MEC Consulting Group

FLOOD RISK & DRAINAGE



Henfield Leisure Centre, Northcroft, Henfield
Flood Risk Assessment
September 2024

Report Ref: 27951-FLD-0101 Rev B

Henfield Leisure Centre, Northcroft, Henfield
Flood Risk Assessment
September 2024

REPORT REF: 27951-FLD-0101 Rev B

CLIENT: Henfield Leisure Centre

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REGISTRATION OF AMENDMENTS

Date	Rev	Comment	Prepared By	Checked By	Approved By
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September 2024	A	Updated drainage design	**Zoe Jordan** **BSc (Hons)** Assistant Flood Risk Engineer	**Ryan Chafer,** **BSc (Hons)** Flood Risk Engineer	**Tim Rose,** **BA (Hons), MCIHT, MTPS** Regional Director
September 2024	B	Rainwater Harvesting Information	**Zoe Jordan** **BSc (Hons)** Assistant Flood Risk Engineer	**Ryan Chafer,** **BSc (Hons)** Flood Risk Engineer	**Tim Rose,** **BA (Hons), MCIHT, MTPS** Regional Director

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EXECUTIVE SUMMARY

Site Address	Henfield Leisure Centre, Northcroft, Henfield, BN5 9QB, Grid Ref: E:521141, N:116372
Site Description and Setting	The site is located within Northcroft, and covers an approximate area of 0.04ha. The development within the red line will consist of two proposed new padel courts under a canopy. The land under the applicant's control consists of four existing tennis courts, a leisure centre and a sports field. The site is bounded by the leisure centre to the south, Henfield cemetery and existing residential properties to the east, existing properties to the north and Northcroft Road to the west.
Proposed Development	The development consists of the installation of two new padel courts with a Quick Box Canopy overhead.
Flood Risk Information	The site is located within Flood Zone 1, defined as land with a yearly chance of flooding from fluvial sources lower than 0.1%. The Long-Term flood risk map from the Environment Agency, shows the site to be at very low risk of surface water flooding. The Environment Agency Historical Flood maps show no evidence of any historical flooding near the site.
Surface Water Drainage Strategy	In accordance with the drainage hierarchy, surface water will discharge to a Rainwater Harvesting Tank adjacent to the padel court. Surface water flows for the impermeable areas of 0.04ha will be conveyed to integrated gutters within the roof before out falling into the 15,000lt Rainwater Harvesting Tank on site. The Rainwater Harvesting Tank could be reduced to 7500lt and still provide the same effect due to the daily usage being so high, especially in the months of higher rainfall offset by increased member attendance due to the weather. It was calculated that the daily utilization of the Rainwater Harvesting Tank would be less than 10% as such sudden storm surges would be dealt with as the tank would remain partially empty at the end of each day. The Centre's booking system was used to record the user trends over the year and it can be demonstrated that as the weather worsens the attendance rises as does the water consumption. Based on a very conservative 20% utilization for current members but risen to 25% for Padel users as the sessions are longer. The highest monthly rainfall of 36m3 is easily used up by the members with a monthly usage of 55m3 is used. The usage assumption has been double-checked against the water bills and the calculations show approx. 60% of the water goes to toilet flushes. From the calculations it can be shown that the Padel roof collected water will be used 100% utilized by the Leisure Centre, the Rainwater Harvesting Tank will remain mostly empty and there will be zero overflow of surface water drainage from the tank during any storm events. Given the above the proposed 15000lt Rainwater Harvesting Tank will allow sufficient storage to accommodate all events up to and including the 1%AEP20CC storm event on site. A Rain Director unit will be provided to reduce the energy use and pump wear within the system and allow water to be controlled and gravity-fed into toilets and washing machines. The control unit will automatically register when rainwater is available within the system. In addition to the Rainwater Harvesting Tank, the existing sewer that conveys surface water from the Leisure Centre will be diverted around the proposed padel courts. These sewers will connect with the existing system and convey surface water flows northwards.
Conclusions	With the above measures in place, the development of the site will not create any flood risk issues to the wider area. Compliance with the NPPF is therefore ensured.
This summary should be read in conjunction with the full report and reflects an assessment of the site based on information received by MEC at the time of production.	

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1.0 INTRODUCTION

1.1 MEC Consulting Group Ltd has been commissioned by Henfield Leisure Centre (hereafter referred to as 'the Client') to undertake a drainage strategy drawing and supplementary report for two proposed padel courts under a canopy at Henfield Leisure Centre (hereafter referred to as 'the site').

1.2 A site location plan is provided in Appendix A and a sketch masterplan is contained within Appendix B.

1.3 This report should be read in conjunction with the drainage strategy drawing 27951_01_230_01a in Appendix C.

1.4 Revision A of the report aims to address the comments made by Horsham District Council as the Local Planning Authority in April 2024 (ref: DISC/24/0058). This report aims to address condition 4 which states:

'No development shall commence until a drainage strategy detailing the proposed means of surface water disposal has been submitted to and approved in writing by the Local Planning Authority.'

1.5 This assessment has been carried out in accordance with the requirements of the National Planning Policy Framework and its companion documents the National Planning Practice Guidance. See Appendix D for policies and references.

Disclaimer

1.6 MEC has completed this report for the benefit of the individuals referred to in paragraph 1.1 and any relevant statutory authority which may require a reference in relation to approvals for the proposed development. Other third parties should not use or rely upon the contents of this report unless explicit written approval has been gained from M-EC.

1.7 MEC accepts no responsibility or liability for:

a) The consequence of this documentation being used for any purpose or project other than that for which it was commissioned;
b) The issue of this document to any third party with whom approval for use has not been agreed.

2.0 SITE DESCRIPTION

Site Location and Features

2.1 The site is located within Northcroft, and covers an approximate area of 0.04ha. The development within the red line will consist of two proposed new Padel courts under a canopy. The land under the applicant's control consists of four existing tennis courts, a leisure centre and a sports field.

2.2 The site is bounded by the leisure centre to the south, Henfield cemetery and existing residential properties to the east, existing properties to the north and Northcroft Road to the west, see Figure 2.1.

Figure 2.1: Site Location Plan



Topographic Data

2.3 Full details of the topographical survey are included in Appendix E. The information indicates the site is generally flat with a gradual fall from south to north with levels ranging from 25.47m AOD to 25.22m AOD.

Fluvial and Surface Water Flood Risk

2.4 Information relating to the current flood risk to the site has been obtained from the Environment Agency and *gov.uk* websites.

2.5 The site is located within Flood Zone 1, which is defined as land with a yearly chance of flooding from fluvial sources lower than 0.1%.

