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DRAINAGE STRATEGY REPORT

PREMIER INN – CATHEDRAL BUSINESS PARK
BOGNOR ROAD
CHICHESTER
PO20 1EJ

PREPARED FOR: Whitbread PLC
JOB NO: P19-370
DATE: 22nd March 2024
ISSUE NO: 2

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Issue No.	Description	Date
1	Issued to accompany planning application.	12.03.2024
2	Site plan updated.	22.03.2024

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1. INTRODUCTION

1.1 This report has been prepared on behalf of Whitbread PLC to accompany a planning application for the development of a new Premier Inn on a vacant plot within Cathedral Business Park.

1.2 This report intends to outline the strategy for the drainage and disposal of surface water runoff throughout the development, following guidance set out in relevant documentation including the Flood and Water Management Act 2010 (FWMA) and consequently, acting as the Lead Local Flood Authority (LLFA), West Sussex County Council's Local Flood Risk Management Strategy.

2. SITE LOCATION AND CHARACTERISTICS

Site Location

2.1 The development site is located in Cathedral Business Park, Bognor Road, Chichester, PO20 1EJ, as shown in *Figure 1*.

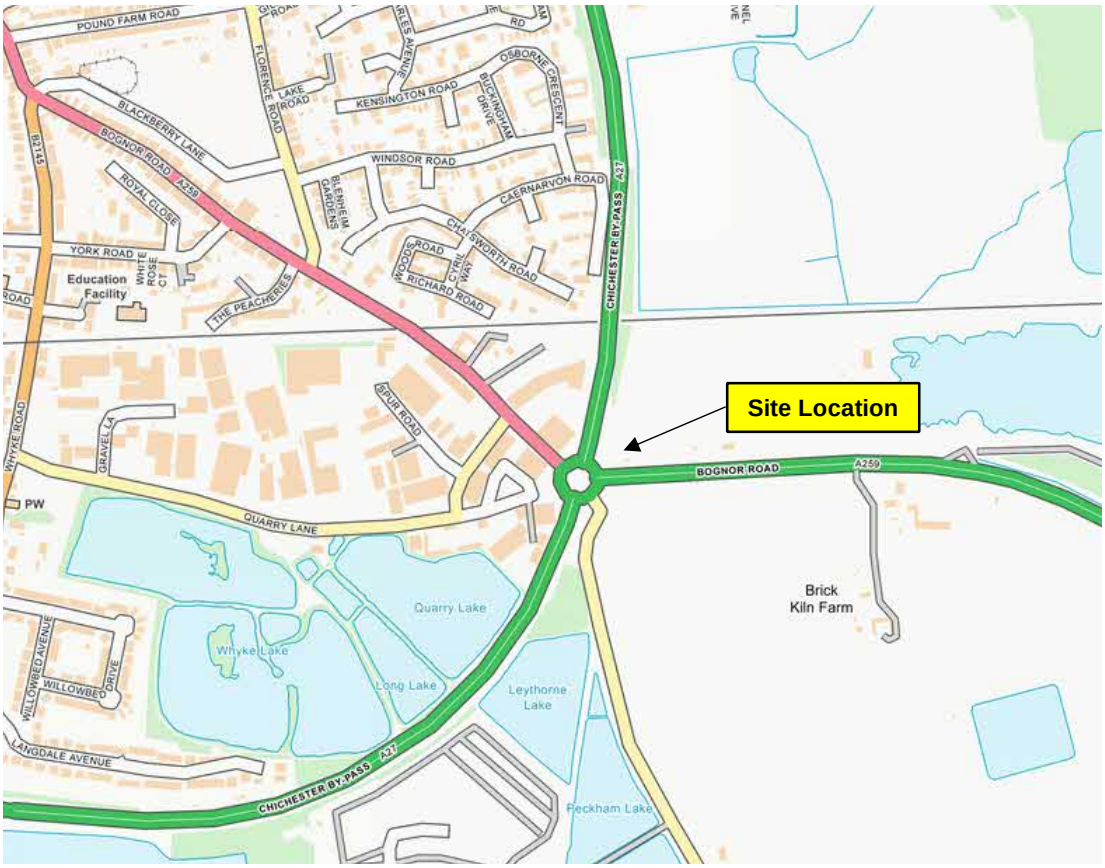


Figure 1: Site Location

2.2 The site is centred on Ordnance Survey grid SU 87860 04200 and co-ordinates X: 487860; Y: 104200.

Site Description

2.3 The site's measured area is approximately 0.466ha and comprises an empty plot on the Cathedral Business Park. The site is adjacent to an existing unit occupied by 'MKM Building Supplies'. The site is bounded by Bognor Road to the south and the Chichester Bypass to the west. Vehicular access to the premises is via a shared access road off Bognor Road (A259) to the south of the site, providing access to the Cathedral Business Park.

Topography

2.4 A topographical survey is included in *Appendix A*, which shows the site to be relatively flat with a slight fall to the south and east boundaries. Within the site boundary, the levels range from circa 11.80mAOD in the south east corner up to circa 13.00mAOD in the north west corner. There is an existing bund that straddles the western boundary between the site and the Chichester Bypass.

Existing Ground Conditions

2.5 Two geotechnical investigations have been undertaken on the site. Infiltration testing and window samples, together with groundwater monitoring, were undertaken by Card Geotechnics Ltd (CGL) between October 2019 and March 2020. Further investigation works were undertaken in July and August 2023 by Risk Management Ltd (RML). Copies of the relevant sections of each report are included in *Appendix B.*

2.6 The CGL report recorded ground conditions on the site to comprise 0.3 to 0.4m of topsoil over 0.6 to 0.8m of gravelly silty or silty gravel, and silty gravel down from depths of 0.9 to 1.1m bgl. Between the completion of the CGL report and RML investigation the site has been reprofiled. The RML report recorded ground conditions to comprise made ground to between 0.8m and 1.1m depth overlying gravel with occasional slightly clayey silt and sand.

2.7 Winter groundwater monitoring, in the relevant 'Phase 1' area of the development, was undertaken as a part of the investigation completed by CGL between October 2019 to March 2020. Groundwater levels were recorded at approximately two-week intervals across a range of locations within the site. Over the period of testing, it was noted that significant storms and greater than average monthly rainfall occurred in comparison to the previous 10 years. Groundwater levels were recorded at levels of up to 10.52mAOD within the development area.10.41mOD. Copies of the groundwater monitoring results are included in *Appendix B.*

2.8 Soakage testing in accordance with BRE 365 was undertaken across the site during both investigations. Due to the presence of groundwater up to a level of 10.52mAOD within the site boundary, soakage testing undertaken by CGL at approximately 11.20mAOD is considered to provide the most accurate representation of the infiltration characteristics of the existing ground. The soakage testing was undertaken within the underlying gravel strata. The worst case infiltration rate recorded during the on site testing within the development area was 0.2988m/hr in SA-404 so this will be used for design. Copies of the soakage test results are included in *Appendix B.*

Existing Drainage Characteristics

2.10 An 'underground utility survey' conducted by Premier Surveys (Ref. 8906, July 2023) identifies there to be separate foul and surface water drainage networks in the vicinity of the site. The existing access road is drained via a series of trapped road gullies to ring soakaways beneath the road construction. There is also a trio of soakaway chambers to the south west of the site boundary which are understood to serve gullies along Bognor Road.

2.11 No formal surface water drainage infrastructure was identified within the site boundary, and it is therefore assumed that any rainfall will infiltrate through the surface into the underlying soils. Should any overland flows be generated, water is expected to flow into Bognor Road to the south.

2.12 The wider development is served by a traditional network of foul water drainage running within the access road to the north of the site. This network will eventually discharge to the Southern Water foul sewer to the west of the Chichester Bypass via a new pumping station to be provided as part of the wider development. A copy of the Southern Water sewer record plan is included in *Appendix C*. Currently the foul water drainage along the access road is diverted through the north east corner of the site to a temporary treatment plant on unoccupied land to the east.

2.13 A 150mm diameter foul water spur and manhole (MH04) have been provided within the boundary of the site to dispose of foul water flows generated by the development. The spur connects into the foul water network installed in the site's access road. The location of the existing foul water spur is shown on the topographical survey in *Appendix A.*

3. PROPOSED SCHEME

3.1 The proposed development comprises of a new 82 bedroom hotel and 164 cover restaurant, together with associated customer parking, delivery area, and external customer amenities.

3.2 The proposed site layout is included in *Appendix D*.

4. SURFACE WATER MANAGEMENT & DRAINAGE STRATEGY

4.1 This section of the report outlines an approach for the disposal and management of surface water runoff from the development, with it expected that any further details of the strategy could be provided via a condition of the planning permission once detailed design information and construction drawings are available for the development.

Surface Water Drainage Policy & Guidance

4.2 At a national level, the Flood and Water Management Act 2010 (FWMA) was introduced with the specific aim of reducing the risk of flooding in England and Wales and improving water management. The Act states that Lead Local Flood Authorities (LLFAs), must act within the Environment Agency's (EA's) national strategy and co-operate with neighbouring authorities to address flood risk in their area and contribute towards the achievement of sustainable development.

4.3 The FWMA states that Sustainable Drainage Systems (SuDS) should manage rainwater with the following aims:

- reducing damage from flooding,
- improving water quality,
- protecting and improving the environment,
- protecting health and safety, and
- ensuring the stability and durability of drainage systems

4.4 This has been incorporated into the NPPF and associated PPG, which recommends SuDS are designed to control surface water runoff close to where it falls and mimic natural drainage as closely as possible to provide opportunities to:

- reduce the causes and impacts of flooding;
- remove pollutants from urban run-off at source;
- combine water management with green space with benefits for amenity, recreation, and wildlife.

4.5 SuDS encompass a wide range of drainage techniques intended to minimise the rate of discharge, volume, and environmental impact of runoff and include; blue / green roofs; rainwater harvesting; soakaways / infiltration systems / infiltration trenches / permeable paving; swales / basins / ponds / wetlands / below ground attenuation tanks.

4.6 The PPG goes on to advise that the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

4.7 The March 2015 DEFRA report "*Sustainable Drainage Systems: Non-statutory technical standards for sustainable drainage systems*" sets out the generic requirements for design of SuDS. It provides requirements for: flood risk outside the development; peak flow control; volume control; flood risk within the development; structural integrity; designing for maintenance considerations; and construction.

4.8 At a local level, Chichester District Councils Local Plan Policy NE15 on Flood Risk and Water Management requires all development proposals to demonstrate:

- New site drainage systems are designed to cope with events that exceed the normal design standard, such as by considering flood flow routing and using temporary storage areas.
- There is no increase in either the volume or rate of surface water run-off leaving the site. Where development is on a brownfield site, run off rates should be reduced to match those of greenfield sites wherever possible.

4.9 Furthermore, the Chichester DC Local Plan states that Sustainable Drainage Systems should be designed into the landscape of all major development in order to reduce surface water flow, to provide flood mitigation and improve water quality. Clear and funded management arrangements must be in place for the lifetime of the development. The use of SuDS on smaller sites is encouraged.

Methods of Discharge

4.10 In accordance with the hierarchy of drainage disposal options, *Table 1* below provides an assessment of each method's suitability.

Table 1: Surface Water Runoff Discharge Method

System	Assessment
Discharge to ground by infiltration	In *Section 2* it was reported that the ground investigation identified that shallow soakaway drainage is likely to be viable at the site. BRE 365 soakage tests were undertaken which identified a worst-case infiltration rate of 0.2988m/hr within the site area. Therefore, discharging surface water to ground by infiltration is assessed to be the most appropriate method of managing surface water.
Discharge rainwater direct to a watercourse	There are a series of Lakes to the east and south west of the site with an ordinary watercourse running alongside the railway to the north of the site. However, as it has been identified to be appropriate to discharge surface water runoff via infiltration it is not necessary to give any further consideration to the discharge of surface water runoff to a watercourse.
Discharge rainwater to a surface water sewer / drain	As it has been identified to be appropriate to discharge surface water runoff via infiltration it is not necessary to give any further consideration to the discharge of surface water runoff to a surface water sewer / drain.
Discharge rainwater to the combined sewer	As it has been identified to be appropriate to discharge surface water runoff via infiltration it is not necessary to give any further consideration to the discharge of surface water runoff to a combined sewer.

4.11 Based on the assessment in *Table 1*, the discharge of surface water to ground by infiltration is considered to be the most appropriate method for the disposal of surface water runoff from the development.

Sustainable Drainage Systems (SuDS)

4.12 SuDS should be used across the development to control surface water flows to the required levels and to address other aims of surface water management, which are water quantity (flooding), water quality (pollution), biodiversity (wildlife and plants) and amenity. The SuDS approach uses natural hydrology as the baseline against which system performance is evaluated. *Table 2* below, lists a range of SuDS techniques that can be used to minimise the rate of discharge, volume and provides an assessment of each method's suitability.

Table 2: SuDS Assessment

System	Assessment
Rainwater Harvesting	Rainwater harvesting is the collection of rainwater runoff for practical reuse. Runoff can be collected from roofs and then used in place of mains water for certain applications. In this instance, it is unlikely that rainwater harvesting would contribute to a significant reduction in surface water runoff volumes as the development would have limited requirement for recycled rainwater. Therefore, rainwater harvesting has not been considered as part of the surface water drainage strategy.
Infiltration Systems	There are many different types of drainage components that can be used to facilitate infiltration. These include soakaways, infiltration trenches, infiltration blankets and infiltration basins. Bioretention systems and pervious pavements can also be designed to allow infiltration from their bases. In *Section 2* it was established that shallow soakage would be feasible. Therefore, surface water runoff from the development will be discharged to ground via the porous sub-base beneath hardstanding areas.
Blue / Green Roofs	Green roofs are areas of living vegetation, installed on the top of buildings, for a range of reasons including visual benefit, ecological value, enhanced building performance and the reduction of surface water runoff. They can be adapted to incorporate blue roof systems beneath, which comprise of a cellular system used to provide further attenuation and storage of surface water. The hotel is proposed to have an area occupied by a biodiverse roof system, providing additional surface water runoff storage and treatment. Larger systems and blue roofs are not deemed necessary for the development given the suitability of infiltration via permeable paving.
Filter Strips/ Filter Drains	Filter strips are uniformly graded and gently sloping strips of grass or other dense vegetation that are designed to treat runoff from adjacent impermeable areas by promoting sedimentation, filtration, and infiltration. Generally, these systems are located alongside roads and parking areas, and are incorporated into landscaping and public open spaces often used as either a pre-treatment facility before swales, bioretention systems and trenches. Filter strips and drains are not likely to be effective due to the lack of soft landscaping areas within the site boundary.
Permeable Pavements	Permeable pavements provide a pavement suitable for pedestrian and / or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying structural layers. The water is temporarily stored beneath the overlying surface before it soaks into the ground or is collected by a filter drain where ground conditions do not permit infiltration, additional crate systems can be incorporated to increase the temporary storage volume if required. The proposed car park can incorporate a permeable block paved car park with a porous sub-

	base to discharge surface water runoff to the ground via infiltration
Swales	Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat, and store runoff. They are generally suited for managing runoff from roads because they are a linear feature and easily incorporated into the roadside space. They are also suitable for managing runoff from car parks and other impermeable and permeable areas. Swales are normally incorporated into landscape and public open spaces, as they tend to demand significant land-take due to their shallow side slopes. The limited green space and high groundwater levels make the incorporation of swales difficult. The area of soft landscaping along the southern boundary of the site will not be suitable as it is within 5m of the highway where soakage is not permitted.
Basins / Ponds	Basins are large, landscaped depressions that are normally dry except during and immediately following storm events, while ponds are features with a permanent pool of water that provide both attenuation and treatment of surface water runoff. The systems are generally strategically located in areas of open space and are designed to temporarily store runoff associated with extreme rainfall events while it is released at controlled rates. To keep soakaway features shallow it is intended to discharge surface water runoff as close to the source as possible. With porous / permeable surfaces provided to hardstanding areas it is assessed that basins / ponds will not be required.
Attenuation Tanks	Attenuation tanks comprise below ground storage systems that temporarily store runoff associated with extreme rainfall events while it is released at controlled rates. They are normally incorporated beneath areas of hard landscaping. Attenuation tanks could be used to supplement storage volumes on this site.
Proprietary Treatment Systems	Proprietary treatment systems are manufactured products that remove specified pollutants from surface water runoff. It would normally only be appropriate to consider their use where site constraints preclude the use of other methods or where they offer specific benefits in facilitating the delivery of SuDS design criteria for a site. Proprietary treatment channels could feasibly be incorporated into the drainage of concrete hardstanding areas prior to discharging runoff to ground via the porous sub-base. However, permeable paving provides sufficient runoff treatment for expected volumes of this size.

4.13 Based on the assessment in *Table 2*, the suitability of the various SuDS systems for the development is summarised in *Table 3* below.

Table 3: SuDS Suitability

SuDS Element	Suitability
Rainwater Harvesting	×
Infiltration Systems	
Blue / Green Roofs	
Filter Strips	×
Filter Drains	×
Bioretention Systems	×
Permeable Pavements	
Swales	×
Basins / Ponds	×
Attenuation Tanks	
Proprietary Treatment Systems	×

4.14 Based on the assessment in the above tables, a surface water drainage scheme has been developed for the site and is shown on the proposed drainage strategy layout included in *Appendix E*. A description of the proposals is provided below.

- The proposed hotel roof area, customer parking, and external hardstanding areas are shown to discharge surface water runoff to ground at a rate of 0.2988m/hr via a layer of porous sub-base beneath the proposed permeable paved car park.

- The site has been subdivided into 6 no. catchments as shown on the drained areas plan in *Appendix F*. Within each catchment is a SuDS feature comprising either permeable paving or a combination of permeable paving and below ground attenuation tanks to supplement the storage volumes.

- The underside of each SuDS feature will be founded in the gravel strata at circa 0.8m bgl to ensure consistent infiltration rates. Where this results in the underside of the soakaway being within 1m of groundwater levels, attenuation volumes will only be calculated to a minimum of 1m above the groundwater level to ensure a suitable buffer is maintained should groundwater levels rise in the future.

- The porous sub-base depth has been designed to store and attenuate all excess flows up for rainfall events to and including the 1 in 100 year storm event, with an additional 45% allowance for climate change. This climate change allowance is in accordance with the 'Upper End' value for the 2070s epoch within the Arun and Western Streams Management Catchment.

- A typical section through the proposed car park illustrating the composition of the permeable paving and below ground attenuation is included on a SuDS details plan in *Appendix E*.

- The delivery yard will be drained to the foul water drainage system to minimise the higher pollution risk posed by commercial use.

Hydraulic Analysis

4.15 The Source Control facility in the MicroDrainage software package by Innovyze has been used to design the surface water drainage system, which would serve a total drained area of 0.381ha as illustrated on the drained areas layout in *Appendix F*.

4.16 The site is split into 6 no. catchments, determined by the most appropriate routes of draining surface water runoff to porous sub-base through permeable block paved car parking areas. The catchments are split into the following areas as referenced on the drainage strategy plan in *Appendix E.*

- Catchment 1 = 0.034ha
- Catchment 2 = 0.029ha
- Catchment 3 = 0.116ha
- Catchment 4 = 0.015ha
- Catchment 5 = 0.059ha
- Catchment 6 = 0.130ha

4.17 Based on an infiltration rate of 0.2988m/hr, the design results for each catchment for the 1 in 100 year return period with a 45% allowance for increase in peak rainfall intensity over the lifetime of the development are included in *Appendix F*. The design results confirm that the surface water drainage network would store and attenuate surface water flows with no surface water flooding identified.

Exceedance

4.18 If the capacity of the surface water drainage network was exceeded, site levels would allow surface water to be channelled away from the building in a south easterly direction. Further to this, the building's finished floor level would be raised above surrounding levels to minimise the risk from overland flows. The design of the site has ensured that flows resulting from rainfall in excess of a 1 in 100 year + 45% climate change allowance rainfall event are managed in exceedance routes that minimise the risks to people and property, and do not increase the flood risk off site. Exceedance flow routes are shown on the drainage strategy drawing in *Appendix E.*

Water Quality

4.19 The CIRIA C753 SUDS Manual 2015 sets out requirements for delivering appropriate levels of treatment to surface water runoff using SUDS. *Table 4* below identifies that the proposed SUDS components would have a total pollution mitigation index equal to or exceeding the recommended pollution hazard index thus confirming the SUDS components would provide suitable treatment to surface water runoff.

Table 4: Pollution Mitigation Assessment

Runoff Source	Pollution Hazard Index			SUDS Component	Mitigation Index		
	TSS	Metals	TPH		TSS	Metals	TPH
Commercial Roof	0.3	0.2	0.05	Porous sub-base	0.4	0.4	0.4
				Green roof	0.4	0.3	0.3
Infrequent Change Car Park	0.5	0.4	0.4	Permeable Pavement	0.7	0.6	0.7

Amenity / Biodiversity

4.20 A biodiverse roof system is included in the architect's design at a lower roof level which will be overlooked by occupants of the hotel, and it is considered that this would provide valuable amenity. The green roof can also provide high ecological value and help provide a valuable habitat and biodiversity. The strategy also shows that the remainder of the proposed surface water storage will be located beneath the car parking areas with no unnecessary loss of amenity space required to enable the development. The proposals also maximise the opportunity for biodiversity benefits to be implemented within the introduction of new areas of soft landscaping.

Maintenance

4.21 The maintenance of the surface water drainage system would fall under the responsibility of Whitbread PLC.

5. FOUL WATER DRAINAGE STRATEGY

5.1 This section of the report outlines an approach for the disposal and management of foul water waste from the development.

5.2 The proposed drainage layout plan included in *Appendix E* shows that foul water flows from the hotel will be discharged via a traditional network of below ground pipework to an existing foul water spur via a manhole in the proposed yard which is connected to the wider site's foul drainage network.

5.3 The spur pipe has a diameter of 150mm with a minimum capacity of 12.71 l/s. The peak foul water flow from the development can be calculated using a Dry Weather Flows (DWF) of 300 litres / room / day for the bedrooms and 150 litres / cover / day for the restaurant covers. Applying a peaking factor of 6 and an allowance of 10% for infiltration, the peak flow generated by the development can be calculated as follows:

Peak flow = 1.1 x 6 x Total DWF

DWF (Hotel) = 300 x No. of bedrooms
= 300 x 82
= 24,600 litres / day

DWF (Restaurant) = 150 x No. of covers
= 150 x 164
= 24,600 litres / day

Peak flow = 1.1 x 6 x (24,600 + 24,600)
= 324,720 litres / day
= 3.76 litres / second

Since 3.76 l/s < 12.71 l/s it is considered that the peak flows from the development will not exceed the capacity of the existing network.

5.4 On a similar basis to the surface water drainage system, Whitbread PLC would be responsible for the maintenance of the on-site foul water drainage system serving the proposed development.

5.5 The wastewater emanating from the hotel will ultimately discharge to the public sewer network in accordance with the approved Foul Drainage Technical Report, dated January 2021.

6. CONCLUSIONS

6.1 Soakaway testing carried out as part of the ground investigation established that the ground conditions at the site would permit use of infiltration drainage systems for the disposal of surface water runoff by infiltration.

6.2 The disposal of surface water to ground by infiltration is the preferred destination for surface water disposal recommended in National and Local drainage standards as well as The Building Regulations. On this basis, and in conjunction with the findings of the ground investigation, it is considered appropriate to discharge surface water runoff from the development to ground by means of infiltration drainage techniques.

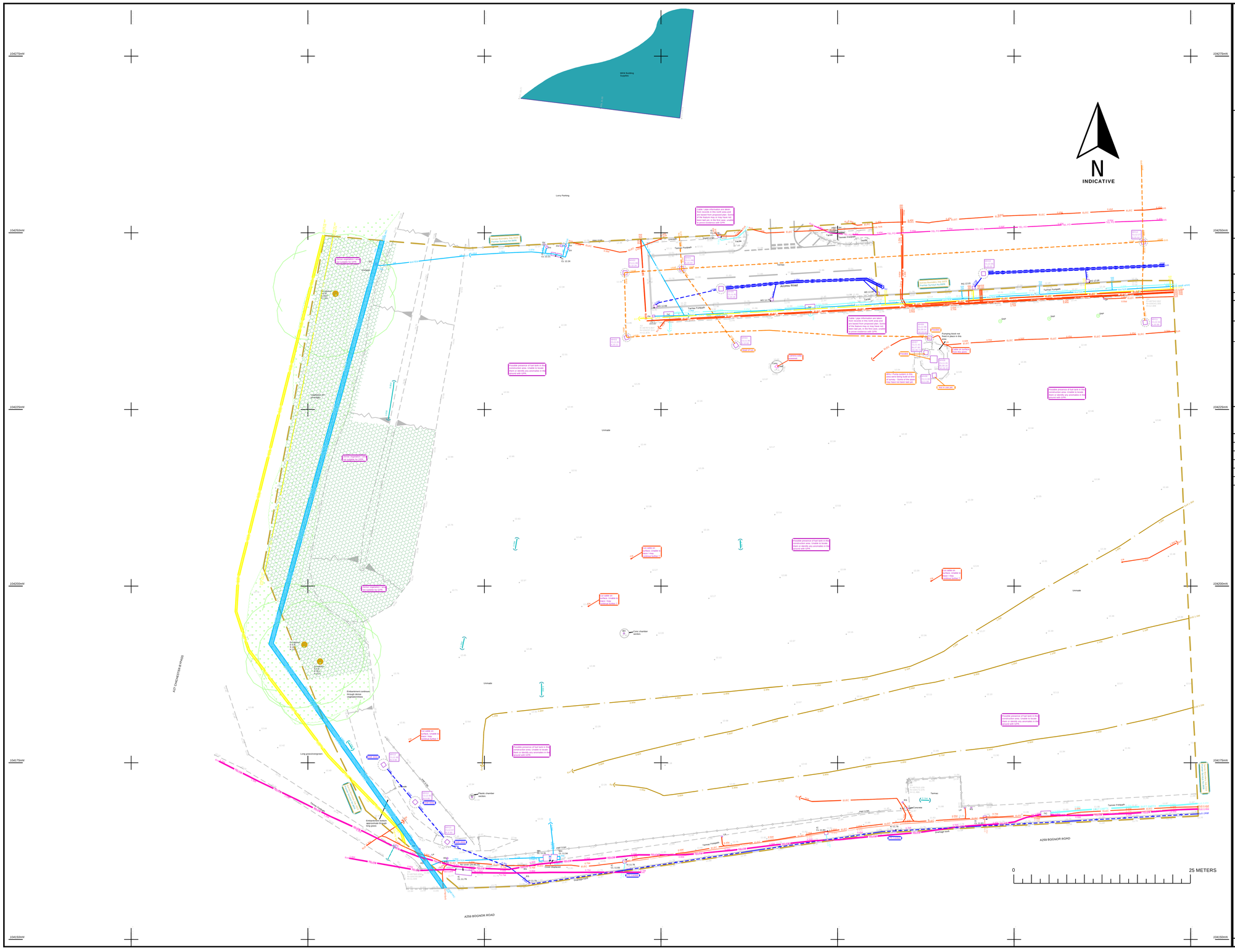
6.3 A surface water drainage strategy has been developed for the scheme, which proposes the use of a combination of infiltration components for the discharge of surface water runoff from the development to ground in the form of geocellular storage crate soakaways and porous surfacing systems.

6.4 Systems have been designed with sufficient capacity to store surface water for a 1 in 100 year event with 45% allowance for climate change, while water infiltrates into underlying soils at the soils natural infiltration rate

6.5 It has been established to be appropriate to discharge foul water runoff from the development by discharging it into an allocated spur of the newly constructed foul network which serves the wider development.

6.6 It is concluded that it would be possible to dispose of surface water runoff from the development by infiltration and foul water via an existing drainage spur. Therefore, the scheme can be considered acceptable in terms of drainage strategy.

APPENDIX A
TOPOGRAPHICAL SURVEY



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JOB TITLE
PROPOSED PREMIER INN
CATHEDRAL BUSINESS PARK
BOGNOR ROAD, MERSTON
CHICHESTER, PO20 1EN

DRAWING TITLE
UNDERGROUND UTILITY SURVEY

SURVEYOR:	DRAWN:	CHECKED:
VD	VD	DS

SCALE	SHEET No:
1/250	SHEET 1 OF 1

DATE	SHEET SIZE	DRAWING No:
JULY 23	A1	8906_UNDERGROUND_R0

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36 via Global Navigational Satellite System and the O.S. Active Network using OSTN15 transformation.
Vertical datum - levels are related to GPS Orthometric height, converted to MSL (Newlyn) by OSGM15 transformation parameters.
No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates.
A true OSGB36 coordinates can be calculated by scaling the survey by the centre point as follows:

Scale Factor: 0.99969615 Centre Point: 487891.857E, 104202.757N

Every effort is made to identify and survey all relevant, visible features. However, it should be borne in mind, some features may have been obscured by vegetation, debris, parked vehicles etc. As such, some items may have been omitted.

REVISIONS

No.	REVISION	DATE	BY

** Note **
A range of detection methods are used to obtain the underground information produced in this drawing. Variations in the ground conditions can affect the quality of the data and therefore an absolute affirmation cannot be guaranteed.

The identification of any located service should not be treated as infallible. The originating source may not have been traced.

The location and/or identification of a service will not necessarily indicate whether it is live or dead or identify whether it is a single or multiple service where one or more services may be situated above, below or in close proximity of the indicated line. Where possible, this will be annotated as 'multiple'.

All depths of metallic features are to centre of the service, depths on drainage runs are to the pipe invert at the manhole and should be treated as an approximate indication.

Underground drainage has been proven for position using traceable sonde methods, unless otherwise stated. No allowance has been made for sub surface entry into manholes or other chambers or voids below ground level, therefore any details relating to depths, sizes etc, are taken from above ground and as such will be approximate only.

Features not traceable by electromagnetic or sonde techniques, such as polyethylene watertigas pipes have been located using Ground Probing Radar (GPR). Successful GPR detection is based on a number of factors, clear access, ground/geophysical conditions and size/type of physical target. All GPR work, unless verified (QL-A) is interpretive. Trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

Premier Surveys use skilled professional surveyors and modern, calibrated location equipment. However, the completeness of any underground utility survey should not be 100% guaranteed. We cannot be held liable for inaccuracies beyond those that could be reasonably expected of a professionally skilled company. Any information taken from these drawings, pipe sizes/positions etc cannot be 100% guaranteed.

These results are not infallible and trial holes should be carried out to confirm service identification, position and particularly depths, where these are critical, in accordance with HSG47 - "Avoiding Danger from Underground Services".

This drawing must be read in conjunction with all available statutory undertakers record information. Record information is often incomplete and should be used for reference only and combined with detailed survey works/verification.

- Power Carrying Feature
- Water Main
- Sewer Foul Water
- Sewer Combined
- Sewer Rising Main
- Sewer Surface Water
- Sewer Surface Water GOD and above
- Sewer Foul and above GOD and above
- Sewer Grey Water
- Telecom
- Telecom (Fibre Optic Cable)
- Communications
- Closed Circuit Television
- Undistrifted EML
- Undistrifted GPR
- Heating Flow
- Road Traffic Sensor
- Traffic Signals
- Pipe (use unknown)
- Extents of Chamber
- Earthing Strap
- Survey Boundary
- End of Trench scar
- End of Trace
- Characteristic Change
- Depth to service (applicable to all types)
- Extent of survey (service continues)
- Assumed Route
- Taken from Records
- Manhole Test
- UG Trace
- Inaccessible areas, Walking Survey
- Inaccessible areas due to vegetation

WHILST PREMIER SURVEYS APPROACH ALL PROJECTS WITH THE INTENTION OF PROVIDING FULL UNDERGROUND UTILITY MAPPING INFORMATION, 100% DETECTION IS NOT ACHIEVABLE AND CANNOT BE GUARANTEED. ITEMS MAY BE OMITTED DESPITE THE BEST ENDEAVOURS OF THE SURVEYORS.

UNDERGROUND ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFO
BT	BRITISH TELECOM	OH	OVERHEAD
CL	COVER LEVEL	OHL	OVERHEAD
CB	CABLE RISER	PR	PIPE RISER
DW	DRINKING WATER (SEWER)	PL	PLASTIC
DI	DUCTILE IRON	ST	STEEL
FW	FOUL WATER (SEWER)	SW	STORM WATER (SEWER)
HP	HYDRANT	TC	TOP OF CHAMBER/CORGI
HV	HIGH VOLTAGE	UG	UNDERGROUND
IC	INSPECTION CHAMBER	UTL	UNABLE TO LIFT
LC	LAMP COLUMN	UTS	UNABLE TO SURVEY
LV	LOW VOLTAGE	UTT	UNABLE TO TRACE
MH	MANHOLE	SL	SILT LEVEL

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APPENDIX B

GEOTECHNICAL REPORTS, SOAKAGE TESTING
& GROUNDWATER MONITORING RESULTS

Providing Ground Solutions

Hanbury Properties (Chichester) Ltd

Cathedral Park, Chichester

Factual report on winter groundwater levels and infiltration testing

July, 2021

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www.cgl-uk.com

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Figure 1 Site location plan
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1. INTRODUCTION

1.1 General

Following discussions with Chichester District Council (CDC) in September 2019 on the preliminary drainage design for Phase 1 of Cathedral Park Business Park (Bognor Bridge Road), Chichester PO20 1EG, it was agreed that there would be a programme of groundwater monitoring of specifically installed standpipes through the winter months of November 2019 to February 2020. In addition, a series of BRE 365 infiltration tests would be undertaken within trial pits in the Phase 1 area at a level of 11.2mOD together with tests at deeper levels, circa 10.5mOD and falling head tests within the standpipe installations.

Following submission of the factual report specific to the Phase 1 area, Hanbury Properties instructed CGL to update the report to include groundwater monitoring data for the Phase 2 area of Cathedral Park Business Park

This report presents the factual information in connection with the testing and monitoring recently undertaken. A site location plan is provided in Figure 1.

2. WINTER GROUNDWATER LEVELS

2.1 Standpipe installations

A series of standpipes were installed across the site within windowless sampling boreholes, details of which are provided in Table 1 below. The monitoring response zones were such that groundwater levels at near surface relevant to a possible infiltration elevation of 11.2mOD could be achieved.

Table 1. Groundwater monitoring boreholes and corresponding ground levels

Phase 1 Area	
Borehole	GL (mOD)
WS305	12.9
WS307	11.83
WS308	12.15
WS309	11.8
BH201	11.8
BH2	11.95
Phase 2 Area	
Borehole	GL (mOD)
WS301	13.26
WS302	13.24
WS303	12.94
WS304	12.5
WS306	12.4
WS310	12.49
WS311	12.87
WS312	12.9
WS313	12.6
WS204	12.4
WS211	11.8
BH1	12

At the same time BH201 and BH2 from earlier stages of investigation were re activated.

The location of these monitoring points is shown on Figure 2. Borehole records are included in Appendix A.

2.2 Winter groundwater monitoring

It had been agreed that water level monitoring would occur at approximately 2 week intervals through the months of November and December, 2019 and January and February, 2020.

The tabulated readings in relation to Ordnance Datum are shown in Table 2 and Table 3 below.

Table 2.Winter groundwater monitoring records for Phase 1 Area

Borehole	GL (mOD)	23/10/2019 Level (mOD)	06/11/2019 Level (mOD)	20/11/2019 Level (mOD)	11/12/2019 Level (mOD)	23/12/2019 Level (mOD)	03/01/2020 Level (mOD)	16/01/2020 Level (mOD)	29/01/2020 Level (mOD)	12/02/2020 Level (mOD)	02/03/2020 Level (mOD)
WS305	12.9	9.63	9.64	9.67	9.65	10.2	10.13	10.14	10.07	10.02	10.23
WS307	11.83	9.77	9.54	9.56	9.77	10.46	10.31	10.32	10.23	10.12	10.31
WS308	12.15	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
WS309	11.8	9.74	9.72	9.82	9.75	10.52	10.39	10.38	10.23	10.19	10.39
BH201	11.8	9.49	8.98	9.61	9.55	10.29	10.15	10.14	10.07	9.98	10.17
BH2	11.95	9.69	9.7	9.7	9.63	10.41	10.25	10.21	10.16	10.08	10.25

Table 3. Winter groundwater monitoring records for Phase 2 Area

Borehole	GL (mOD)	23/10/19 Level (mOD)	6/11/19 Level (mOD)	20/11/19 Level (mOD)	11/12/19 Level (mOD)	23/12/19 Level (mOD)	03/01/20 Level (mOD)	16/01/20 Level (mOD)	29/01/20 Level (mOD)	12/02/20 Level (mOD)	02/03/20 Level (mOD)
WS301	13.26	9.86	9.79	9.79	9.79	10.46	10.35	10.37	10.27	10.16	10.38
WS302	13.24	9.73	9.73	9.73	9.70	10.27	10.19	10.21	10.12	10.01	10.21
WS303	12.94	9.62	9.6	9.6	12.47 FLOODED	10.2	10.09	10.14	9.96	10.01	10.23
WS304	12.5	9.24	9.18	9.65	9.22	9.76	9.67	9.84	9.6	9.67	9.9
WS306	12.4	9.79	9.77	9.79	9.76	10.49	10.36	10.38	10.3	10.15	10.37
WS310	12.49	9.77	9.79	9.85	9.78	10.65	10.49	10.46	10.34	10.29	10.5
WS311	12.87	9.84	9.84	9.85	9.83	10.59	10.42	10.43	10.35	10.28	10.49
WS312	12.9	9.69	9.6	9.74	9.69	10.42	10.29	10.3	10.13	10.13	10.34
WS313	12.6	10.39	10.25	10.27	10.28	11.15	11.02	11.01	10.94	10.85	11.03
WS204	12.4	10.18	10.18	10.21	10.17	11.01	10.84	10.81	10.66	10.63	10.79
WS211	11.8	8.79	8.79	8.86	8.81	9.41	9.28	9.29	9.18	9.17	9.38
BH1	12	9.69	9.26	9.23	9.14	10.01	9.85	9.83	9.75	9.64	9.86

The water levels can be compared to the proposed development levels and the proposed infiltration level for the Phase 1 area of 11.2mOD as shown in Plate 1 below.

