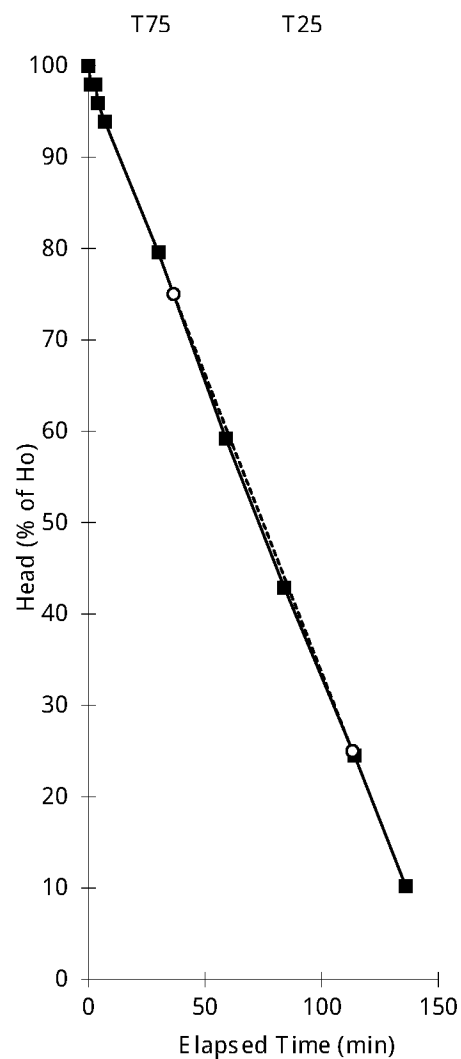
Field Test

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
ap_{50}	2.843 m ²
V_{p75-25}	0.3724 m ³
t_{75-25}	76.6 min
water used	0.7448 m ³
f	2.849E-05 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of H_0)	Head of Water (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

T
F

Soakaway Calculations

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

Field Test

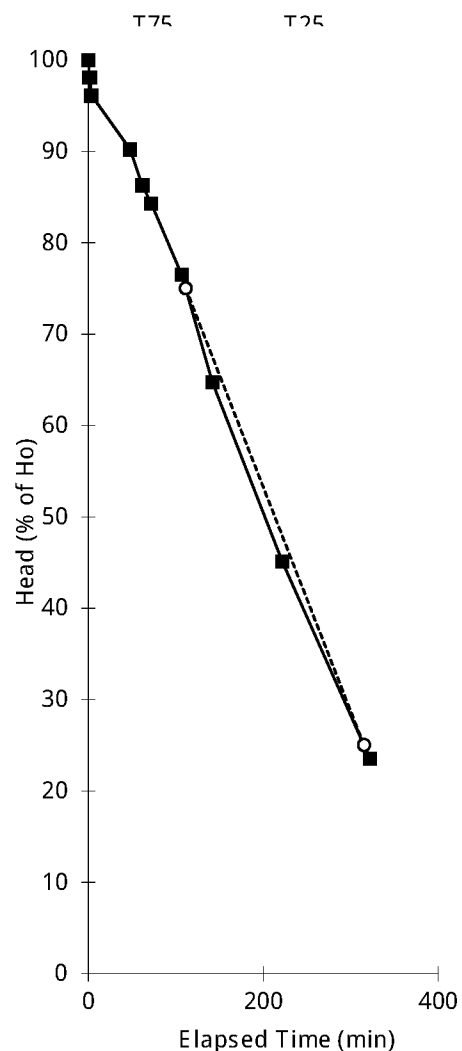
Trial Pit Log (include details of groundwater):

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
q_{p50}	2.897 m ²
V_{p75-25}	0.3876 m ³
t_{75-25}	203.8 min
water used	0.7752 m ³
f	1.094E-05 m/sec.