2.6 The Long-Term flood risk map from the Environment Agency, shows the site to be at very low risk of surface water flooding.

2.7 The Environment Agency Historical Flood maps show no evidence of any historical flooding within the vicinity of the site.

Watercourses & Hydrology

2.8 The closest designated Main River is an unnamed watercourse, that is a tributary of the River Adur, located approximately 900m to the north of the site. The closest ordinary watercourse is located 258m to the northeast of the site, which is a tributary of the River Adur.

2.9 There is an existing swale to the west of the site, within the applicant's boundary, which was created as a SuDS feature in 2017 to accommodate surface water runoff from the new car park.

Geological Data

2.10 The British Geological Survey (BGS) reports show the majority of the site is directly underlain by bedrock of the lower Greensand group consisting of sandstone. Superficial river terrace deposits consisting of sand and gravel overlie the bedrock.

2.11 Borehole records from nearby locations show stiff to very stiff light brown clayey silt and fine sand to a depth of 6.5m and hard grey and brown clayey silt and fine sand from a depth of 6.5m to 9m.

2.12 The SoilScapes Map describes the soil as freely draining; therefore, the soils absorb rainfall allowing it to drain through to underlying layers.

Sewers

2.13 The topographical survey shows there are existing manholes on site. A CCTV investigation has shown the leisure centre drains northwards, towards the youth club and it is likely to outfall into a ditch behind the youth club.

3.0 SURFACE WATER MANAGEMENT STRATEGY

3.1 It is essential that the proposed development does not increase flood risk to adjacent land or downstream of the site and protects the development itself from flooding. To ensure that the flood risk is minimised, the drainage design will incorporate the following flood mitigation measures:

- Site levels will be designed to direct all overland surface water flows away from the dwellings following the land's natural topography.
- The proposed development will include a surface water drainage system that will intercept runoff generated within the development. This will minimise the risk of flooding within the new padel court and also reduce the incidence of overland flows.
- The surface water drainage system will convey flows to an underground rainwater harvesting tank.

Surface Water Outfall

3.2 Surface water arising from developed sites should, as far as practical, be managed in a sustainable manner to mimic the surface water flows arising from the undeveloped site. When considering the surface water discharge the SuDS hierarchy needs to be adhered to. The SuDS hierarchy states that the options below must be adhered to in order of sustainability or evidenced otherwise before moving down to a less sustainable discharge method;

- Discharge at source (soakaway)
- Rainwater Harvesting
- Watercourse or waterbody
- Public Sewer

Discharge at Source

3.3 As discussed in paragraph 2.10 – 2.12, the majority of the site is directly underlain by bedrock of the lower Greensand group consisting of sandstone. Superficial river terrace deposits consisting of sand and gravel overlie the bedrock. Given the geology and the freely draining soils, it is assumed some level of infiltration may be feasible.

3.4 Ashdown Site Investigation Ltd undertook soakage testing in October 2016, see Appendix F. Two boreholes were drilled using dynamic sampling techniques to a depth of 3.00m below ground level and two hand-dug pits were excavated to depths of 0.7m to 0.9m. The soakage results are shown in Table 3.1 below.

Table 3.1: Infiltration Rates derived from Ashdown Site Investigation Ltd Infiltration Testing in October 2016.

Exploratory Hole	Test Response Zone Depth (m)		Stratum	Infiltration Rate (m/sec)
	Top	Bottom		
TH1 Test 1	0.40	0.70	River Terrace Deposits	1.7×10^{-5}
TH1 Test 2	0.40	0.70	River Terrace Deposits	4.5×10^{-6}
TH2 Test 1	0.60	0.90	River Terrace Deposits	1.5×10^{-5}
TH2 Test 2	0.57	0.90	River Terrace Deposits	1.5×10^{-5}
BH1	2.00	3.00	Weald Clay Formation	3.4×10^{-6}
BH2	2.00	3.00	Weald Clay Formation	3.4×10^{-6}

3.5 It is considered that the River Terrace deposits may be capable of accepting surface water runoff via infiltration, although it should be noted that given the shallow thickness of these soils and the low infiltration rates of the underlying Weald Clay Formation soils, the storage capacity is likely to be limited. The Weald Clay Formation soils are unlikely to be suitable for discharging waters to the ground.

3.6 The topographical survey shows an existing soakaway 1m away from the proposed Padel courts. Further investigations have found this soakaway is not functioning to its desired effect, which proves that infiltration isn't feasible or has failed over time. Given the above information, discharge via infiltration is not feasible and an alternative outfall should be sought.

Discharge via Rainwater Harvesting

3.7 As infiltration is not feasible on site, rainwater harvesting has been proposed as a more viable option than the remainder of the drainage hierarchy.

3.8 Surface water flows from the site will discharge into a proposed 15,000lt Rainwater Harvesting Tank on site. The Rainwater Harvesting Tank could be reduced to 7500lt and still provide the same effect due to the daily usage being so high, especially in the months of higher rainfall offset by increased member attendance due to the weather. Rainwater and stormwater re-use helps to control discharge volumes into the surrounding network whilst also reducing potable water demand. Details of the proposed Rainwater Harvesting Tank can be seen in Appendix G.

Discharge to a Watercourse

3.9 In accordance with the drainage hierarchy, surface water flows will discharge into the Boxall Rainwater Harvesting System on site.

3.10 The closest designated Main River is an unnamed watercourse, that is a tributary of the River Adur, located approximately 900m to the north of the site. The closest ordinary watercourse is located 258m to the northeast of the site, which is a tributary of the River Adur. Any route to these watercourses would cross third-party land and therefore an alternative option should be sought.

Discharge to a sewer

3.11 In accordance with the drainage hierarchy, surface water flows from the site will discharge into a rainwater harvesting tank. However, it is important to provide an overflow system within the rainwater harvesting tank, to prevent pollution risk and ensure rainwater harvesting systems do not cause flooding during exceedance events.

3.12 The topographical survey shows there are existing manholes on site. A CCTV investigation has shown the leisure centre drains northwards, towards the youth club and it is likely to outfall into a ditch behind the youth club. Due to the location of the proposed padel court, the existing manholes will be diverted around the court prior to continuing northwards towards the youth club. An overflow pipe from the rainwater harvesting tank will be placed into the proposed diverted route.

Land Use

3.13 In order to calculate the drainage requirements an understanding of the land uses on-site needs to be known. Table 3.2, below summarises the proposed land uses within the site. The site within the red line boundary currently comprises greenfield land. The current land use has been calculated using the existing site plan and the post-development land use has been measured from the proposed layout. Urban creep has not been applied to the calculations.