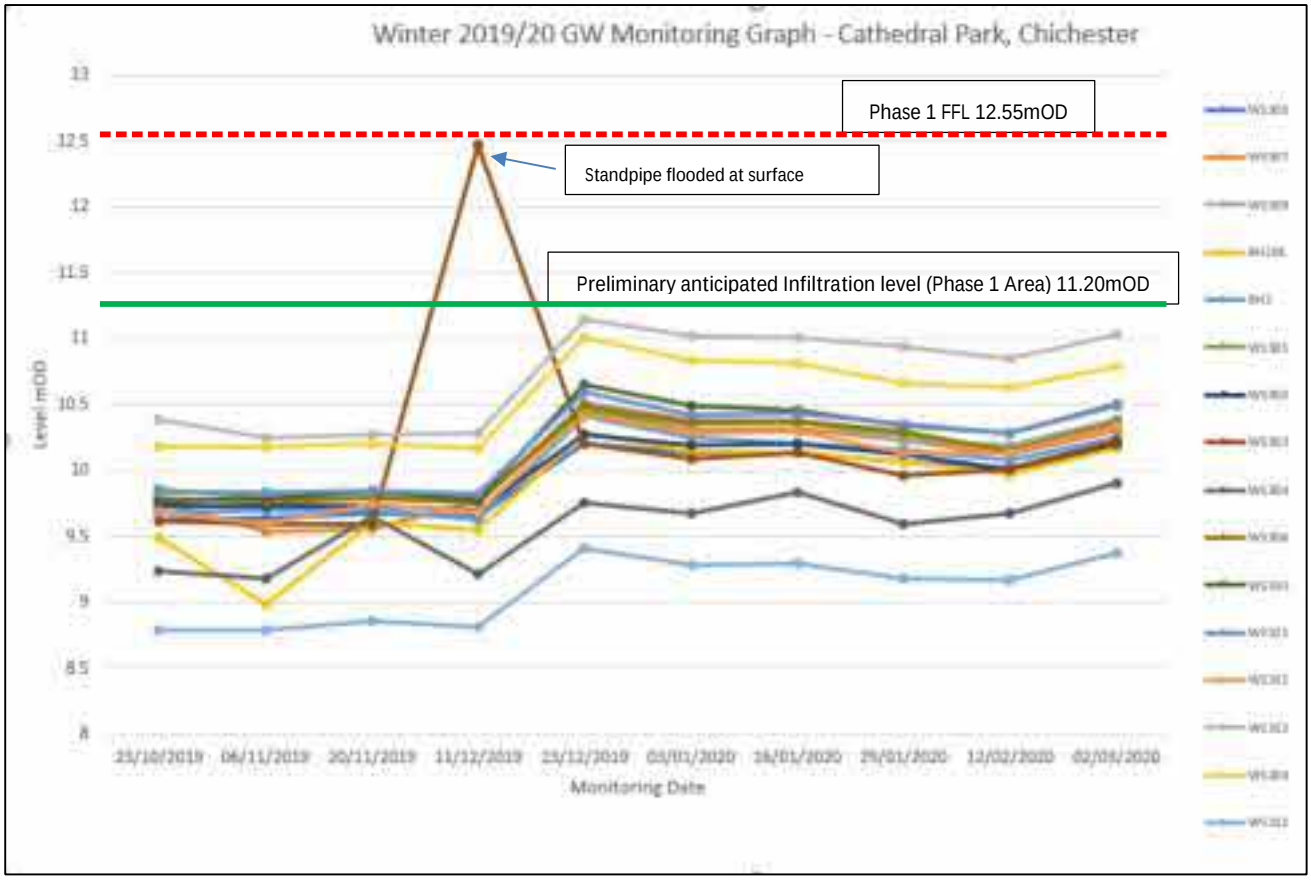
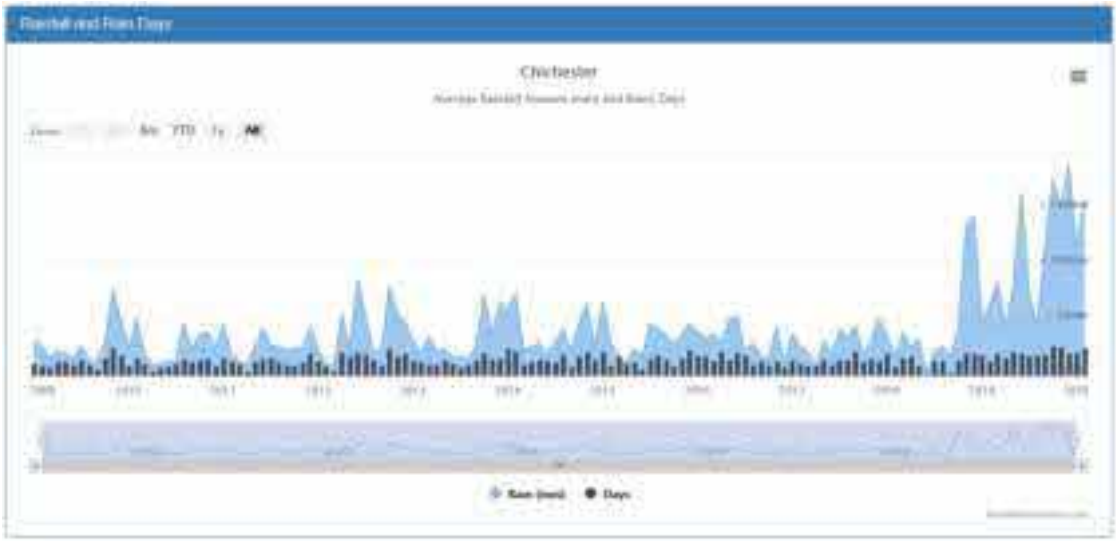


Plate 1. Winter groundwater levels compared to key development levels

2.3 Rainfall records for monitoring period

The winter of 2019/20 has seen a series of significant storms and greater than average monthly rainfall for the last decade as shown in Plate 2 below.

Plate 2. Rainfall data for Chichester – 2009 to 2020



3. INFILTRATION

3.1 Infiltration testing

Two series of infiltration tests were undertaken, broadly in line with BRE365 as conditions allowed in January and March 2020. Two levels for infiltration testing were targeted, approximately 11.2mOD and deeper at approximately 10.5mOD. The locations of the tests are shown on Figure 2.

Trial pit logs are provided in Appendix A. The records for each test are presented in Appendix B.

In summary, the infiltration permeability in m/s for those tests done at approximately 11.2mOD are tabulated below:

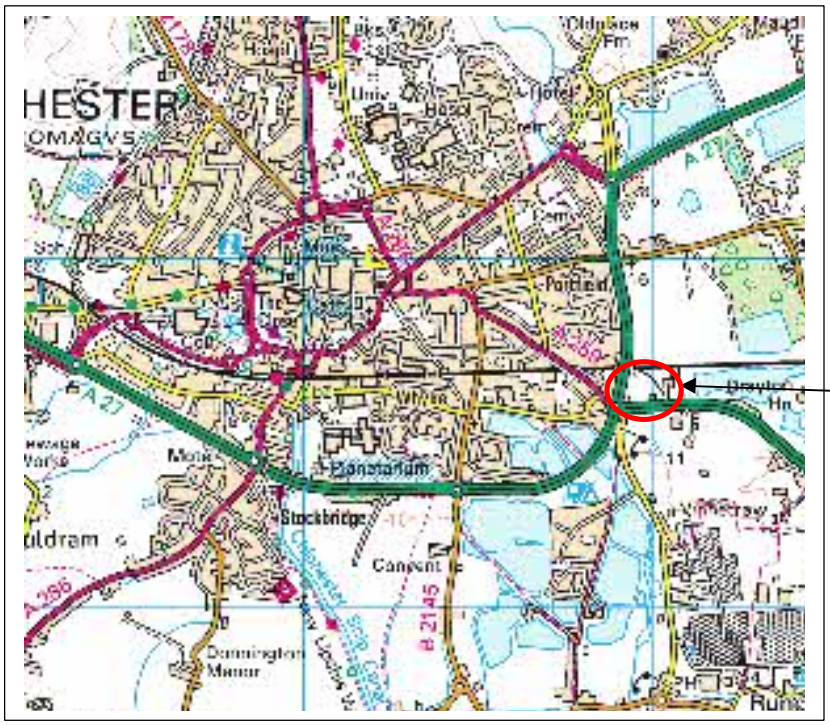
Location	Level of test	Run 1	Run 2	Run 3	Average
SA-401	11.30	3.25E-05			3.25E-05
SA-403	11.65	3.71E-05			3.71E-05
SA-404	11.20	1.76E-04	8.30E-05	1.65E-03	6.36E-04
SA-405	11.25	1.76E-03	1.47E-03	1.06E-03	1.43E-03
SA-406	10.85	3.50E-03	1.64E-03	1.38E-03	2.17E-03
SA-407	11.10	3.03E-04	1.45E-04	8.95E-05	1.79E-04
				Average	7.47E-04

Note: Results for SA402 have been omitted due to presence of void infilled with brick cobbles encountered below soakage test level.

The infiltration permeability for those tests done at approximately 10.5mOD are tabulated below:

Location	Level of test	Run 1	Run 2	Run 3	Average
SA_301	10.70	7.14E-04	3.66E-04	1.52E-04	4.11E-04
SA_302	10.75	1.94E-02	1.66E-03	1.45E-03	7.51E-03
SA_303	10.45	4.74E-03	1.29E-03	2.33E-03	2.79E-03
SA_304	10.65	1.44E-03	5.34E-04	2.32E-04	7.34E-04
SA_305	10.30	1.75E-03	1.38E-03	1.10E-03	1.41E-03
SA_306	11.05	4.23E-04	2.16E-04	7.89E-04	4.76E-04
SA_307	9.90	5.70E-04	4.57E-04	4.20E-04	4.82E-04
SA_308	10.35	2.88E-04	1.82E-04	2.34E-04	2.35E-04
SA_309	9.95	8.22E-05	6.14E-04	7.73E-04	4.90E-04
				Average	1.61E-03

FIGURES



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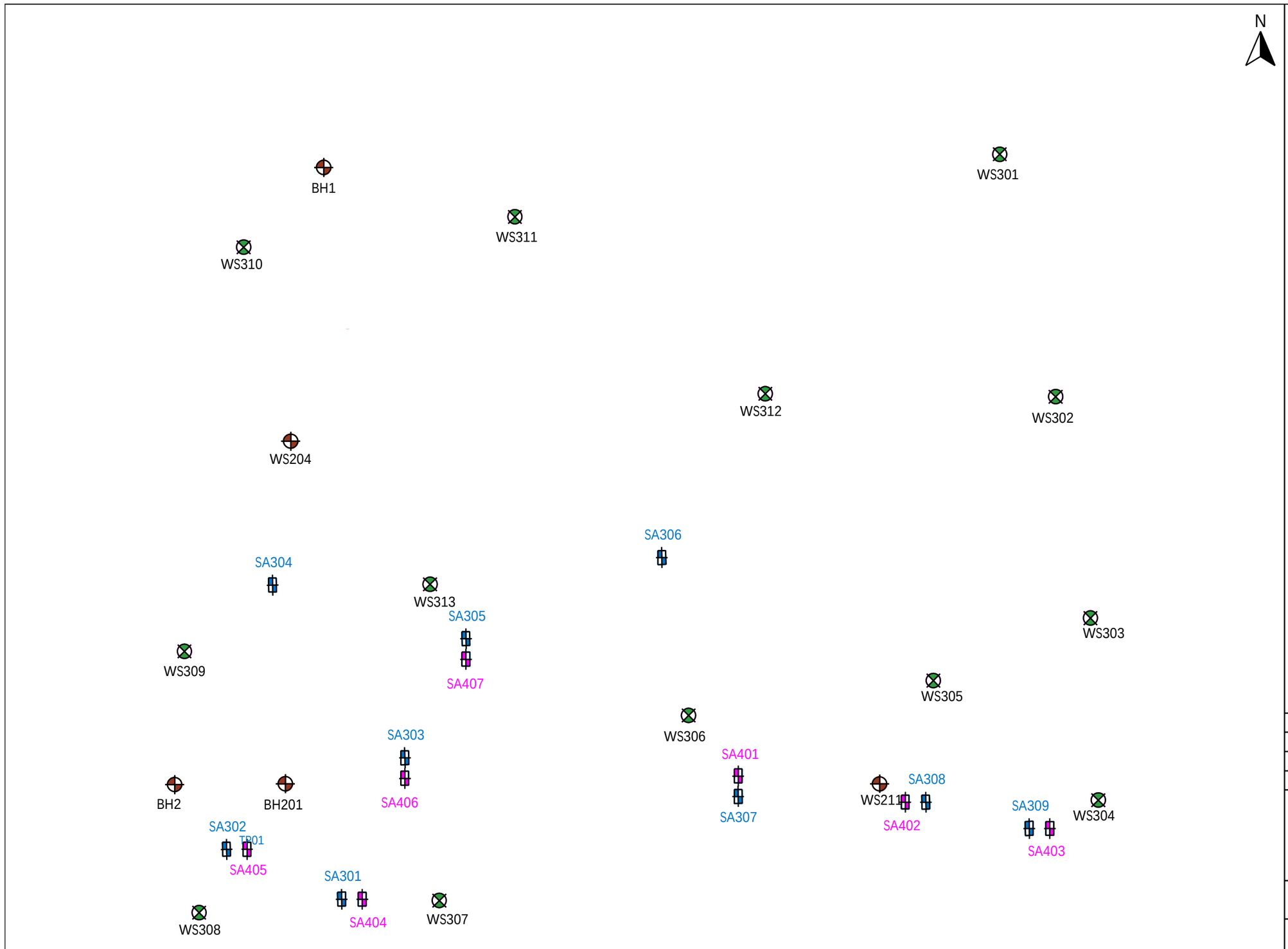
Client	Project	Job No
Hanbury Properties (Chichester) Ltd	Cathedral Park, Chichester	CG/28824B
CGL	Title: Site Location Plan	Figure 1



KEY

- Historical install locations
- CGL window samples (2019)
- CGL soakaway trial pit (2020)
- CGL soakaway trial pit (2020)

Notes

1. Do not scale from drawing.
2. Baseplan taken from Ramboll Infiltration Testing Location Plan 'RAM-0500DR-CR-00002' Rev P01 (September 2019).

Rev	Date	Comments
2	06/03/20	Additional CGL trial pits added
1	27/01/2020	Proposed CGL trial pits added
0	21/11/2019	

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Project: Cathedral Park, Chichester - Drainage

Client: Hanbury

Drawing title: Proposed Exploratory Hole Location Plan

Scale(s): NTS

Job No.: CG/28824B

Drawn	TSB	21/11/19
Checked		
Approved		

Dwg No.: CG/28824B-PEHLP

Rev.: 2

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APPENDIX A

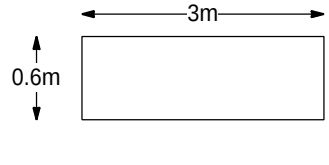
CGL borehole and trial pit logs

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA301
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	29-01-20 29-01-20	12.00	E 487,885.3 N 104,172.8	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.70		(0.30) 0.30	Grass over: Firm dark brown sandy gravelly silt TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				11.00		(0.70) 1.00	Firm dark brown very gravelly sandy cobbly SILT. Gravel is fine to coarse, angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint.
				10.70		(0.30) 1.30	Medium dense dark brown sandy very silty fine to coarse GRAVEL of angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint. 1.00 Becoming dense.
							(Pit terminated at 1.3m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

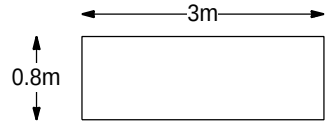
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA302
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	29-01-20 29-01-20	12.05	E 487,857.3 N 104,184.9	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.65		(0.40) 0.40	Grass over: Dark brown slighlty gravelly, silty fine to coarse sand TOPSOIL. Gravel is fine to medium, angular to subrounded of flint.
				11.05		(0.60) 1.00	Firm dark brown very gravelly sandy cobbly SILT. Gravel is fine to coarse, angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint. 0.70 Becoming light brown and slightly sandy.
				10.75		(0.30) 1.30	Medium dense dark brown slightly silty sandy fine to coarse, subangular to rounded GRAVEL of flint. Sand is fine to coarse. Frequent cobbles of angular to subrounded flint.
							(Pit terminated at 1.3m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

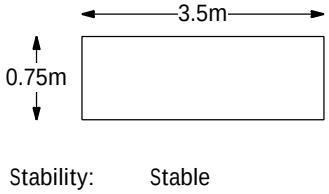
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA303
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	29-01-20 29-01-20	11.65	E 487,900.7 N 104,207.2	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.25		(0.40) 0.40	Grass over: Firm dark brown slightly gravelly silty fine to coarse sand TOPSOIL. Gravel is fine to medium, angular to subrounded of flint.
				10.65		(0.60) 1.00	Firm dark brown very gravelly sandy cobbly SILT. Gravel is fine to coarse, angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint.
				10.45		(0.20) 1.20	Dense light brown sandy fine to coarse, subangular to rounded GRAVEL of flint. Sand is fine to coarse. Frequent cobbles of angular to subrounded flint.
							(Pit terminated at 1.2m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

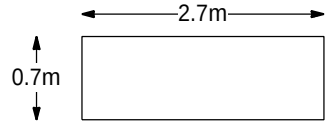
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA304
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	29-01-20 29-01-20	11.85	E 487,868.4 N 104,249.2	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.25		(0.60) 0.60	Grass over: Dark brown slightly gravelly silty fine to coarse sand TOPSOIL. Gravel is fine to medium, angular to subrounded of flint.
				10.85		(0.40) 1.00	Firm dark brown very gravelly sandy cobbly SILT. Gravel is fine to coarse, angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint.
				10.65		(0.20) 1.20	Dense light brown slightly sandy fine to coarse, subangular to rounded GRAVEL of flint. Sand is fine to coarse. Frequent cobbles of angular to subrounded flint.
							(Pit terminated at 1.2m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

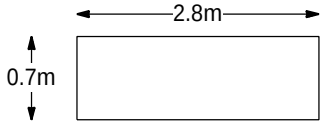
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA305
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	29-01-20 29-01-20	11.90	E 487,915.6 N 104,236.2	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.50		(0.40) 0.40	Grass over: Firm dark brown slightly gravelly sandy silt TOPSOIL. Sand is fine to coarse. Gravel is fine to coarse, angular to subrounded of flint.
				10.78		(0.72) 1.12	Firm dark brown very gravelly sandy cobbly SILT. Gravel is fine to coarse, angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint.
				10.30		(0.48) 1.60	Structureless CHALK composed of light brown to cream slightly sandy silty, medium to coarse, subangular to rounded GRAVEL with many rounded flint cobbles. Gravel is of flint and weak, low density, white chalk. Matrix is uncompact and light brown. (Grade Dc)
			1				(Pit terminated at 1.6m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

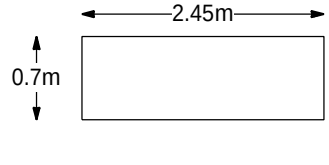
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA306
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	30-01-20 30-01-20	12.65	E 487,963.3 N 104,255.9	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				12.10		(0.55) 0.55	Grass over: Firm dark brown to orange slightly gravelly slightly sandy siltly clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				11.20		(0.90) 1.45	Firm dark brown very clayey gravelly sandy cobbly SILT. Gravel is fine to coarse, angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint.
				11.05		(0.15) 1.60	Structureless CHALK composed of slightly gravelly SILT with occasional cobbles. Gravel is fine to medium, angular to subrounded of flint and weak, low density white of chalk. Cobbles are angular to subrounded flint. (Grade Dm)
							(Pit terminated at 1.6m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

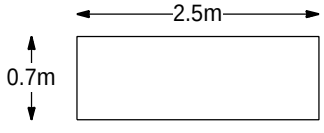
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA307
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	30-01-20 30-01-20	12.00	E 487,981.9 N 104,197.8	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.00		(1.00) 1.00	Grass over: Dark brown slightly sandy slightly gravelly silty clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				10.30		(0.70) 1.70	Firm dark brown very gravelly sandy cobbly SILT. Gravel is fine to coarse, angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint.
				9.90		(0.40) 2.10	Structureless CHALK composed of slightly gravelly SILT with occasional cobbles. Gravel is fine to medium, angular to subrounded of flint and weak, low density white of chalk. Cobbles are angular to subrounded flint. (Grade Dm)
							(Pit terminated at 2.1m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

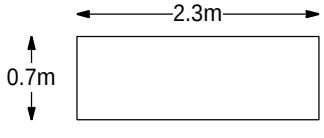
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA308
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	30-01-20 30-01-20	12.10	E 488,027.6 N 104,196.4	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.10		(1.00) 1.00	Grass over: Dark brown clayey silt TOPSOIL. Sand is fine to coarse. Occasional fine to coarse, angular to subrounded of gravel flint.
				10.55		(0.55) 1.55	Medium dense light brown to cream silty gravelly fine to coarse SAND. Gravel is fine to medium, angular to subrounded of flint.
				10.35		(0.20) 1.75	Dense brown silty SAND and GRAVEL. Sand is fine to coarse. Frequent cobbles of angular to subrounded flint. Gravel is fine to coarse, angular to subrounded of flint.
							(Pit terminated at 1.75m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

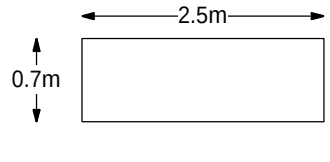
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA309
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	30-01-20 30-01-20	12.05	E 488,052.8 N 104,190.0	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
						(1.10)	Grass over: Dark brown clayey silt TOPSOIL.
				10.95		1.10	
						(0.70)	Firm dark brown very sandy slightly gravelly cobbly SILT. Gravel is fine to coarse, angular to subrounded of flint. Sand is fine to coarse. Frequent cobbles of angular to rubrounded flint.
				10.25		1.80	
						(0.30)	Structureless CHALK composed of slightly gravelly SILT with occasional cobbles. Gravel is fine to medium, angular to subrounded of flint and weak, low density white of chalk. Cobbles are angular to subrounded flint. (Grade Dm)
				9.95		2.10	
							(Pit terminated at 2.1m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
8 tonne tracked excavator	BPH Plant Hire	ELD	DRAFT

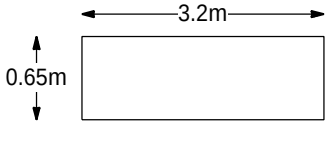
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA401
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	02-03-20 02-03-20	12.10	E 487,981.9 N 104,202.8	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
						(0.80)	Grass over: Firm dark brown slightly sandy slightly gravelly silty clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				11.30		0.80	(Pit terminated at 0.8m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
5 tonne tracked excavator	BPH Plant Hire	SMS	DRAFT

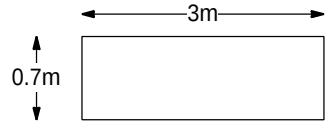
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA402
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	02-03-20 02-03-20	12.30	E 488,022.6 N 104,196.4	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.40		(0.90) 0.90	Grass over: Firm dark brown slightly sandy slightly gravelly silty clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				10.95		(0.45) 1.35	Cobbles of red brick
							(Pit terminated at 0.8m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
5 tonne tracked excavator	BPH Plant Hire	SMS	DRAFT

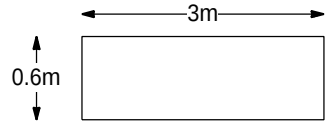
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA403
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	02-03-20 02-03-20	12.45	E 488,057.8 N 104,190.0	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
						(0.80)	Grass over: Firm dark brown slightly sandy slightly gravelly silty clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				11.65		0.80	(Pit terminated at 0.8m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
5 tonne tracked excavator	BPH Plant Hire	SMS	DRAFT

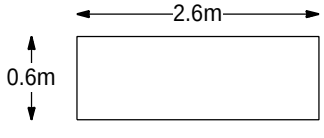
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA404
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	02-03-20 02-03-20	12.00	E 487,890.3 N 104,172.8	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.70		(0.30) 0.30	Grass over: Firm dark brown slightly sandy slightly gravelly silty clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				11.20		(0.50) 0.80	Firm brown slightly sandy very gravelly SILT.
							(Pit terminated at 0.8m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
5 tonne tracked excavator	BPH Plant Hire	SMS	DRAFT

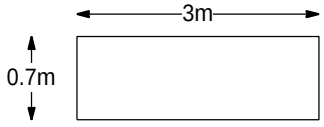
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA405
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	02-03-20 02-03-20	12.05	E 487,862.3 N 104,184.9	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.70		(0.35) 0.35	Grass over: Firm dark brown slightly sandy slightly gravelly silty clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				11.25		(0.45) 0.80	Medium dense brown slightly sandy very silty GRAVEL
							(Pit terminated at 0.8m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
5 tonne tracked excavator	BPH Plant Hire	SMS	DRAFT

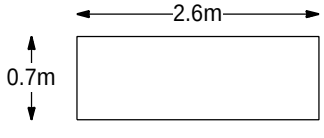
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA406
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	02-03-20 02-03-20	11.65	E 487,900.7 N 104,202.2	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.30		(0.35) 0.35	Grass over: Firm dark brown slightly sandy slightly gravelly silty clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				10.85		(0.45) 0.80	Medium dense brown slightly sandy very silty GRAVEL
							(Pit terminated at 0.8m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
5 tonne tracked excavator	BPH Plant Hire	SMS	DRAFT

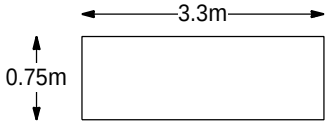
Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

TRIAL PIT LOG

Project				TRIAL PIT No
Cathedral Park, Drainage				SA407
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	02-03-20 02-03-20	11.90	E 487,915.6 N 104,231.2	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA			
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION
				11.50		(0.40) 0.40	Grass over: Firm dark brown slightly sandy slightly gravelly silty clay TOPSOIL. Sand is fine to coarse. Gravel is fine to medium, angular to subrounded of flint.
				11.10		(0.40) 0.80	Firm brown slightly sandy very gravelly SILT.
							(Pit terminated at 0.8m)

Plan



Stability: Stable

General Remarks

1. Trial excavated for BRE365 soakage test. 2. Coordinates and ground levels extracted from topographic survey. 3. Backfilled with arisings upon completion

Method/ Plant Used	Field Crew	Logged By	Checked By
5 tonne tracked excavator	BPH Plant Hire	SMS	DRAFT

Report ID: CGL TP LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS301
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	21-10-19	13.26	E 488,045.6 N 104,354.1	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				13.16		0.10	Grass over: Soft brown slightly gravely silt. Gravel is subangular, fine of flint. With abundant fine rootlets.	
						(1.20)	Soft clayey SILT with rare subangular, fine to medium flint gravel.	
				11.96		1.30		
1.40	B1.9			11.76		1.50	Medium dense light brown slightly silty clayey GRAVEL. Gravel is subangular to angular, fine to coarse of flint.	
				11.46		(0.30) 1.80	Firm light brown gravelly CLAY. Gravel is subrounded to angular, fine to medium of flint.	
				11.16		(0.30) 2.10	Medium dense light brown slightly silty clayey GRAVEL. Gravel is subrounded to angular, fine to medium of flint and chalk.	
3.00	B4		1			(2.90)	Medium dense cream to beige very silty GRAVEL. Gravel is subangular to angular, fine to coarse of flint. 3.00 Dark brown silt infill. 4.70 Silt becoming orange brown.	
				8.26		5.00	(Window sample terminated at 5m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
21-10-19	3.8		Wet soil in sampler		

General Remarks

1. Window sample terminated at 5.0m bgl.
2. Wet soil was noted from 3.8m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.3m Plain 38mm pipe with bentonite seal; 0.3m to 3.3m Slotted with gravel filter pack; 3.3m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS302
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	21-10-19	13.24	E 488,059.2 N 104,295.1	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				13.14		0.10	Grass over: Soft brown silt with abundant rootlets.	
						(1.80)	Soft brown slightly gravelly clayey SILT. Gravel is subangular to angular, fine to medium of flint.	
				11.34		1.90		
				11.14		2.10	Soft brown very gravelly CLAY. Gravel is subangular to angular, fine to coarse of flint.	
						(2.90)	Medium dense to dense brown very clayey GRAVEL. Gravel is subangular to very angular, fine to coarse of flint.	
							3.00 Becoming clayey.	
							3.50 Becoming slightly clayey.	
			1				4.00 Becoming light brown.	
				8.24		5.00		
							(Window sample terminated at 5m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
21-10-19	4		Wet soil in sampler		

General Remarks

1. Window sample terminated at 5.0m bgl.
2. Wet soil was noted from 4.0m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.5m Plain 38mm pipe with bentonite seal; 0.5m to 4.5m Slotted with gravel filter pack; 4.5m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS303
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	21-10-19	12.94	E 488,067.7 N 104,241.9	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				12.84		0.10	Grass over: Soft brown silt with abundant rootlets.	
						(1.40)	Soft brown clayey SILT. Rare subangular, fine to medium flint gravel.	
				11.44		1.50		
						(0.80)	Soft mottled brown and grey brown very silty gravelly CLAY. Gravel is subrounded to angular, fine to coarse of flint.	
				10.64		2.30		
						(0.50)	Medium dense brown very clayey GRAVEL. Gravel is subangular to very angular, fine to coarse of flint.	
				10.14		2.80		
			1			(2.20)	Medium dense to dense cream to beige very silty GRAVEL. Gravel is subangular to very angular, fine to coarse of flint.	
				7.94		5.00		
							(Window sample terminated at 5m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
21-10-19	3.5		Wet soil in sampler		

General Remarks

1. Window sample terminated at 5.0m bgl.
2. Wet soil was noted from 3.5m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.4m Plain 38mm pipe with bentonite seal; 0.4m to 3.4m Slotted with gravel filter pack; 3.4m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS304
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	21-10-19	12.50	E 488,069.6 N 104,196.9	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				12.40		0.10	Grass over: Soft brown silt with abundant rootlets.	
						(0.40)	Soft dark brown gravelly silt. Gravel is subrounded to angular, fine to coarse of flint, brick and tarmac. With subangular cobbles of tarmac.	
				12.00		0.50		
						(1.20)	Soft very silty slightly gravelly CLAY. Gravel is subangular, fine of flint.	
							1.40 - 1.50 Band of subangular to angular, fine to coarse flint gravel.	
				10.80		1.70		
						(0.40)	Medium dense cream to beige clayey GRAVEL. Gravel is rounded to subangular, fine of flint.	
2.00	B4			10.40		2.10		
			1			(2.90)	Medium dense to dense brown mottled beige slightly clayey GRAVEL. Gravel is subangular to angular, fine to coarse of flint.	
				7.50		5.00		
							(Window sample terminated at 5m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
21-10-19	3.6		Wet soil in sampler		

General Remarks

1. Window sample terminated at 5.0m bgl.
2. Wet soil was noted from 3.6m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.3m Plain 50mm pipe with bentonite seal; 0.3m to 3.3m Slotted with gravel filter pack; 3.3m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS305
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	21-10-19	12.90	E 488,029.2 N 104,226.0	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				12.80		0.10	Grass over: Soft brown slightly gravely silt. Gravel is subangular to angular, fine of flint. Fragments of broken glass/plastic.	
						(0.50)	Soft brown slightly gravelly clayey SILT. Gravel is subangular to angular, fine to medium of flint.	
				12.30		0.60		
						(0.80)	Soft light brown very silty slightly gravely CLAY. Gravel is subrounded to subangular, fine to medium of flint.	
				11.50		1.40		
						(0.55)	Soft to firm very gravelly CLAY. Gravel is subangular to very angular, fine to medium of flint.	
				10.95		1.95		
						(0.55)	Medium dense brown very clayey GRAVEL. Gravel is subangular to very angular, fine to coarse of flint.	
				10.40		2.50		
			▼1			(2.50)	Medium dense to dense cream to beige silty GRAVEL. Gravel is subrounded to angular, fine to coarse of flint. 2.60 Flint cobble ~100mm diameter.	
				7.90		5.00		
							(Window sample terminated at 5m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
21-10-19	3.9		Wet soil in sampler		

General Remarks

1. Window sample terminated at 5.0m bgl.
2. Wet soil was noted from 3.9m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.6m Plain 38mm pipe with bentonite seal; 0.6m to 3.6m Slotted with gravel filter pack; 3.6m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS306
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	22-10-19	12.40	E 487,969.8 N 104,217.5	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				12.30		0.10	Grass over: Soft brown very clayey slightly gravelly silt. Gravel is subrounded to subangular, fine to medium of flit and rare brick.	
						(1.20)	Soft brown gravelly SILT. Gravel is subangular to very angular, fine to coarse of flint.	
1.20	B2.1			11.10		1.30		
				10.30		(0.80)	Soft brown very gravelly CLAY. Gravel is subangular to very angular, fine to medium of flint.	
2.10	B2.8			9.60		2.10 (0.70) 2.80	Soft cream to beige very gravelly SILT. Gravel is subrounded to very angular, fine to medium of flint.	
			▼1	8.70		(0.90) 3.70	Medium dense brown silty GRAVEL. Subrounded to angular, fine to coarse of flint. Gravel is subangular to angular, fine to medium of flint.	
3.80	ES			8.40		(0.30) 4.00	Medium dense to dense white mottled grey very silty GRAVEL. Gravel is subangular to angular, fine to medium of flint. 3.80 Grey staining with mild hydrocarbon odour.	
							(Window sample terminated at 4m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
22-10-19	2.9		Wet soil in sampler		

General Remarks

1. Window sample terminated at 4.0m to prevent generating preferential contamination pathway.
2. Wet soil was noted from 2.9m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.7m Plain 38mm pipe with bentonite seal; 0.7m to 2.7m Slotted with gravel filter pack; 2.7m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS307
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	22-10-19	11.83	E 487,909.1 N 104,172.5	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				11.53		(0.30) 0.30	Grass over: Soft brown gravely silt. Gravel is subrounded to subangular, fine to medium of flint.	
				10.43		(1.10) 1.40	Medium dense brown clayey silty GRAVEL. Gravel is subrounded to angular, fine to coarse of flint. With occasional subrounded to subangular cobbles of flint.	
				9.93		(0.50) 1.90	Soft white to beige very gravelly SILT. Gravel is subangular to angular, fine to medium of flint.	
			▼1	8.73		(1.20) 3.10	Medium dense light brown clayey GRAVEL. Gravel is subrounded to angular, fine to coarse of flint.	
				7.83		(0.90) 4.00	Medium dense to dense cream silty GRAVEL. Gravel is subangular to very angular, fine to coarse of flint.	
							(Window sample terminated at 4m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
22-10-19	1.95		Wet soil in sampler		

General Remarks

1. Window sample terminated at 4.0m due to dense granular material.
2. Wet soil was noted from 1.95m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.2m Plain 38mm pipe with bentonite seal; 0.2m to 2.2m Slotted with gravel filter pack; 2.2m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS308
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	22-10-19	12.15	E 487,850.7 N 104,169.8	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
						(0.40)	Weeds and scrub over: Soft brown gravelly silt. Gravel is subrounded to subangular, fine to coarse of flint and brick. With occasional rootlets.	
				11.75		0.40		
						(1.60)	Loose to medium dense brown silty GRAVEL. Gravel is subrounded to subangular, fine to coarse of flint. With frequent subrounded to subangular cobbles of flint.	
							1.50 Becoming slightly silty.	
				10.15		2.00		
							(Window sample terminated at 2m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth

General Remarks

1. Window sample terminated at 2.0m due to repeated collapse below 1.0m.
2. Groundwater was not encountered during the excavation.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.1m Plain 38mm pipe with bentonite seal; 0.1m to 1.1m Slotted with gravel filter pack; 1.1m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS309
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	22-10-19	11.80	E 487,847.0 N 104,233.1	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				11.60		0.20	Grass over: Soft brown gravelly silty clay. Gravel is subrounded to subangular, fine to medium of flint and brick.	
						(0.70)	Soft brown gravelly silty CLAY. Gravel is subrounded to angular fine to coarse of flint.	
				10.90		0.90		
			1			(3.10)	Medium dense to dense light brown to beige silty sandy GRAVEL. Gravel is subangular to angular, fine to coarse of flint. Sand is medium to coarse.	
				7.80		4.00		
							(Window sample terminated at 4m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
22-10-19	2.1		Wet soil in sampler		

General Remarks

1. Window sample terminated at 4.0m due to dense granular material.
2. Wet soil was noted from 2.1m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.1m Plain 38mm pipe with bentonite seal; 0.1m to 2.1m Slotted with gravel filter pack; 2.1m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS310
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	22-10-19	12.49	E 487,861.4 N 104,331.5	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				12.29		0.20	Grass over: Soft brown gravelly silty clay. Gravel is subrounded to subangular, fine to medium of flint and brick.	
						(0.70)	Soft brown gravelly silty CLAY. Gravel is subrounded to angular, fine to coarse of flint.	
				11.59		0.90		
1.20	B2		1			(3.10)	Medium dense to dense light brown/beige silty sandy GRAVEL. Gravel is subangular to angular, fine to coarse of flint. Sand is medium to coarse. 2.20 Becoming light brown.	
				8.49		4.00		
							(Window sample terminated at 4m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
22-10-19	3		Wet soil in sampler		

General Remarks

1. Window sample terminated at 4.0m due to dense granular material.
2. Wet soil was noted from 3.0m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.5m Plain 38mm pipe with bentonite seal; 0.5m to 3.0m Slotted with gravel filter pack; 3.0m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS311
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	22-10-19	12.87	E 487,927.5 N 104,338.9	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				12.47		(0.40) 0.40	Grass over: Soft brown silty slightly gravelly clay. Gravel is subrounded to subangular, fine to medium of flint and rare brick.	
				11.57		(0.90) 1.30	Soft brown silty very gravelly CLAY. Gravel is subangular to angular, fine to coarse of flint.	
			1	8.87		(2.70) 4.00	Medium dense to dense light brown very clayey sandy GRAVEL. Gravel is subangular to very angular, fine to coarse of flint. Sand is medium to coarse. 2.40 Becoming clayey.	
							(Window sample terminated at 4m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
22-10-19	3.5		Wet soil in sampler		

General Remarks

1. Window sample terminated at 4.0m due to dense granular material.
2. Wet soil was noted from 3.5m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.1m Plain 38mm pipe with bentonite seal; 0.1m to 3.1m Slotted with gravel filter pack; 3.1m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS312
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	22-10-19	12.90	E 487,988.5 N 104,295.8	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				11.90		(1.00) 1.00	Grass over: Soft silty slightly gravelly clay. Gravel is subrounded to subangular, fine to medium of flint and rare fine brick.	
				11.30		(0.60) 1.60	Soft silty slightly gravelly CLAY. Gravel is subrounded to angular, fine to medium of flint.	
			1	8.90		(2.40) 4.00	Medium dense light brown very clayey sandy GRAVEL. Gravel is subangular to very angular, fine to coarse of flint. Sand is medium to coarse. 1.90 Becoming clayey.	
							(Window sample terminated at 4m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
22-10-19	3.5		Wet soil in sampler		

General Remarks

1. Window sample terminated at 4.0m due to dense granular material.
2. Wet soil was noted from 3.5m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.1m Plain 38mm pipe with bentonite seal; 0.1m to 3.1m Slotted with gravel filter pack; 3.1m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

WINDOW SAMPLE LOG

Project				HOLE No
Cathedral Park, Drainage				WS313
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
CG/28824	22-10-19	12.60	E 487,906.8 N 104,249.5	
Client				Sheet
Hanbury Properties (Chichester) Limited				1 of 1

SAMPLES & TESTS			Water	STRATA				Instrument /Backfill
Depth (m)	Type No	Test Result (N/kPa/ppm)		Reduced Level	Legend	Depth (m) (Thick-ness)	DESCRIPTION	
				12.20		(0.40) 0.40	Grass over: soft brown gravelly silt. Gravel is subrounded to subangular, fine to medium of flint. [TOPSOIL]	
				11.00		(1.20) 1.60	Soft light brown very gravelly CLAY. Gravel is subangular to angular, fine to coarse of flint. [ALLUVIAL FAN DEPOSITS]	
			1	8.60		(2.40) 4.00	Medium dense to dense light brown to beige very clayey GRAVEL. Gravel is subangular to very angular, fine to medium of flint. [RIVER TERRACE DEPOSITS] 1.90 Becoming clayey.	
							(Window sample terminated at 4m)	

Boring Progress and Water Observations

Date	Strike depth	Casing depth	Comment	Time measured	Standing Depth
22-10-19	2.4		Wet soil in sampler		

General Remarks

1. Window sample terminated at 4.0m due to dense granular material.
2. Wet soil was noted from 2.4m.
3. No in-situ testing undertaken.
4. Hole installed with: Top hat cover concrete and bentonite at surface; 0.0m to 0.1m Plain 38mm pipe with bentonite seal; 0.1m to 2.1m Slotted with gravel filter pack; 2.1m to base collapsed granular soil.
5. Densities based on engineers observation.