Field Data

Depth to Water	Elapsed Time	Head of Water	Head of Water
(m)	(min)	(% of H ₀)	(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

Soakaway Calculations

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

Field Test

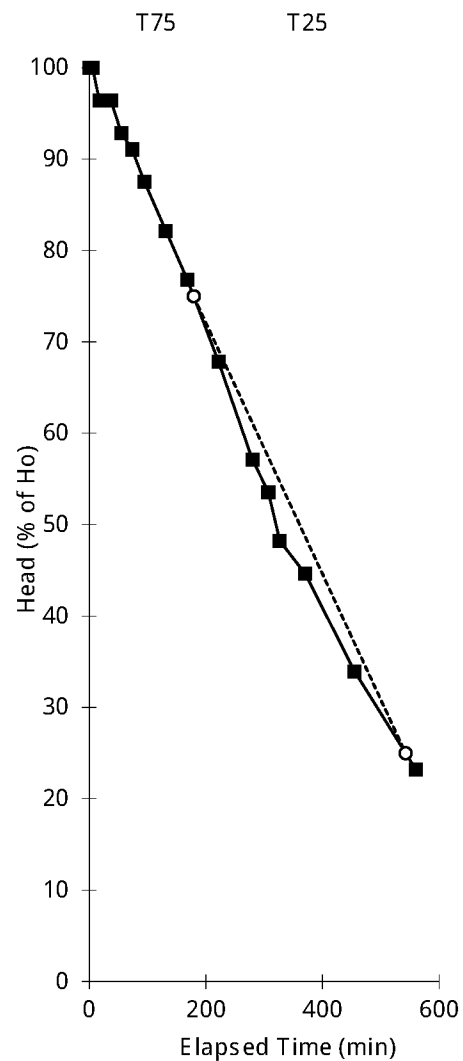
Trial Pit Log (include details of groundwater):
See trial Pit record

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
ap_{50}	3.032 m ²
V_{p75-25}	0.4256 m ³
t_{75-25}	363.6 min
water used	0.8512 m ³
f	6.435E-06 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of Ho)	Head of Water (m)
0.24	0	100	0.56
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

Soakaway Calculations

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

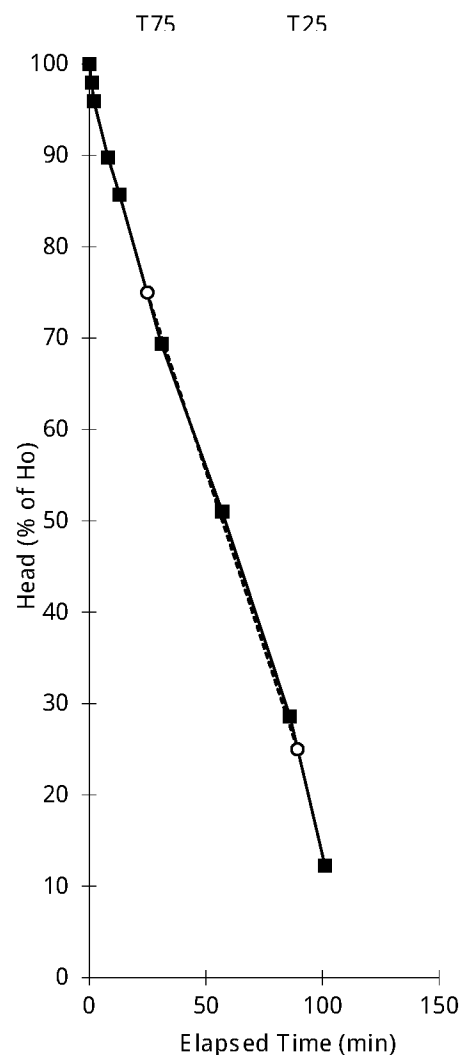
Field Test

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
ap_{50}	2.714 m ²
V_{p75-25}	0.3528 m ³
t_{75-25}	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 H_0)	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

Soakaway Calculations

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

Field Test

Trial Pit Log (include details of groundwater):