Table 3.2: Land Use Summary.

Land Use Type	Existing Site Areas		Proposed Site Areas	
	Ha	%	Ha	%
Impermeable Areas	0	0	0.04	100
Green Landscape / Permeable areas	0.04	100	0	0
TOTAL	**0.04**	**100**	**0.04**	**100**

Climate Change Allowances

3.14 The influence of climate change on rivers and watercourses is likely to increase the frequency of flood events and the overall volume of water that passes the site. When considering surface water runoff from the site, the increase in peak rainfall intensity varies over the lifetime of the development. Where commercial/ leisure developments with a lifetime up to 2060 are proposed the NPPF states the central allowance for the 2050's epoch allowance should be used, as highlighted in red in Table 3.3.

Table 3.3: Peak Rainfall intensity allowance in small and urban catchments from the Flood Risk Assessments: Climate Change Allowances Guidance

Annual Exceedance Probability	Total potential change anticipated for the '2050s' (2022 to 2060)		Total potential change anticipated for the '2070s' (2061 to 2125)	
	Central	Upper End	Central	Upper End
3.3 % AEP	20%	35%	20%	40%
1 % AEP	20%	45%	25%	45%

Drainage Strategy

3.15 The overall drainage strategy has been based on the contributing areas, geology, existing drainage on-site and the current site layout, presented in Appendix B. In accordance with the drainage hierarchy, surface water will discharge into a 15,000lt Rainwater Harvesting Tank adjacent to the padel court.

3.16 The new padel court will be constructed directly onto the natural ground using porous synthetic grass, over a porous asphalt medium (40mm porous asphalt + 25mm open fabric surface) on a 250mm deep consolidated DtP Type 3 road stone including regulating layer providing a stable, free draining base with integral storage capacity below the playing surface to allow a slow dissipation of rainfall. A Quickbox canopy roof will be installed above the Padel Courts.

3.17 Surface water flows for the impermeable areas of 0.04ha will be conveyed to integrated gutters within the roof before out falling into the 15,000lt Rainwater Harvesting Tank on site. The Rainwater Harvesting Tank could be reduced to 7500lt and still provide the same effect due to the daily usage being so high, especially in the months of higher rainfall offset by increased member attendance due to the weather. It was calculated that the daily utilization of the Rainwater Harvesting Tank would be less than 10% as such sudden storm surges would be dealt with as the tank would remain partially empty at the end of each day. The Centre's booking system was used to record the user trends over the year and it can be demonstrated that as the weather worsens the attendance rises as does the water consumption. Based on a very conservative 20% utilization for current members but risen to 25% for Padel users as the sessions are longer. The highest monthly rainfall of 36m3 is easily used up by the members with a monthly usage of 55m3 is used. The usage assumption has been double-checked against the water bills.

3.18 A Rain Director unit will be provided to reduce the energy use and pump wear within the system and allow water to be controlled and gravity-fed into toilets and washing machines. The control unit will automatically register when rainwater is available within the system.

3.19 Given the above the proposed 15000lt Rainwater Harvesting Tank will allow sufficient storage to accommodate all events up to and including the 1%AEP20CC storm event on site.

3.20 A drainage strategy based on the principles above is shown in drawing 27951_01_230_01a in Appendix C and Rainwater Harvesting calculations can be found in Appendix H.

3.21 In addition to the Rainwater Harvesting Tank, the existing sewer that conveys surface water from the Leisure Centre will be diverted around the proposed padel courts. These sewers will connect with the existing system and convey surface water flows northwards.

Applicable SuDS Techniques

3.22 The National Standards for Sustainable drainage systems (Ref. 16) that deals with SuDS cover a whole range of sustainable approaches to surface water drainage management including:

- source control measures including rainwater recycling and drainage;
- filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns;
- filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed; and
- basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding.

3.23 Each of the five SuDS considerations listed above is discussed below in Table 3.4, with reference to their suitability for the proposed development.

Table 3.4: Suitability of SuDS techniques

	COMPONENT	SUITABILITY	REASON
Source Control	Rainwater Harvesting	Yes	Rainwater Harvesting will be utilised on-site, with rainwater being reused within the leisure facility.
	Green Roofs	No	This would not be appropriate given the scope and scale of the development.
	Bio-retention Systems/ Rain Gardens	No	This would not be appropriate given the scope and scale of the development.
Proprietary Systems	Proprietary bio-retention systems	No	More appropriate SuDS features can be accommodated within the development and are preferred.
Infiltration Devices	Permeable Paving	Yes	A porous surface will be used for the surface of the padel courts and will act as a first stage of treatment.
	Infiltration trenches/ Soakaways	No	Infiltration has proven to be unfeasible at the site.
Filtration	Open Swales, Filter Strips/ Drains	No	This would not be appropriate given the scope and scale of the development.
Retention/ Detention	Detention Basin, Attenuation Pond/ Tanks	No	More appropriate SuDS features can be accommodated within the development and are proposed.

Surface Water Quality

3.24 The SuDS Manual CIRIA document C753 (Ref. 10), indicates the minimum treatment indices appropriate for contributing pollution hazards for different land use classifications. To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant) that equals or exceeds the pollution hazard index.

3.25 Surface water runoff from the proposed Padel courts will have a very low pollution hazard. The only likely pollutants from the site would be suspended solids discharged from the site during an intense storm event after a period of dry weather. To provide the correct level of treatment, an assessment needs to be made of the mitigation provided by each SuDS feature. This is shown in Table 3.5.

Table 3.5: SuDS Mitigation Indices for discharges to groundwater (Extract from CIRIA 753 Table 26.4)

	Mitigation indices		
Type of SuDS component	Total Suspended Solids	Metals	Hydrocarbons
Permeable Paving (where a suitable filtration layer is included that provides treatment and includes a geotextile at the base separating the foundation from the subgrade) underlain by a soil with a good contaminant attenuation potential of at least 300mm in depth	0.7	0.6	0.7

3.26 Permeable paving manages rainwater close to where it falls by slowing and storing run-off to mimic natural runoff characteristics. It treats surface water runoff to reduce the risk of urban contaminants causing environmental pollution. Therefore, permeable paving on its own would provide sufficient treatment in accordance with the Simple Index Method.

Exceedance and Flow Routing

3.27 The risk of overland flooding from adjacent land to dwellings is very low. The design of levels and features on the site will follow best practice by ensuring any overland flow on the site is routed safely away from dwellings and to areas of the lowest risk on site. Any surcharging and subsequent flooding of sewers will be mitigated by the flood routing described above. The exceedance flows will remain within the site and will flow away from the proposed dwellings. Exceedance flows from the site will be conveyed to the diverted sewers within the site. These sewers will join with the existing sewers and flow northwards towards the youth club.