Method/ Plant Used	Field Crew	Logged By	Checked By
Premier Compact	Oakland SI	CGH	DRAFT

Report ID: CGL WS LOG || Project: CG_28824B CATHEDRAL PARK, CHICHETSTER.GPJ || Library: CGL_AGS4_R1.GLB || Date: 9 March 2020

APPENDIX B

Soakage test results

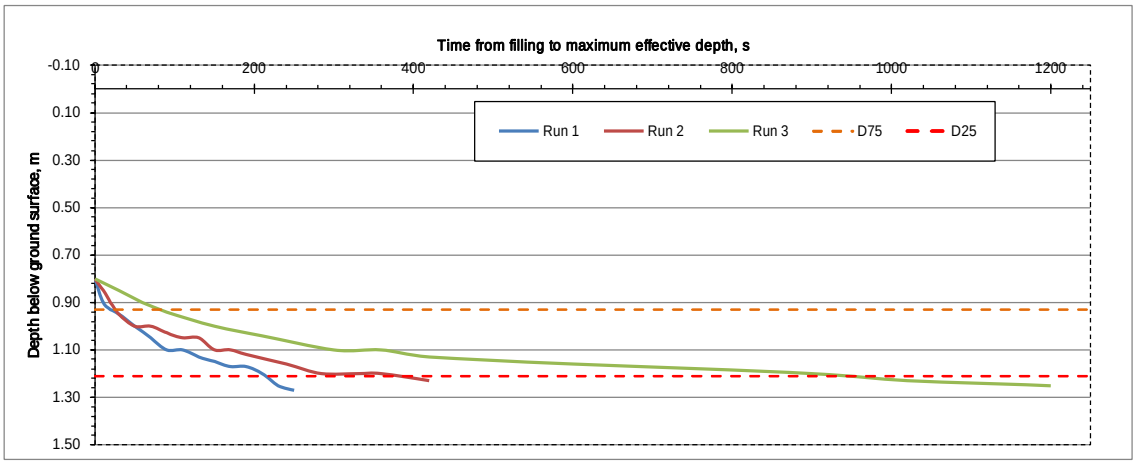
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: ELD / SM Checke NJL
Date: 29/01/20

Location: SA_301



	Run1
Pit Length (m	3.00
Pit Width (m):	0.60
Pit Depth (m):	1.30

Effective Depth	*0.50*
D_{75} (m)	*0.93*
D_{25} (m)	*1.18*
V_{p75-25} (m^3)	*0.45*

t_{75} (s)	*18.333333*
t_{25} (s)	*193.33333*
t_{p75-25} (s)	*175*
a_{p50} (m^2)	*3.6*
Infiltration Rate (m/s):	7.14E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.80
0.16	10	0.90
0.33	20	0.93
0.50	30	0.95
0.83	50	1.00
1.16	70	1.05
1.50	90	1.10
1.83	110	1.10
2.16	130	1.13
2.50	150	1.15
2.83	170	1.17
3.16	190	1.17
3.50	210	1.20
3.83	230	1.25
4.16	250	1.27

	Run 2
Pit Length (m	3.00
Pit Width (m):	0.60
Pit Depth (m):	1.35

Effective Depth	*0.55*
D_{75} (m)	*0.94*
D_{25} (m)	*1.21*
V_{p75-25} (m^3)	*0.50*

t_{75} (s)	*28*
t_{25} (s)	*385*
t_{p75-25} (s)	*357.5*
a_{p50} (m^2)	*3.78*
Infiltration Rate (m/s):	3.66E-0

Time (m)	Time (s)	Depth (m)
0.00	0.00	0.80
0.16	10.00	0.85
0.33	20.00	0.90
0.50	30.00	0.95
0.83	50.00	1.00
1.16	70.00	1.00
1.50	90.00	1.03
1.83	110.00	1.05
2.16	130.00	1.05
2.50	150.00	1.10
2.83	170.00	1.10
3.16	190.00	1.12
4.00	240.00	1.16
4.75	285.00	1.20
5.50	330.00	1.20
6.00	360.00	1.20
7.00	420.00	1.23
9.0	940	1.27

	Run 3
Pit Length (m	3.00
Pit Width (m):	0.60
Pit Depth (m):	1.35

Effective Depth	*0.55*
D_{75} (m)	*0.94*
D_{25} (m)	*1.21*
V_{p75-25} (m^3)	*0.50*

t_{75} (s)	*88*
t_{25} (s)	*950*
t_{p75-25} (s)	*861.875*
a_{p50} (m^2)	*3.78*
Infiltration Rate (m/s):	1.52E-0

Time (m)	Time (s)	Depth (m)
0.00	0.00	0.80
0.50	30.00	0.85
1.00	60.00	0.90
1.50	90.00	0.94
2.50	150.00	1.00
3.50	210.00	1.04
5.00	300.00	1.10
6.00	360.00	1.10
7.00	420.00	1.13
10.00	600.00	1.16
15.00	900.00	1.20
17.00	1020.00	1.23
20.00	1200.00	1.25

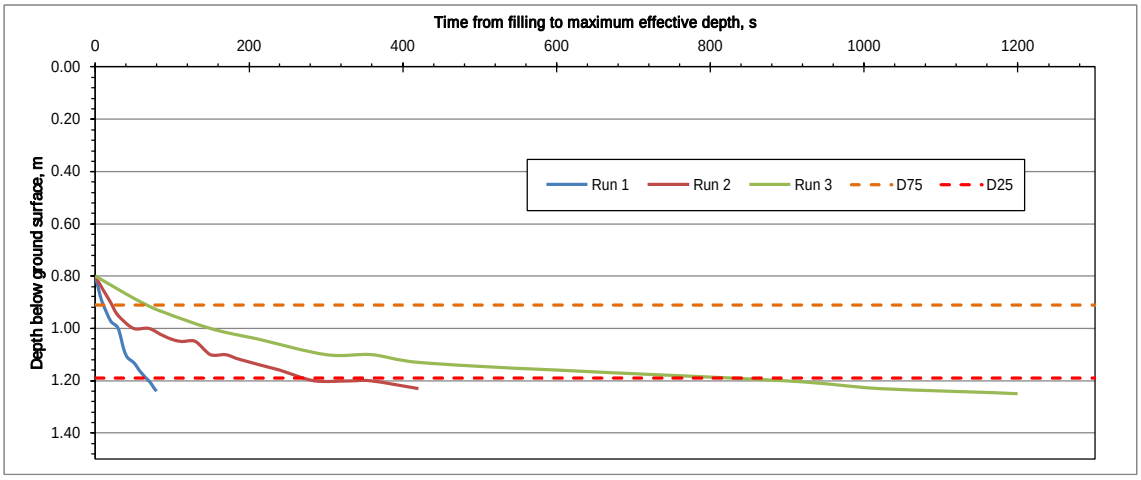
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: ELD / SMS Checke NJI
Date: 29/01/20

Location: SA_302



	Run1
Pit Length (m	3.00
Pit Width (m):	0.80
Pit Depth (m):	1.30

	Run 2
Pit Length (m	3.00
Pit Width (m):	0.80
Pit Depth (m):	1.30

	Run 3
Pit Length (m	3.00
Pit Width (m):	0.80
Pit Depth (m):	1.25

Effective Depth		*0.50*
D_{75} (m)		*0.93*
D_{25} (m)		*1.18*
V_{p75-25} (m^3)		*0.60*
t_{75} (s)		*68.785714*
t_{25} (s)		*61.6*
t_{p75-25} (s)		*-7.185714*
a_{p50} (m^2)		*4.3*
Infiltration Rate (m/s):		-1.94E-0

Effective Depth		*0.45*
D_{75} (m)		*0.96*
D_{25} (m)		*1.19*
V_{p75-25} (m^3)		*0.54*
t_{75} (s)		*24*
t_{25} (s)		*103*
t_{p75-25} (s)		*79*
a_{p50} (m^2)		*4.11*
Infiltration Rate (m/s):		1.66E-0

Effective Depth		*0.45*
D_{75} (m)		*0.91*
D_{25} (m)		*1.14*
V_{p75-25} (m^3)		*0.54*
t_{75} (s)		*18*
t_{25} (s)		*109*
t_{p75-25} (s)		*91*
a_{p50} (m^2)		*4.11*
Infiltration Rate (m/s):		1.45E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.80
0.16	9.6	0.90
0.33	19.8	0.97
0.50	30	1.00
0.66	39.6	1.10
0.83	49.8	1.13
1.00	60	1.17
1.16	69.6	1.20
1.33	79.8	1.24
1.50	90	1.28

Time (m)	Time (s)	Depth (m)
0.00	0	0.85
0.16	9.6	0.90
0.33	19.8	0.95
0.50	30	0.98
0.66	39.6	1.00
0.83	49.8	1.05
1.00	60	1.07
1.16	69.6	1.10
1.33	79.8	1.14
1.50	90	1.16
1.66	99.6	1.18
1.83	109.8	1.20
2.00	120	1.24
2.16	129.6	1.28

Time (m)	Time (s)	Depth (m)
0.00	0	0.80
0.16	9.6	0.88
0.33	19.8	0.92
0.50	30	0.94
0.66	39.6	0.96
0.83	49.8	0.98
1.00	60	1.00
1.16	69.6	1.04
1.33	79.8	1.07
1.50	90	1.09
1.66	99.6	1.12
1.83	109.8	1.14
2.16	129.6	1.19
2.50	150	1.22
2.83	169.8	1.27

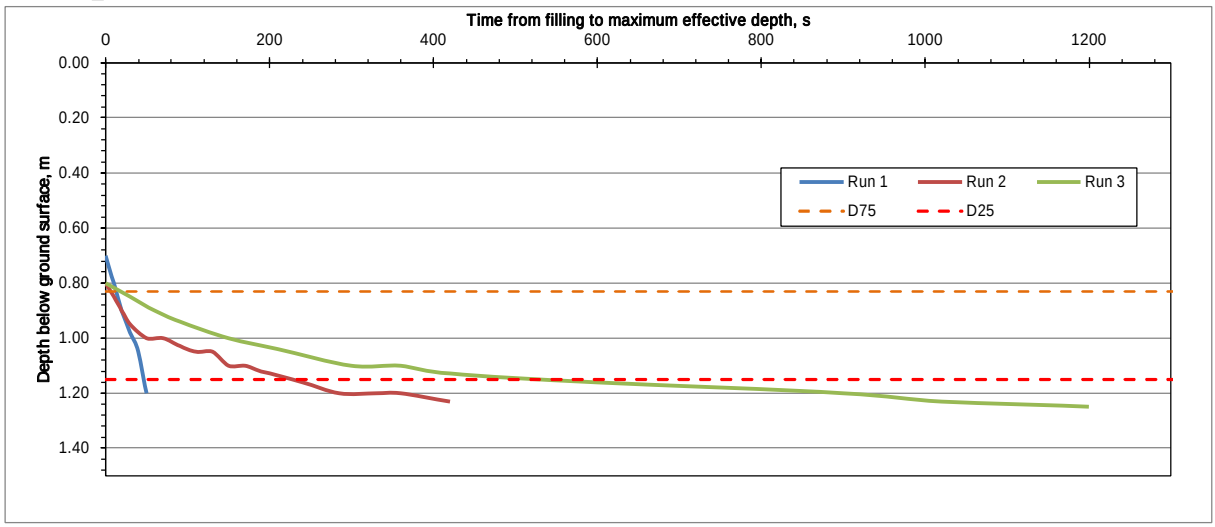
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: ELD / SMS Checker: NJL
Date: 29/01/20

Location: SA_303



	Run1
Pit Length (m):	3.50
Pit Width (m):	0.75
Pit Depth (m):	1.20
Effective Depth (	0.50
D_{75} (m)	0.83
D_{25} (m)	1.08
V_{p75-25} (m^3)	0.66
t_{75} (s)	12.15
t_{25} (s)	41.30
t_{p75-25} (s)	29.15
a_{p50} (m^2)	4.75
Infiltration Rate (m/s):	4.74E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.70
0.16	9.6	0.80
0.33	19.8	0.90
0.50	30	0.98
0.66	39.6	1.05
0.83	49.8	1.20

	Run 2
Pit Length (m	3.50
Pit Width (m):	0.75
Pit Depth (m):	1.25
Effective Depth (	0.40
D_{75} (m)	0.95
D_{25} (m)	1.15
V_{p75-25} (m^3)	0.53
t_{75} (s)	20
t_{25} (s)	114
t_{p75-25} (s)	94
a_{p50} (m^2)	4.325
Infiltration Rate (m/s):	1.29E-0

Time (m)	Time (s)	Depth (m)
0.00	0.00	0.85
0.16	9.60	0.90
0.33	19.80	0.95
0.50	30.00	0.98
0.66	39.60	1.00
0.83	49.80	1.04
1.00	60.00	1.05
1.16	69.60	1.07
1.33	79.80	1.09
1.66	99.60	1.10
2.00	120.00	1.17
2.33	139.80	1.20

	Run 3
Pit Length (m):	3.50
Pit Width (m):	0.75
Pit Depth (m):	1.22
Effective Depth (	0.42
D_{75} (m)	0.91
D_{25} (m)	1.12
V_{p75-25} (m^3)	0.55
t_{75} (s)	21
t_{25} (s)	75
t_{p75-25} (s)	54
a_{p50} (m^2)	4.41
Infiltration Rate (m/s):	2.33E-0

Time (m)	Time (s)	Depth (m)
0.00	0.00	0.80
0.16	9.60	0.85
0.33	19.80	0.90
0.50	30.00	0.94
0.66	39.60	0.98
0.83	49.80	1.00
1.00	60.00	1.08
1.16	69.60	1.10
1.33	79.80	1.13
1.50	90.00	1.17
1.66	99.60	1.19
1.83	109.80	1.20
2.00	120.00	1.20

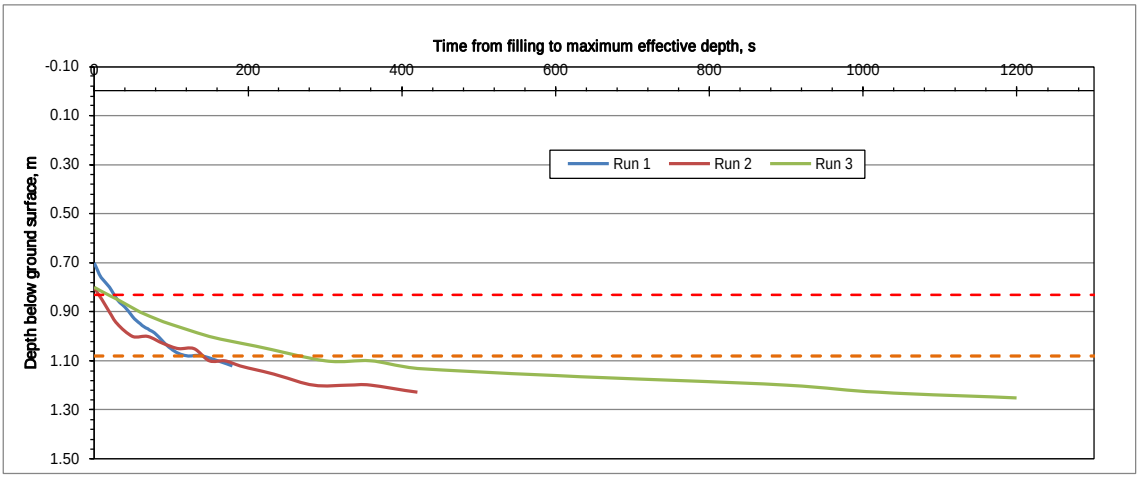
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: ELD / SMS Checke NJI
Date: 29/01/20

Location: SA_304



	Run1
Pit Length (n	2.70
Pit Width (m):	0.70
Pit Depth (m):	1.20

Effective Depth	*0.50*
D_{75} (m)	*0.83*
D_{25} (m)	*1.08*
V_{p75-25} (m^3)	*0.47*

t_{75} (s)	*24.9*
t_{25} (s)	*116.6*
t_{p75-25} (s)	*91.7*
a_{p50} (m^2)	*3.59*
Infiltration Rate (m/s):	1.44E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.70
0.16	9.6	0.76
0.33	19.8	0.80
0.50	30	0.85
0.66	39.6	**0.88**
0.83	49.8	0.92
1.00	60	0.95
1.16	69.6	0.97
1.33	79.8	0.99
1.66	99.6	1.05
2.00	120	1.08
2.33	139.8	1.08
3	180	1.12

	Run 2
Pit Length (n	2.70
Pit Width (m):	0.70
Pit Depth (m):	1.20

Effective Depth	*0.40*
D_{75} (m)	*0.90*
D_{25} (m)	*1.10*
V_{p75-25} (m^3)	*0.38*

t_{75} (s)	*22*
t_{25} (s)	*240*
t_{p75-25} (s)	*217.65*
a_{p50} (m^2)	*3.25*
Infiltration Rate (m/s):	5.34E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.80
0.16	9.6	0.85
0.33	19.8	0.89
0.50	30	0.93
0.66	39.6	0.95
0.83	49.8	0.97
1.00	60	0.99
1.33	79.8	1.00
1.66	99.6	1.03
2.00	120	1.05
2.50	150	1.06
3.00	180	1.07
5.00	300	1.13

	Run 3
Pit Length (n	2.70
Pit Width (m):	0.70
Pit Depth (m):	1.20

Effective Depth	*0.40*
D_{75} (m)	*0.90*
D_{25} (m)	*1.10*
V_{p75-25} (m^3)	*0.38*

t_{75} (s)	*40*
t_{25} (s)	*540*
t_{p75-25} (s)	*500.4*
a_{p50} (m^2)	*3.25*
Infiltration Rate (m/s):	2.32E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.80
0.16	9.6	0.83
0.33	19.8	0.86
0.50	30	0.88
0.66	39.6	0.90
0.83	49.8	0.92
1.00	60	0.94
1.50	90	0.96
2.00	120	0.98
3.00	180	1.03
4.00	240	1.03
6.00	360	1.05
8.00	480	1.08
9.00	540	1.10

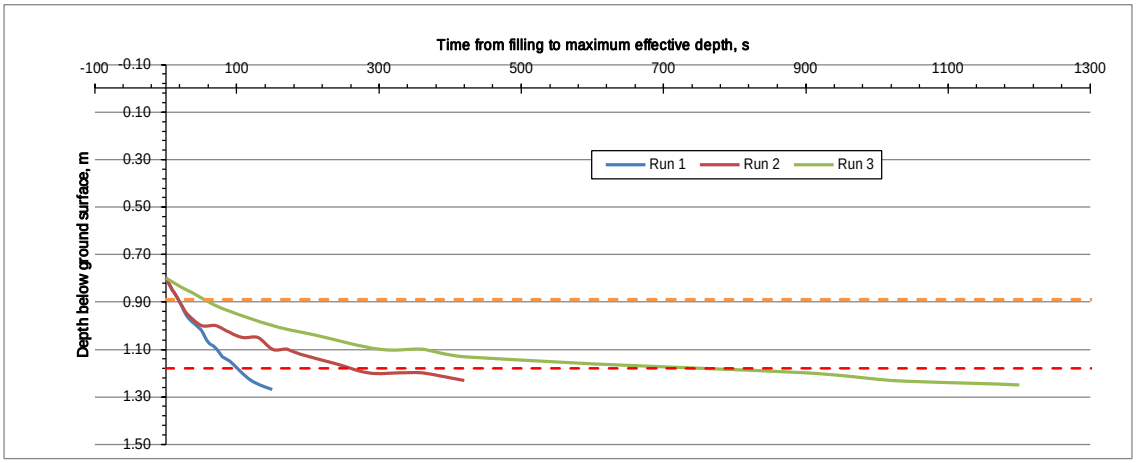
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Engi: ELD / SM Checkei NJL
Date: 29/01/20

Location: SA_305



	Run1
Pit Length (m	2.80
Pit Width (m):	0.70
Pit Depth (m):	1.30

	Run 2
Pit Length (m	2.80
Pit Width (m):	0.70
Pit Depth (m):	1.25

	Run 3
Pit Length (m	2.80
Pit Width (m):	0.70
Pit Depth (m):	1.30

Effective Depth		*0.50*
D_{75} (m)		*0.93*
D_{25} (m)		*1.18*
V_{p75-25} (m^3)		*0.49*

Effective Depth		*0.45*
D_{75} (m)		*0.91*
D_{25} (m)		*1.14*
V_{p75-25} (m^3)		*0.44*

Effective Depth		*0.55*
D_{75} (m)		*0.89*
D_{25} (m)		*1.16*
V_{p75-25} (m^3)		*0.54*

t_{75} (s)		*24.05*
t_{25} (s)		*99.375*
t_{p75-25} (s)		*75.325*
a_{p50} (m^2)		*3.71*
Infiltration Rate (m/s):		1.75E-0

t_{75} (s)		*28.0875*
t_{25} (s)		*118.725*
t_{p75-25} (s)		*90.6375*
a_{p50} (m^2)		*3.535*
Infiltration Rate (m/s):		1.38E-0

t_{75} (s)		*35.6*
t_{25} (s)		*161.3*
t_{p75-25} (s)		*125.7*
a_{p50} (m^2)		*3.885*
Infiltration Rate (m/s):		1.10E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.80
0.16	9.6	0.85
0.33	19.8	0.90
0.50	30	0.96
0.66	39.6	0.99
0.83	49.8	1.02
1.00	60	1.07
1.16	69.6	1.09
1.33	79.8	1.13
1.50	90	1.15
2.00	120	1.23
2.50	150	1.27

Time (m)	Time (s)	Depth (m)
0.00	0	0.80
0.16	9.6	0.83
0.33	19.8	0.88
0.50	30	0.92
0.66	39.6	0.95
0.83	49.8	0.98
1.00	60	1.00
1.33	79.8	1.05
1.66	99.6	1.10
2.00	120.00	1.14
2.33	139.80	1.18
2.66	159.60	1.23

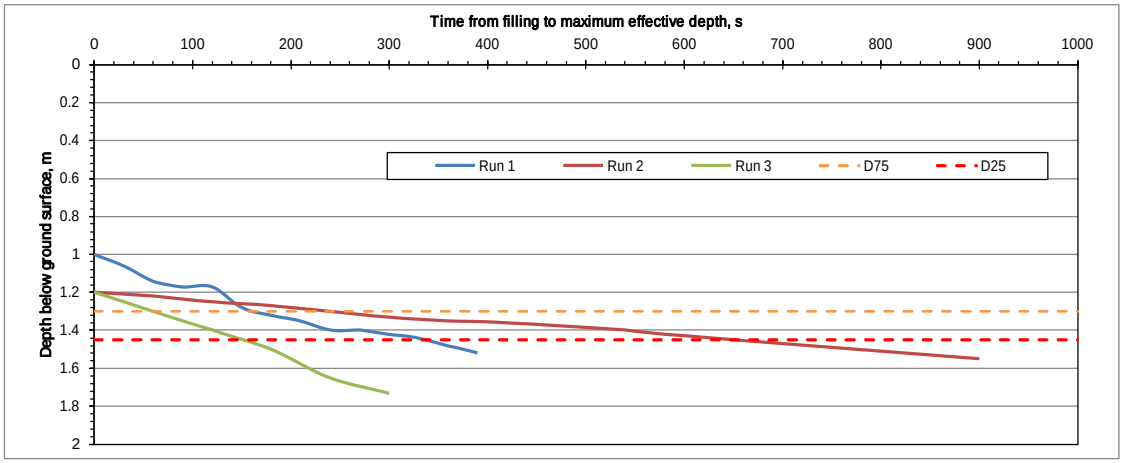
Time (m)	Time (s)	Depth (m)
0.00	0	0.75
0.16	9.6	0.80
0.33	19.8	0.84
0.50	30	0.87
0.66	39.6	0.90
0.83	49.8	0.94
1.00	60	0.97
1.33	79.8	1.00
1.66	99.6	1.05
2.00	120	1.08
2.33	139.8	1.13
2.66	159.6	1.16
3.00	180	1.19
3.33	199.8	1.23

Soil Infiltration T

Based on BRE 365 Soakaway Design

Project:	CG/28824B				
Client:	Hanbury	Eng:	ELD / SM	Checker	NJL
Project:	Cathedral Park, Chichester - Drainage	Date:	30/01/20		

Location: SA_306



	Run1
Pit Length (m	2.45
Pit Width (m):	0.70
Pit Depth (m):	1.60

	Run 2
Pit Length (m	2.45
Pit Width (m):	0.70
Pit Depth (m):	1.60

	Run 3
Pit Length (m	2.45
Pit Width (m):	0.70
Pit Depth (m):	2.05

Effective Depth	*0.60*
D_{75} (m)	*1.15*
D_{25} (m)	*1.45*
V_{p75-25} (m^3)	*0.51*

Effective Depth	*0.40*
D_{75} (m)	*1.30*
D_{25} (m)	*1.50*
V_{p75-25} (m^3)	*0.34*

Effective Depth	*0.85*
D_{75} (m)	*1.4125*
D_{25} (m)	*1.8375*
V_{p75-25} (m^3)	*0.728875*

t_{75} (s)	*217.5*
t_{25} (s)	*555*
t_{p75-25} (s)	*337.5*
a_{p50} (m^2)	*3.605*
Infiltration Rate (m/s):	4.23E-0

t_{75} (s)	*240*
t_{25} (s)	*775*
t_{p75-25} (s)	*535*
a_{p50} (m^2)	*2.975*
Infiltration Rate (m/s):	2.16E-0

t_{75} (s)	*128*
t_{25} (s)	*338*
t_{p75-25} (s)	*210.441176*
a_{p50} (m^2)	*4.3925*
Infiltration Rate (m/s):	7.89E-0

Time (m)	Time (s)	Depth (m)
0.00	0	1
0.50	30	1.06
1.00	60	1.14
1.50	90	1.17
2.00	120	1.17
2.50	150	1.28
3.00	180	1.32
3.50	210	1.35
4.00	240	1.4
4.50	270	1.4
5.00	300	1.42
5.50	330	1.44
6.00	360	1.48
6.50	390	1.52

Time (m)	Time (s)	Depth (m)
0.00	0	1.20
1.00	60	1.22
2.00	120	1.25
3.00	180	1.27
4.00	240	1.30
5.00	300	1.33
6.00	360	1.35
7.00	420	1.36
9.00	540	1.40
10.00	600	1.43
15.00	900	1.55

Time (m)	Time (s)	Depth (m)
0.00	0	1.20
1.00	60	1.30
2.00	120	1.40
3.00	180	1.50
4.00	240	1.65
5.00	300	1.73
6.00	360	1.90
7.00	420	2.05

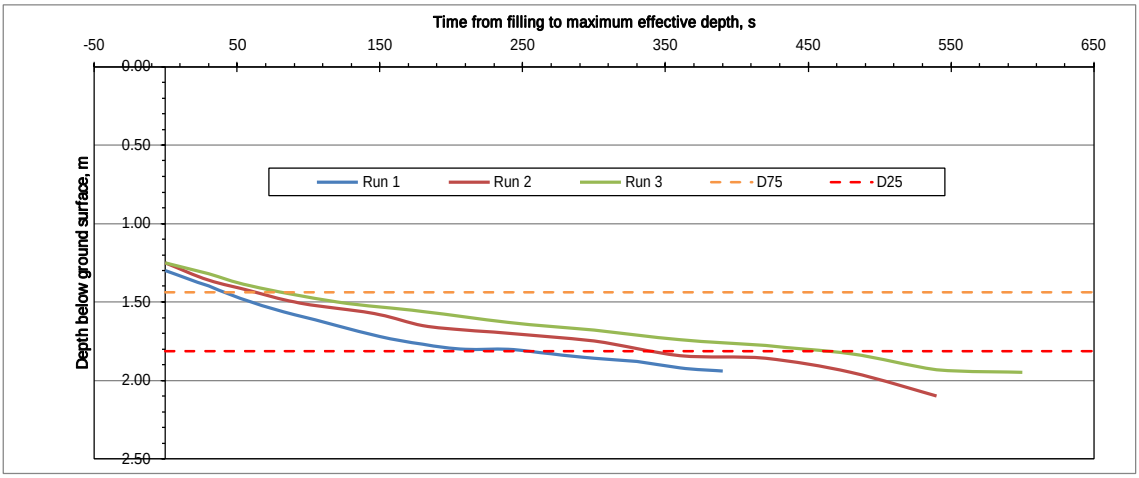
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: ELD / SMS Checke NJI
Date: 30/01/20

Location: SA_307



	Run1
Pit Length (m	2.50
Pit Width (m):	0.70
Pit Depth (m):	2.10

	Run 2
Pit Length (m	2.50
Pit Width (m):	0.70
Pit Depth (m):	2.10

	Run 3
Pit Length (m	2.50
Pit Width (m):	0.70
Pit Depth (m):	2.00

Effective Depth		*0.80*
D_{75} (m)		*1.50*
D_{25} (m)		*1.90*
V_{p75-25} (m^3)		*0.70*

Effective Depth		*0.85*
D_{75} (m)		*1.46*
D_{25} (m)		*1.89*
V_{p75-25} (m^3)		*0.74*

Effective Depth		*0.75*
D_{75} (m)		*1.4375*
D_{25} (m)		*1.8125*
V_{p75-25} (m^3)		*0.65625*

t_{75} (s)		*60*
t_{25} (s)		*345*
t_{p75-25} (s)		*285*
a_{p50} (m^2)		*4.31*
Infiltration Rate (m/s):		5.70E-0

t_{75} (s)		*74*
t_{25} (s)		*438*
t_{p75-25} (s)		*364.40476*
a_{p50} (m^2)		*4.47*
Infiltration Rate (m/s):		4.57E-0

t_{75} (s)		*83*
t_{25} (s)		*459*
t_{p75-25} (s)		*376.5*
a_{p50} (m^2)		*4.15*
Infiltration Rate (m/s):		4.20E-0

Time (m)	Time (s)	Depth (m)
0.00	0	1.30
0.50	30	1.40
1.00	60	1.50
1.50	90	1.58
2.00	120	1.65
2.50	150	1.72
3.00	180	1.77
3.50	210	1.80
4.00	240	1.80
4.50	270	1.83
5.00	300	1.86
5.50	330	1.88
6.00	360	1.92
6.50	390	1.94

Time (m)	Time (s)	Depth (m)
0.00	0	1.25
0.50	30	1.36
1.00	60	1.43
1.50	90	1.50
2.00	120	1.54
2.50	150	1.58
3.00	180	1.65
3.50	210	1.68
4.00	240	1.70
5.00	300	1.75
6.00	360	1.84
7.00	420	1.86
8.00	480	1.95
9.00	540	2.10

Time (m)	Time (s)	Depth (m)
0.00	0	1.25
0.50	30	1.32
1.00	60	1.40
2.00	120	1.50
3.00	180	1.56
4.00	240	1.63
5.00	300	1.68
6.00	360	1.74
7.00	420	1.78
8.00	480	1.83
9.00	540	1.93
10.00	600	1.95

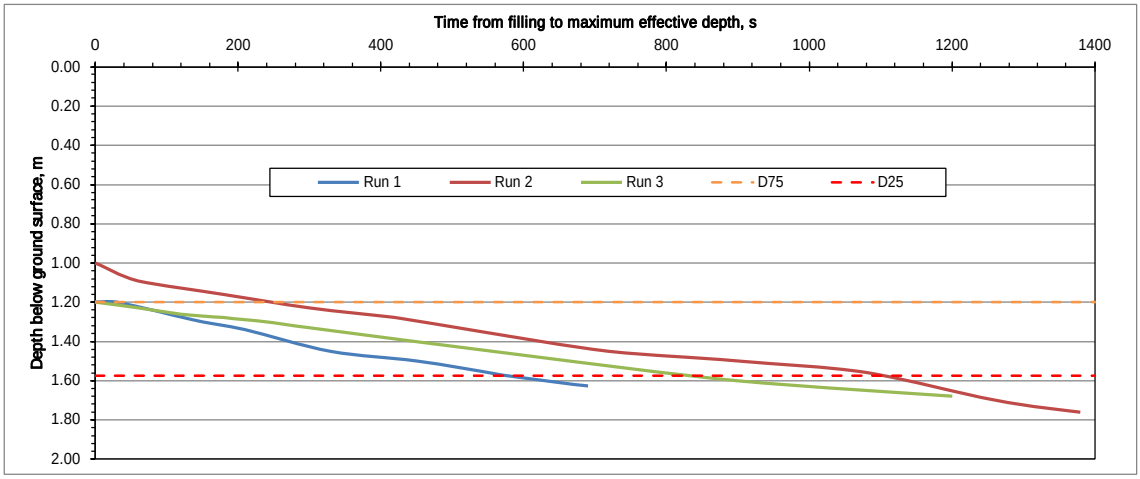
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: ELD / SMS Checke NJI
Date: 30/01/20

Location: SA_308



	Run1
Pit Length (n	2.30
Pit Width (m):	0.70
Pit Depth (m):	1.70

	Run 2
Pit Length (n	2.30
Pit Width (m):	0.70
Pit Depth (m):	1.80

	Run 3
Pit Length (n	2.30
Pit Width (m):	0.70
Pit Depth (m):	1.70

Effective Depth	*0.50*
D_{75} (m)	*1.33*
D_{25} (m)	*1.58*
V_{p75-25} (m^3)	*0.40*

Effective Depth	*0.80*
D_{75} (m)	*1.20*
D_{25} (m)	*1.60*
V_{p75-25} (m^3)	*0.64*