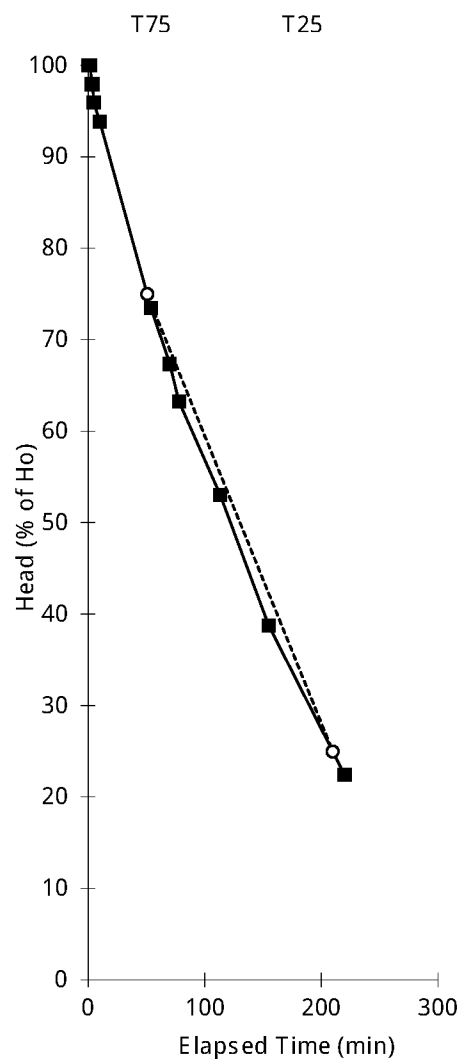
See trial Pit record

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
q_{50}	2.714 m ²
V_{p75-25}	0.3528 m ³
t_{75-25}	159.1 min
water used	0.7056 m ³
f	1.361E-05 m/sec.

Field Data

Depth to Water	Elonged Time	Head of Water	Head of 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

Soakaway Calculations

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

Field Test

Trial Pit Log (include details of groundwater):

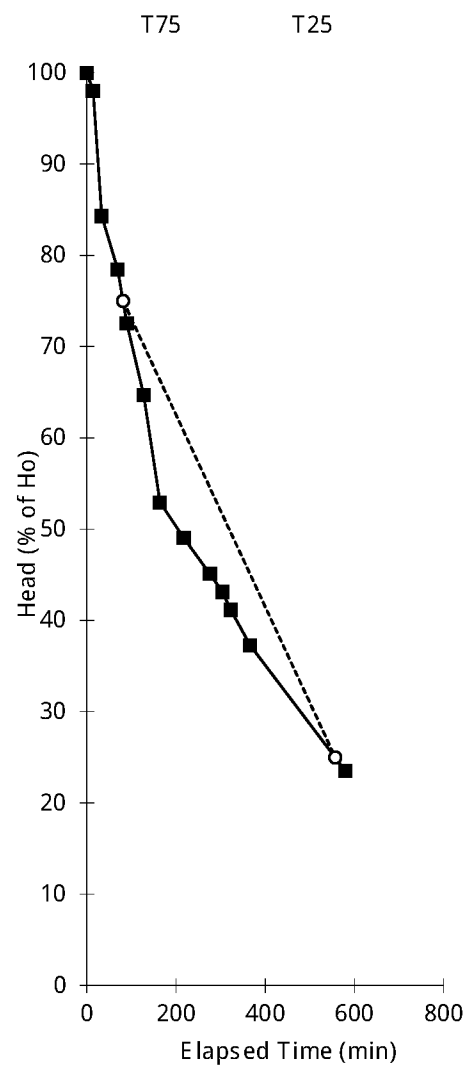
See trial Pit record

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
q_{50}	2.766 m ²
V_{p75-25}	0.3672 m ³
t_{75-25}	475.9 min
water used	0.7344 m ³
f	4.649E-06 m/sec.