Maintenance and Management

3.28 An integrated approach to the maintenance and management of SuDS systems is a requirement of the NPPF and by the Flood & Water Management Act 2010. The aim of a maintenance and management plan is to ensure that there is a clear understanding of responsibilities and that a maintenance regime is implemented for all new drainage systems for the lifetime of the development, so they can continue to function as required.

3.29 All private drainage systems, will be maintained by Henfield Leisure Centre. The maintenance plan for the court surface will include:

- Monthly litter removal
- Bi-Annual suction sweeping
- Annual inspection and repairs as/if required,
- Weed and invasive plant control,
- Remedial maintenance: Surface reconditioning

3.30 A proposed maintenance schedule that breaks down the maintenance requirements of the various proposed assets can be found in Table 3.6.

Table 3.6: Proposed Maintenance Regime

Drainage Asset	Responsible Organisation	Maintenance Work	Frequency
Pipework / Manholes	Henfield Leisure Centre	Inspect pipework and clear blockages	Annually or after severe storms.
		Inspect manholes and clear blockages	
		Repair any defects in the network	
		Inspect flow control, ensure operating freely and pivoting bypass door and penstock valve operating correctly	
Catchpits	Henfield Leisure Centre	Inspect structure and remove any debris/litter on structure	Annually or after severe storms
		Replace malfunctioning parts or structures	As required
Rainwater Harvesting	Henfield Leisure Centre	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps and filters	Annually (and following poor performance)
		Cleaning of the tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	
		Cleaning and/or replacement of any filters	3 monthly (or as required)
		Repair of overflow erosion damage or damage to the tank	As required
		Pump repairs	
Permeable Surface	Henfield Leisure Centre	Brushing and vacuuming (standard cosmetic sweep over the whole surface)	Once a year after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging of manufacturer's recommendations.
		Stabilise and mow contributing and adjacent areas	As required
		Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than sweeping	
		Remediate any landscaping which, through vegetation maintenance of soil slip, has been raised to within 50 mm of the level of the paving	
		Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material	
		Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
		Initial inspection	Monthly for 3 months after installation

		Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	3 monthly, 48 hours after large storms in first 6 months
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	

4.0 CONCLUSIONS

4.1 MEC Consulting Group Ltd, has been commissioned by Henfield Leisure Centre to produce a drainage strategy drawing and supplementary report for two proposed padel courts under a canopy at Henfield Leisure Centre, Henfield. This assessment has been undertaken to ascertain the constraints of the development of the site and to assess the impact of the design, with respect to flood risk.

- The whole site is located within Flood Zone 1 with a very low risk of surface water flooding.
- The British Geological Survey shows the site is underlain by the lower greensand group, consisting of sandstone. Superficial river terrace deposits consisting of sand and gravel overlie the bedrock. The SoilScapes Map shows the site is free-draining.
- Soakage testing undertaken in October 2016 proved infiltration is unfeasible.
- There is an existing swale to the west of the site, within the applicant's boundary, which was created as a SuDS feature in 2017 to accommodate surface water runoff from the new car park.
- Surface water flows for the impermeable areas of 0.04ha will be conveyed to integrated gutters within the roof before out falling into the 15,000lt Rainwater Harvesting Tank on site.
- It was calculated that the daily utilization of the Rainwater Harvesting Tank would be less than 10% as such sudden storm surges would be dealt with as the tank would remain partially empty at the end of each day. The Centre's booking system was used to record the user trends over the year and it can be demonstrated that as the weather worsens the attendance rises as does the water consumption. Based on a very conservative 20% utilization for current members but risen to 25% for Padel users as the sessions are longer. The highest monthly rainfall of 36m3 is easily used up by the members with a monthly usage of 55m3 is used. The usage assumption has been double-checked against the water bills.
- A Rain Director unit will be provided to reduce the energy use and pump wear within the system and allow water to be controlled and gravity-fed into toilets and washing machines. The control unit will automatically register when rainwater is available within the system.
- In addition to the Rainwater Harvesting Tank, the existing sewer that conveys surface water from the Leisure Centre will be diverted around the proposed padel courts. These sewers will connect with the existing system and convey surface water flows northwards.

4.2 With the above measures in place, the development of the site will not create any flood risk issues to the wider area.

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APPENDICES



APPENDIX A

01 SITE LOCATION
1:500



1:500
10m 0 10m 20m 30m

N

KEY

Application site boundary

REV:	DESCRIPTION:	BY:	DATE:
B	Changed scale and map for location	AC	14.03.23

STATUS: DRAFT DESIGN

CLIENT: Robert Mohamed

SITE: Henfield Leisure Centre

TITLE: LOCATION PLAN

SCALE:	DATE:	DRAWN:	CHECKED:
1:500 @A1	30.11.21	LS	GH

PROJECT No:	DRAWING No:	REVISION:
2211-01	001	B

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APPENDICES



APPENDIX B

01 PROPOSED COURTS OVERLAY

1:200



1:200

4m 0 4m 8m 12m

N

KEY

Proposed padel court

REV:	DESCRIPTION:	BY:	DATE:
-	-	-	-

STATUS: DRAFT DESIGN

CLIENT: Robert Mohamed

SITE: Henfield Leisure Centre

TITLE: GA OVERLAY

SCALE:	DATE:	DRAWN:	CHECKED:
1:200 @A1	14.07.23	LS	DC

PROJECT No:	DRAWING No:	REVISION:
2211-01	003	A

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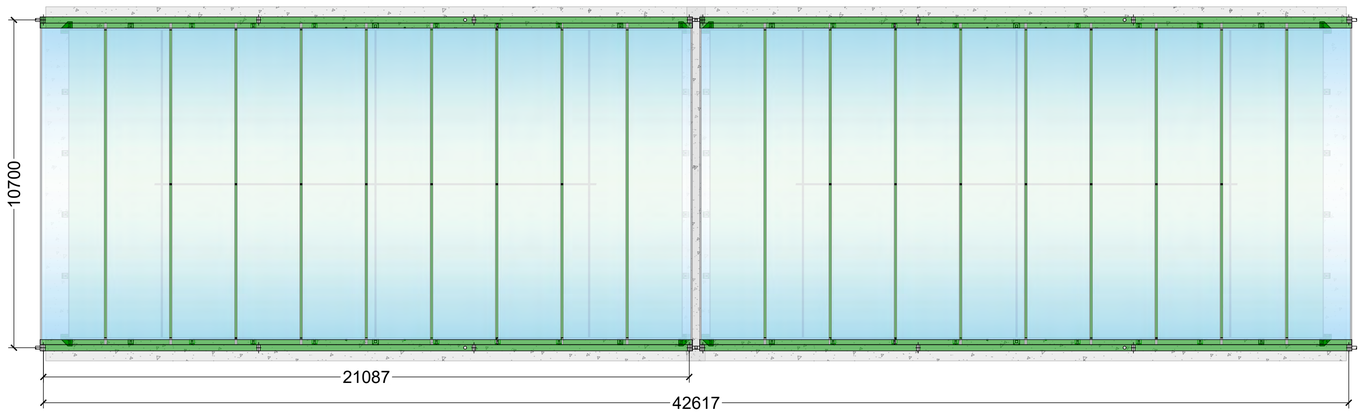
01 EAST ELEVATION
1:200