Effective Depth	*0.5*
D_{75} (m)	*1.325*
D_{25} (m)	*1.575*
V_{p75-25} (m^3)	*0.4025*

t_{75} (s)	*206.25*
t_{25} (s)	*655*
t_{p75-25} (s)	*448.75*
a_{p50} (m^2)	*3.11*
Infiltration Rate (m/s):	2.88E-0

t_{75} (s)	*249*
t_{25} (s)	*1131*
t_{p75-25} (s)	*882.85714*
a_{p50} (m^2)	*4.01*
Infiltration Rate (m/s):	1.82E-0

t_{75} (s)	*290*
t_{25} (s)	*842*
t_{p75-25} (s)	*552.30769*
a_{p50} (m^2)	*3.11*
Infiltration Rate (m/s):	2.34E-0

Time (m)	Time (s)	Depth (m)
0.00	0	1.20
0.50	30	1.20
1.50	90	1.25
2.50	150	1.30
3.50	210	1.34
5.50	330	1.45
7.50	450	1.50
9.50	570	1.57
11.50	690	1.63

Time (m)	Time (s)	Depth (m)
0.00	0	1.00
1.00	60	1.09
3.00	180	1.16
5.00	300	1.23
7.00	420	1.28
9.00	540	1.35
12.00	720	1.45
15.00	900	1.50
18.00	1080	1.56
21.00	1260	1.70
23.00	1380	1.76

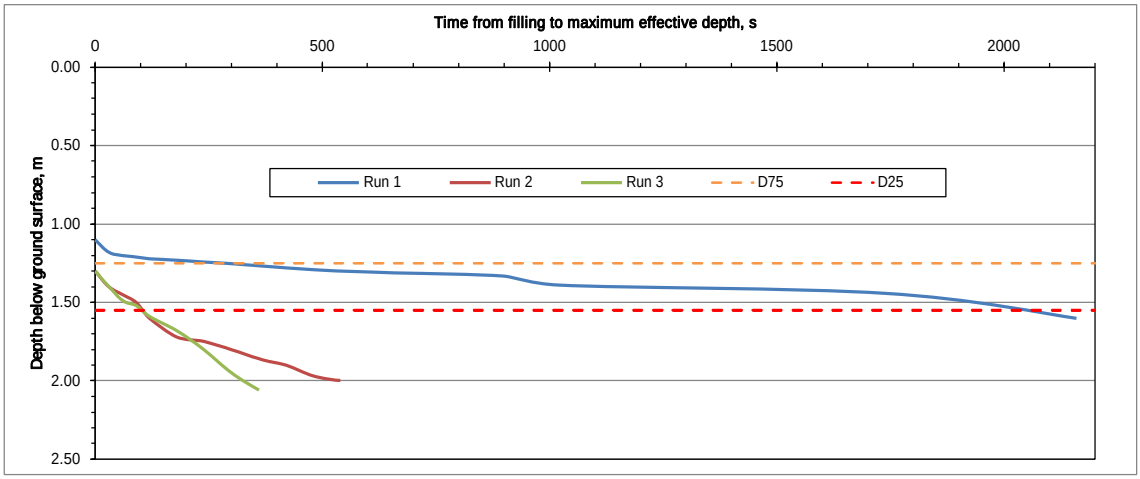
Time (m)	Time (s)	Depth (m)
0.00	0	1.20
1.00	60	1.23
2.00	120	1.26
3.00	180	1.28
4.00	240	1.30
5.00	300	1.33
10.00	600	1.47
15.00	900	1.60
20.00	1200	1.68

Soil Infiltration T

Based on BRE 365 Soakaway Design

Project:	CG/28824B		
Client:	Hanbury	Eng:	ELD / SMS Checke NJI
Project:	Cathedral Park, Chichester - Drainage	Date:	30/01/20

Location: SA_309



	Run1	Run 2	Run 3
Pit Length (n	2.50	2.50	2.50
Pit Width (m):	0.70	0.70	0.70
Pit Depth (m):	1.70	2.00	2.10
Effective Depth	*0.60*	*0.70*	*0.8*
D_{75} (m)	*1.25*	*1.48*	*1.5*
D_{25} (m)	*1.55*	*1.83*	*1.9*
V_{p75-25} (m^3)	*0.53*	*0.61*	*0.7*
t_{75} (s)	*288*	*75*	*70*
t_{25} (s)	*2028.75*	*325*	*280*
t_{p75-25} (s)	*1740.75*	*250*	*210*
a_{p50} (m^2)	*3.67*	*3.99*	*4.31*
Infiltration Rate (m/s):	8.22E-0	6.14E-0	7.73E-0

Time (m)	Time (s)	Depth (m)
0.00	0	1.10
0.50	30	1.18
1.00	60	1.20
2.00	120	1.22
4.00	240	1.24
8.00	480	1.29
11.00	660	1.31
15.00	900	1.33
17.00	1020	1.39
29.00	1740	1.44
36.00	2160	1.60

Time (m)	Time (s)	Depth (m)
0.00	0	1.30
0.50	30	1.40
1.00	60	1.45
1.50	90	1.50
2.00	120	1.60
3.00	180	1.72
4.00	240	1.75
5.00	300	1.80
6.00	360	1.86
7.00	420	1.90
8.00	480	1.97
9.00	540	2.00

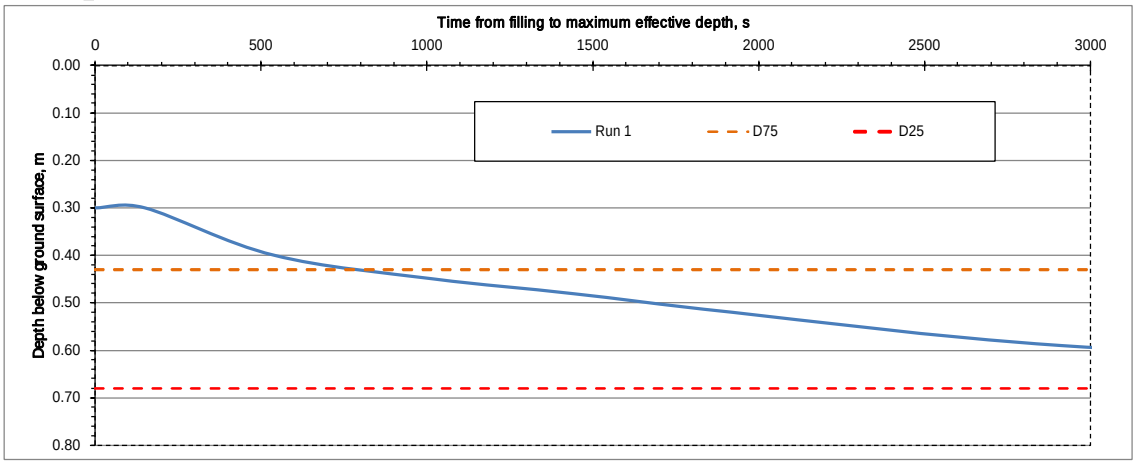
Time (m)	Time (s)	Depth (m)
0.00	0	1.30
0.50	30	1.40
1.00	60	1.49
1.50	90	1.52
2.00	120	1.59
3.00	180	1.68
4.00	240	1.80
5.00	300	1.95
6.00	360	2.06

Soil Infiltration T

Based on BRE 365 Soakaway Design

Project:	CG/28824B				
Client:	Hanbury	Eng:	SM S	Checke	NJL
Project:	Cathedral Park, Chichester - Drainage	Date:	02/03/20		

Location: SA_401



	Run1	Run 2	Run 3
Pit Length (m	3.20		
Pit Width (m):	0.65		
Pit Depth (m):	0.80		
Effective Depth (m)	*0.50*		
D_{75} (m)	*0.43*		
D_{25} (m)	*0.68*		
V_{p75-25} (m^3)	*0.52*		
t_{75} (s)	*780*		
t_{25} (s)	*4776*		
t_{p75-25} (s)	*3996*		
a_{p50} (m^2)	*4.005*		
Infiltration Rate (m/s):	3.25E-0		

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
2.50	150	0.30
9.00	540	0.40
17.00	1020	0.45
24.00	1440	0.48
32.00	1920	0.52
48.50	2910	0.59
71.50	4290	0.63
80.50	4830	0.68
96.50	5790	0.70
106.50	6390	0.71

Time (m)	Time (s)	Depth (m)

Time (m)	Time (s)	Depth (m)

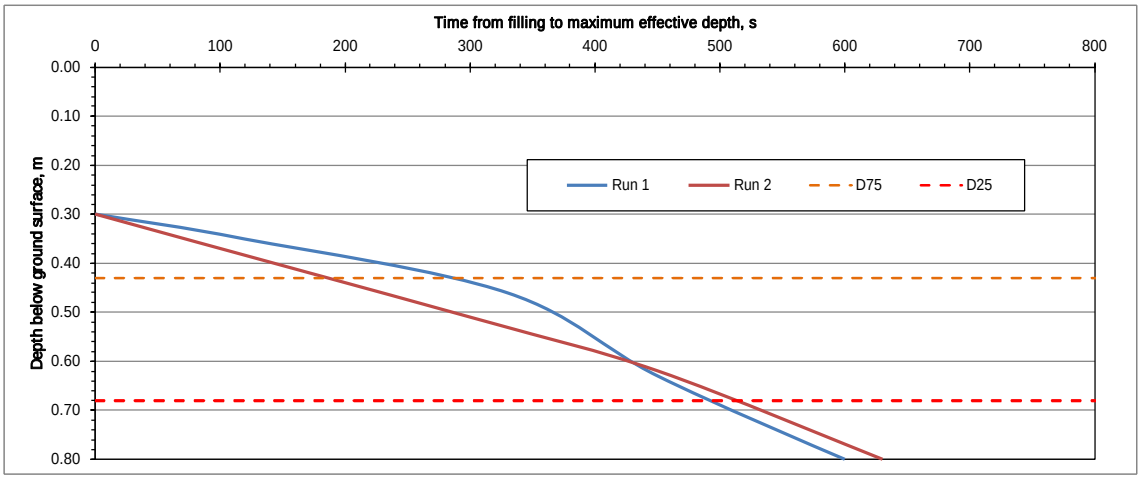
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: SM S Checke NJI
Date: 02/03/20

Location: SA_402



	Run1
Pit Length (n	3.00
Pit Width (m):	0.70
Pit Depth (m):	0.80

	Run 2
Pit Length (n	3.00
Pit Width (m):	0.70
Pit Depth (m):	0.80

	Run 3
Pit Length (n	
Pit Width (m):	
Pit Depth (m):	

Effective Depth (m)	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.53*

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.53*

Effective Depth	
D_{75} (m)	
D_{25} (m)	
V_{p75-25} (m^3)	

t_{75} (s)	*263.18182*
t_{25} (s)	*489.70588*
t_{p75-25} (s)	*226.52406*
a_{p50} (m^2)	*3.95*
Infiltration Rate (m/s):	5.87E-0

t_{75} (s)	*179*
t_{25} (s)	*505*
t_{p75-25} (s)	*326*
a_{p50} (m^2)	*3.95*
Infiltration Rate (m/s):	4.07E-0

t_{75} (s)	
t_{25} (s)	
t_{p75-25} (s)	
a_{p50} (m^2)	
Infiltration Rate (m/s):	

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
2.00	120	0.35
5.50	330	0.46
7.50	450	0.63
10.00	600	0.80

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
5.00	300	0.51
7.50	450	0.62
10.50	630	0.80

Time (m)	Time (s)	Depth (m)

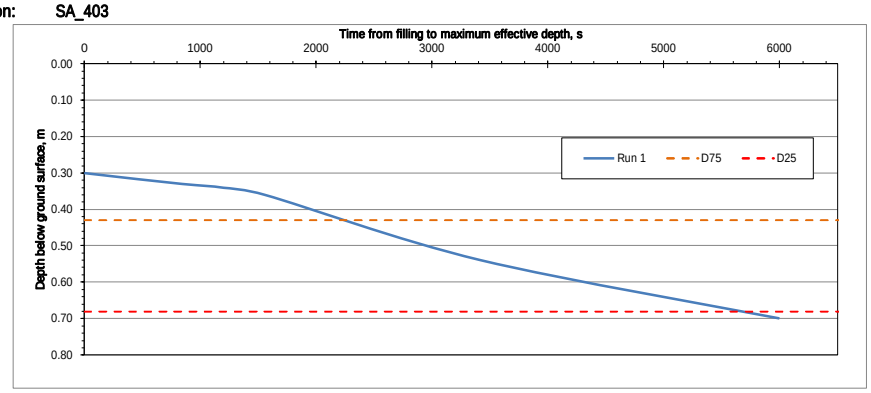
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: SM S **Checke** NJL
Date: 02/02/20

Location: SA_403



	Run1	Run 2	Run 3
Pit Length (n	3.00		
Pit Width (m):	0.60		
Pit Depth (m):	0.80		
Effective Depth (m)	*0.50*		
D_{75} (m)	*0.43*		
D_{25} (m)	*0.68*		
V_{p75-25} (m^3)	*0.45*		
t_{75} (s)	*2231.6667*		
t_{25} (s)	*5596.88*		
t_{p75-25} (s)	*3365.2083*		
a_{p50} (m^2)	*3.6*		
Infiltration Rate (m/s):	3.71E-0		

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
14.00	840	0.33
20.00	1200	0.34
26.00	1560	0.36
57.00	3420	0.54
100.00	6000	0.70

Time (m)	Time (s)	Depth (m)

Time (m)	Time (s)	Depth (m)

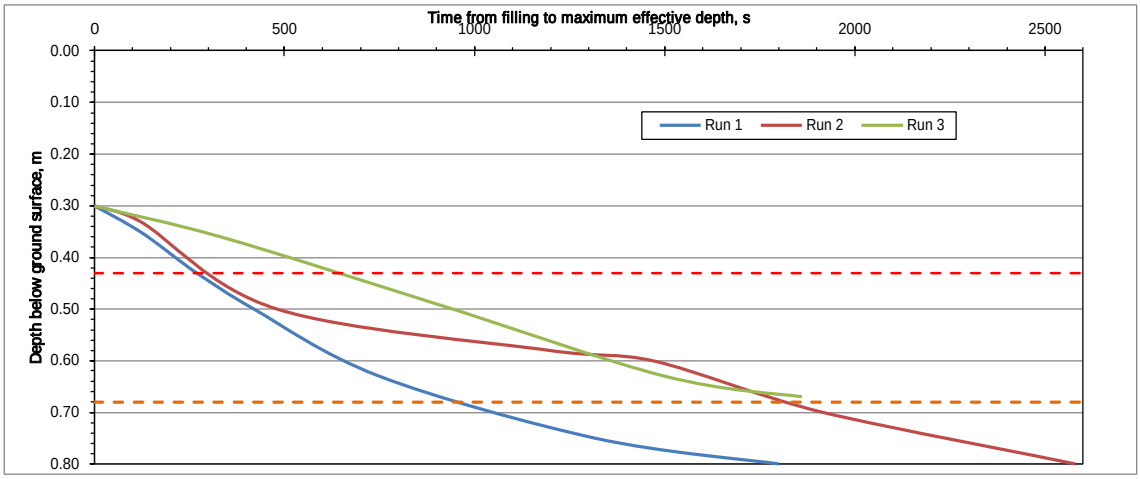
Notes:

Soil Infiltration T

Based on BRE 365 Soakaway Design

Project:	CG/28824B		
Client:	Hanbury	Eng:	SM S Checke NJI
Project:	Cathedral Park, Chichester - Drainage	Date:	02/03/20

Location: SA_404



	Run1
Pit Length (m	2.60
Pit Width (m):	0.60
Pit Depth (m):	0.80

	Run 2
Pit Length (m	2.60
Pit Width (m):	0.60
Pit Depth (m):	0.80

	Run 3
Pit Length (m	2.60
Pit Width (m):	0.60
Pit Depth (m):	0.80

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.39*

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.39*

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.39*

t_{75} (s)	*260.625*
t_{25} (s)	*963.75*
t_{p75-25} (s)	*703.125*
a_{p50} (m^2)	*3.16*
Infiltration Rate (m/s):	1.76E-0

t_{75} (s)	*321*
t_{25} (s)	*1808*
t_{p75-25} (s)	*1486.3235*
a_{p50} (m^2)	*3.16*
Infiltration Rate (m/s):	8.30E-0

t_{75} (s)	*615*
t_{25} (s)	*540*
t_{p75-25} (s)	*-75*
a_{p50} (m^2)	*3.16*
Infiltration Rate (m/s):	-1.65E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
2.00	120	0.35
4.50	270	0.43
7.00	420	0.50
12.50	750	0.63
22.00	1320	0.75
30.00	1800	0.8

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
2.00	120	0.33
8.00	480	0.50
20.00	1200	0.58
24.50	1470	0.60
32.00	1920	0.70
43.00	2580	0.80

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
5.50	330	0.36
15.00	900	0.49
25.00	1500	0.63
31.00	1860	0.67

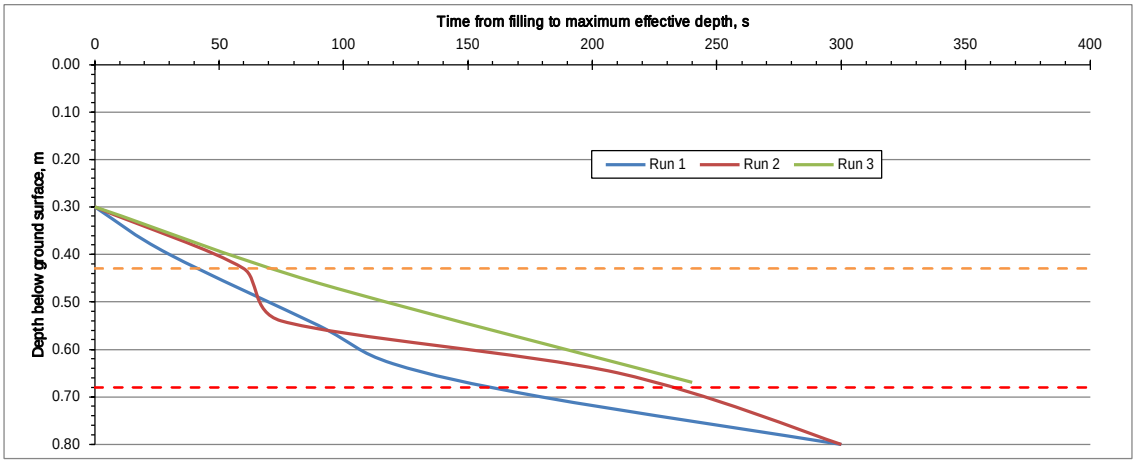
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: SM S Checke NJL
Date: 02/03/20

Location: SA_405



	Run1
Pit Length (m	3.00
Pit Width (m):	0.70
Pit Depth (m):	0.80

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.53*

t_{75} (s)	*40*
t_{25} (s)	*158.57143*
t_{p75-25} (s)	*118.57143*
a_{p50} (m^2)	*3.95*
Infiltration Rate (m/s):	1.12E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
0.50	30	0.40
1.50	90	0.55
2.00	120	0.63
3.00	180	0.70
5.00	300	0.80

	Run 2
Pit Length (m	3.00
Pit Width (m):	0.70
Pit Depth (m):	0.80

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.53*

t_{75} (s)	*57.692308*
t_{25} (s)	*225*
t_{p75-25} (s)	*167.30769*
a_{p50} (m^2)	*3.95*
Infiltration Rate (m/s):	7.94E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
1.00	60	0.43
1.25	75	0.54
3.50	210	0.65
5.00	300	0.80

	Run 3
Pit Length (m	3.00
Pit Width (m):	0.70
Pit Depth (m):	0.80

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.53*

t_{75} (s)	*70.3125*
t_{25} (s)	*161.3*
t_{p75-25} (s)	*90.9875*
a_{p50} (m^2)	*3.95*
Infiltration Rate (m/s):	1.46E-0

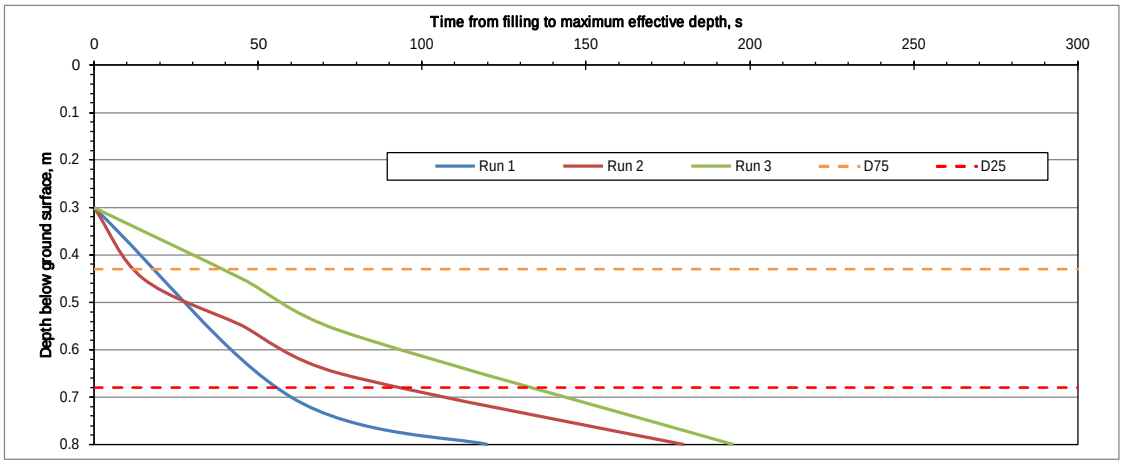
Time (m)	Time (s)	Depth (m)
0.00	0	0.30
1.50	90	0.46
4.00	240	0.67

Soil Infiltration T

Based on BRE 365 Soakaway Design

Project:	CG/28824B				
Client:	Hanbury	Eng:	SM S	Checker	NJL
Project:	Cathedral Park, Chichester - Drainage	Date:	02/03/20		

Location: SA_406



	Run1
Pit Length (m	2.60
Pit Width (m):	0.70
Pit Depth (m):	0.80

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.46*

t_{75} (s)	*18.75*
t_{25} (s)	*56.25*
t_{p75-25} (s)	*37.5*
a_{p50} (m^2)	*3.47*
Infiltration Rate (m/s):	3.50E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.3
1.00	60	0.7
2.00	120	0.8

	Run 2
Pit Length (m	2.60
Pit Width (m):	0.70
Pit Depth (m):	0.80

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.46*

t_{75} (s)	*13*
t_{25} (s)	*93*
t_{p75-25} (s)	*80*
a_{p50} (m^2)	*3.47*
Infiltration Rate (m/s):	1.64E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
0.25	15	0.45
0.75	45	0.55
1.25	75	0.65
3.00	180	0.80

	Run 3
Pit Length (m	2.60
Pit Width (m):	0.70
Pit Depth (m):	0.80

Effective Depth	*0.5*
D_{75} (m)	*0.425*
D_{25} (m)	*0.675*
V_{p75-25} (m^3)	*0.455*

t_{75} (s)	*38*
t_{25} (s)	*133*
t_{p75-25} (s)	*95*
a_{p50} (m^2)	*3.47*
Infiltration Rate (m/s):	1.38E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
0.75	45	0.45
1.25	75	0.56
3.25	195	0.80

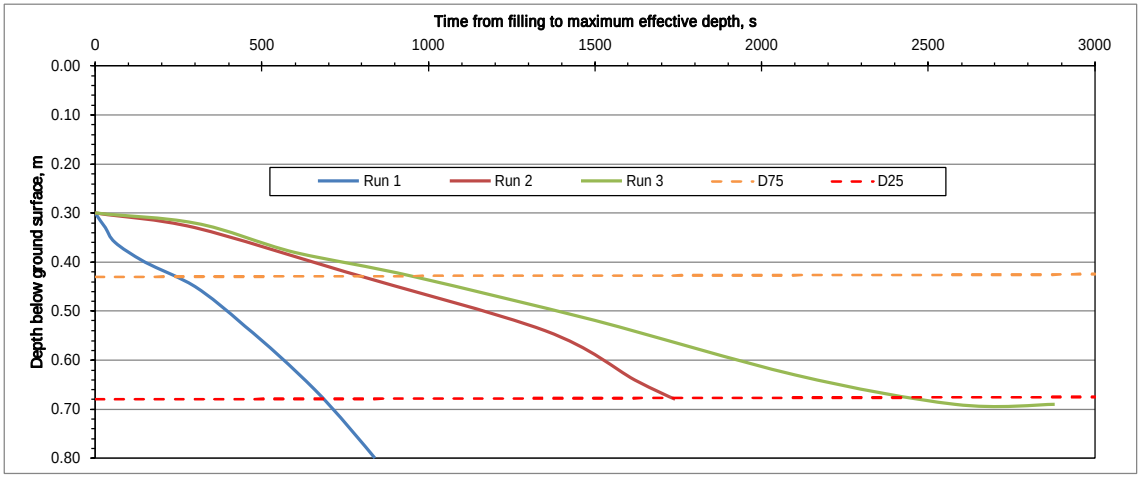
Soil Infiltration T

Based on BRE 365 Soakaway Design

Project: CG/28824B
Client: Hanbury
Project: Cathedral Park, Chichester - Drainage

Eng: SM S Checke NJI
Date: 02/03/20

Location: SA_407



	Run1
Pit Length (n	3.30
Pit Width (m):	0.75
Pit Depth (m):	0.80

	Run 2
Pit Length (n	3.30
Pit Width (m):	0.75
Pit Depth (m):	0.80

	Run 3
Pit Length (n	3.30
Pit Width (m):	0.75
Pit Depth (m):	0.80

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.62*

Effective Depth	*0.50*
D_{75} (m)	*0.43*
D_{25} (m)	*0.68*
V_{p75-25} (m^3)	*0.62*

Effective Depth	*0.5*
D_{75} (m)	*0.425*
D_{25} (m)	*0.675*
V_{p75-25} (m^3)	*0.61875*

t_{75} (s)	*225*
t_{25} (s)	*679.28571*
t_{p75-25} (s)	*454.28571*
a_{p50} (m^2)	*4.5*
Infiltration Rate (m/s):	3.03E-0

t_{75} (s)	*775*
t_{25} (s)	*1725*
t_{p75-25} (s)	*950*
a_{p50} (m^2)	*4.5*
Infiltration Rate (m/s):	1.45E-0

t_{75} (s)	*924*
t_{25} (s)	*2460*
t_{p75-25} (s)	*1536*
a_{p50} (m^2)	*4.5*
Infiltration Rate (m/s):	8.95E-0

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
0.50	30	0.33
1.00	60	0.36
2.50	150	0.40
5.00	300	0.45
7.50	450	0.53
11.00	660	0.66
14.00	840	0.80

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
5.00	300	0.33
12.50	750	0.42
22.50	1350	0.54
27.00	1620	0.64
29.00	1740	0.68

Time (m)	Time (s)	Depth (m)
0.00	0	0.30
5.00	300	0.32
10.00	600	0.38
16.00	960	0.43
25.00	1500	0.52
35.00	2100	0.63
43.00	2580	0.69
48.00	2880	0.69

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PROJECT No. RML 8530

SITE INVESTIGATION

AT
BOGNOR ROAD, CHICHESTER PO20 1EJ

ON BEHALF OF
WHITBREAD PLC

AUGUST 2023

DOCUMENT CONTROL

Project:	Bognor Road, Chichester West Sussex, PO20 1EJ
Title:	Site Investigation
Client:	Whitbread PLC
Reference:	RML 8503
Prepared by:	[redacted] Malcolm S. Price B.Sc., M.Sc., M.I.C.E., C.Eng. M.I.Env.Sc. Director
Checked by:	[redacted] Stephen O'Hara M.I.Env.Sc. Project Engineer
Approved by:	[redacted] Richard Price B.Sc. (Hons), F.G.S., M.I.Env.Sc. Director
Distribution :	Simpson TWS - pdf copy

Issue/revision	Date	Status	Issued by
1	**22/08/23**	**Approved**	**MSP**

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3.0	GROUND CONDITIONS	Page 7
4.0	LABORATORY TESTING	Pages 8-9
5.0	DISCUSSION & RECOMMENDATIONS	Pages 10-20

APPENDICES

Light Percussion Borehole Records (BH1-BH5)
Mechanically Excavated Trial Pit Records (TP1 & TP2)
SPT versus Depth Profiles
Soil infiltration Test Results Sheets (SA1 & SA2)
Laboratory Test Results
Gas/Groundwater Monitoring Results Sheet
Proposed Site Plan - Messrs. Axiom Architects Drawing No. 4011-F9 100 Revision E
Sketch Fieldwork Location Plan, Drawing No. RML 8530/1

1.0 INTRODUCTION & SCOPE OF WORKS

1.1 This report has been prepared by Risk Management Limited (RML) for the Client, Whitbread PLC, under cover of a signed Instructions to Proceed received from the Consulting Engineers for the project, Messrs. Simpson TWS, dated 7th June 2023.

1.2 The site under consideration is the south-western portion of a larger site which, it is understood, was a Second World-War Fuel Depot which previously contained bunded areas, fuel tanks, storage tanks etc.

1.3 A Phase 1, Non-Intrusive, Environmental Risk Assessment and a Phase II, Intrusive, Site Investigation have already been undertaken across the larger site, which includes the current site, by Messrs Constructive Evaluation Limited. These Reports have been made available to RML for information purposes.

1.4 It is understood that a multi-storey, Premier Inn Hotel, together with associated car parking, is currently proposed at this site as indicated on the appended Proposed Site Plan, Messrs. Axiom Architects Drawing No. 4011-F9 100, Revision E.

1.5 The current work was designed to obtain additional information on the sub-soil conditions at this site, together with some laboratory testing, in order to provide baseline information for any subsequent foundation design by others. The results of the laboratory testing and the gas monitoring also provide information to determine the requirement for gas protection measures and ground remediation at this site.

1.6 This report presents the work carried out and discusses the findings.

2.0 FIELDWORK

2.1 Fieldwork was generally executed in accordance with the recommendations given in British Standard BS EN 1997-1:2004+A1:2013, BS EN 1997-2:2007 (Eurocode 7: Geotechnical Design – Parts 1 and 2) and BS 5930:2015+A1:2020, "Code of Practice for Ground Investigations". Contamination sampling was undertaken in accordance with BS 10175:2011+A2, "Code of Practice for the Investigation of Potentially Contaminated Sites".

2.2 Borehole and Trial Pit locations are shown on the appended Sketch Fieldwork Location Plan, Drawing No. RML 8530/1.

2.3 Intrusive fieldwork was undertaken on the 4th July 2023 and 1st August 2023 and comprised the following:-

Light Percussion Boreholes

2.4 A total of 5 No. light percussion boreholes (BH1-BH5) were drilled across the site to depths of between 3.00m and 3.45m below existing ground level.

2.5 The drilling rig used was a Premier tracked drive-in-sampler rig which utilises a series of 1-metre long metal tubes driven into the ground, varying in diameter from 131mm down to 35mm, in combination with a 98mm casing system, to obtain disturbed samples at regular depth intervals.

2.6 In addition, Standard Penetration Test (SPT) 'N' values were obtained within the boreholes at regular depth intervals, in order to provide additional information on the consistency of the material encountered. The appended SPT versus Depth Profile includes a plot of SPT 'N' values against depth for all five boreholes at this site.

2.7 The SPT test comprises a weight of 63.6 kg dropping through a free-fall height of 762mm in accordance with British Standard BS 1377 : Part 9. The weight drives a 50mm diameter "split-spoon" sampler into the ground. The resistance to penetration is recorded for 6 consecutive 75mm increments with the SPT 'N' value calculated from an addition of the final four 4 readings.

2.8 Upon completion of boreholes BH3 and BH4 combined gas/groundwater monitoring standpipes were installed to a depth of 3.00m below existing ground level.

2.9 The monitoring installations comprise a 1 metre length of plain 50mm diameter HDPE pipe followed by slotted geotextile wrapped HDPE pipe, capped at the base. A cement/bentonite seal was installed between the plain and slotted pipework. The installations were finished with a gas valve on top of the pipe with a lockable stopcock cover cemented in flush to existing ground level.

2.10 Full details of the light percussion borehole findings are given on the appended borehole record sheet.

MEXE Probe CBR Tests

2.11 In-situ MEXE Probe tests were undertaken at depths of 0.50m and 1.00m below existing ground level within all five boreholes in order to provide California Bearing Ratio (CBR) information.

2.12 The MEXE Probe consists of a cast aluminium housing containing a calibrated compression spring, operating shafts and dials with a CBR cone. The instrument is forced into the ground and an average of the readings obtained is considered the CBR value.

2.13 The following CBR test values were obtained:-

BH1	-	0.50m (MADE GROUND)	-	3%
BH1	-	1.00m (MADE GROUND)	-	3%
BH2	-	0.50m (MADE GROUND)	-	2%
BH2	-	1.00m (GRAVEL)	-	11%
BH3	-	0.50m (MADE GROUND)	-	4%
BH3	-	1.00m (GRAVEL)	-	>14%
BH4	-	0.50m (MADE GROUND)	-	3%
BH4	-	1.00m (GRAVEL)	-	9%
BH5	-	0.50m (MADE GROUND)	-	6%
BH5	-	1.00m (GRAVEL)	-	>14%

BRE 365 Soil Infiltration Tests

2.14 Two mechanically excavated Trial Pits (TP1 & TP2) were excavated, at locations chosen by the Consulting Engineers, in order to allow BRE 365 Soil Infiltration Tests to be undertaken.

2.15 The dimensions of the Trial Pits were recorded and the sides of the Trial Pits kept as vertical as possible. Upon completion Soil Infiltration Tests were carried out, generally in accordance with the recommendations given in BRE Digest 365 "Soakaway Design".

2.16 The purpose of the Soil Infiltration test is to determine the permeability of the soil so that soakaways can be designed for the required flow rate and frequency of use.

2.17 The trial pits were filled with water as quickly as possible and the time noted for the start of the test. The depth to the bottom of the pit at the start of the test was measured and the time and depth from ground level to water surface was then recorded at regular intervals as the water level fell within the trial pit. Water was supplied from a 2000 gallon tanker situated as close to the excavations as possible and water pumped through pipework directly into the trial pit.

2.18 Full details of the Trial Pits undertaken, including photographs of the excavations, are given on the appended Mechanically Excavated Trial Pit Records (TP1 & TP2). In addition, full details of the BRE 365 Soil Infiltration Tests are given on the appended Soil Infiltration Test Results Sheets (SA1 & SA2).

Land-Borne Gas and Groundwater Monitoring

2.19 Following the initial site works, four return gas/groundwater monitoring visits have been undertaken to the installations fitted within boreholes BH3 and BH4 on the 25th July and 1st, 8th and 15th August 2023.

2.20 It should be noted that, whilst the current investigation was underway, groundworks were being carried out across the site by others and this resulted in some initial damage to the monitoring installations installed by RML. These were repaired but caused a delay in undertaking all the scheduled monitoring visits.

2.21 On each visit the barometric pressure was recorded together with the level of Carbon Dioxide, Oxygen and Methane. In addition, gas flow measurements were taken and the depth to groundwater recorded.

2.22 Full details of the readings obtained are included on the appended Gas/Groundwater Monitoring Record Sheet.

3.0 GROUND CONDITIONS

3.1 According to information published by the British Geological Survey (BGS) the underlying geology at this site is shown as being Recent River Terrace Deposits overlying London Clay of the Eocene Period.

3.2 The underlying London Clay was not encountered during the current work but was noted in previous investigation work to be circa 6 metres below existing ground level.

3.3 Full details of the ground conditions encountered during the current work are presented on the borehole records appended to this report and can be summarised as follows:-

Depth From (m)	Depth To (m)	Description
0.00	0.80/1.10	MADE GROUND.
0.80/1.10	3.45m +	GRAVEL with occasional slightly clayey silt and sand.

3.4 Groundwater was noted during boring in borehole BH3 at 2.70m depth, borehole BH4 at 2.60m depth and borehole BH5 at 2.70m depth. Groundwater was also noted in trial pit TP1 at 2.40m depth and in trial pit TP2 at 2.35m depth.

3.5 Groundwater was not noted during all four of the return monitoring visits to the installations fitted within boreholes BH3 and BH4.

3.6 However, it should be noted that, as discussed in paragraph 2.20 above, groundworks were being carried out across the site by others and this may explain differences in groundwater levels between the initial boreholes and subsequent trial pits and monitoring visits.

4.0 LABORATORY TESTING

4.1 The following geotechnical and chemical laboratory tests have been carried out on samples recovered from the boreholes at this site.

4.2 Unless otherwise stated, the geotechnical tests have generally been carried out in accordance with the recommendations given in British Standard 1377-1:2016, "Methods of Test for Soils for Civil Engineering Purposes".

4.3 The chemical testing was carried out in accordance with standard industry methods in a UKAS approved laboratory which is also currently accredited in accordance with MCERTS for the majority of its testing. Further information regarding this accreditation is available on request together with a full list of test methods if required.

Particle Size Distribution

4.4 The particle size distribution has been determined for eight samples of the more granular soils encountered.

The results are presented as grading curves in the appendix to this report.

pH and Sulphate Tests

4.5 The pH has been determined for a total of five samples from across the site and was found to range between 8.0 and 8.7.

The sulphate content has been determined for two samples, taken from depths of 0.50m and 1.50m below existing ground level and was found, on a 2:1 water:soil extract, to be 0.320 g/l and 0.026 g/l, respectively.

Chemical Analysis

4.6 Four samples of MADE GROUND were selected and tested for a range of commonly occurring contaminants and indicators of contamination including those given by the Contaminated Land Exposure Assessment (CLEA).

The contamination suite undertaken at this site includes Metals, speciated PolyAromatic Hydrocarbon (PAH) and speciated Total Petroleum Hydrocarbon (TPH), together with BTEX, Benzene, Toluene, Ethylbenzene and Xylenes.