Field Data

Depth to Water	Elegand Time	Head of Water	Head of 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

Soakaway Calculations

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

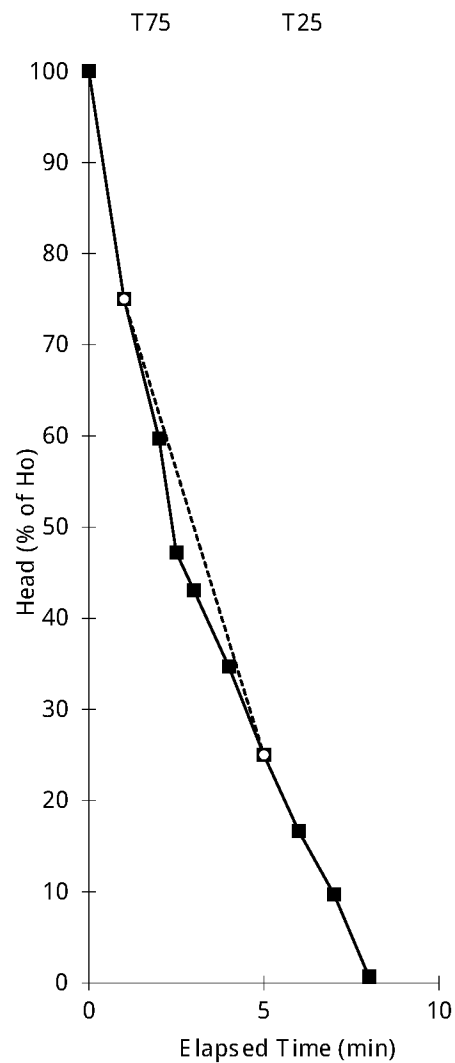
Field Test

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
ap_{50}	3.312 m ²
V_{p75-25}	0.5184 m ³
t_{75-25}	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

Soakaway Calculations

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

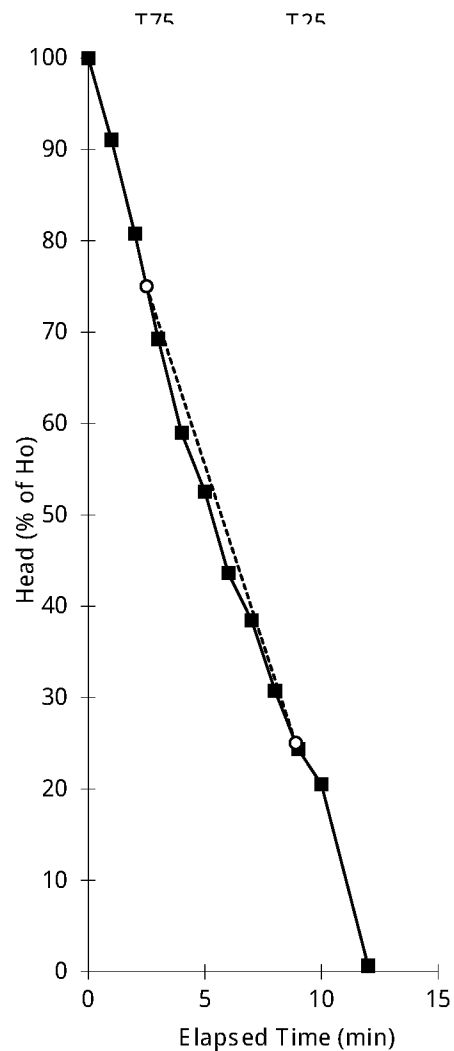
Field Test

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
ap_{50}	3.468 m ²
V_{p75-25}	0.5616 m ³
t_{75-25}	6.4 min
water used	1.1232 m ³
f	4.217E-04 m/sec.

Field Data

Depth to Water (m)	Elapsed Time (min)	Head of Water (% of H_0)	Head of Water (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