02 CANOPY OVERVIEW
1:100

QUICK BOX - VEGA CANOPY
PLAN VIEW
SCALE 1:100



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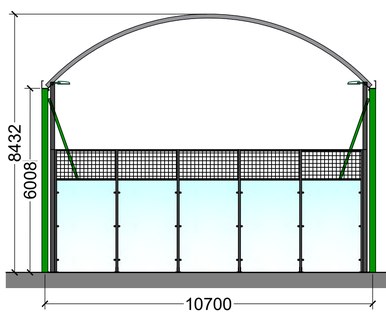
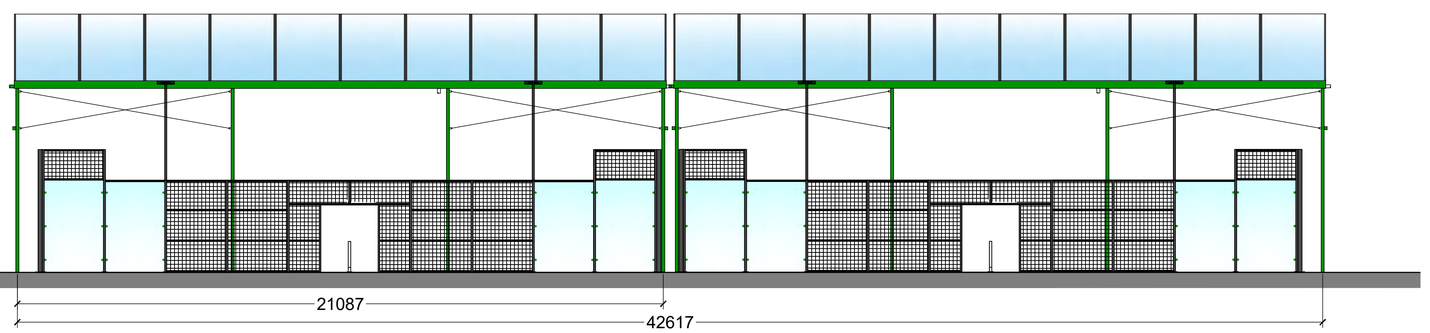
SCALE 1:100



SIDE ELEVATION
SCALE 1:100



1:100
2m 0 2m 4m 6m

N

KEY

Courts carpet

Concrete foundation

NOTES

This is an overview of how the courts would look like with the Quick Box canopy option.

REV:	DESCRIPTION:	BY:	DATE:
B	Added Elevation with building heights	AC	13.06.23

STATUS: DRAFT DESIGN

CLIENT: Robert Mohamed

SITE: Henfield Leisure Centre

TITLE: QUICK BOX CANOPY OVERVIEW

SCALE	DATE:	DRAWN:	CHECKED:
1:100 @A1	30.11.22	LS	GH

PROJECT No:	DRAWING No:	REVISION:
2211-01	004	B

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Southern office
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MEC
Consulting Group

APPENDICES



APPENDIX C

N

FOOTBALL PITCH

COURT 1

COURT 2

CAR PARK

CAR PARK

HENFIELD LEISURE CENTRE

RIDGE LEVEL 35.49

Leisure C

ASSUMED PERMEABLE AREA TO ACCOMMODATE TWO PADEL COURTS AND A PAVED AREA AROUND THE COURTS.

DIMENSIONS = 40m x 10m

DOWNPIPES FROM THE QUICKBOX CANOPY WILL CATCH ANY SURFACE WATER AND OUTFALL INTO THE RAINWATER HARVESTING TANK.

RAINWATER HARVESTING TANK
SURFACE WATER TO OUTFALL INTO A 15000 LITRE (2 X 7500) SHALLOW DIG GRAVITY F-LINE RAINWATER HARVESTING SYSTEM SUPPLIED BY RAINWATER HARVESTING LTD.

THE RAINWATER HARVESTING TANK WILL BE ABLE TO ACCOMMODATE A COLLECTABLE ROOF AREA OF 400m²

LENGTH = 3.34m
WIDTH = 2.31m
DEPTH = 1.41-1.81m

BASED ON THE RAINWATER HARVESTING TANK CALCULATIONS THE 15000 LITRE TANK WILL ALLOW SUFFICIENT STORAGE TO ACCOMMODATE ALL EVENTS UP TO THE 1%AEP20CC STORM EVENT.

OVERFLOW PIPE FROM RAINWATER HARVESTING TANK INTO DIVERTED SEWER SYSTEM.

EXISTING SEWER NETWORK CONTINUES NORTH TOWARDS THE YOUTH CENTRE

THE SUB-BASE HAS BEEN DESIGNED TO BE FLAT.

MAXIMUM RECOMMENDED SURFACE GRADIENT FOR POROUS COURTS IS 1:120

EXISTING DOWNPIPES AND SEWER NETWORK TO BE DIVERTED AROUND PADEL COURT.

POTENTIAL LOCATION OF NEW SEWER ROUTE FROM LEISURE CENTRE

THE PROPOSED PADEL COURTS USE AN APPROXIMATE 3m X 7.8m SECTION OF THE EXISTING CAR PARK.