Waste Acceptance Criteria Tests

4.7 Two samples of the MADE GROUND were also selected and tested for Waste Acceptance Criteria (WAC) testing in accordance with BS EN 12457 Part 3.

Full details of the results are given on the appended result sheet.

Asbestos Identifications

4.8 The samples noted above, discussed in paragraphs 4.6 and 4.7, were also submitted to a UKAS accredited laboratory for asbestos identification and, if encountered, gravimetrical analysis. Full details of the results are appended.

5.0 DISCUSSION & RECOMMENDATIONS

PROPOSED DEVELOPMENT & SCOPE OF WORKS

5.1 As discussed in Section 1.0 of this Report, it is understood that a multi-storey, Premier Inn Hotel, together with associated car parking, is proposed at this site as indicated on the appended Proposed Site Plan, Messrs. Axiom Architects Drawing No. 4011-F9 100, Revision E.

5.2 The current work was, therefore, designed to obtain additional information on the sub-soil conditions at this site, together with some laboratory testing, in order to provide baseline information for any subsequent foundation design by others. The results of the laboratory testing and the gas monitoring also provide information to determine the requirement for gas protection measures and ground remediation at this site.

FOUNDATION DESIGN

5.3 The boreholes at this site all encountered MADE GROUND to between 0.80m and 1.10m depth overlying GRAVEL with occasional slightly clayey silt and sand. The GRAVEL was not penetrated at the borehole termination depths of between 3.00m and 3.45m below existing ground level.

5.4 Based on the current findings, conventional strip or pad footings should be founded below any MADE GROUND in the underlying GRAVEL at a minimum depth of 1.50m below existing ground level, where an allowable bearing pressure of 100 kN/m^2 could be adopted. This could be increased to 150 kN/m^2 at 2.00m depth and to 200 kN/m^2 at 2.50m depth.

5.5 Settlement due to the above noted order of loading would not be expected to exceed 20-25mm.

5.6 From the evidence of the current boreholes, shallow foundation or service excavations deeper than about 1 metre are likely to require support in the short-term in the MADE GROUND and underlying GRAVEL and we would recommend that a contingency is made for this at this stage.

5.7 Groundwater was noted during boring in borehole BH3 at 2.70m depth, borehole BH4 at 2.60m depth and borehole BH5 at 2.70m depth. Groundwater was also noted in trial pit TP1 at 2.40m depth and in trial pit TP2 at 2.35m depth.

5.8 Groundwater was not noted during all four of the return monitoring visits to the installations fitted within boreholes BH3 and BH4. However, again, it should be noted that, as discussed in paragraph 2.20 above, groundworks were being carried out across the site by others and this may explain differences in groundwater levels between the initial boreholes and subsequent trial pits and monitoring visits.

5.9 It should also be noted that should ground conditions differing significantly from those described in our report be encountered during foundation excavation, then Risk Management Limited should be contacted immediately foundation design may need to be altered accordingly.

GROUND BEARING FLOOR SLABS

5.10 As mentioned above the superficial material encountered across the site consists of MADE GROUND. Owing to the variations of strength within the upper soil, to adopt ground bearing floor slabs would require significant "proof rolling". Notwithstanding this we would not recommend an allowable bearing pressure of more than 20 to 30 kN/m^2 to keep settlements of the ground bearing floor slab to within acceptable limits.

5.11 In addition, there will inevitably be significant lateral and vertical variations in the quality and density of the MADE GROUND resulting in the potential for differential settlements across ground bearing floor slabs. This should be noted with respect to service connections into buildings and where applicable additional reinforcement may be required within the slab itself.

5.12 Should a ground bearing floor slabs be considered then we would recommend that, as a minimum, approximately 0.50m of material beneath the slab sub-base is removed and replaced with a graded sub-base material with a DPM between the sub-base material and the concrete slab itself. However, it should be noted that a suspended ground floor slab may be required at this site owing to the presence of methane as discussed in paragraph 5.19 of this report, below.

ROAD PAVEMENT DESIGN

5.13 The results of the current work recorded CBR values, in boreholes BH1-BH5 recorded CBR values of between 2% and 6% in MADE GROUND and between 9% and >14% in the underlying GRAVEL.

5.14 We would therefore recommend a CBR value of 8%-10% be adopted for road pavement design in the GRAVEL and some 2%-3% in the overlying MADE GROUND.

BRE 365 INFILTRATION TESTS

5.15 The two BRE 365 Soil Infiltration Tests undertaken at this site both completed three full fillings and the following Soil Infiltration Rates (f) were calculated;

TP1 - $f = 3.85 \times 10^{-4}$ m/sec.
TP2 - $f = 4.97 \times 10^{-4}$ m/sec.

5.16 Based on these results, soakage was generally 'good' and conventional shallow soakaways are, therefore, likely to be successful at this location. However, the depth to groundwater should be taken into consideration in the design of any new soakaways.

PILED FOUNDATIONS

5.17 Should piled foundations be required at this site then reference should be made to the previous Phase II, Intrusive, Site Investigation already undertaken by Messrs Constructive Evaluation Limited, as this Report contains deeper boreholes and a discussion on piled foundations.

BURIED CONCRETE

5.18 The results of the current chemical analyses indicates that both samples tested would fall into Class DS-1 of the Building Research Establishments (BRE) classification system Special Digest Part 1:2005 "Concrete in aggressive ground".

LAND-BORNE GAS

5.19 During the three return gas/groundwater monitoring visits to the installation fitted within boreholes BH3 and BH4, significant levels of Methane were detected in borehole BH4 with levels of between 42.4% and 91.4% being recorded.

5.20 Therefore, in accordance with the methodology set out in BS 8485:2015, land borne gas remedial measures will be required at this site.

5.21 The final design and specification of any gas protection system should be undertaken by a specialist consultant and comply with the requirements of BS 8485:2015 - Sections 7 & 8. The gas protection system should be independently tested to ISO 15105-1 and comply with the requirements of BS 8485:2015 - Section 8.

PRELIMINARY CONTAMINATION ASSESSMENT

5.22 Part IIA of the Environmental Protection Act 1990 contains the legislative framework for the regulation of contaminated land and this was implemented in the Contaminated Land (England) Regulations 2000. This legislation allows for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment. The approach adopted by the UK contaminated land policy is "suitable for use" which implies that the land should be suitable for its current use and made suitable for any known future use.

5.23 For this Preliminary Contamination Assessment the site has been modelled using the Source-Pathway-Receptor approach to produce a Conceptual Site Model.

Source (substances or potential contaminants which may cause harm)

Pathway (a linkage route between the source and receptor)

Receptor (something which may be harmed by the source e.g. humans, plant, groundwater)

5.24 Source

Four samples of MADE GROUND were selected and tested for a range of commonly occurring contaminants and indicators of contamination including those given by the Contaminated Land Exposure Assessment (CLEA).

5.25 Pathways

The pathways needing to be considered, as discussed above, depend on the land usage, and will include for, example; Dermal contact, soil ingestion and inhalation of vapour and dust, where this is applicable.

5.26 Receptors

From the currently proposed development at the site, the following potential receptors have been identified.

Site workers likely to come into contact with the soils.
New neighbouring buildings.
Users of the Premier Inn Hotel.
Controlled Waters.

5.27 It should be noted that the CLEA software has limited functionality and contains algorithms, which the EA has publicly expressed its intention to update. As a consequence of this, some of the screening values generated by the CLEA software may not adequately reflect specific site conditions and, in some instances, are unduly conservative. In addition, it should also be noted that the figures given in the appended table are based on a 6% soil organic matter content.

5.28 The DEFRA/EA model has been developed on the basis of many critical assumptions about possible exposure to soil contamination and the development of conceptual exposure models to describe different land uses as follows:

Residential with consumption of home-grown fruit and vegetables
Residential without consumption of home-grown fruit and vegetables
Allotments
Commercial

5.29 The Contaminated Land Exposure Assessment (CLEA) model was originally published in March 2002 as joint DEFRA/EA publications; Contaminated Land Research (CLR) Report CLR 10, with Reports CLR7, 8 and 9 as supporting documents, providing toxicity data and human tolerable daily intake (TDI) data to be used with this model. This model enabled the derivation of more site-specific values for contaminants present on a site, rather than the use of 'generic' values, which were previously used.

5.30 DEFRA/EA previously published a number of Soil Guideline Values (SGVs) for certain determinands, (common toxic metals), which were generic guideline criteria for assessing the risks to human health from chronic exposure to soil contamination for standard land-use functions. However, these were withdrawn in late 2008 and DEFRA/EA have now issued a new set of guidance documents. With regard to the Risk Management Limited standard suite of tests, currently SGV figures have only been issued for Arsenic, Cadmium, Mercury, Nickel, Phenols and Selenium.

5.31 In the absence of currently published SGV values for the remaining contaminants, Messrs. W. S. Atkins have derived ATRISK^{soil} Soil Screening Values (SSVs) which have been updated using CLEA v1.071 to incorporate changes to exposure assessment parameters, methodology, and land uses as set out in the Department for Environment, Food and Rural Affairs (Defra) Category 4 Screening Level (C4SL) Project Methodology Report.

5.32 Full details of how the SSVs have been derived and general notes as to their use are given on the ATRISK website and are available from Risk Management Limited upon request. A few of the PAH levels have not been updated and have been left as per the previous CLEA v1.04 derivation.

5.33 The SGV and SSV levels represent "intervention" levels above which the levels of contamination may pose an unacceptable risk to the health of site-users such that further investigation and/or remediation is required.

5.34 Total Petroleum Hydrocarbons are considered in accordance with the fractions proposed by The Environment Agency, drawing on the TPHCWG methodology. These are contained in Table 4.2 – Petroleum hydrocarbon fractions for use in UK human health risk assessment, based on Equivalent Carbon (EC) number, contained in Science Report P5-080/TR3, The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils.

5.35 Currently, there is no Soil Guideline Value (SGV) for asbestos, so operatives within the industry usually work to >0.1% for hazardous waste definition, and >0.001% for human health risk assessment. The 0.1% value is taken from a document produced by the Interdepartmental Committee for the Redevelopment of Contaminated Land (ICRCL), 1990, Guidance note 64/85 'Asbestos on Contaminated Sites', (but this does not take into account the 2006 regulations) and the 0.001% value is based on research conducted at the Institute of Occupational Medicine (IOM), 1988, Addison et al 'The release of dispersed asbestos fibres from soils'.

5.36 The contamination results have been compared with the Commercial criteria as shown on the table below. Any exceedences are marked in yellow on the appended laboratory test results sheets.

Determinand (below)		Units	ATRISK Contaminated Land Screening Values (SSV) derived using CLEA v1.071 as set out in DEFRA Category 4 Screening Levels (C4SL) Methodology. 6% SOM Sandy Loam.			
			Residential with consumption of home-grown fruit and vegetables.	Residential without consumption of home-grown fruit and vegetables.	Allotments.	Commercial.
Aliphatic Hydrocarbons (mg/kg)	C5-C6		369	371	6110	29400
	C6-C8		1240	1240	18300	98200
	C8-C10		204	205	2390	14800
	C10-C12		1180	1190	8960	69500
	C12-C16		4130	2710	16300	139000
	C16-C35		210100	212000	477000	3620000
Aromatic Hydrocarbons (mg/kg)	C8-C10		232	332	73.9	20800
	C10-C12		468	1550	95.9	53800
	C12-C16		830	2710	176	65400
	C16-C21		1040	1930	321	28400
	C21-C35		1710	1930	1570	28400
TOTAL TPH						
Naphthalene		mg/kg	12.2	13.1	27.4	1050
Acenaphthylene		mg/kg	-	-	-	-
Acenaphthene		mg/kg	2760	6730	680	106000
Fluorene		mg/kg	2610	4860	796	72000
Phenanthrene		mg/kg	-	-	-	-
Anthracene		mg/kg	26200	37700	11300	544000
Fluoranthene		mg/kg	2980	5050	1010	72600
Pyrene		mg/kg	2120	3780	679	54400
Benz(a)anthracene		mg/kg	8.54	9.04	10.3	10.3
Chrysene		mg/kg	2.64	2.64	2.64	2.64
Benzo(b)fluoranthene		mg/kg	7.29	7.29	7.29	7.29
Benzo(k)fluoranthene		mg/kg	4.12	4.12	4.12	4.12
Benzo(a)pyrene		mg/kg	4.95	5.34	5.72	76.3
Indeno(123-cd)pyrene		mg/kg	9.75	10.3	16.6	144
Dibenz(ah)anthracene		mg/kg	1	1.03	2.57	14.4
Benzo(ghi)perylene		mg/kg	103	104	342	1450
TOTAL PAH						
Cyanide (Free)		mg/kg	34	34	34	373
pH		unit	-	-	-	-
Copper (Total)		mg/kg	4790	9060	1450	106000
Lead (Total)		mg/kg	200	313	79.1	2310
Zinc (Total)		mg/kg	20300	47000	5230	1100000
Chromium III		mg/kg	14300	16700	12600	208000
Chromium (Hexavalent)		mg/kg	20.5	20.5	171	49.1
			CLEA Soil Guideline Values (SGV)			
Benzene		mg/kg	0.33	0.998	0.07	95
Toluene		mg/kg	610	2710	120	4400
Ethylbenzene		mg/kg	350	843	90	2800
Xylenes		mg/kg	230	321	160	2600
Arsenic (Total)		mg/kg	32	35	43	640
Cadmium (Total)		mg/kg	10	83.6	1.8	230
Mercury (Total)		mg/kg	170	238	80	3600
Nickel (Total)		mg/kg	130	130	230	1800
Phenols (Total)		mg/kg	420	519	280	3200
Selenium (Total)		mg/kg	350	595	120	13000

ASSESSMENT OF RESULTS

5.37 Of the four samples tested no samples were found to contain contaminants exceeding the CLEA Soil Guideline Values (SGV) or the ATRISK Soil Screening Values (SSV) for Commercial usage.

WASTE ACCEPTANCE CRITERIA RESULTS

5.38 Two Waste Acceptance Criteria (WAC) tests have been undertaken during the current work and the certificates pertaining to these are appended to this report.

5.39 The results of the WAC tests tend to indicate that the material tested would probably be classified as "Inert". However, it should be noted that Risk Management are not a licensed landfill operator and we therefore strongly recommend that the WAC data should be presented to potential Waste Management Companies in order for them to confirm the waste classification of surplus soils to be removed from this site and to determine its acceptability at appropriate landfill sites for disposal/treatment.

ASBESTOS

5.40 Asbestos was not identified in any of the above noted samples tested.

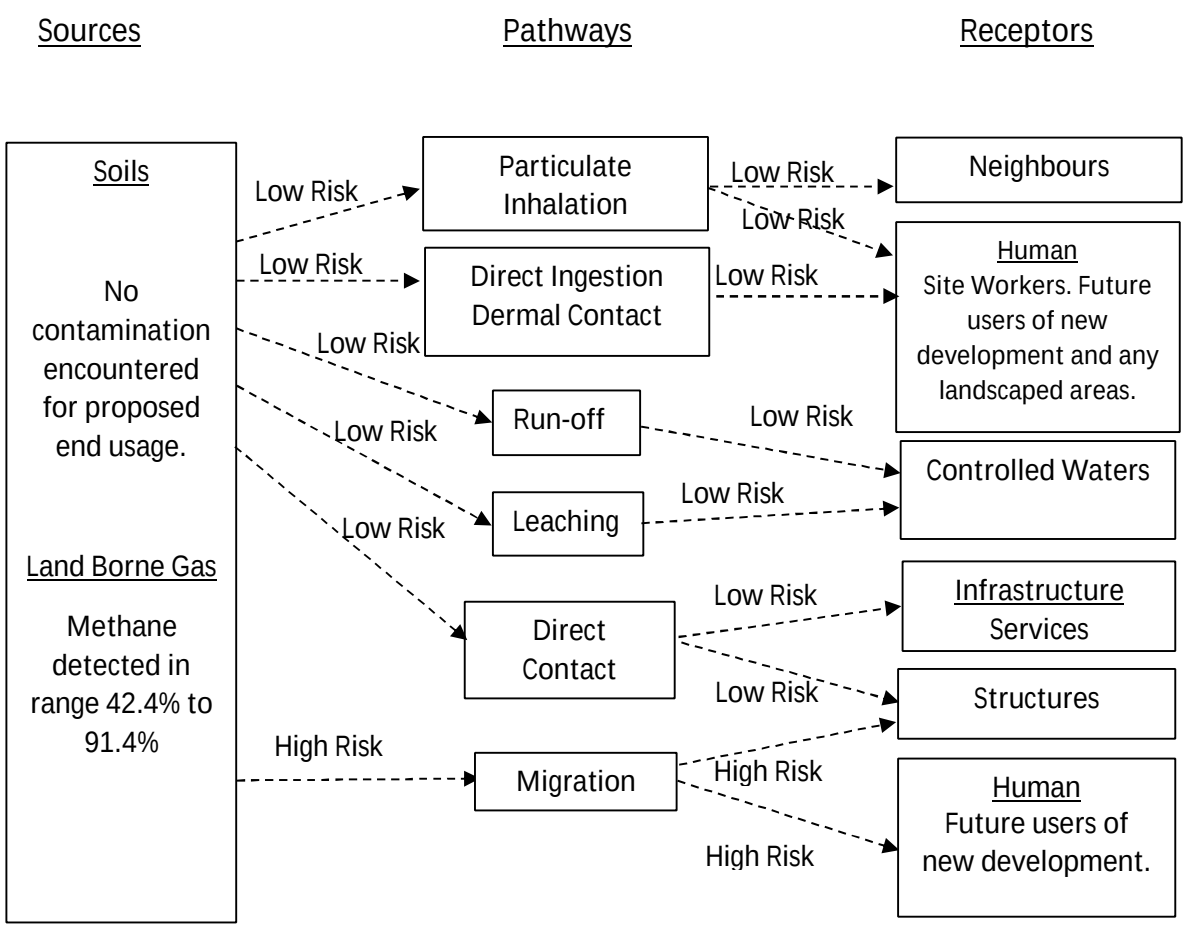
5.41 Discussion

Based on the results of the current work no remedial measures against ground contamination would be required for the currently proposed development.

Notwithstanding the above we would still recommend that standard Health and Safety precautions be taken with regard to ground workers at this site and these should include PPE equipment such as gloves, overalls etc. and normal washing facilities available on-site.

CONCEPTUAL SITE MODEL

5.42 The following diagram summarises the potential pollution linkages identified for this site in the form of a diagrammatic Conceptual Site Model (CSM).



5.43 To bring the above noted 'high' risks down to 'low' risk, the recommendations given in paragraphs 5.19 to 5.21 of this report, above, should be followed.

5.44 As always, the above recommendations are based on a selected number of representative samples and further testing may be required if any significant contamination is suspected or encountered during ground works.

BURIED WATER SUPPLY PIPES

5.45 With regard to provision of new water supply pipes, reference should be made to UKWIR Report No. 10/WM/03/21 "Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites" (2010 and updated in 2011). It is recommended that the results of any contamination testing undertaken on the site should be provided to the water supplier in order to ensure that the supply pipe provided complies with their requirements.

DISCOVERY STRATEGY

5.46 A 'Discovery Strategy' should be adopted whilst the groundworks are being carried out. In the event that any obvious, or significant visual, or olfactory signs of contamination are encountered, then RML should be contacted immediately for advice, and a site inspection, if deemed necessary. Contractors should comply with the recommendations presented in the HSE Guidance Document HS(G)66 'Protection of Workers and the General Public during the Development of Contaminated Land'. This should include the suitable fencing off of the areas where works are to take place.

SOIL SAMPLES

5.47 All soil samples will be kept for a period of 28 days after the date of the invoice for this project unless otherwise notified to Risk Management Limited. Should samples be required to be stored for longer than 28 days then a storage charge may be levied.

LIMITATIONS

The recommendations made and the opinions expressed in this report are based on the borehole records, examination of samples and the results of site and laboratory tests.

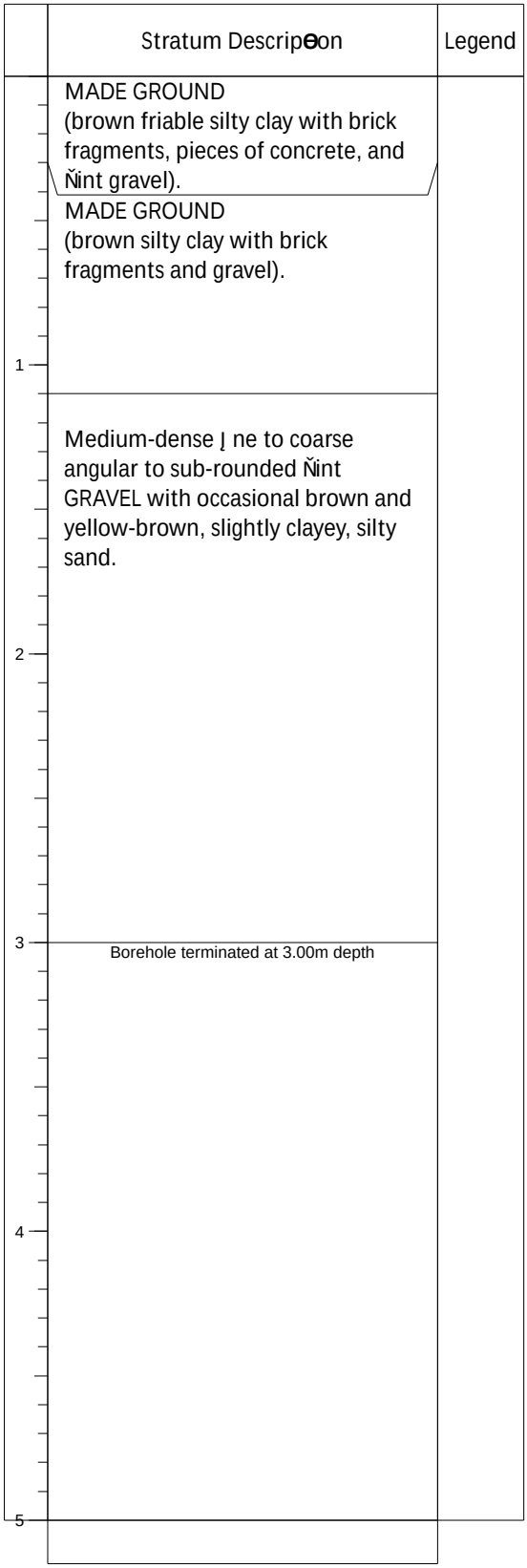
The report is issued on the condition that Risk Management Limited will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the boreholes or trial pits which have not been shown by the boreholes, trial pits or other tests carried out during the investigation.

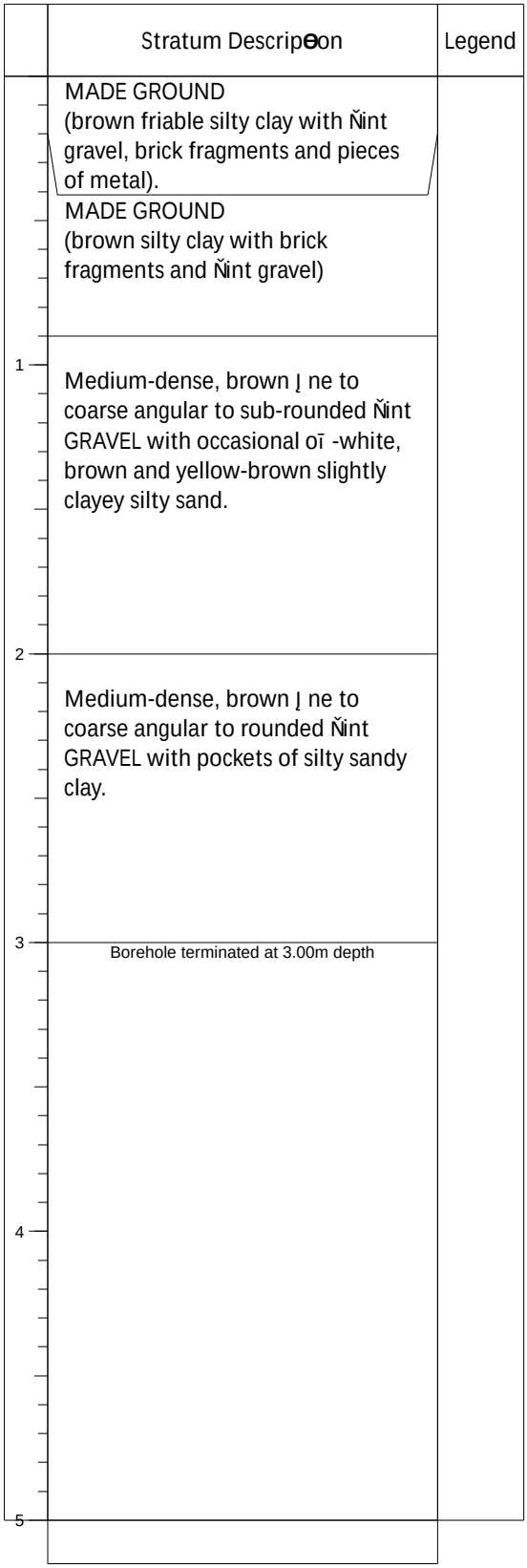
In addition, Risk Management Limited will not be liable for any loss whatsoever arising directly or indirectly from any opinion given on the possible configuration of strata both between the borehole and/or trial pit positions and/or below the maximum depth of the investigation. Such opinions, where given, are for guidance only.

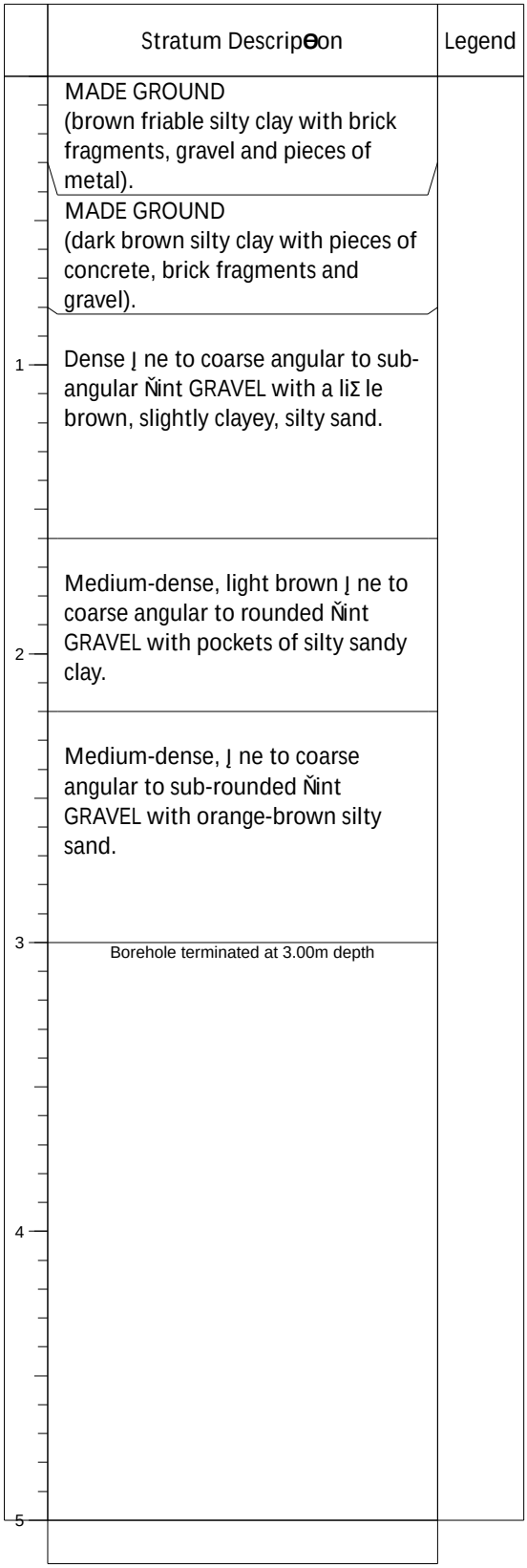
Groundwater levels may also vary with time from those reported during our site investigation due to factors such as tidal conditions, heavy pumping from nearby wells or seasonal changes.

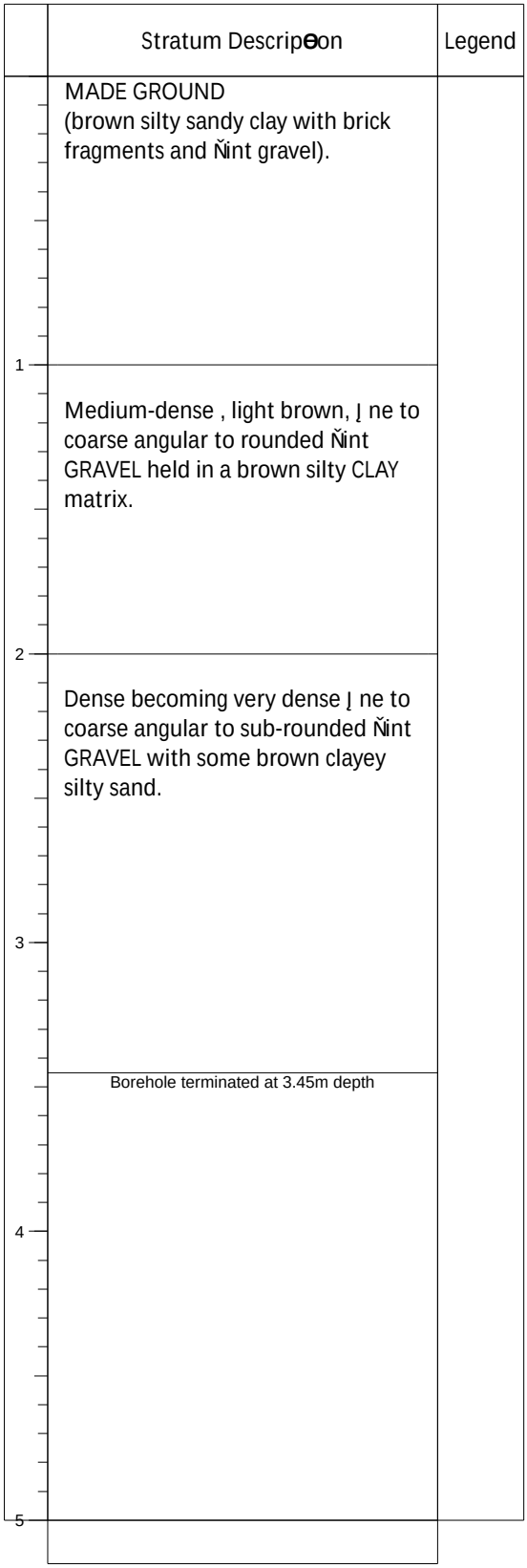
No person other than the client to whom this report is addressed, shall rely on it in any respect and no duty of care shall be owed to any such third party.

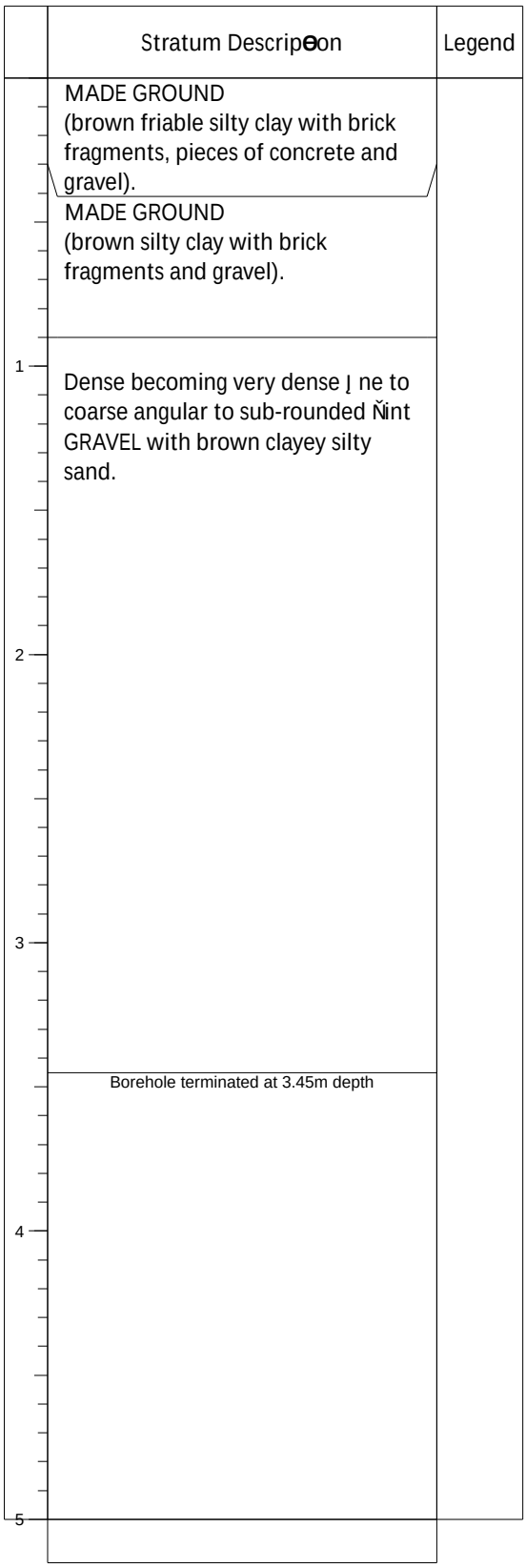
Copyright of this Report remains with Risk Management Limited and in addition we will not accept any responsibility for the report and recommendations given until our invoice is settled in full.