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

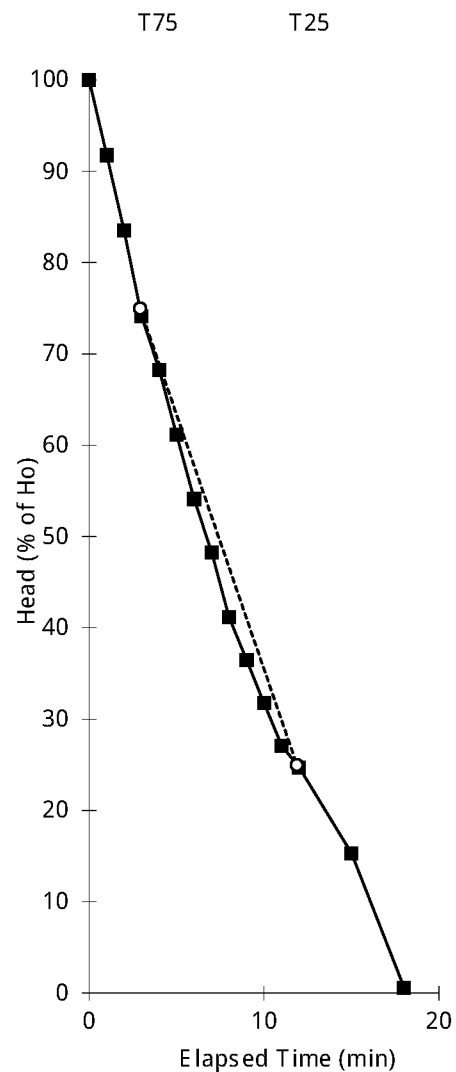
Depth of Pit	1.59 m
Width of Pit	0.80 m
Length of Pit	1.80 m
Depth of Pit Soaked	0.85 m
ap_{60}	3.65 m ²
Vp_{75-25}	0.612 m ³
t_{75-25}	9.0 min
water used	1.2240 m ³
f	$3.116E-04$ m/sec.

Field Data

Depth to Water	Elapsed Time	Head of Water	Head of Water
(m)	(min)	(% of H ₀)	(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

Soakaway Calculations

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

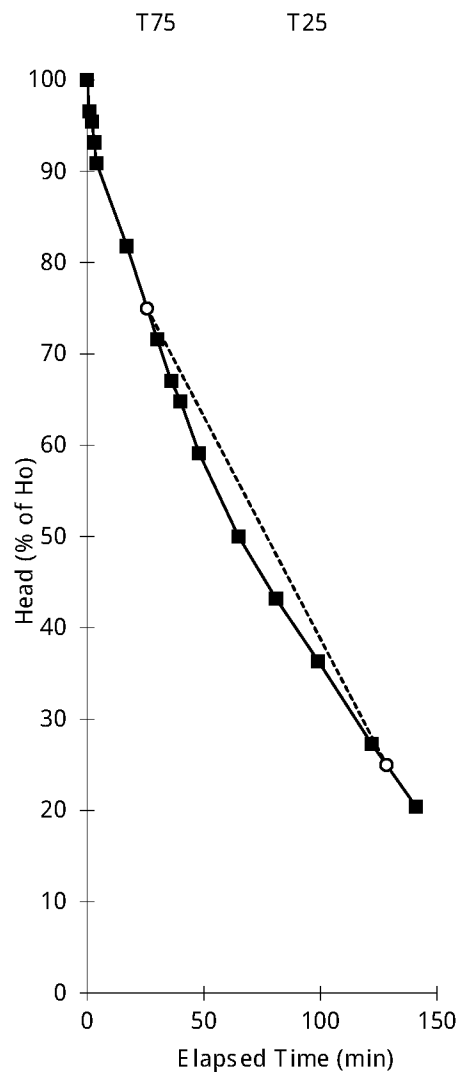
Field Test

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
ap_{50}	3.392 m ²
V_{p75-25}	0.5632 m ³
t_{75-25}	102.7 min
water used	1.1264 m ³
f	2.695E-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	0.88
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