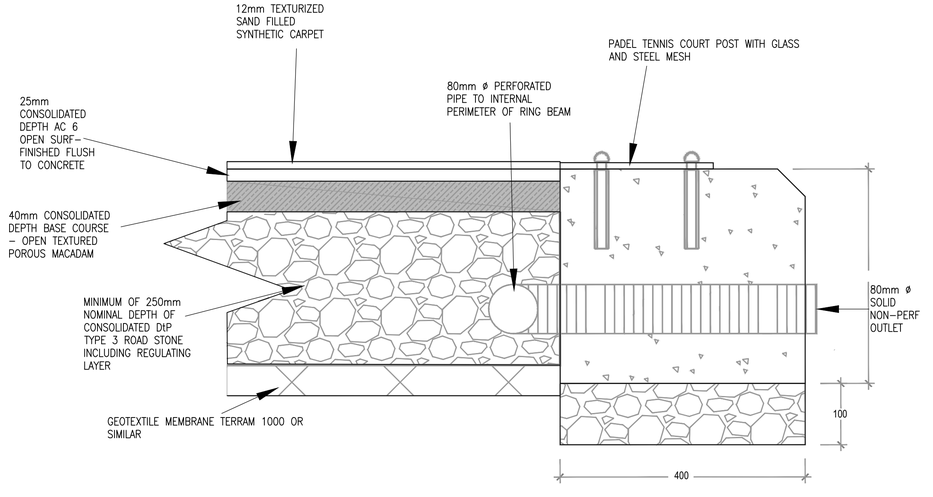
ADDITIONAL BOXALL RAINWATER HARVESTING TANKS TO BE LOCATED WITHIN LEISURE CENTRE TO SLOW DOWN THE FLOW OF WATER ENTERING THE SYSTEM.

WATER TO BE REUSED WITHIN THE LEISURE CENTRE.

DRAINAGE STRATEGY - LAYOUT
SCALE 1:125

1:125

5m 0 5m 10m 15m 20m 25m



PADEL COURT CONSTRUCTION DETAIL
SCALE 1:5000

NOTES:

1. DO NOT SCALE THIS DRAWING.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SPECIALIST DESIGN DRAWINGS AND DETAILS.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE. ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
4. THIS DRAWING IS FOR STRATEGY PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION PURPOSES.
5. DESIGN BASED ON EXISTING LEVELS AND SUBJECT TO CHANGE WITH EXTERNAL WORKS DESIGN. THE DRAINAGE STRATEGY WILL NEED UPDATING IF THE LAYOUT IS REVISED.
6. DRAINAGE STRATEGY IS SUBJECT TO AGREEMENT WITH RELEVANT THIRD PARTIES.
7. THE DEVELOPABLE AREA HAS BEEN BASED ON THE ASSUMED AREA OF THE PADEL COURTS.
8. INFILTRATION HAS BEEN PROVEN TO BE UNFEASIBLE BASED ON TESTING CONDUCTED IN OCTOBER 2016.
9. SURFACE WATER WILL OUTFALL INTO RAINWATER HARVESTING TANKS AND THE WATER WILL BE REUSED WITHIN THE SITE. THE 15000 LITRE TANK WILL ALLOW SUFFICIENT STORAGE TO ACCOMMODATE ALL EVENTS UP TO THE 1%AEP20CC STORM EVENT.

KEY

- SITE BOUNDARY
- PROPOSED SURFACE WATER SEWER
- PROPOSED AREA OF SUB-BASE
- PROPOSED QUICKBOX CANOPY INTEGRATED GUTTERS
- 15000 LITRE RAINWATER HARVESTING TANK (2 X 7500 TANKS)
- OVERLAND FLOW ROUTES

REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
B	UPDATE BASED ON RAINWATER HARVESTING DETAILS	ZJ	RC	TR	27.09.24
A	UPDATE DRAINAGE STRATEGY TO INCLUDE RAINWATER HARVESTING FEATURES	ZJ	RC	TR	02.09.24
-	FIRST ISSUE	ZJ	RC	EM	19.05.23

PROJECT:
HENFIELD LEISURE CENTRE,
NORTHCROFT,
HENFIELD

DRAWING TITLE:
DRAINAGE STRATEGY
LAYOUT PLAN

CLIENT:
HENFIELD LEISURE CENTRE

DRAWING NUMBER:
27951_01_230_01

REVISION:	SHEET SIZE:	SCALE:
B	A1	AS SHOWN

STATUS:
FOR INFORMATION / APPROVAL

M-EC
Consulting Development Engineers

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Website: www.m-ec.co.uk

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File Location: R:\27951\02 Flood\drawings\27951_01_230_01a Drainage Strategy.dwg

Printed:27.09.2024

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APPENDICES



APPENDIX D

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Policies and References

National Planning Policy Framework

The National Planning Policy Framework (Ref. 4) sets out the Government's objectives for the planning system and how there should be a 'Presumption in Favour of Sustainable Development and the planning system should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change.

The document seeks to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Reference should also be made to the Planning Practice Guidance (Ref. 17) which provides additional guidance on flood risk.

For the purposes of applying the National Planning Policy Framework, areas at risk from all sources of flooding are included. For fluvial (river) and sea flooding, this is principally land within Flood Zones 2 and 3. It can also include an area within Flood Zone 1 in which the Environment Agency has notified the local planning authority of having critical drainage problems.

Key elements from the document include

> *"Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk…"*
>
> *"Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding."*
>
> *"When determining any planning applications, local planning authorities should ensure flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific risk assessment. Development should only be allowed in areas at risk of flooding where in light of this assessment (and the sequential and exception tests) it can be demonstrated that:*
>
> a) *Within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
>
> b) *The development is appropriately flood resistant and resilient*
>
> c) *It incorporates sustainable drainage systems unless there is clear evidence that this would be inappropriate;*
>
> d) *Any residual risk can be safely managed; and*
>
> e) *Safe access and escape plan routes are included where appropriate, as part of an agreed emergency plan."*

Flood and Water Management Act 2010

The Flood and Water Management Act 2010 (Ref. 19) gained Royal Assent on the 8th April 2010. The Flood and Water Management Act is the government's newest legislation to help improve flood risk management and ensure the security of water supplies in England and Wales. The Act updates legislation to ensure better protection from flooding, manage water more sustainably, improve public services and secure water resources during periods of drought. The Flood and Water Management Act helps to reduce flood risk by:

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- Clarifying who is responsible for managing all sources of flood risk.
- Encourage more sustainable forms of drainage in new developments.
- Makes it easier to resolve misconnections to sewers.

The Flood and Water Management Act imparts significant new roles and responsibilities on local authorities. County or unitary authorities are now classed as lead local flood authorities (LLFAs) who have responsibilities for managing local flood risk. The responsibilities of a LLFA include:

- Prepare and maintain a strategy for local flood risk management in their areas, coordinating views and activity with other local bodies and communities through public consultation and scrutiny, and delivery planning.
- Maintain a register of assets – these are physical features that have a significant effect on flooding in their area.
- Investigate significant local flooding incidents and publish the results of such investigations.
- Issue consents for altering, removing or replacing certain structures or features on ordinary watercourses.
- Play a lead role in emergency planning and recovery after a flood event.