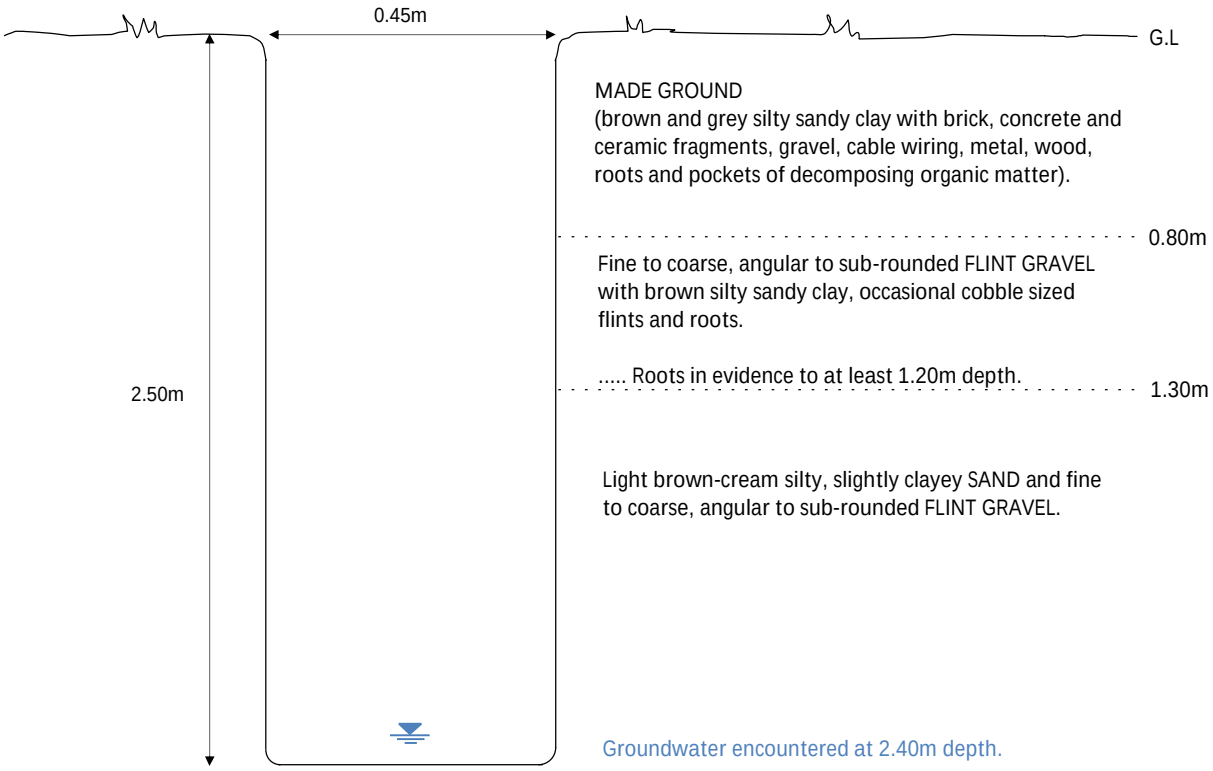

Stratum Description
Legend
MADE GROUND
(brown friable silty clay with brick fragments, pieces of concrete, and flint gravel).
MADE GROUND
(brown silty clay with brick fragments and gravel).
Medium-dense fine to coarse angular to sub-rounded flint GRAVEL with occasional brown and yellow-brown, slightly clayey, silty sand.
Borehole terminated at 3.00m depth
1
2
3
4
5


Stratum Description
Legend
MADE GROUND
(brown friable silty clay with flint gravel, brick fragments and pieces of metal).
MADE GROUND
(brown silty clay with brick fragments and flint gravel)
1
Medium-dense, brown fine to coarse angular to sub-rounded flint GRAVEL with occasional off-white, brown and yellow-brown slightly clayey silty sand.
2
Medium-dense, brown fine to coarse angular to rounded flint GRAVEL with pockets of silty sandy clay.
3
Borehole terminated at 3.00m depth
4
5


Stratum Description
Legend
MADE GROUND
(brown friable silty clay with brick fragments, gravel and pieces of metal).
MADE GROUND
(dark brown silty clay with pieces of concrete, brick fragments and gravel).
1
Dense fine to coarse angular to sub-angular flint GRAVEL with a little brown, slightly clayey, silty sand.
Medium-dense, light brown fine to coarse angular to rounded flint GRAVEL with pockets of silty sandy clay.
2
Medium-dense, fine to coarse angular to sub-rounded flint GRAVEL with orange-brown silty sand.
3
Borehole terminated at 3.00m depth
4
5


Stratum Description
Legend
MADE GROUND
(brown silty sandy clay with brick fragments and flint gravel).
Medium-dense , light brown, fine to coarse angular to rounded flint GRAVEL held in a brown silty CLAY matrix.
Dense becoming very dense fine to coarse angular to sub-rounded flint GRAVEL with some brown clayey silty sand.
Borehole terminated at 3.45m depth
1
2
3
4
5


Stratum Description
Legend
MADE GROUND
(brown friable silty clay with brick fragments, pieces of concrete and gravel).
MADE GROUND
(brown silty clay with brick fragments and gravel).
Dense becoming very dense fine to coarse angular to sub-rounded flint GRAVEL with brown clayey silty sand.
Borehole terminated at 3.45m depth
1
2
3
4
5

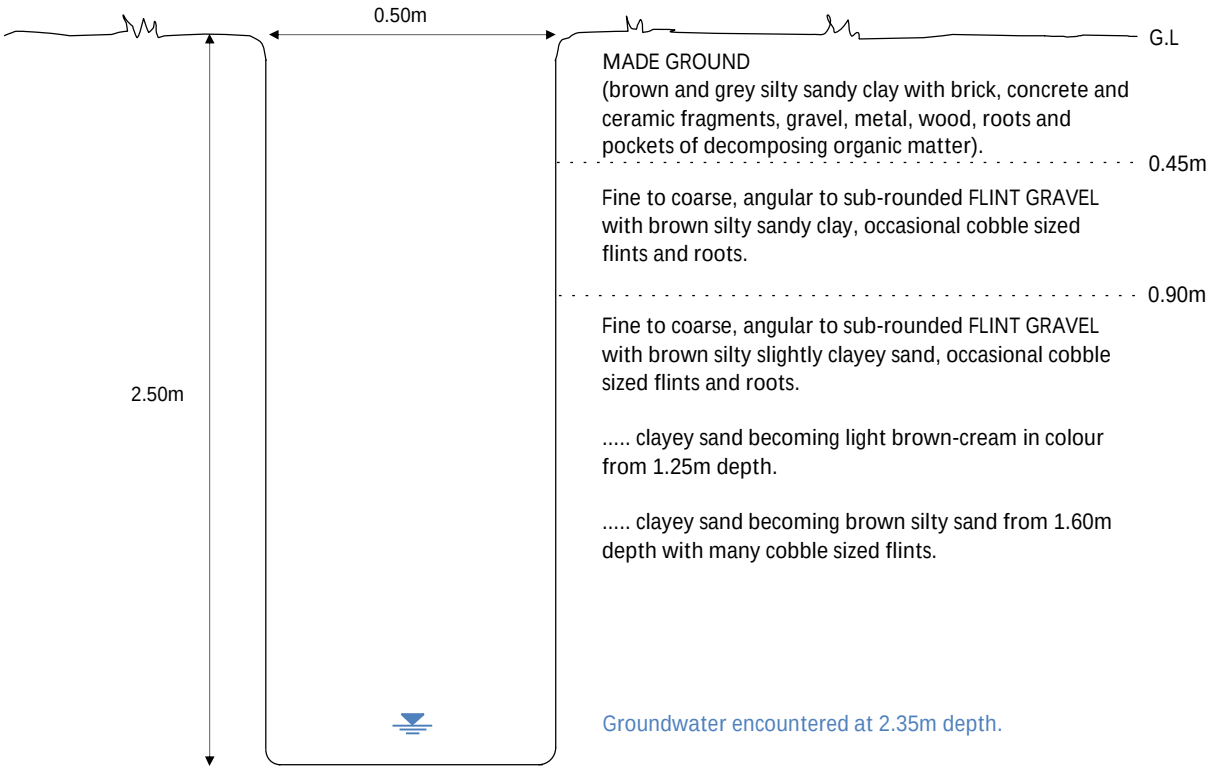


Risk Management

Title :	BRE 365 TRIAL PIT - TP1
Project Location :	Bognor Road, Chichester, PO20 1EJ

RECORD OF MECHANICALLY EXCAVATED TRIAL PIT

Job No :	RML 8530	Scale :	Not To Scale
Date :	1st August 2023		



Risk Management

Title :	BRE 365 TRIAL PIT - TP2
Project Location :	Bognor Road, Chichester, PO20 1EJ

RECORD OF MECHANICALLY EXCAVATED TRIAL PIT

Job No :	RML 8530	Scale :	Not To Scale
Date :	1st August 2023		

Standard Penetration Test (SPT) versus Depth Profile

Risk Management Limited
Tel : 01883 343572

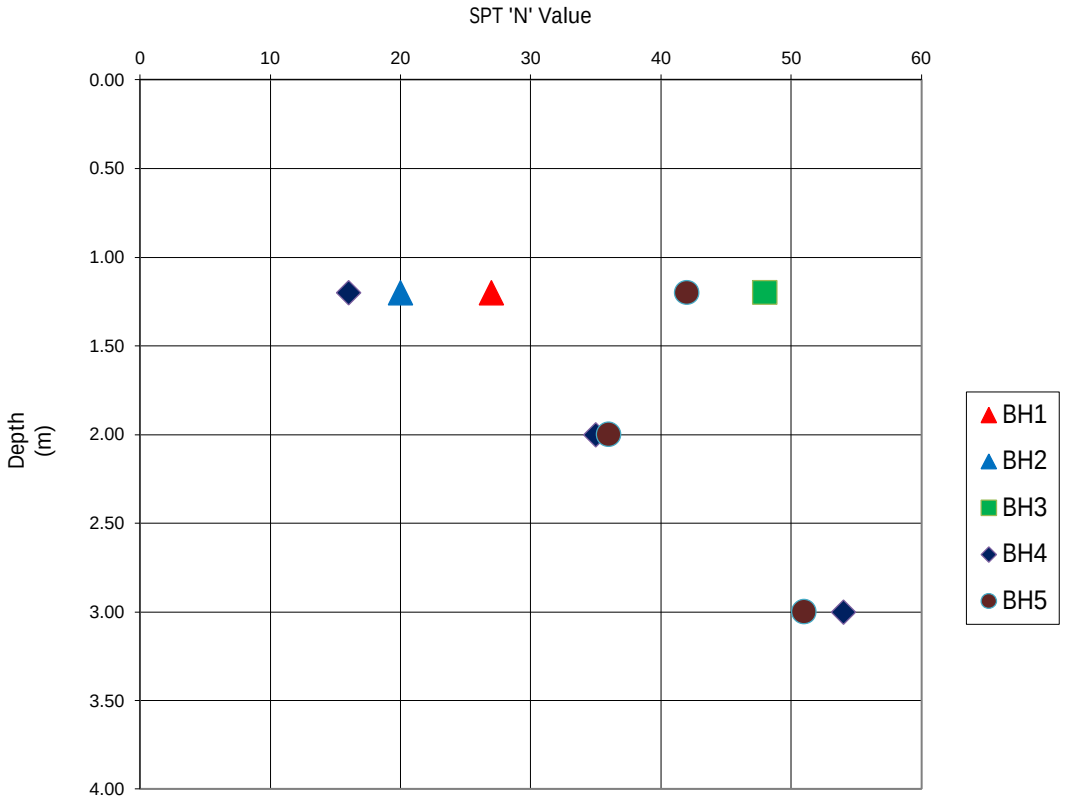
Project Name : Bognor Road, Chichester, West Sussex, PO20 1EJ

Job No. : RML 8530

Date : August 2023

BH1		BH2		BH3	
Depth (m)	SPT 'N' value	Depth (m)	SPT 'N' value	Depth (m)	SPT 'N' value
1.20	27	1.20	20	1.20	48

BH4		BH5	
Depth (m)	SPT 'N' value	Depth (m)	SPT 'N' value
1.20	16	1.20	42
2.00	35	2.00	36
3.00	54	3.00	51



BRE 365 SOIL INFILTRATION TEST SA1 - TP1

Risk Management Limited
Tel : 01883 343572

Project Name : Bognor Road, Chichester, West Sussex, PO20 1EJ

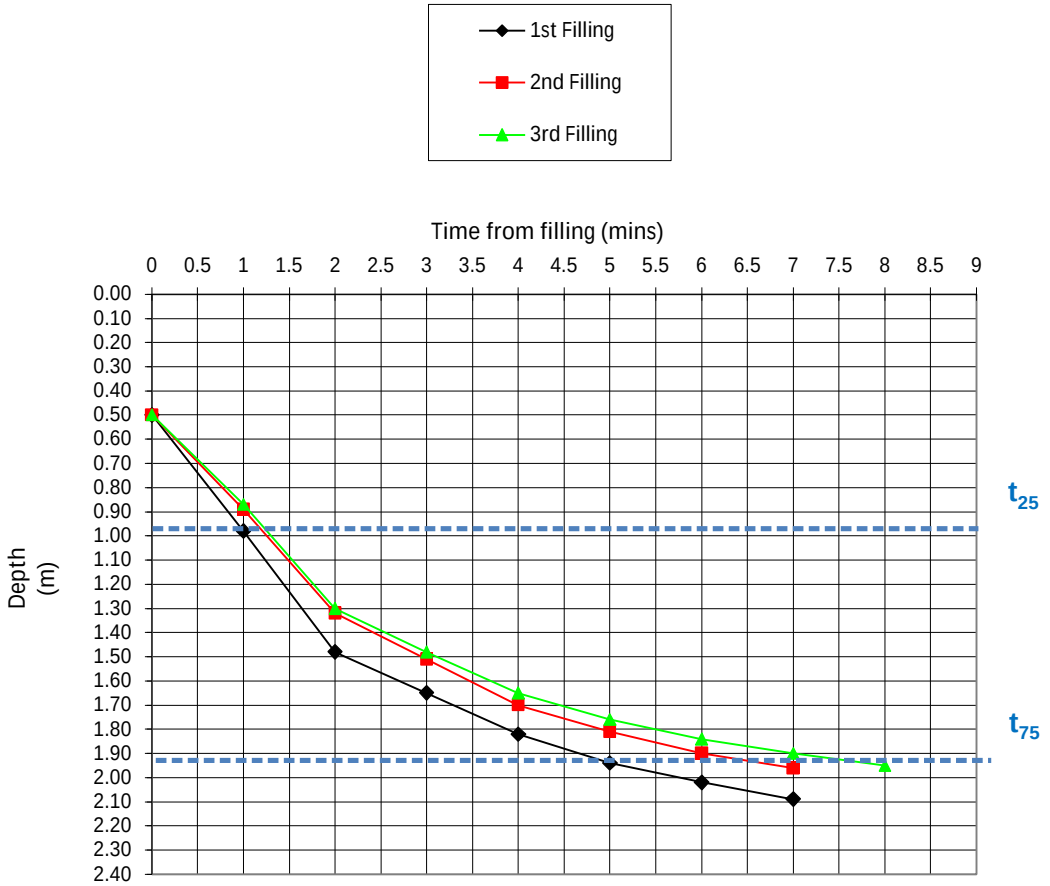
Three Fillings

Job No. RML 8530

Date : August 2023

1st Filling		2nd Filling		3rd Filling	
Test Depth (m)		Test Depth (m)		Test Depth (m)	
2.40		2.40		2.40	
Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)
0.500	0	0.500	0	0.500	0
0.980	1	0.890	1	0.870	1
1.480	2	1.320	2	1.300	2
1.650	3	1.510	3	1.480	3
1.820	4	1.700	4	1.650	4
1.940	5	1.810	5	1.760	5
2.020	6	1.900	6	1.840	6
2.090	7	1.960	7	1.900	7
				1.950	8

TIME TAKEN TO FALL BETWEEN 25% and 75% approx 6.25 mins
TAKEN FROM 3rd FILLING



Risk Management Limited
Tel : 01883 343572

BRE 365 SOIL INFILTRATION TEST SA1 - TP1

Project Name :	Bognor Road, Chichester, West Sussex, PO20 1EJ	Project No:	RML 8530
		Date :	August 2023

Trial Pit No.	TP1

Depth of pit (m)	2.40
Width of pit (m)	0.45
Length of pit (m)	1.40
Depth of water in pit (m)	1.90

Volume of 75% to 25% (V_{p75})	0.60

Mean surface area through which flow occurs (a_{p50})	4.15

Time for outflow (minutes) 75% to 25% (t_{p75-25})	6.25
Time for outflow (seconds) 75% to 25% (t_{p75-25})	375

Soil Infiltration Rate (f) m/s =	3.85E-04

BRE 365 SOIL INFILTRATION TEST SA2 - TP2

Risk Management Limited
Tel : 01883 343572

Project Name : Bognor Road, Chichester, West Sussex, PO20 1EJ

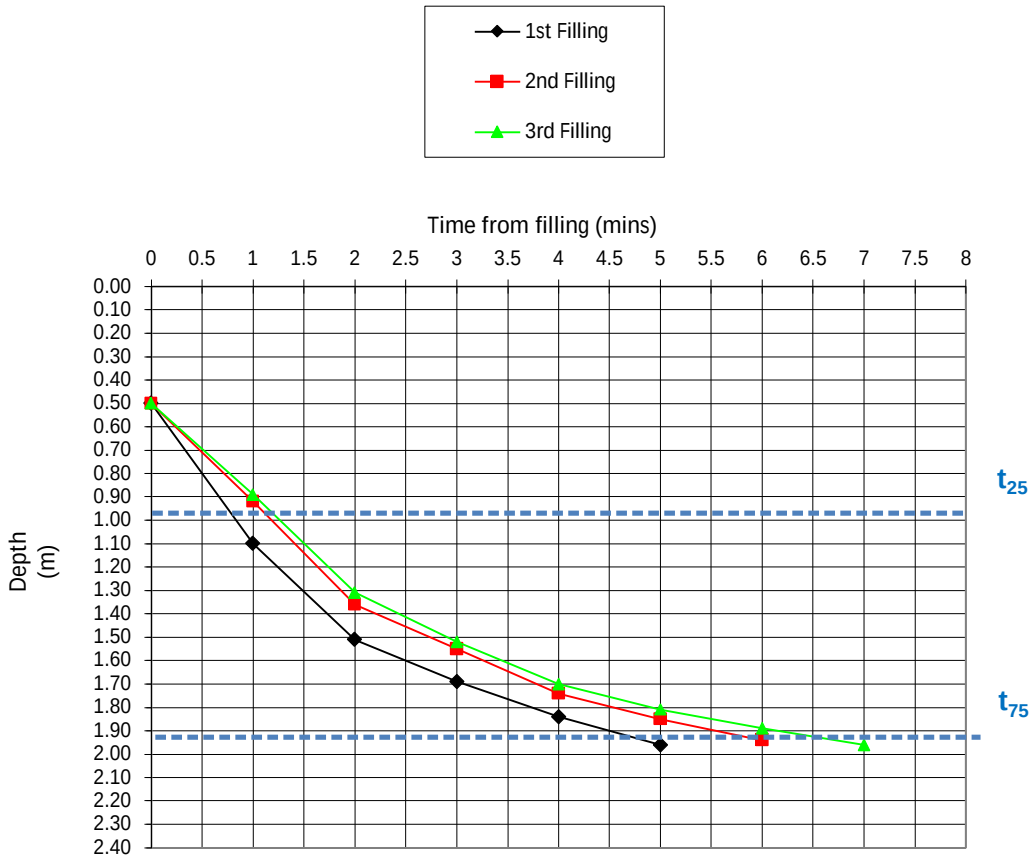
Three Fillings

Job No. RML 8530

Date : August 2023

1st Filling		2nd Filling		3rd Filling	
Test Depth (m)		Test Depth (m)		Test Depth (m)	
2.40		2.40		2.40	
Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)
0.500	0	0.500	0	0.500	0
1.100	1	0.920	1	0.890	1
1.510	2	1.360	2	1.310	2
1.690	3	1.550	3	1.520	3
1.840	4	1.740	4	1.700	4
1.960	5	1.850	5	1.810	5
		1.940	6	1.890	6
				1.960	7

TIME TAKEN TO FALL BETWEEN 25% and 75% approx 5.25 mins
TAKEN FROM 3rd FILLING



Risk Management Limited
Tel : 01883 343572

BRE 365 SOIL INFILTRATION TEST SA2 - TP2

Project Name :	Bognor Road, Chichester, West Sussex, PO20 1EJ	Project No:	RML 8530
		Date :	August 2023

Trial Pit No.	TP2

Depth of pit (m)	2.40
Width of pit (m)	0.50
Length of pit (m)	1.50
Depth of water in pit (m)	1.90

Volume of 75% to 25% (V_{p75})	0.71

Mean surface area through which flow occurs (a_{p50})	4.55

Time for outflow (minutes) 75% to 25% (t_{p75-25})	5.25
Time for outflow (seconds) 75% to 25% (t_{p75-25})	315

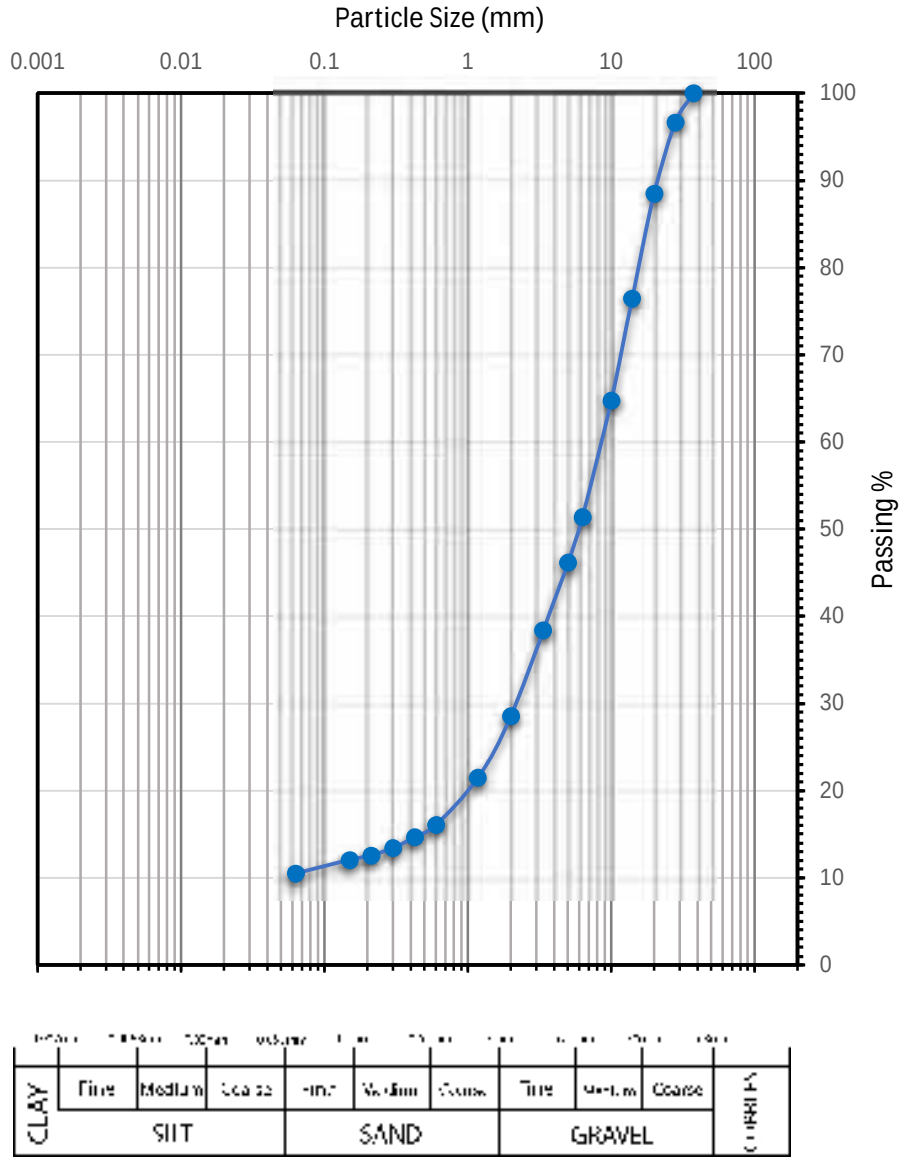
Soil Infiltration Rate (f) m/s =	4.97E-04

Results of Particle Size Distribution Tests

Project Name : Bognor Road, Chichester, West Sussex.		Project No. : RML 8530
Borehole No. BH2	Sample No. D3	Depth : 1.00m

Test Method : BS 1377 : Part 2 : 1990 : Clause 9

Sieve appature (mm)	Passing % of Total
200	100.00
125	100.00
90	100.00
75	100.00
63	100.00
50	100.00
37.5	100.00
28	96.68
20	88.51
14	76.48
10	64.72
6.3	51.37
5	46.18
3.35	38.38
2	28.57
1.18	21.53
0.6	16.06
0.425	14.67
0.3	13.43
0.212	12.57
0.15	12.06
0.063	10.52



% Per Particle	
Cobble	0.00
Gravel	71.43
Sand	18.05
Silt & Clay	10.52

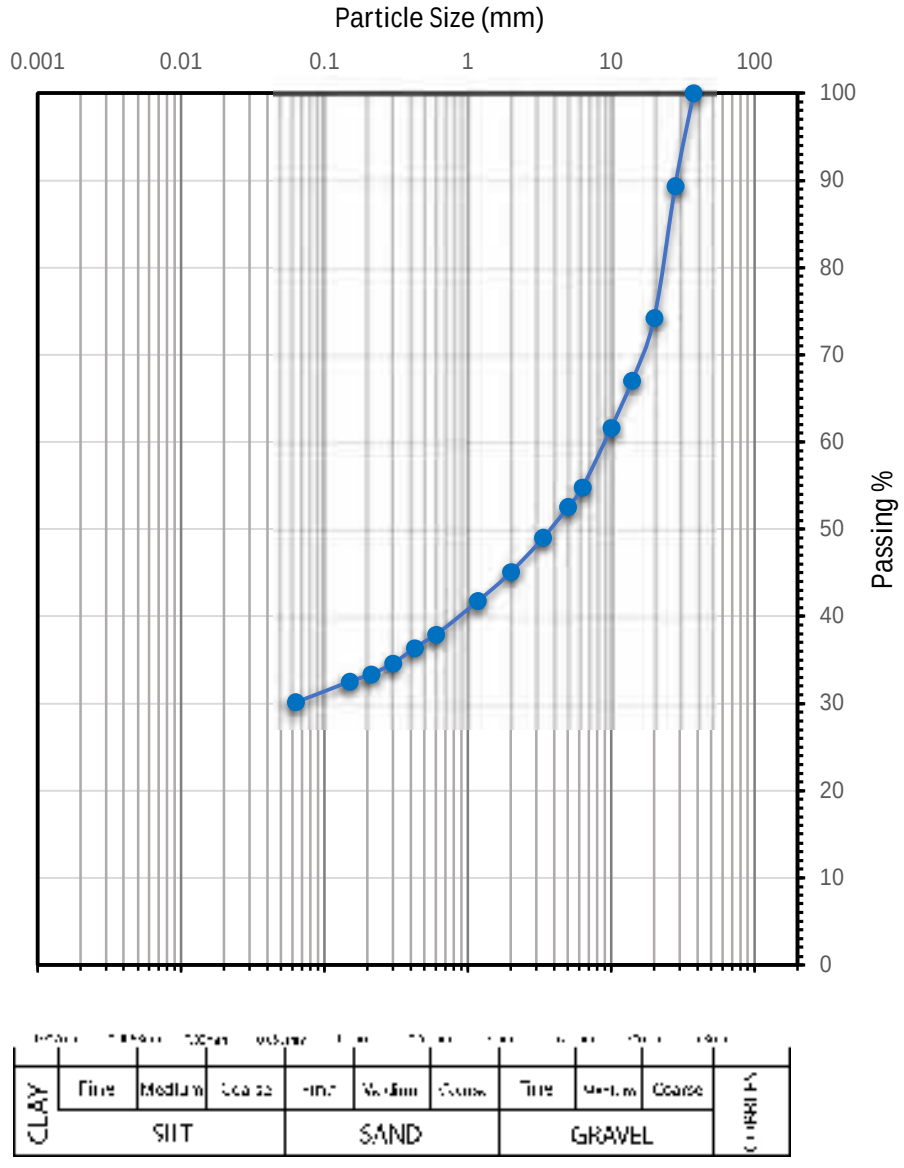
Description:	Brown fine to coarse angular to rounded GRAVEL with occasional off-white and brown, slightly clayey silty sand.

Results of Particle Size Distribution Tests

Project Name : Bognor Road, Chichester, West Sussex.		Project No. : RML 8530
Borehole No. BH3	Sample No. D5	Depth : 2.00m

Test Method : BS 1377 : Part 2 : 1990 : Clause 9

Sieve appature (mm)	Passing % of Total
200	100.00
125	100.00
90	100.00
75	100.00
63	100.00
50	100.00
37.5	100.00
28	89.36
20	74.25
14	67.05
10	61.62
6.3	54.79
5	52.53
3.35	49.00
2	45.11
1.18	41.76
0.6	37.92
0.425	36.37
0.3	34.63
0.212	33.36
0.15	32.53
0.063	30.17



% Per Particle	
Cobble	0.00
Gravel	54.89
Sand	14.94
Silt & Clay	30.17

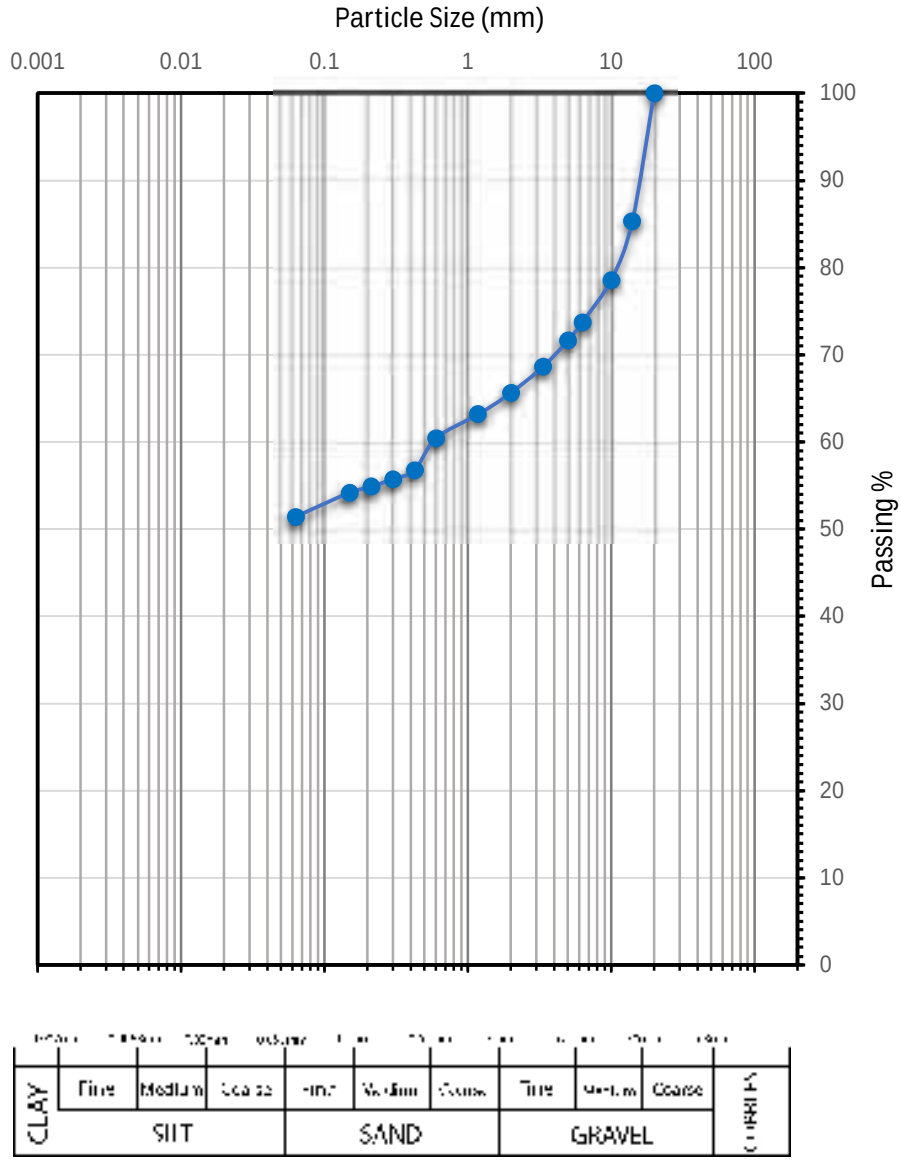
Description:	Light brown fine to coarse angular to rounded GRAVEL with pockets of silty sandy clay.

Results of Particle Size Distribution Tests

Project Name : Bognor Road, Chichester, West Sussex.		Project No. : RML 8530
Borehole No. BH4	Sample No. D4	Depth : 1.50m

Test Method : BS 1377 : Part 2 : 1990 : Clause 9

Sieve appature (mm)	Passing % of Total
200	100.00
125	100.00
90	100.00
75	100.00
63	100.00
50	100.00
37.5	100.00
28	100.00
20	100.00
14	85.31
10	78.58
6.3	73.75
5	71.66
3.35	68.64
2	65.66
1.18	63.20
0.6	60.46
0.425	56.80
0.3	55.73
0.212	54.87
0.15	54.20
0.063	51.43



% Per Particle	
Cobble	0.00
Gravel	34.34
Sand	14.23
Silt & Clay	51.43

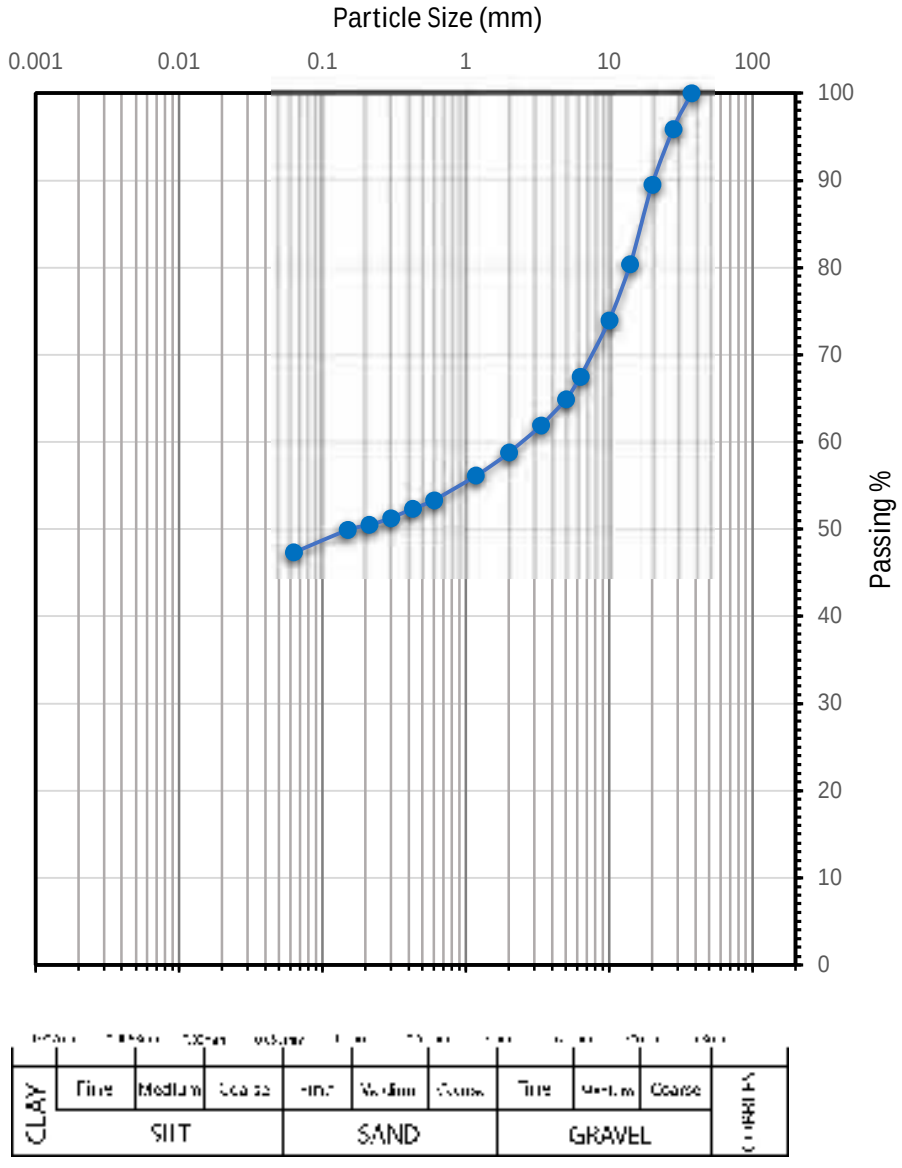
Description:	Light brown fine to coarse angular to rounded GRAVEL held in a brown silty sandy CLAY matrix.

Results of Particle Size Distribution Tests

Project Name : Bognor Road, Chichester, West Sussex.		Project No. : RML 8530
Borehole No. BH4	Sample No. D5	Depth : 2.00m

Test Method : BS 1377 : Part 2 : 1990 : Clause 9

Sieve appature (mm)	Passing % of Total
200	100.00
125	100.00
90	100.00
75	100.00
63	100.00
50	100.00
37.5	100.00
28	95.90
20	89.54
14	80.39
10	73.98
6.3	67.52
5	64.92
3.35	61.92
2	58.81
1.18	56.16
0.6	53.35
0.425	52.34
0.3	51.28
0.212	50.50
0.15	49.93
0.063	47.34



% Per Particle	
Cobble	0.00
Gravel	41.19
Sand	11.46
Silt & Clay	47.34

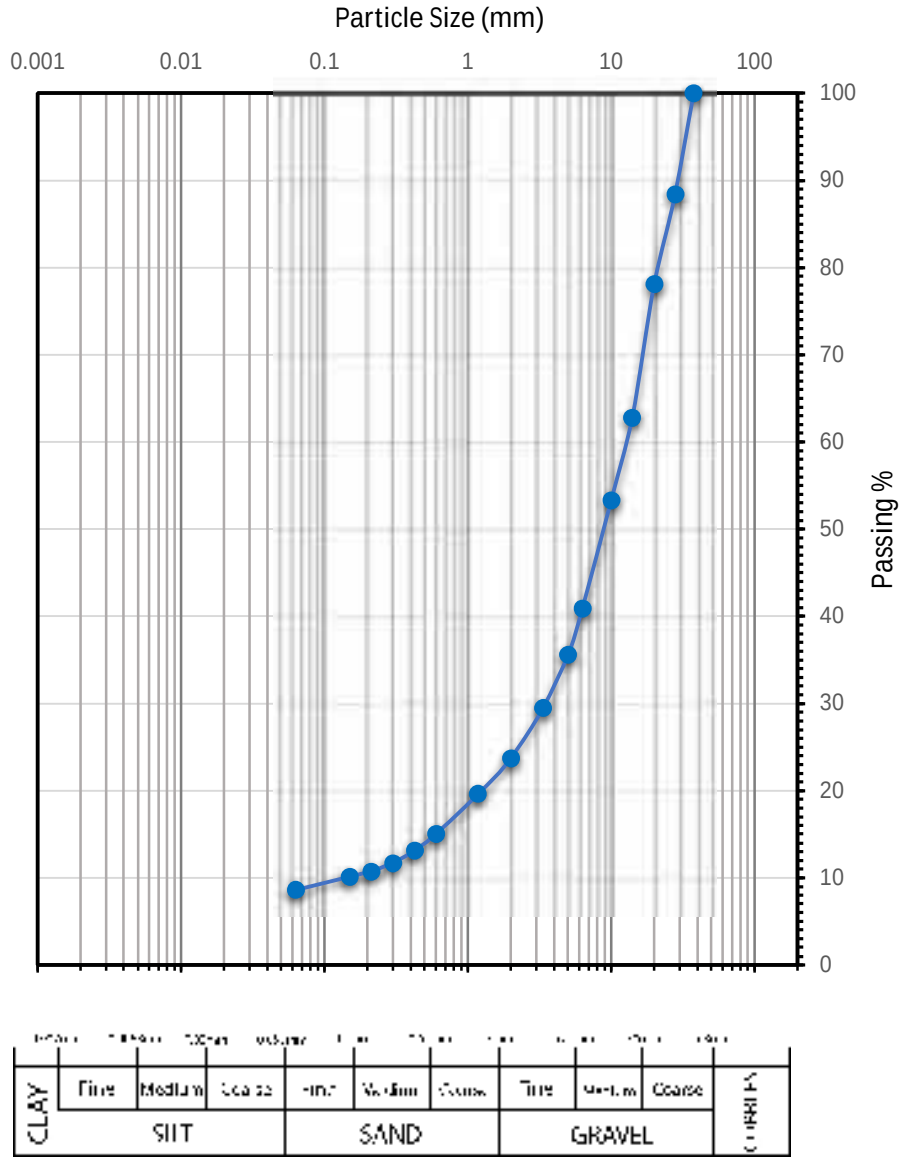
Description:	Light brown fine to coarse angular to rounded GRAVEL held in a brown silty sandy CLAY matrix.