Soakaway Calculations

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

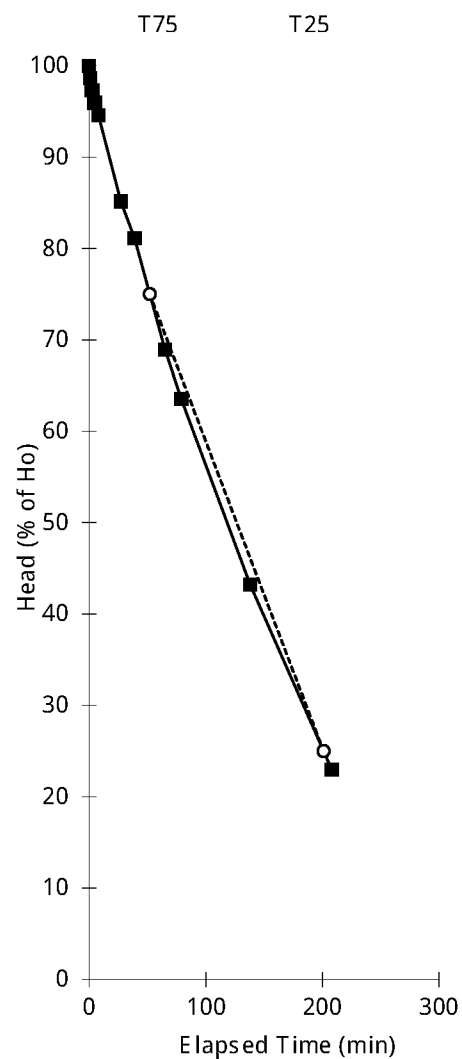
Field Test

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
ap_{50}	3.056 m ²
V_{p75-25}	0.4736 m ³
t_{75-25}	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

Soakaway Calculations

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

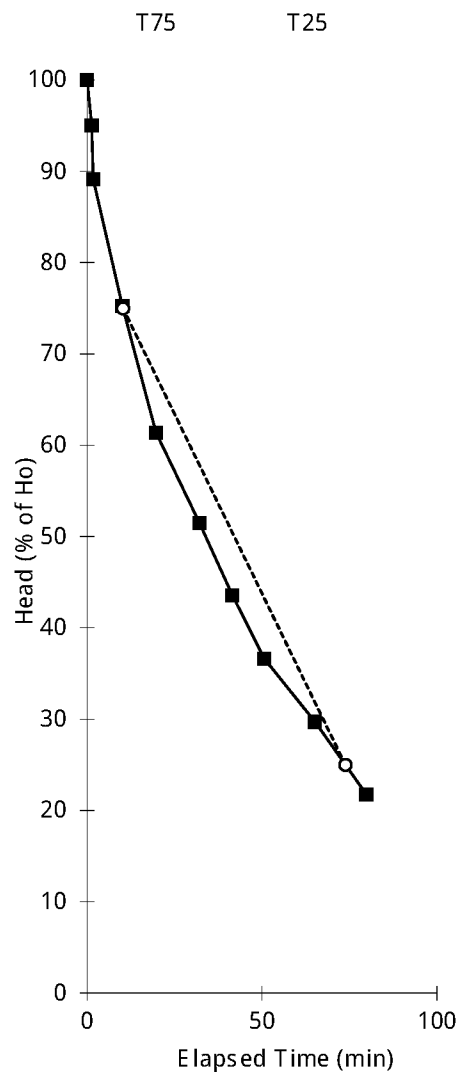
Field Test

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
ap_{50}	4.0415 m ²
V_{p75-25}	0.689325 m ³
t_{75-25}	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



T75	10.255	75
T25	73.812	25
T75-25	63.557	Derived from Best Fit

Comments

SOILS LIMITED

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

Soakaway Calculations

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

Field Test

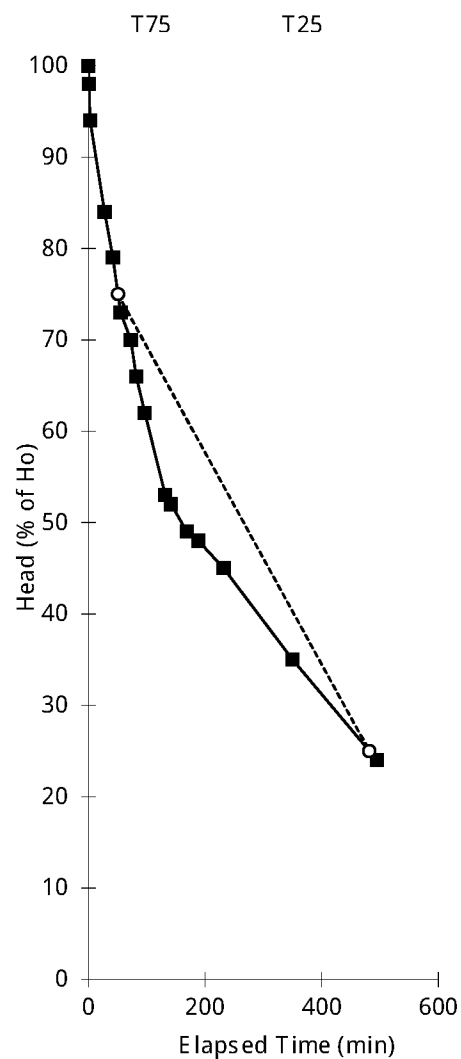
Trial Pit Log (include details of groundwater):