Planning Practice Guidance on Flood Risk & Coastal Change – March 2014, updated August 2021
The Government's new planning policy on sustainable drainage systems came into effect on 6 April 2015. It expects local planning policies and decisions on planning applications relating to major development (those of 10 dwellings or more; or equivalent non-residential or mixed development) to ensure that sustainable drainage systems for the management of run-off are put in place unless demonstrated to be inappropriate. Lead Local Flood Authorities (LLFAs) have also been made statutory consultees and new non-statutory guidance has been published under the changes.

The changes follow a joint Defra/DCLG consultation on delivering SuDS published in September 2014 in which the Government dropped all the key provisions of Schedule 3 of the Flood & Water Management Act 2010 and SuDS Approval Bodies (SABs) in favour of passing the oversight of SuDS from county councils (who are also LLFAs) to local planning authorities. According to the new planning policy, local planning authorities are expected, when considering planning applications:

- To consult the relevant lead local flood authority on the management of surface water,
- To satisfy themselves that the proposed minimum standards of operation are appropriate, and
- To ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

The policy also states that the sustainable drainage system should be designed to ensure that the maintenance and operation requirements are economically proportionate.

Sustainable Drainage Systems - Non-statutory technical standards for sustainable drainage systems – 2015
The non-statutory technical standards for the design, maintenance and operation of sustainable drainage systems to drain surface water have been published by Defra. The standards apply to systems that drain surface water from housing, non-residential or mixed use developments for the lifetime of the developments. The non-statutory technical standards are to be used in conjunction with the National Planning Policy Framework, and Planning Practice Guidance on Flood Risk & Coastal Change.

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The following documents have been referred to in this report:

1 The Building Regulations 2015, Approved Document H.
2 Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code") - October 2019, updated June 2022.
3 Planning Practice Guidance – November 2016, updated August 2022.
4 National Planning Policy Framework - March 2012, updated December 2023
5 Civil Engineering Specification for the Water Industry, 7th Edition.
6 Flood Risk and Coastal Change Guidance – March 2014, updated August 2022.
7 Environment Agency Flood Risk Standing Advice.
8 Environment Agency 'Flood Risk Assessments – Climate Change Allowances' - February 2016., updated May 2022.
9 The SuDS Manual – CIRIA C753.
10 Interim Code of Practice for Sustainable Drainage Systems – National SuDS Working Group, July 2004.
11 Cranfield University Soilscapes Map - http://www.landis.org.uk/soilscapes/.
12 British Geological Survey – Geology of Britain viewer, http://mapapps.bgs.ac.uk /geologyofbritain/home.html.
13 FEH WebService – Centre for Ecology and Hydrology, https://fehweb.ceh.ac.uk/GB/map.
14 Design and analysis of urban storm drainage. The Wallingford Procedure Vol.1.
15 Institute of Hydrology Report No. 124 – Flood Estimation for small catchments.
16 Sustainable Drainage Systems – Non-statutory technical standards for sustainable drainage systems – March 2015.
17 Water Industry Act 1991.
18 Flood and Water Management Act 2010.

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APPENDICES



APPENDIX E

JUNIOR FOOTBALL PITCH

SKATE PARK

BASKETBALL COURT

YOUTH CLUB

SECTION

SENIOR FOOTBALL PITCH

JUNIOR FOOTBALL PITCH

CAR PARK

HENFIELD LEISURE CENTRE

CAR PARK

GRASS

GRASS

DOG WASTE BIN

LITTER BIN

FOOTBALL CLUB PAVILION

GARAGE

SECTION

0m 1 2 3 4 5m 10m 20m

LAYER INFORMATION

0	EMPTY
BOUNDER	BOUNDARY BLOCK & BORDER
BTELECOM	BRITISH TELECOM MH'S ETC.
BTLINES	BRITISH TELECOM ROUTES
BUILDING	BUILDING OUTLINE
CONTOURS	CONTOURS (SURVEYED)
CONTOURS	CONTOURS
CROSSES	POINT MARKERS
DRAINAGE	DRAINAGE MH'S ETC.
ELECTRIC	ELECTRICAL MH'S ETC.
FENCES	FENCE LINES
FOUL	FOUL DRAIN MH'S
FURNITURE	STREET FURNITURE
GAS	GAS MH'S,VALVES ETC.
GASPIPES	GAS ROUTING
GRID	GRID
LEVELS	LEVELS
SPOTS	SPOT OUTLINE
STATIONS	SURVEY STATIONS
STORM	STORM WATER MH'S, GULLY'S ETC.
SURFACES	SURFACE EDGES
TEXT	TEXT
TREES	TREE OUTLINE & FOLIAGE
UNKNOWN	UNKNOWN SERVICES
WALLS	WALLS
WATER	WATER OUTLINE
WSERVICES	WATER METERS, STOP VALVES ETC.

LINETYPES & SYMBOLS

- BUILDING OUTLINE
- KERB LINE
- FENCE
- SURFACE EDGE
- FOUL DRAINAGE
- STORM DRAINAGE
- GAS PIPES
- WATER SERVICE PIPES
- BRITISH TELECOM CABLES
- ELECTRICITY CABLES
- OVERHEAD CABLES
- FOLIAGE OUTLINE
- SURVEY STATION
- GATES
- TREE CANOPY
- SLOPE SYMBOL