Results of Particle Size Distribution Tests

Project Name : Bognor Road, Chichester, West Sussex.		Project No. : RML 8530
Borehole No. BH4	Sample No. D7	Depth : 3.00m

Test Method : BS 1377 : Part 2 : 1990 : Clause 9

Sieve appature (mm)	Passing % of Total
200	100.00
125	100.00
90	100.00
75	100.00
63	100.00
50	100.00
37.5	100.00
28	88.45
20	78.11
14	62.80
10	53.34
6.3	40.92
5	35.63
3.35	29.53
2	23.74
1.18	19.65
0.6	15.05
0.425	13.17
0.3	11.71
0.212	10.76
0.15	10.18
0.063	8.61



% Per Particle	
Cobble	0.00
Gravel	76.26
Sand	15.13
Silt & Clay	8.61

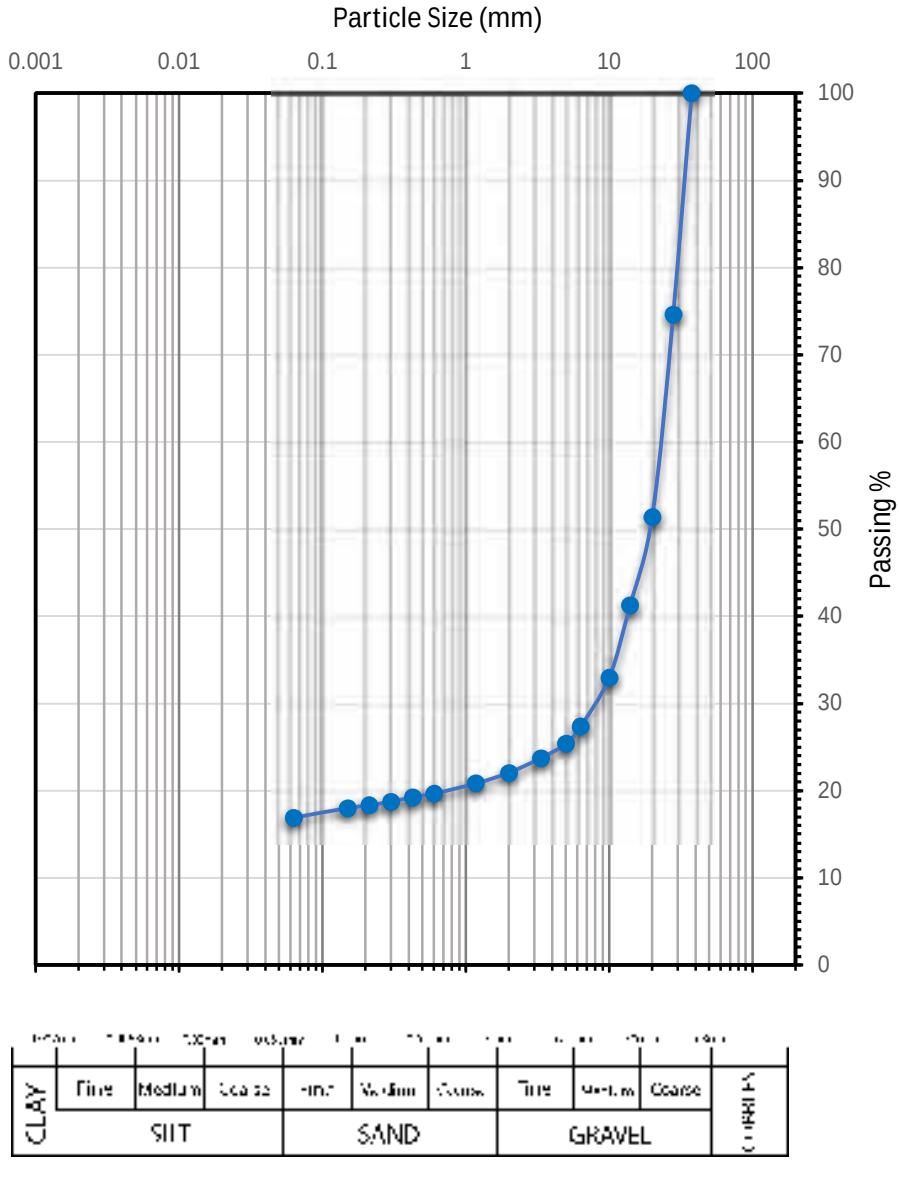
Description:	Fine to coarse angular to sub-rounded GRAVEL with some brown clayey silty sand.

Results of Particle Size Distribution Tests

Project Name : Bognor Road, Chichester, West Sussex.		Project No. : RML 8530
Borehole No. BH5	Sample No. D3	Depth : 1.00m

Test Method : BS 1377 : Part 2 : 1990 : Clause 9

Sieve appature (mm)	Passing % of Total
200	100.00
125	100.00
90	100.00
75	100.00
63	100.00
50	100.00
37.5	100.00
28	74.63
20	51.41
14	41.30
10	32.97
6.3	27.35
5	25.39
3.35	23.77
2	22.07
1.18	20.87
0.6	19.68
0.425	19.23
0.3	18.75
0.212	18.33
0.15	18.02
0.063	16.91



% Per Particle	
Cobble	0.00
Gravel	77.93
Sand	5.16
Silt & Clay	16.91

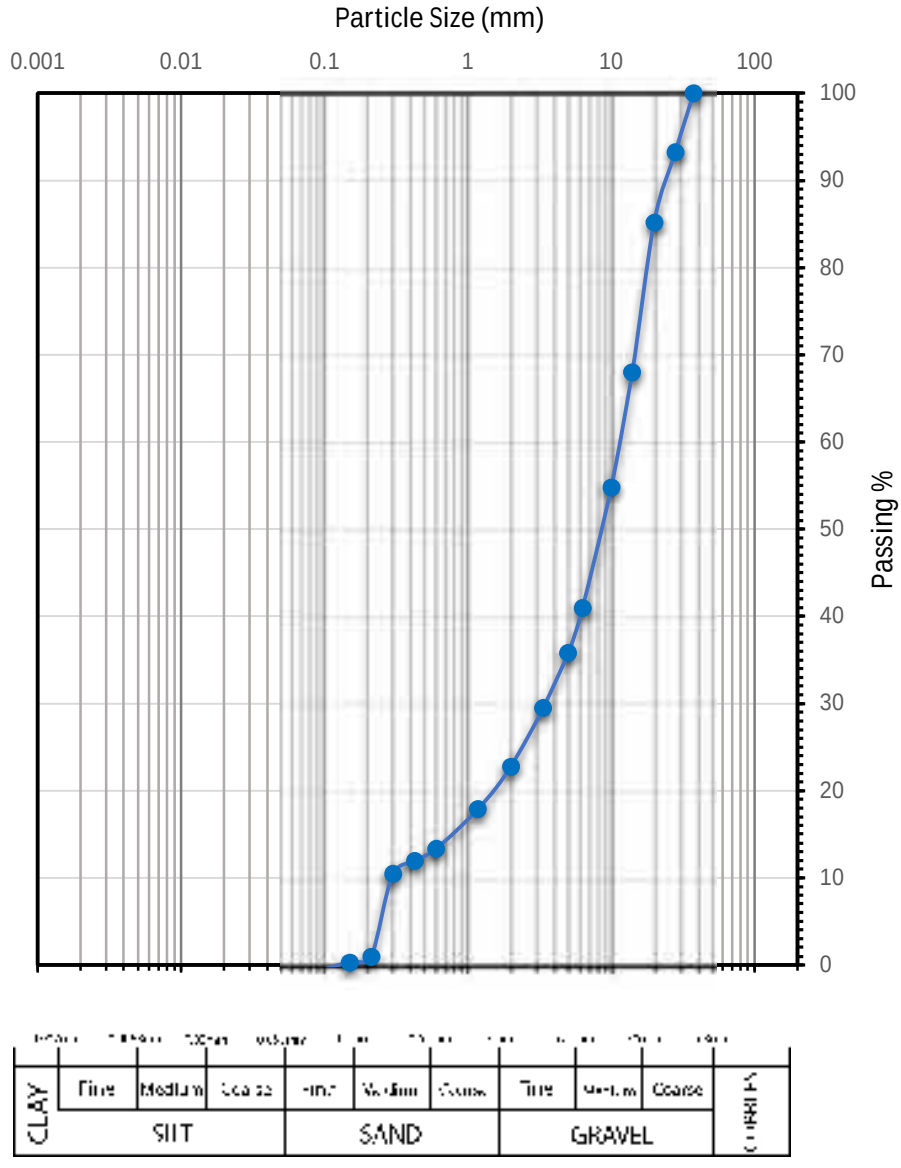
Description: Fine to coarse angular to sub-rounded GRAVEL with brown clayey silty sand.

Results of Particle Size Distribution Tests

Project Name : Bognor Road, Chichester, West Sussex.		Project No. : RML 8530
Borehole No. BH5	Sample No. D5	Depth : 2.00m

Test Method : BS 1377 : Part 2 : 1990 : Clause 9

Sieve appature (mm)	Passing % of Total
200	100.00
125	100.00
90	100.00
75	100.00
63	100.00
50	100.00
37.5	100.00
28	93.24
20	85.19
14	68.03
10	54.82
6.3	40.96
5	35.82
3.35	29.53
2	22.79
1.18	17.90
0.6	13.36
0.425	11.95
0.3	10.47
0.212	0.98
0.15	0.34
0.063	-1.36



% Per Particle	
Cobble	0.00
Gravel	77.21
Sand	24.15
Silt & Clay	-1.36

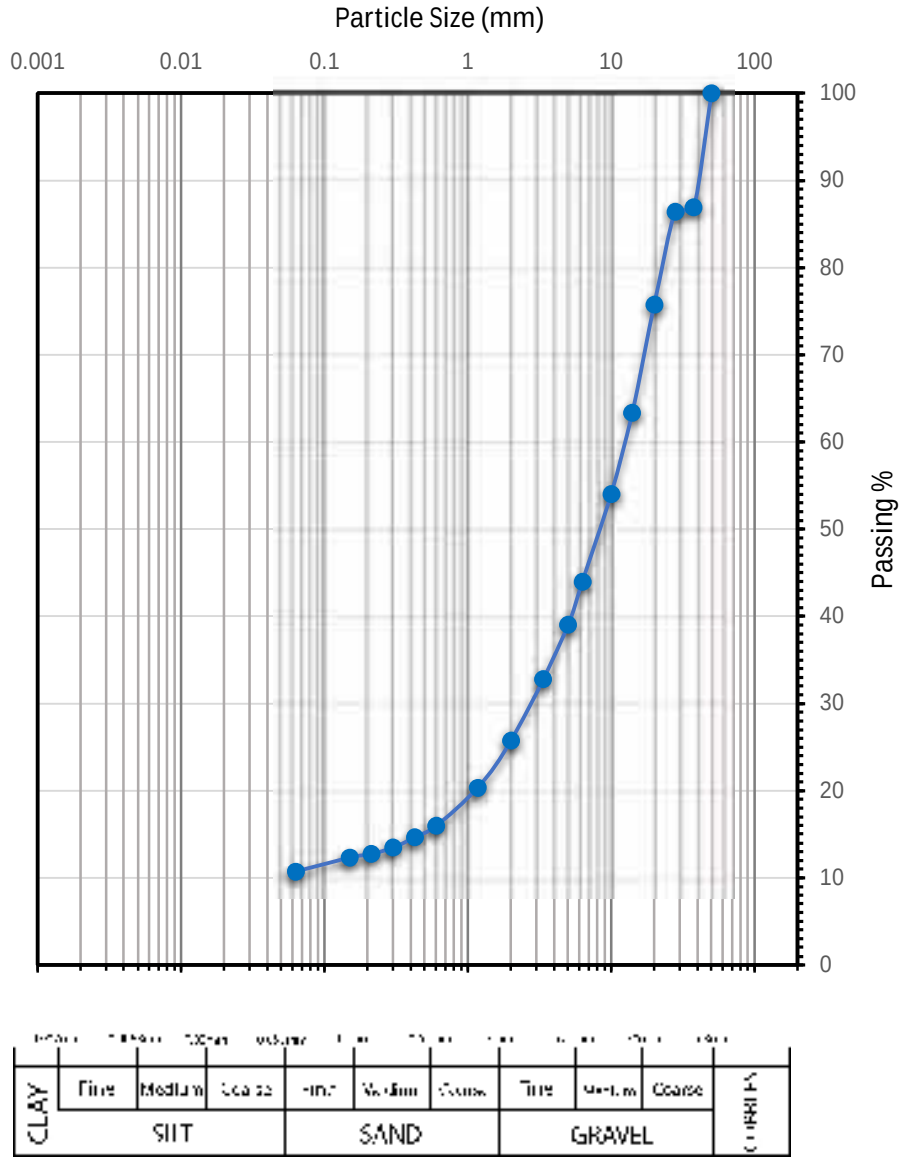
Description: Fine to coarse angular to sub-rounded GRAVEL with silty sand.

Results of Particle Size Distribution Tests

Project Name : Bognor Road, Chichester, West Sussex.		Project No. : RML 8530
Borehole No. BH5	Sample No. D7	Depth : 3.00m

Test Method : BS 1377 : Part 2 : 1990 : Clause 9

Sieve appature (mm)	Passing % of Total
200	100.00
125	100.00
90	100.00
75	100.00
63	100.00
50	100.00
37.5	86.90
28	86.43
20	75.74
14	63.36
10	54.06
6.3	44.00
5	39.05
3.35	32.80
2	25.77
1.18	20.38
0.6	15.98
0.425	14.67
0.3	13.48
0.212	12.76
0.15	12.36
0.063	10.71



% Per Particle	
Cobble	0.00
Gravel	74.23
Sand	15.05
Silt & Clay	10.71

Description: Fine to coarse angular to sub-rounded GRAVEL with slightly clayey silty sand.

pH & Sulphate Test Results

PROJECT NAME :	Bognor Road, Chichester, West Sussex, PO20 1EJ
PROJECT NO:	RML 8530

Sheet	1 of 1
Date	August 2023

Sample Details			Chemical Tests				
BH No.	Depth (m)	No.	pH	W/S SO_4 (g/l)	Total SO_4 (%)	Water SO_4 (g/l)	Comments
BH1	0.15	D1	8.1				
	0.50	D2	8.7	0.320			
BH2	1.50	D4	8.0	0.026			
BH5	0.15	D1	8.0				
	0.50	D2	8.1				

Projects
Risk Management Limited☐
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Godalming
GU8 5SZ

e: projects@riskmanagementltd.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
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WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 23-44511

Project / Site name:	Chichester	**Samples received on:**	12/07/2023
Your job number:	RML 8530	**Samples instructed on/ Analysis started on:**	12/07/2023
Your order number:		**Analysis completed by:**	21/07/2023
Report Issue Number:	1	**Report issued on:**	21/07/2023
Samples Analysed:	8 soil samples		

Signed: [redacted]

Dominika Warjan
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 23-44511
Project / Site name: Chichester

Lab Sample Number				2745114	2745115	2745116	2745117	2745118
Sample Reference				BH1-D1	BH1-D2	BH2-D2	BH2-D4	BH3-D2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	0.50	0.50	1.50	0.50
Date Sampled				04/07/2023	04/07/2023	04/07/2023	04/07/2023	04/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	0.66	15	4.2	5.4	16
Total mass of sample received	kg	0.001	NONE	1	0.4	0.4	0.4	1
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	WEM	N/A	WEM	N/A	WEM

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.7	-	8	9.6
Total Cyanide	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.32	-	0.026	-
Organic Matter (automated)	%	0.1	MCERTS	2.6	-	-	-	5.2

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	< 0.10	-	-	-	< 0.10
Resorcinol	mg/kg	0.1	MCERTS	< 0.10	-	-	-	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	< 0.30	-	-	-	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	< 0.20	-	-	-	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	< 0.10	-	-	-	< 0.10
Phenol	mg/kg	0.1	MCERTS	< 0.10	-	-	-	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	< 0.10	-	-	-	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	< 0.30	-	-	-	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	NONE	< 1.3	-	-	-	< 1.3

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.4	-	-	-	0.22
Anthracene	mg/kg	0.05	MCERTS	0.07	-	-	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.2	-	-	-	0.57
Pyrene	mg/kg	0.05	MCERTS	1.1	-	-	-	0.55
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.53	-	-	-	0.29
Chrysene	mg/kg	0.05	MCERTS	0.65	-	-	-	0.34
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.63	-	-	-	0.43
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.41	-	-	-	0.22
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.57	-	-	-	0.36
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.31	-	-	-	0.24
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.05	-	-	-	0.06
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.39	-	-	-	0.28

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	6.32	-	-	-	3.56

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 23-44511
Project / Site name: Chichester

Lab Sample Number				2745114	2745115	2745116	2745117	2745118
Sample Reference				BH1-D1	BH1-D2	BH2-D2	BH2-D4	BH3-D2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.15	0.50	0.50	1.50	0.50
Date Sampled				04/07/2023	04/07/2023	04/07/2023	04/07/2023	04/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.9	-	6.1	-	7.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	-	< 0.2	-	0.5
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	-	< 1.8	-	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	26	-	18	-	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	26	-	67	-	22
Lead (aqua regia extractable)	mg/kg	1	MCERTS	73	-	27	-	56
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	-	11	-	14
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	91	-	62	-	97
Monoaromatics & Oxygenates								
Benzene~	µg/kg	5	MCERTS	< 5.0	-	-	-	< 5.0
Toluene~	µg/kg	5	MCERTS	< 5.0	-	-	-	< 5.0
Ethylbenzene^	µg/kg	5	NONE	< 5.0	-	-	-	< 5.0
p & m-xylene^	µg/kg	5	NONE	< 5.0	-	-	-	< 5.0
o-xylene^	µg/kg	5	NONE	< 5.0	-	-	-	< 5.0
MTBE (Methyl Tertiary Butyl Ether)~	µg/kg	5	NONE	< 5.0	-	-	-	< 5.0
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.1	NONE	< 0.10	-	-	-	< 0.10
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.1	NONE	< 0.10	-	-	-	< 0.10
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.1	NONE	< 0.10	-	-	-	< 0.10
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	< 2.0	-	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	< 8.0	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	20	-	-	-	17
TPH-CWG - Aliphatic > EC35 - EC44 $_{EH\_CU\_1D\_AL}$	mg/kg	8.4	NONE	< 8.4	-	-	-	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	21	-	-	-	17
TPH-CWG - Aliphatic (EC5 - EC44) $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	26	-	-	-	17
TPH-CWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.1	NONE	< 0.10	-	-	-	< 0.10
TPH-CWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.1	NONE	< 0.10	-	-	-	< 0.10
TPH-CWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.1	NONE	< 0.10	-	-	-	< 0.10
TPH-CWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	< 2.0	-	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	< 10	-	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	15	-	-	-	25
TPH-CWG - Aromatic > EC35 - EC44 $_{EH\_CU\_1D\_AR}$	mg/kg	8.4	NONE	71	-	-	-	44
TPH-CWG - Aromatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	21	-	-	-	27
TPH-CWG - Aromatic (EC5 - EC44) $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	92	-	-	-	71
TPH Total C5 - C44 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	NONE	120	-	-	-	88

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 23-44511
Project / Site name: Chichester

Lab Sample Number				2745119	2745120	2745121
Sample Reference				BH4-D3	BH5-D1	BH5-D2
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.15	0.50
Date Sampled				04/07/2023	04/07/2023	04/07/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	10	9.4	11
Total mass of sample received	kg	0.001	NONE	1	1	1
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	WEM	WEM	WEM

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	8	8.1
Total Cyanide	mg/kg	1	MCERTS	-	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	-	< 1.0	< 1.0
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-
Organic Matter (automated)	%	0.1	MCERTS	-	1.3	3.3

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	-	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	-	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10
Phenol	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	-	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	-	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	NONE	-	< 1.3	< 1.3

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	0.06	0.14
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	0.16	0.36
Pyrene	mg/kg	0.05	MCERTS	-	0.14	0.33
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.06	0.17
Chrysene	mg/kg	0.05	MCERTS	-	0.08	0.19
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	-	0.09	0.27
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	0.05	0.11
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	0.07	0.18
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	0.11
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	0.11

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	-	< 0.80	1.97

Analytical Report Number: 23-44511
Project / Site name: Chichester

Lab Sample Number				2745119	2745120	2745121
Sample Reference				BH4-D3	BH5-D1	BH5-D2
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.15	0.50
Date Sampled				04/07/2023	04/07/2023	04/07/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.4	11	6.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	0.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	27	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	30	19
Lead (aqua regia extractable)	mg/kg	1	MCERTS	31	26	57
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	24	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	52	61	64
Monoaromatics & Oxygenates						
Benzene~	µg/kg	5	MCERTS	-	< 5.0	< 5.0
Toluene~	µg/kg	5	MCERTS	-	< 5.0	< 5.0
Ethylbenzene^	µg/kg	5	NONE	-	< 5.0	< 5.0
p & m-xylene^	µg/kg	5	NONE	-	< 5.0	< 5.0
o-xylene^	µg/kg	5	NONE	-	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)~	µg/kg	5	NONE	-	< 5.0	< 5.0
Petroleum Hydrocarbons						
TPH-CWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$	mg/kg	0.1	NONE	-	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$	mg/kg	0.1	NONE	-	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$	mg/kg	0.1	NONE	-	< 0.10	< 0.10
TPH-CWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$	mg/kg	1	MCERTS	-	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$	mg/kg	2	MCERTS	-	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	-	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$	mg/kg	8	MCERTS	-	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44 $_{EH\_CU\_1D\_AL}$	mg/kg	8.4	NONE	-	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	-	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44) $_{EH\_CU+HS\_1D\_AL}$	mg/kg	10	NONE	-	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	mg/kg	0.1	NONE	-	< 0.10	< 0.10
TPH-CWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	mg/kg	0.1	NONE	-	< 0.10	< 0.10
TPH-CWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	mg/kg	0.1	NONE	-	< 0.10	< 0.10
TPH-CWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$	mg/kg	1	MCERTS	-	< 1.0	2.7
TPH-CWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$	mg/kg	2	MCERTS	-	< 2.0	4
TPH-CWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	-	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$	mg/kg	10	MCERTS	-	< 10	20
TPH-CWG - Aromatic > EC35 - EC44 $_{EH\_CU\_1D\_AR}$	mg/kg	8.4	NONE	-	< 8.4	15
TPH-CWG - Aromatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	-	< 10	31
TPH-CWG - Aromatic (EC5 - EC44) $_{EH\_CU+HS\_1D\_AR}$	mg/kg	10	NONE	-	< 10	47
TPH Total C5 - C44 $_{EH\_CU+HS\_1D\_TOTAL}$	mg/kg	10	NONE	-	< 10	47

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Analytical Report Number : 23-44511
Project / Site name: Chichester

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2745114	BH1-D1	None Supplied	0.15	Brown loam and clay with gravel and vegetation.
2745115	BH1-D2	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2745116	BH2-D2	None Supplied	0.5	Brown loam and clay with gravel.
2745117	BH2-D4	None Supplied	1.5	Brown loam and sand with gravel.
2745118	BH3-D2	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2745119	BH4-D3	None Supplied	1	Brown loam and clay with gravel and vegetation.
2745120	BH5-D1	None Supplied	0.15	Brown loam and clay with gravel.
2745121	BH5-D2	None Supplied	0.5	Brown loam and clay with gravel.

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Analytical Report Number : 23-44511
Project / Site name: Chichester

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Phenols, speciated, in soil, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS

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Analytical Report Number : 23-44511
Project / Site name: Chichester

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

~ - Quality control surrogate recovery outside of limits, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.
^ - Data reported unaccredited due to quality control parameter failure associated with this result; The result should be considered as being deviating and may be compromised.

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Analytical Report Number : 23-44511

Project / Site name: Chichester

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH1-D1	None Supplied	S	2745114	c	Free cyanide in soil	L080-PL	c
BH1-D1	None Supplied	S	2745114	c	Total cyanide in soil	L080-PL	c
BH3-D2	None Supplied	S	2745118	c	Free cyanide in soil	L080-PL	c
BH3-D2	None Supplied	S	2745118	c	Total cyanide in soil	L080-PL	c
BH5-D1	None Supplied	S	2745120	c	Free cyanide in soil	L080-PL	c
BH5-D1	None Supplied	S	2745120	c	Total cyanide in soil	L080-PL	c
BH5-D2	None Supplied	S	2745121	c	Free cyanide in soil	L080-PL	c
BH5-D2	None Supplied	S	2745121	c	Total cyanide in soil	L080-PL	c

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Analytical Report Number : 23-44512

Project / Site name:	Chichester	**Samples received on:**	12/07/2023
Your job number:	RML 8530	**Samples instructed on/ Analysis started on:**	12/07/2023
Your order number:		**Analysis completed by:**	21/07/2023
Report Issue Number:	1	**Report issued on:**	21/07/2023
Samples Analysed:	2 10:1 WAC samples		

Signed: [redacted]

Joanna Szwagrzak
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report relate only to the sample(s) submitted for testing.

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Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	23-44512						
					Client: RISKMANA		
Location	Chichester						
Lab Reference (Sample Number)	2745122 / 2745123				Landfill Waste Acceptance Criteria Limits		
Sampling Date	04/07/2023						
Sample ID	BH2-D2						
Depth (m)	0.50				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Solid Waste Analysis							
TOC (%)**	0.9				3%	5%	6%
Loss on Ignition (%) **	1.9				--	--	10%
BTEX (µg/kg)^	< 5.0				6000	--	--
Sum of PCBs (mg/kg)**	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	32				500	--	--
Total PAH (WAC-17) (mg/kg)	12.9				100	--	--
pH (units)**	7.8				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	4.7				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0038			0.0378	0.5	2	25
Barium *	0.0149			0.149	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0028			0.028	0.5	10	70
Copper *	0.011			0.11	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0058			0.0576	0.5	10	30
Nickel *	0.0008			0.0082	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0048			0.048	4	50	200
Chloride *	4.4			44	800	15000	25000
Fluoride*	0.47			4.7	10	150	500
Sulphate *	31			310	1000	20000	50000
TDS*	130			1300	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	11.5			115	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.30						
Dry Matter (%)	96						
Moisture (%)	4.2						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

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Waste Acceptance Criteria Analytical Results

Report No:	23-44512						
					Client: RISKMANA		
Location	Chichester						
Lab Reference (Sample Number)	2745124 / 2745125				Landfill Waste Acceptance Criteria Limits		
Sampling Date	04/07/2023						
Sample ID	BH4-D3						
Depth (m)	1.00				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Solid Waste Analysis							
TOC (%)**	0.7				3%	5%	6%
Loss on Ignition (%) **	2.7				--	--	10%
BTEX (µg/kg)^	< 5.0				6000	--	--
Sum of PCBs (mg/kg)**	< 0.007				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	3.39				100	--	--
pH (units)**	9.8				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	36				--	To be evaluated	To be evaluated
Eluate Analysis (BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1 mg/l			10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0089			0.0887	0.5	2	25
Barium *	0.0091			0.0910	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0070			0.070	0.5	10	70
Copper *	0.073			0.73	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0024			0.0236	0.5	10	30
Nickel *	0.012			0.12	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0022			0.022	4	50	200
Chloride *	1.7			17	800	15000	25000
Fluoride*	0.51			5.1	10	150	500
Sulphate *	44			440	1000	20000	50000
TDS*	160			1600	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	37.6			376	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	90						
Moisture (%)	10						

Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation ** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 23-44512
Project / Site name: Chichester

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2745122	BH2-D2	None Supplied	0.5	Brown loam and clay with gravel.
2745124	BH4-D3	None Supplied	1	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 23-44512
Project / Site name: Chichester

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270.	L064-PL	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031	W	ISO 17025

Analytical Report Number : 23-44512
Project / Site name: Chichester

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

^ - Data reported unaccredited due to quality control parameter failure associated with this result; The result should be considered as being deviating and may be compromised.

Risk Management Limited
Tel : 01883 343572

GROUNDWATER & GAS MONITORING RESULTS

Project Name:	Bognor Road, Chichester, West Sussex, PO20 1EJ	Project No. :	RML 8530
		Date :	August 2023

BH No.	Date	Pressure (mb)	Oxygen (%)	Carbon Dioxide (%)	Methane (%)	Methane LEL (%)	Flow Rate (l/hr)	Groundwater Level (m)
BH3	25th July 2023	1008	15.5	4.1	0.0	0.0	0.0	Dry (>2.5m)
	1st August 2023	1004	14.0	5.5	0.1	2.0	0.0	Dry (>2.5m)
	8th August 2023	1017	8.3	8.8	0.0	0.0	0.0	Dry (>2.5m)
	15th August 2023	1017	14.0	4.5	0.3	6.0	0.0	Dry (>2.5m)
BH4	25th July 2023	1008	2.5	0.3	50.0	1000.0	0.0	Dry (>2.6m)
	1st August 2023	1004	0.0	0.0	91.4	1828.0	0.0	Dry (>2.6m)
	8th August 2023	1016	0.0	0.0	89.8	1796.0	0.0	Dry (>2.6m)
	15th August 2023	1017	0.0	0.1	42.4	848.0	0.0	Dry (>2.6m)

KEY

Borehole Location

Trial Pit Location

Risk Management

Title : SKETCH FIELDWORK LOCATION PLAN

RISK MANAGEMENT LIMITED
Unit 10 Coopers Place, Combe Lane,
Godalming, Surrey GU8 5SZ
Tel : 01883 343572

Project Location : Bognor Road, Chichester, West Sussex, PO20 1EJ

Report Date : August 2023

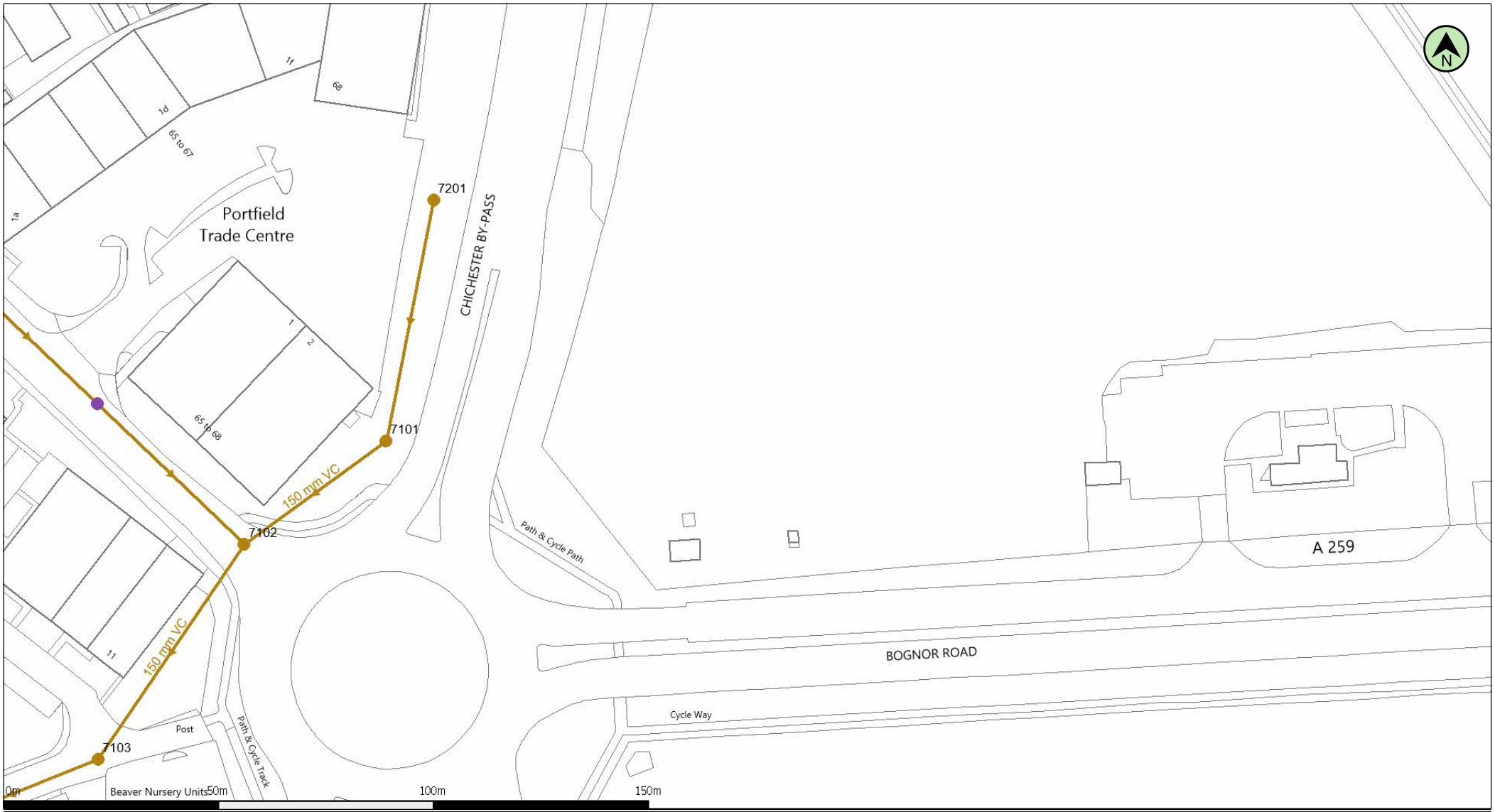
Scale : NTS

Drawn By : RP

Drg. No. RML 8530 /1

APPENDIX C

SOUTHERN WATER SEWER RECORD PLAN



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Date: 29/06/23 | Scale: 1:1250 | Map Centre: 487871,104204 | Data updated: 05/05/23 | Our Ref: 1212679 - 2 | Wastewater Plan A4

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2023 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
WWTW Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

daniel.simms@premiersurveys.co.uk

8906 Chichester

WATER for LIFE from Southern Water

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
7101	F	12.41	10.00	-
7102	F	11.85	9.25	-
7103	F	12.18	0.00	-
7201	F	12.15	10.48	-

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

APPENDIX D
PROPOSED SITE LAYOUT

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N

0 10 20 30 40 M

Infrastructure to be installed for future EV charging spaces.