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
q_{50}	4.015 m ²
V_{p75-25}	0.6825 m ³
t_{75-25}	431.2 min
water used	1.3650 m ³
f	6.570E-06 m/sec.

Field Data

<u>Depth to</u>	<u>Elapsed</u>	<u>Head of</u>	<u>Head of</u>
<u>Water</u>	<u>Time</u>	<u>Water</u>	<u>Water</u>
(m)	(min)	(% of H ₀)	(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

Soakaway Calculations

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

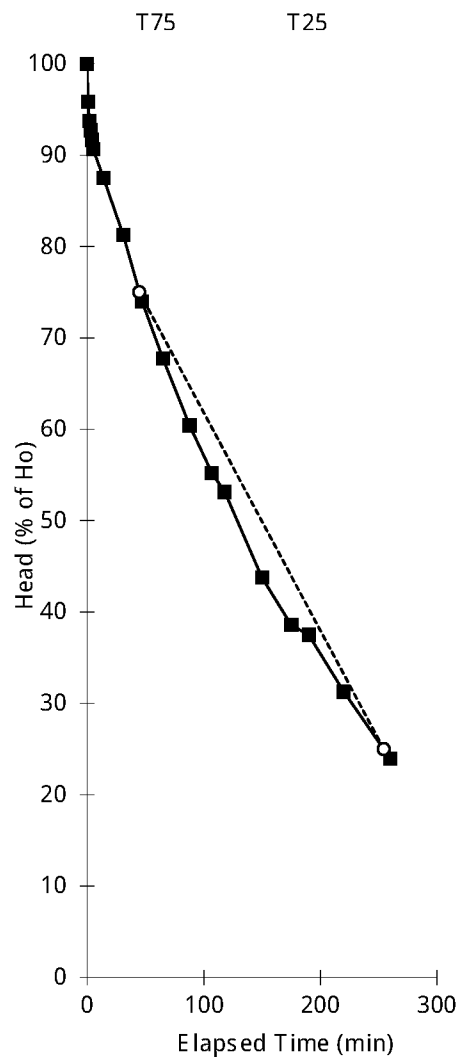
Field Test

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
ap_{50}	3.909 m ²
V_{p75-25}	0.6552 m ³
t_{75-25}	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

Soakaway Calculations

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

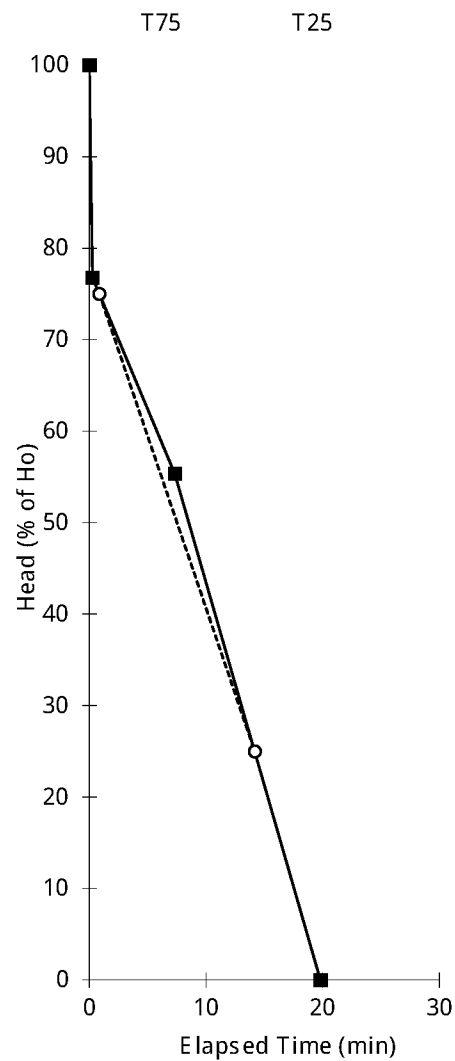
Field Test

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
ap_{50}	4.606 m ²
V_{p75-25}	0.8232 m ³
t_{75-25}	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