Rev	Date	Description	By	Chk
F	20/03/2024	Parking bay changes	AK	
E	19/03/2024	Changes to parking bays and additional access path.	AK	
D	18/03/2024	Added boundary	AK	

Client
Whitbread Plc

1 Brooklands Yard
Southover High Street
Lewes
East Sussex BN7 1HU

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AXIOM ARCHITECTS

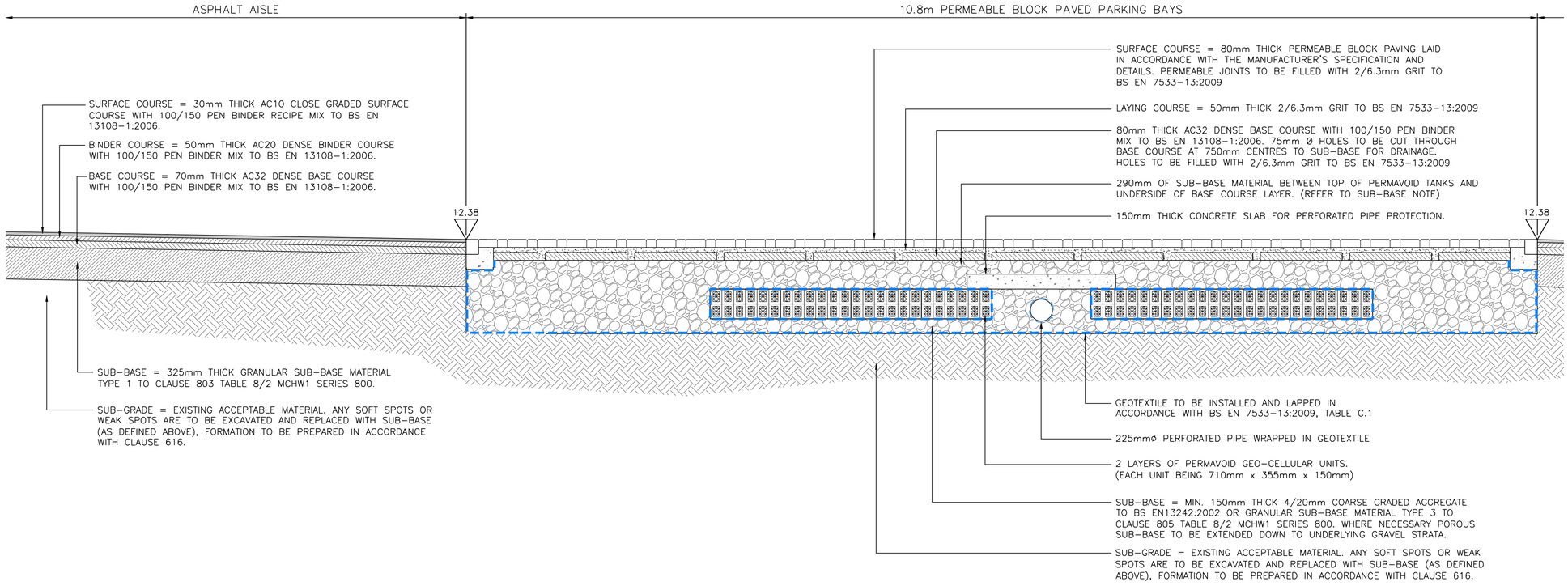
Project
Premier Inn
Bognor Road
Chichester

Drawing
Block Plan
As Proposed

Drawing No.		Revision	Date	Scale	Drawn	Checked	Status
4011-P-	100	F	21/02/24	1:200 @ A1	AK	LB	PLANNING

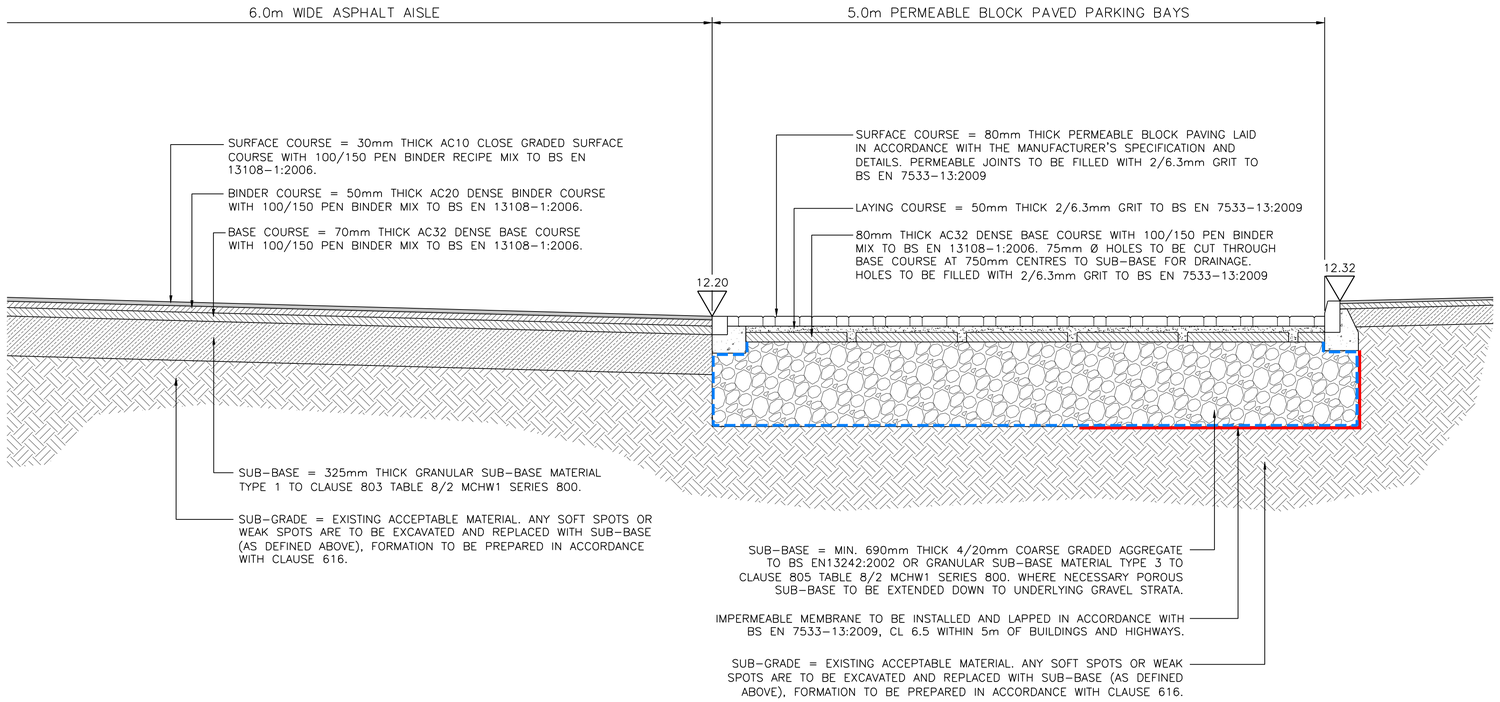
APPENDIX E
DRAINAGE STRATEGY PLAN & DETAILS

DO NOT SCALE



SPECIFICATION FOR NEW PERMEABLE BLOCK PAVED CAR PARK

SCALE 1:25



SPECIFICATION FOR NEW PERMEABLE BLOCK PAVED CAR PARK

SCALE 1:25

P2	CENTRAL PARKING AREA WIDTH UPDATED.	GH	22.03.24
P1	ISSUED TO ACCOMPANY DRAINAGE STRATEGY.	GL	01.03.24
MK	REVISION	BY	DATE

DRAWING STATUS

NOT FOR CONSTRUCTION

DRAWING TITLE

SUDS CONSTRUCTION DETAILS

PROJECT

PREMIER INN
BOGNOR ROAD
CHICHESTER
PO20 1EG

simpson | tws
8 Friday Street
Henley-On-Thames
Oxfordshire, RG9 1AH
T: 01491 576 221
E: mail@simpsoneng.com
W: www.simpsoneng.com
London, Henley-on Thames and Gloucester

Drawn	Ch'kd	Scales	Date
GL	GH	1:25 @ A1	MAR' 2024

Purpose of Issue: PLANNING

Project Number	Drawing Number	Revision
P19-370	SK106	P2

A1

APPENDIX F
DRAINED AREAS LAYOUT

DO NOT SCALE

DRAINED AREAS LEGEND

- CATCHMENT 1 = 0.034ha
- CATCHMENT 2 = 0.029ha
- CATCHMENT 3 = 0.116ha
- CATCHMENT 4 = 0.015ha
- CATCHMENT 5 = 0.059ha
- CATCHMENT 6 = 0.130ha
- SITE BOUNDARY

Deliveries Area

AC Condensers 27m²

Kitchen 87m²

EOH Landing

Toilet Lobby

Team Room 12m²

Cellar 16m²

Office 10m²

Public WC

Plant 43m²

Lawn mower 17m²

EOH Corridor 13m²

Staff WC 3m²

Staff WC 3m²

Cleaners Cupboard 2m²

Staff WC 3m²

Staff WC 3m²

Cleaners Cupboard 2m²

Staff Store 6m²

Staff Store 6m²

Staff WC 3m²

Staff WC 3m²

Staff WC 3

APPENDIX G
MICRODRAINAGE DESIGN RESULTS

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 45 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.769	0.279	2.9	9.5	O K
30 min Summer	11.824	0.334	2.9	11.7	O K
60 min Summer	11.846	0.356	2.9	12.6	O K
120 min Summer	11.823	0.333	2.9	11.7	O K
180 min Summer	11.790	0.300	2.9	10.3	O K
240 min Summer	11.755	0.265	2.9	8.9	O K
360 min Summer	11.690	0.200	2.9	6.3	O K
480 min Summer	11.634	0.144	2.9	4.2	O K
600 min Summer	11.588	0.098	2.9	2.7	O K
720 min Summer	11.555	0.065	2.9	1.7	O K
960 min Summer	11.535	0.045	2.6	1.1	O K
1440 min Summer	11.522	0.032	1.8	0.8	O K
2160 min Summer	11.513	0.023	1.3	0.5	O K
2880 min Summer	11.508	0.018	1.0	0.4	O K
4320 min Summer	11.503	0.013	0.8	0.3	O K
5760 min Summer	11.501	0.011	0.6	0.2	O K
7200 min Summer	11.499	0.009	0.5	0.2	O K
8640 min Summer	11.498	0.008	0.5	0.2	O K
10080 min Summer	11.498	0.008	0.4	0.2	O K
15 min Winter	11.770	0.280	2.9	9.5	O K
30 min Winter	11.825	0.335	2.9	11.8	O K
60 min Winter	11.844	0.354	2.9	12.5	O K
120 min Winter	11.806	0.316	2.9	11.0	O K
180 min Winter	11.754	0.264	2.9	8.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	144.711	0.0	17
30 min Summer	96.798	0.0	30
60 min Summer	61.791	0.0	48
120 min Summer	37.237	0.0	82
180 min Summer	27.401	0.0	116
240 min Summer	21.927	0.0	150
360 min Summer	15.882	0.0	212
480 min Summer	12.542	0.0	270
600 min Summer	10.414	0.0	326
720 min Summer	8.933	0.0	376
960 min Summer	7.000	0.0	490
1440 min Summer	4.956	0.0	734
2160 min Summer	3.526	0.0	1080
2880 min Summer	2.787	0.0	1460
4320 min Summer	2.032	0.0	2172
5760 min Summer	1.645	0.0	2920
7200 min Summer	1.411	0.0	3592
8640 min Summer	1.254	0.0	4304
10080 min Summer	1.141	0.0	5040
15 min Winter	144.711	0.0	17
30 min Winter	96.798	0.0	30
60 min Winter	61.791	0.0	50
120 min Winter	37.237	0.0	88
180 min Winter	27.401	0.0	124

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	11.702	0.212	2.9	6.8	O K
360 min Winter	11.610	0.120	2.9	3.4	O K
480 min Winter	11.544	0.054	2.9	1.3	O K
600 min Winter	11.533	0.043	2.5	1.1	O K
720 min Winter	11.527	0.037	2.1	0.9	O K
960 min Winter	11.519	0.029	1.7	0.7	O K
1440 min Winter	11.511	0.021	1.2	0.5	O K
2160 min Winter	11.505	0.015	0.8	0.3	O K
2880 min Winter	11.502	0.012	0.7	0.3	O K
4320 min Winter	11.499	0.009	0.5	0.2	O K
5760 min Winter	11.497	0.007	0.4	0.2	O K
7200 min Winter	11.496	0.006	0.4	0.1	O K
8640 min Winter	11.495	0.005	0.3	0.1	O K
10080 min Winter	11.495	0.005	0.3	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	21.927	0.0	156
360 min Winter	15.882	0.0	214
480 min Winter	12.542	0.0	256
600 min Winter	10.414	0.0	308
720 min Winter	8.933	0.0	368
960 min Winter	7.000	0.0	484
1440 min Winter	4.956	0.0	734
2160 min Winter	3.526	0.0	1100
2880 min Winter	2.787	0.0	1432
4320 min Winter	2.032	0.0	2236
5760 min Winter	1.645	0.0	2912
7200 min Winter	1.411	0.0	3568
8640 min Winter	1.254	0.0	4248
10080 min Winter	1.141	0.0	5000

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Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
FEH Rainfall Version	2013	Cv (Winter)	1.000
Site Location	GB 487869 104202 SU 87869 04202	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.034

Time (mins) From:	To:	Area (ha)
0	4	0.034

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Model Details

Storage is Online Cover Level (m) 12.200

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	0.4
Membrane Percolation (mm/hr)	1000	Length (m)	15.0
Max Percolation (l/s)	1.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.490	Cap Volume Depth (m)	0.500

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	4.6
Membrane Percolation (mm/hr)	1000	Length (m)	15.0
Max Percolation (l/s)	19.2	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.490	Cap Volume Depth (m)	0.500

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	11.7
Max Percolation (l/s)	16.3	Slope (1:X)	61.9
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.490	Cap Volume Depth (m)	0.500

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Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 30 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.551	0.251	3.3	7.7	O K
30 min Summer	11.597	0.297	3.3	9.2	O K
60 min Summer	11.611	0.311	3.3	9.6	O K
120 min Summer	11.573	0.273	3.3	8.4	O K
180 min Summer	11.527	0.227	3.3	7.0	O K
240 min Summer	11.483	0.183	3.3	5.6	O K
360 min Summer	11.412	0.112	3.3	3.3	O K
480 min Summer	11.367	0.067	3.3	1.9	O K
600 min Summer	11.349	0.049	3.2	1.3	O K
720 min Summer	11.344	0.044	2.8	1.2	O K
960 min Summer	11.336	0.036	2.2	0.9	O K
1440 min Summer	11.327	0.027	1.6	0.7	O K
2160 min Summer	11.320	0.020	1.1	0.5	O K
2880 min Summer	11.316	0.016	0.9	0.4	O K
4320 min Summer	11.312	0.012	0.6	0.3	O K
5760 min Summer	11.310	0.010	0.5	0.2	O K
7200 min Summer	11.309	0.009	0.5	0.2	O K
8640 min Summer	11.308	0.008	0.4	0.2	O K
10080 min Summer	11.307	0.007	0.4	0.2	O K
15 min Winter	11.550	0.250	3.3	7.7	O K
30 min Winter	11.597	0.297	3.3	9.2	O K
60 min Winter	11.603	0.303	3.3	9.3	O K
120 min Winter	11.539	0.239	3.3	7.3	O K
180 min Winter	11.470	0.170	3.3	5.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	144.711	0.0	16
30 min Summer	96.798	0.0	27
60 min Summer	61.791	0.0	44
120 min Summer	37.237	0.0	78
180 min Summer	27.401	0.0	112
240 min Summer	21.927	0.0	142
360 min Summer	15.882	0.0	200
480 min Summer	12.542	0.0	254
600 min Summer	10.414	0.0	308
720 min Summer	8.933	0.0	368
960 min Summer	7.000	0.0	490
1440 min Summer	4.956	0.0	732
2160 min Summer	3.526	0.0	1088
2880 min Summer	2.787	0.0	1440
4320 min Summer	2.032	0.0	2140
5760 min Summer	1.645	0.0	2848
7200 min Summer	1.411	0.0	3632
8640 min Summer	1.254	0.0	4280
10080 min Summer	1.141	0.0	5136
15 min Winter	144.711	0.0	16
30 min Winter	96.798	0.0	29
60 min Winter	61.791	0.0	46
120 min Winter	37.237	0.0	84
180 min Winter	27.401	0.0	116

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	11.411	0.111	3.3	3.3	O K
360 min Winter	11.349	0.049	3.2	1.3	O K
480 min Winter	11.341	0.041	2.5	1.1	O K
600 min Winter	11.335	0.035	2.1	0.9	O K
720 min Winter	11.331	0.031	1.8	0.8	O K
960 min Winter	11.325	0.025	1.4	0.6	O K
1440 min Winter	11.319	0.019	1.0	0.4	O K
2160 min Winter	11.314	0.014	0.7	0.3	O K
2880 min Winter	11.311	0.011	0.6	0.3	O K
4320 min Winter	11.308	0.008	0.4	0.2	O K
5760 min Winter	11.307	0.007	0.3	0.2	O K
7200 min Winter	11.306	0.006	0.3	0.1	O K
8640 min Winter	11.305	0.005	0.3	0.1	O K
10080 min Winter	11.305	0.005	0.2	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	21.927	0.0	146
360 min Winter	15.882	0.0	188
480 min Winter	12.542	0.0	246
600 min Winter	10.414	0.0	308
720 min Winter	8.933	0.0	368
960 min Winter	7.000	0.0	484
1440 min Winter	4.956	0.0	732
2160 min Winter	3.526	0.0	1116
2880 min Winter	2.787	0.0	1472
4320 min Winter	2.032	0.0	2236
5760 min Winter	1.645	0.0	3000
7200 min Winter	1.411	0.0	3672
8640 min Winter	1.254	0.0	4248
10080 min Winter	1.141	0.0	4976

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Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
FEH Rainfall Version	2013	Cv (Winter)	1.000
Site Location	GB 487869 104202 SU 87869 04202	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.029

Time (mins) From:	To:	Area (ha)
0	4	0.029

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Model Details

Storage is Online Cover Level (m) 12.200

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	3.3
Membrane Percolation (mm/hr)	1000	Length (m)	9.7
Max Percolation (l/s)	8.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.300	Cap Volume Depth (m)	0.700

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	1.7
Membrane Percolation (mm/hr)	1000	Length (m)	9.7
Max Percolation (l/s)	4.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.300	Cap Volume Depth (m)	0.700

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	3.3
Membrane Percolation (mm/hr)	1000	Length (m)	6.1
Max Percolation (l/s)	5.6	Slope (1:X)	122.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.300	Cap Volume Depth (m)	0.700

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	1.7
Membrane Percolation (mm/hr)	1000	Length (m)	6.1
Max Percolation (l/s)	2.9	Slope (1:X)	122.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.300	Cap Volume Depth (m)	0.700

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.3
Max Percolation (l/s)	7.4	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.300	Cap Volume Depth (m)	0.700

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Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 60 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.822	0.392	6.7	32.9	O K
30 min Summer	11.940	0.510	6.7	42.1	O K
60 min Summer	12.050	0.620	6.7	47.7	O K
120 min Summer	12.018	0.588	6.7	46.2	O K
180 min Summer	11.962	0.532	6.7	43.2	O K
240 min Summer	11.897	0.467	6.7	39.8	O K
360 min Summer	11.820	0.390	6.7	32.7	O K
480 min Summer	11.755	0.325	6.7	25.7	O K
600 min Summer	11.696	0.266	6.7	19.6	O K
720 min Summer	11.647	0.217	6.7	14.4	O K
960 min Summer	11.572	0.142	6.7	6.9	O K
1440 min Summer	11.476	0.046	6.2	2.2	O K
2160 min Summer	11.463	0.033	4.4	1.6	O K
2880 min Summer	11.456	0.026	3.5	1.3	O K
4320 min Summer	11.449	0.019	2.6	0.9	O K
5760 min Summer	11.446	0.016	2.1	0.8	O K
7200 min Summer	11.443	0.013	1.8	0.6	O K
8640 min Summer	11.442	0.012	1.6	0.6	O K
10080 min Summer	11.441	0.011	1.4	0.5	O K
15 min Winter	11.823	0.393	6.7	33.0	O K
30 min Winter	11.943	0.513	6.7	42.2	O K
60 min Winter	12.057	0.627	6.7	48.1	O K
120 min Winter	12.010	0.580	6.7	45.7	O K
180 min Winter	11.925	0.495	6.7	41.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	144.711	0.0	18
30 min Summer	96.798	0.0	32
60 min Summer	61.791	0.0	60
120 min Summer	37.237	0.0	92
180 min Summer	27.401	0.0	126
240 min Summer	21.927	0.0	160
360 min Summer	15.882	0.0	226
480 min Summer	12.542	0.0	290
600 min Summer	10.414	0.0	350
720 min Summer	8.933	0.0	406
960 min Summer	7.000	0.0	518
1440 min Summer	4.956	0.0	732
2160 min Summer	3.526	0.0	1100
2880 min Summer	2.787	0.0	1444
4320 min Summer	2.032	0.0	2172
5760 min Summer	1.645	0.0	2880
7200 min Summer	1.411	0.0	3592
8640 min Summer	1.254	0.0	4296
10080 min Summer	1.141	0.0	4992
15 min Winter	144.711	0.0	17
30 min Winter	96.798	0.0	31
60 min Winter	61.791	0.0	60
120 min Winter	37.237	0.0	96
180 min Winter	27.401	0.0	134

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	11.852	0.422	6.7	36.1	O K
360 min Winter	11.751	0.321	6.7	25.4	O K
480 min Winter	11.661	0.231	6.7	15.9	O K
600 min Winter	11.590	0.160	6.7	8.4	O K
720 min Winter	11.502	0.072	6.7	3.5	O K
960 min Winter	11.472	0.042	5.7	2.0	O K
1440 min Winter	11.460	0.030	4.0	1.5	O K
2160 min Winter	11.451	0.021	2.9	1.0	O K
2880 min Winter	11.447	0.017	2.3	0.8	O K
4320 min Winter	11.442	0.012	1.6	0.6	O K
5760 min Winter	11.440	0.010	1.4	0.5	O K
7200 min Winter	11.439	0.009	1.2	0.4	O K
8640 min Winter	11.438	0.008	1.0	0.4	O K
10080 min Winter	11.437	0.007	1.0	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	21.927	0.0	170
360 min Winter	15.882	0.0	238
480 min Winter	12.542	0.0	298
600 min Winter	10.414	0.0	350
720 min Winter	8.933	0.0	392
960 min Winter	7.000	0.0	488
1440 min Winter	4.956	0.0	736
2160 min Winter	3.526	0.0	1096
2880 min Winter	2.787	0.0	1436
4320 min Winter	2.032	0.0	2188
5760 min Winter	1.645	0.0	2896
7200 min Winter	1.411	0.0	3496
8640 min Winter	1.254	0.0	4376
10080 min Winter	1.141	0.0	5032

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Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
FEH Rainfall Version	2013	Cv (Winter)	1.000
Site Location	GB 487869 104202 SU 87869 04202	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Green Roof

Area (m^3) 67 Evaporation (mm/day) 3
Depression Storage (mm) 5 Decay Coefficient 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.001218	32	36	0.000246	64	68	0.000050	96	100	0.000010
4	8	0.000997	36	40	0.000201	68	72	0.000041	100	104	0.000008
8	12	0.000816	40	44	0.000165	72	76	0.000033	104	108	0.000007
12	16	0.000668	44	48	0.000135	76	80	0.000027	108	112	0.000005
16	20	0.000547	48	52	0.000110	80	84	0.000022	112	116	0.000005
20	24	0.000448	52	56	0.000090	84	88	0.000018	116	120	0.000004
24	28	0.000367	56	60	0.000074	88	92	0.000015			
28	32	0.000300	60	64	0.000061	92	96	0.000012			

Time Area Diagram

Total Area (ha) 0.109

Time From:	(mins) To:	Area (ha)
0	4	0.109

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

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Model Details

Storage is Online Cover Level (m) 12.380

Complex Structure

Filter Drain

Infiltration Coefficient Base (m/hr)	0.29880	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.125
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	0.30	Cap Volume Depth (m)	0.740
Invert Level (m)	11.430	Cap Infiltration Depth (m)	0.000
Trench Width (m)	1.0	Number of Pipes	1
Trench Length (m)	15.0		

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	9.8
Membrane Percolation (mm/hr)	1000	Length (m)	15.0
Max Percolation (l/s)	40.8	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.430	Cap Volume Depth (m)	0.150

Cellular Storage

Invert Level (m)	11.580	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	84.9	84.9	0.300	84.9	97.3	0.301	0.0	97.3

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	3.3
Membrane Percolation (mm/hr)	1000	Length (m)	15.0
Max Percolation (l/s)	13.8	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.580	Cap Volume Depth (m)	0.300

Filter Drain

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.150
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.150
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	0.30	Cap Volume Depth (m)	0.450
Invert Level (m)	11.580	Cap Infiltration Depth (m)	0.000
Trench Width (m)	0.5	Number of Pipes	1
Trench Length (m)	21.5		

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Safety Factor	2.0
Membrane Percolation (mm/hr)	1000	Porosity	0.30
Max Percolation (l/s)	40.8	Invert Level (m)	11.880

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Porous Car Park

Width (m)	9.8	Depression Storage (mm)	5
Length (m)	15.0	Evaporation (mm/day)	3
Slope (1:X)	0.0	Cap Volume Depth (m)	0.290

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Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 9 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.432	0.142	3.6	2.9	O K
30 min Summer	11.444	0.154	3.6	3.3	O K
60 min Summer	11.429	0.139	3.6	2.9	O K
120 min Summer	11.385	0.095	3.6	1.7	O K
180 min Summer	11.355	0.065	3.6	0.9	O K
240 min Summer	11.345	0.055	3.3	0.6	O K
360 min Summer	11.336	0.046	2.5	0.5	O K
480 min Summer	11.331	0.041	2.0	0.4	O K
600 min Summer	11.328	0.038	1.7	0.3	O K
720 min Summer	11.325	0.035	1.5	0.3	O K
960 min Summer	11.321	0.031	1.1	0.2	O K
1440 min Summer	11.316	0.026	0.8	0.1	O K
2160 min Summer	11.312	0.022	0.6	0.1	O K
2880 min Summer	11.310	0.020	0.5	0.1	O K
4320 min Summer	11.307	0.017	0.3	0.1	O K
5760 min Summer	11.305	0.015	0.3	0.1	O K
7200 min Summer	11.304	0.014	0.2	0.0	O K
8640 min Summer	11.303	0.013	0.2	0.0	O K
10080 min Summer	11.303	0.013	0.2	0.0	O K
15 min Winter	11.429	0.139	3.6	2.9	O K
30 min Winter	11.435	0.145	3.6	3.0	O K
60 min Winter	11.406	0.116	3.6	2.3	O K
120 min Winter	11.350	0.060	3.6	0.8	O K
180 min Winter	11.338	0.048	2.8	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	144.711	0.0	13
30 min Summer	96.798	0.0	22
60 min Summer	61.791	0.0	38
120 min Summer	37.237	0.0	70
180 min Summer	27.401	0.0	98
240 min Summer	21.927	0.0	126
360 min Summer	15.882	0.0	184
480 min Summer	12.542	0.0	246
600 min Summer	10.414	0.0	304
720 min Summer	8.933	0.0	364
960 min Summer	7.000	0.0	484
1440 min Summer	4.956	0.0	732
2160 min Summer	3.526	0.0	1100
2880 min Summer	2.787	0.0	1420
4320 min Summer	2.032	0.0	2168
5760 min Summer	1.645	0.0	2896
7200 min Summer	1.411	0.0	3632
8640 min Summer	1.254	0.0	4352
10080 min Summer	1.141	0.0	5032
15 min Winter	144.711	0.0	14
30 min Winter	96.798	0.0	23
60 min Winter	61.791	0.0	40
120 min Winter	37.237	0.0	66
180 min Winter	27.401	0.0	96

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	11.333	0.043	2.3	0.4	O K
360 min Winter	11.327	0.037	1.7	0.3	O K
480 min Winter	11.323	0.033	1.3	0.2	O K
600 min Winter	11.320	0.030	1.1	0.2	O K
720 min Winter	11.318	0.028	0.9	0.2	O K
960 min Winter	11.315	0.025	0.7	0.1	O K
1440 min Winter	11.311	0.021	0.5	0.1	O K
2160 min Winter	11.308	0.018	0.4	0.1	O K
2880 min Winter	11.306	0.016	0.3	0.1	O K
4320 min Winter	11.303	0.013	0.2	0.0	O K
5760 min Winter	11.302	0.012	0.2	0.0	O K
7200 min Winter	11.301	0.011	0.2	0.0	O K
8640 min Winter	11.301	0.011	0.1	0.0	O K
10080 min Winter	11.300	0.010	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	21.927	0.0	126
360 min Winter	15.882	0.0	188
480 min Winter	12.542	0.0	248
600 min Winter	10.414	0.0	300
720 min Winter	8.933	0.0	370
960 min Winter	7.000	0.0	476
1440 min Winter	4.956	0.0	714
2160 min Winter	3.526	0.0	1116
2880 min Winter	2.787	0.0	1492
4320 min Winter	2.032	0.0	2156
5760 min Winter	1.645	0.0	2992
7200 min Winter	1.411	0.0	3632
8640 min Winter	1.254	0.0	4248
10080 min Winter	1.141	0.0	5112

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Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
FEH Rainfall Version	2013	Cv (Winter)	1.000
Site Location	GB 487869 104202 SU 87869 04202	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.015

Time (mins) From:	To:	Area (ha)
0	4	0.015

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Model Details

Storage is Online Cover Level (m) 12.180

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	17.5
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	24.3	Slope (1:X)	83.3
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.290	Cap Volume Depth (m)	0.680

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Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 49 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.627	0.167	5.0	16.6	O K
30 min Summer	11.704	0.244	5.0	21.0	Flood Risk
60 min Summer	11.743	0.283	5.0	23.5	Flood Risk
120 min Summer	11.737	0.277	5.0	23.1	Flood Risk
180 min Summer	11.710	0.250	5.0	21.4	Flood Risk
240 min Summer	11.680	0.220	5.0	19.4	O K
360 min Summer	11.607	0.147	5.0	15.5	O K
480 min Summer	11.583	0.123	4.9	12.6	O K
600 min Summer	11.567	0.107	4.4	10.7	O K
720 min Summer	11.554	0.094	3.9	9.2	O K
960 min Summer	11.526	0.066	3.5	6.2	O K
1440 min Summer	11.503	0.043	3.0	3.9	O K
2160 min Summer	11.491	0.031	2.2	2.8	O K
2880 min Summer	11.485	0.025	1.8	2.2	O K
4320 min Summer	11.478	0.018	1.3	1.6	O K
5760 min Summer	11.475	0.015	1.0	1.3	O K
7200 min Summer	11.473	0.013	0.9	1.1	O K
8640 min Summer	11.471	0.011	0.8	1.0	O K
10080 min Summer	11.470	0.010	0.7	0.9	O K
15 min Winter	11.627	0.167	5.0	16.6	O K
30 min Winter	11.704	0.244	5.0	21.0	Flood Risk
60 min Winter	11.739	0.279	5.0	23.3	Flood Risk
120 min Winter	11.720	0.260	5.0	22.1	Flood Risk
180 min Winter	11.679	0.219	5.0	19.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	144.711	0.0	17
30 min Summer	96.798	0.0	30
60 min Summer	61.791	0.0	48
120 min Summer	37.237	0.0	82
180 min Summer	27.401	0.0	116
240 min Summer	21.927	0.0	150
360 min Summer	15.882	0.0	212
480 min Summer	12.542	0.0	270
600 min Summer	10.414	0.0	332
720 min Summer	8.933	0.0	396
960 min Summer	7.000	0.0	512
1440 min Summer	4.956	0.0	736
2160 min Summer	3.526	0.0	1104
2880 min Summer	2.787	0.0	1468
4320 min Summer	2.032	0.0	2204
5760 min Summer	1.645	0.0	2936
7200 min Summer	1.411	0.0	3568
8640 min Summer	1.254	0.0	4400
10080 min Summer	1.141	0.0	5136
15 min Winter	144.711	0.0	17
30 min Winter	96.798	0.0	30
60 min Winter	61.791	0.0	50
120 min Winter	37.237	0.0	88
180 min Winter	27.401	0.0	124

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	11.623	0.163	5.0	16.5	O K
360 min Winter	11.579	0.119	4.8	12.1	O K
480 min Winter	11.557	0.097	4.0	9.5	O K
600 min Winter	11.532	0.072	3.5	6.8	O K
720 min Winter	11.511	0.051	3.5	4.7	O K
960 min Winter	11.500	0.040	2.8	3.7	O K
1440 min Winter	11.489	0.029	2.0	2.6	O K
2160 min Winter	11.481	0.021	1.5	1.8	O K
2880 min Winter	11.476	0.016	1.1	1.4	O K
4320 min Winter	11.472	0.012	0.8	1.0	O K
5760 min Winter	11.470	0.010	0.7	0.8	O K
7200 min Winter	11.468	0.008	0.6	0.7	O K
8640 min Winter	11.467	0.007	0.5	0.6	O K
10080 min Winter	11.467	0.007	0.5	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	21.927	0.0	156
360 min Winter	15.882	0.0	218
480 min Winter	12.542	0.0	282
600 min Winter	10.414	0.0	348
720 min Winter	8.933	0.0	384
960 min Winter	7.000	0.0	500
1440 min Winter	4.956	0.0	738
2160 min Winter	3.526	0.0	1092
2880 min Winter	2.787	0.0	1468
4320 min Winter	2.032	0.0	2204
5760 min Winter	1.645	0.0	2848
7200 min Winter	1.411	0.0	3640
8640 min Winter	1.254	0.0	4328
10080 min Winter	1.141	0.0	5120

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Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
FEH Rainfall Version	2013	Cv (Winter)	1.000
Site Location	GB 487869 104202 SU 87869 04202	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.059

Time (mins) From:	To:	Area (ha)
0	4	0.059

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Model Details

Storage is Online Cover Level (m) 12.000

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	30.0
Membrane Percolation (mm/hr)	1000	Length (m)	1.0
Max Percolation (l/s)	8.3	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.460	Cap Volume Depth (m)	0.150

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	12.5
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	17.4	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.460	Cap Volume Depth (m)	0.150

Cellular Storage

Invert Level (m)	11.460	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.29880	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	84.6	84.6	0.150	84.6	97.8	0.151	0.0	97.8

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	30.0
Membrane Percolation (mm/hr)	1000	Length (m)	1.2
Max Percolation (l/s)	10.0	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.536	Cap Volume Depth (m)	0.150

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	2.0
Max Percolation (l/s)	2.8	Slope (1:X)	23.4
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.560	Cap Volume Depth (m)	0.150

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	11.610
Membrane Percolation (mm/hr)	1000	Width (m)	42.5
Max Percolation (l/s)	59.0	Length (m)	5.0
Safety Factor	2.0	Slope (1:X)	50.0
Porosity	0.30	Depression Storage (mm)	5

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Porous Car Park

Evaporation (mm/day) 3 Cap Volume Depth (m) 0.180

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Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 97 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.548	0.258	5.6	40.5	O K
30 min Summer	11.656	0.366	5.6	52.5	O K
60 min Summer	11.807	0.517	5.6	61.9	Flood Risk
120 min Summer	11.892	0.602	5.6	63.2	Flood Risk
180 min Summer	11.773	0.483	5.6	61.3	Flood Risk
240 min Summer	11.728	0.438	5.6	58.5	Flood Risk
360 min Summer	11.650	0.360	5.6	52.0	O K
480 min Summer	11.579	0.289	5.6	45.3	O K
600 min Summer	11.539	0.249	5.6	39.1	O K
720 min Summer	11.502	0.212	5.6	33.3	O K
960 min Summer	11.440	0.150	5.6	23.6	O K
1440 min Summer	11.362	0.072	5.6	11.4	O K
2160 min Summer	11.333	0.043	4.9	6.8	O K
2880 min Summer	11.325	0.035	3.9	5.4	O K
4320 min Summer	11.315	0.025	2.8	4.0	O K
5760 min Summer	11.311	0.021	2.3	3.2	O K
7200 min Summer	11.308	0.018	2.0	2.8	O K
8640 min Summer	11.306	0.016	1.8	2.4	O K
10080 min Summer	11.304	0.014	1.6	2.2	O K
15 min Winter	11.548	0.258	5.6	40.4	O K
30 min Winter	11.657	0.367	5.6	52.6	O K
60 min Winter	11.825	0.535	5.6	62.1	Flood Risk
120 min Winter	11.893	0.603	5.6	63.3	Flood Risk
180 min Winter	11.752	0.462	5.6	60.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	144.711	0.0	18
30 min Summer	96.798	0.0	32
60 min Summer	61.791	0.0	60
120 min Summer	37.237	0.0	102
180 min Summer	27.401	0.0	134
240 min Summer	21.927	0.0	168
360 min Summer	15.882	0.0	234
480 min Summer	12.542	0.0	302
600 min Summer	10.414	0.0	366
720 min Summer	8.933	0.0	428
960 min Summer	7.000	0.0	548
1440 min Summer	4.956	0.0	766
2160 min Summer	3.526	0.0	1100
2880 min Summer	2.787	0.0	1468
4320 min Summer	2.032	0.0	2200
5760 min Summer	1.645	0.0	2896
7200 min Summer	1.411	0.0	3616
8640 min Summer	1.254	0.0	4400
10080 min Summer	1.141	0.0	5064
15 min Winter	144.711	0.0	18
30 min Winter	96.798	0.0	32
60 min Winter	61.791	0.0	60
120 min Winter	37.237	0.0	112
180 min Winter	27.401	0.0	140

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	11.704	0.414	5.6	56.4	Flood Risk
360 min Winter	11.590	0.300	5.6	47.0	O K
480 min Winter	11.529	0.239	5.6	37.4	O K
600 min Winter	11.473	0.183	5.6	28.7	O K
720 min Winter	11.425	0.135	5.6	21.2	O K
960 min Winter	11.357	0.067	5.6	10.5	O K
1440 min Winter	11.330	0.040	4.5	6.2	O K
2160 min Winter	11.318	0.028	3.2	4.4	O K
2880 min Winter	11.313	0.023	2.6	3.5	O K
4320 min Winter	11.306	0.016	1.8	2.6	O K
5760 min Winter	11.303	0.013	1.5	2.1	O K
7200 min Winter	11.301	0.011	1.3	1.8	O K
8640 min Winter	11.300	0.010	1.2	1.6	O K
10080 min Winter	11.299	0.009	1.0	1.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	21.927	0.0	178
360 min Winter	15.882	0.0	250
480 min Winter	12.542	0.0	318
600 min Winter	10.414	0.0	382
720 min Winter	8.933	0.0	440
960 min Winter	7.000	0.0	538
1440 min Winter	4.956	0.0	738
2160 min Winter	3.526	0.0	1104
2880 min Winter	2.787	0.0	1464
4320 min Winter	2.032	0.0	2204
5760 min Winter	1.645	0.0	2912
7200 min Winter	1.411	0.0	3672
8640 min Winter	1.254	0.0	4352
10080 min Winter	1.141	0.0	5112

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Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
FEH Rainfall Version	2013	Cv (Winter)	1.000
Site Location	GB 487869 104202 SU 87869 04202	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.130

Time (mins) From:	To:	Area (ha)
0	4	0.130

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Model Details

Storage is Online Cover Level (m) 11.970

Complex Structure

Cellular Storage

Invert Level (m) 11.290 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.29880 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	116.4	116.4	0.300	116.4	148.9	0.301	0.0	148.9

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.8
Membrane Percolation (mm/hr)	1000	Length (m)	48.1
Max Percolation (l/s)	37.4	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.290	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	0.8
Membrane Percolation (mm/hr)	1000	Length (m)	2.8
Max Percolation (l/s)	0.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.290	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.29880	Width (m)	2.8
Membrane Percolation (mm/hr)	1000	Length (m)	6.0
Max Percolation (l/s)	4.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.290	Cap Volume Depth (m)	0.300

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	55.0
Max Percolation (l/s)	76.4	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.590	Cap Volume Depth (m)	0.170

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	11.760
Membrane Percolation (mm/hr)	1000	Width (m)	5.0
Max Percolation (l/s)	15.3	Length (m)	11.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	0.30	Depression Storage (mm)	5

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Porous Car Park

Evaporation (mm/day) 3 Cap Volume Depth (m) 0.160

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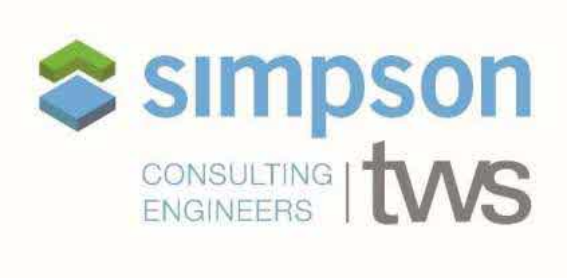

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