Soakaway Calculations

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

Field Test

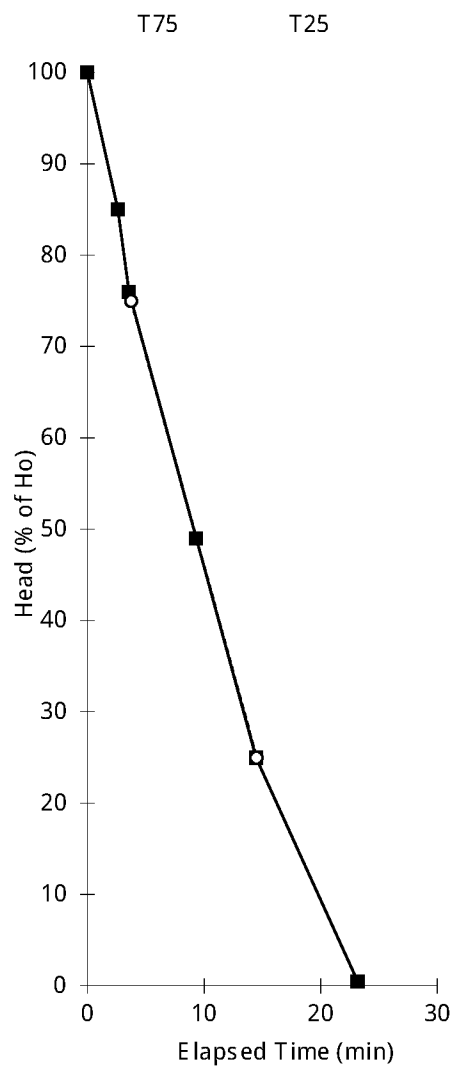
Trial Pit Log (include details of groundwater):

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 m2
Vp75-25	0.735 m3
t75-25	10.7 min
water used	1.4700 m3
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

Soakaway Calculations

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

Field Test

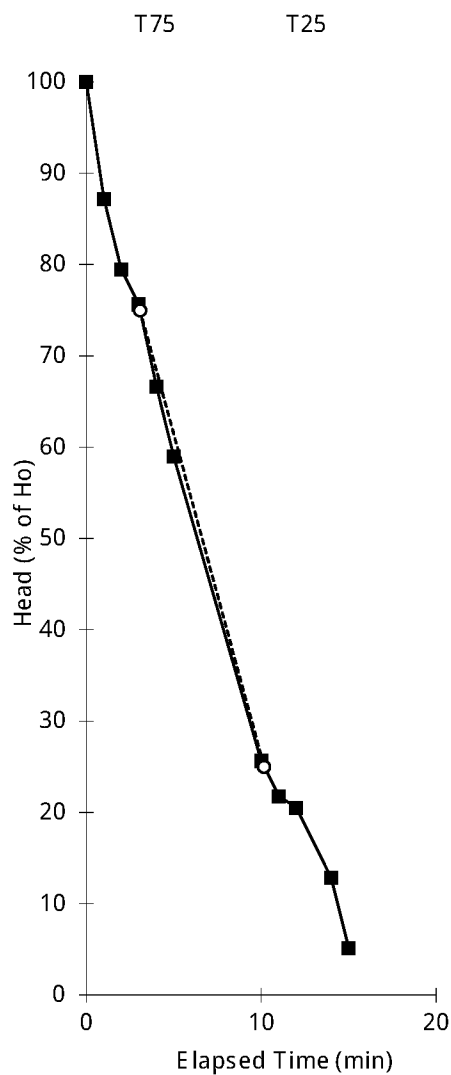
Trial Pit Log (include details of groundwater):

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