LEGEND

AV	AIR VALVE	NP	NAME PLATE
BB	BILLBOARD	OF	OPEN BOARDED FENCE
BE	BOLLARD, BEACON	OP	OPEN PALING FENCE
BM	OS BENCH MARK	P	POST
BT	BUS STOP	PF	POST & CHAIN FENCE
BTB	BRITISH TELECOM BOX	PCB	POLICE CALL BOX
BW	BARB WIRE FENCE	PH	PUBLIC HOUSE
CF	CLOSE BOARDED FENCE	PM	PARKING METER
CH	COAL HOLE	PM	PARKING METER
CHY	CHIMNEY	PR	POST & RAIL FENCE
CI	CORRUGATED IRON FENCE	PW	POST & WIRE FENCE
CL	CHAIN LINK FENCE	PWM	POST & WIRE MESH
CM	CELLAR MANHOLE	RE	ROODING EYE
CP	CLOSE BOARD PALING FENCE	RG	ROOD, SOD
CTV	CABLE TELEVISION POINT	RW	RETAINING WALL
DK	DROP KERB	SIP	SERVICE INDICATOR POST
DP	DRAIN PIPE	SL	SKY LIGHT
ELEC SUB	ELECTRICITY SUB	TF	TREE FELLED
EM	EARTH MAST	T O/H/S	TREE TRUNK DIAMETER/ SPREAD/HEIGHT
EP	ELECTRICITY POLE	TCB	TELEPHONE CALL BOX
FB	FOOT BRIDGE	TP	TELEGRAPH POLE
FC	FLOOD CHANNEL	TS	TRAFFIC SIGNALS
FH	FIRE HYDRANT	UTL	UNABLE TO LIFT.
FP	FOOTPATH	WE	WIRE FENCE
FS	FLAG STAFF	W	WALL
GR	GRATING	WB	WAGGE BIN
GV	GAS VALVE	WF	WIRE NETTING FENCE
H	HYDRANT	WM	WATER METER
IC	INSPECTION COVER	WO	WASH OUT
IL	INVERT LEVEL	YD	YARD
IR	IRON RAILINGS		
KO	KERB OUTLET (SALLY)		
LP	LAMP POST		
LB	LETTER BOX		
MISC	MIXED CONSTRUCTION FENCE		
MH	MANHOLE		
MHBT	BRITISH TELECOM		
MHE	ELECTRICAL		
MHF	FOUL		
MHMC	MERCURY		
MP	MILE POST		
NB	NOTICE BOARD		

NORTH

ERIC HOLDER
22 MANOR CLOSE, HENFIELD
WEST SUSSEX BN5 9LB
TEL 07730 925941
E-MAIL e.holder10@btinternet.com

SITE
HENFIELD LEISURE CENTRE

NOTES
LEVELS AND GRID BASED ON ORDNANCE SURVEY DATUM VIA GPS

SCALE	SHEET SIZE
1:200	A0
DATE	SURVEYED BY
OCTOBER 2022	EH

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APPENDICES



APPENDIX F

Drainage and Maintenance Statement

Project	**Access Road, Kings Leisure Centre, Henfield**
Project Number	**22631**
By	**Tom Zajac**
Date	**19 December 2017**

the Civil Engineering Practice

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Fishersgate
Sussex BN41 1RA
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Proposed Development

The proposed development is for the erection of a new secondary access road and car parking facilities for Henfield Leisure Centre with 32 parking spaces and associated drainage, fencing and street lighting. The site is located at Kings Field, Henfield, West Sussex BN5 9QE, Ordnance Survey reference TQ 211 164.

This Statement has been produced in support of an application for discharge of Condition 5 of Planning Permission DC/16/2836.



Existing Site – Google Map Extract

The site is approximately 0.2ha in area currently undeveloped and with a high point on the southwest corner of the site and ground level sloping from 25.8mAOD to 23.6mAOD nearer to the northeast corner of the existing Youth Club building.

The site is bounded to the west and along the new access route by open playing field. The northern boundary is formed by the existing Youth Club access and car park. To the west of the site there is Henfield Cemetery and to the south Henfield Leisure Centre and Tennis Court fields.

The site location plan, existing site layout and proposed site layout are attached in Appendix 1 at the rear of this Statement.

ACE

ISO 9001 REGISTERED FIRM

Design Criteria

The surface water drainage system has been designed in accordance with the National Planning Policy Framework (NPPF), its accompanying Guidance and Technical Standards for SuDS. It also complies with the requirements under Building Regulations Part H.

The surface water drainage system incorporating storage/infiltration has been designed to accept the discharge from a 100 year return period pluvial event with a further 40% allowance for future climate change.

In accordance with CIRIA SuDS The Manual 2015 (Report C753), NPPF and Building Regulations Part H surface water drainage design follows a discharge destination hierarchy ranging from infiltration to ground as first priority before consideration of discharging to a watercourse and as a last resort discharging to a public sewer.

Geology

The available information and borehole logs hosted on the British Geological Survey (BGS) and Ground Investigation undertaken by Ashdown Site Investigation Limited (ASI) report number R16-11710 notes the site is underlain by River Terrace Deposits overlaying Lower Greensand Ground.

The Ground Investigation report identified the area of the proposed development as being underlain by River Terrace Deposits comprising sandy, gravelly CLAY layers. The soakage testing undertaken confirms the infiltration rates between 4.5 x 10^{-6} m/s and 1.7 x 10^{-5} m/s within the River Terrace Deposits.



Borehole Location Plan – ASI Ground Investigation Extract

The ASI report also confirms that during the investigation all boreholes and trial pits were dry and stable during the course of excavation and testing.

Rainfall on the site currently discharges at an unrestricted Greenfield runoff rate directly into the ground.

Extracts of the British Geological Society Borehole logs and ASI Report together with the borehole information and infiltration test results are located in Appendix 2 at the rear of this Statement.

Surface Water

The catchment area plan is attached in Appendix 3 at the rear of this Statement.

The soakage test result of 1 x 10^{-5}m/s has been adopted for these calculations.

The proposed development site occupies an area of approximately 0.2ha and upon completion will generate a total impermeable area of approximately 0.1ha.

Surface water runoff from the proposed access road and car parking area will be discharged into the ground via a permeable block paving.



Permeable Block Paving

The surface water runoff from the existing car park to the west of the Leisure Centre will be collected via an existing French drain and discharged into the proposed new dry swale along the new access road with a restricted outflow of 3l/s. The proposed system will alleviate current issues due to a defective drainage system serving the existing car park. Whilst there are no proposed changes to the existing car park, the drainage improvements works will provide betterment for up to the 1 in 30 year rainfall event.



Example of Dry Swale with Dams

The surface water drainage calculations is attached in Appendix 4 at the rear of this Statement.

Surface Water Quality

Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types and uses and defines low traffic roads to be at low potential for pollution. The table below summarises the anticipated pollution hazard index from the proposed development.

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Individual property driveways, low traffic roads	Low	0.5	0.4	0.4

Referring to the low risk element for water quality mitigation the site will require SuDS elements with mitigation indices that equal or exceed the above hazard index.

Surface water runoff from the access road and car parking areas will be drained through permeable block paving.

Surface Water runoff from the existing Leisure Centre car parking area will be collected by existing French drain and channelled via positive drainage through a catchpits before it is discharged into the dry swale. The catchpits will provide additional settlement for suspended solids before discharging into the ground.

The following tables detail the mitigation indices for this drainage system. Where multiple drainage components are used in series the individual mitigation index of secondary and tertiary components are lowered due to the reduced performance associated with primary treatment. The total mitigation indices with the combined surface water drainage system is as follows:

Private drives and parking spaces	Mitigation Indices		
SuDS Type			
	Total suspended solids (TSS)	Metals	Hydro-carbons
Permeable Pavement	0.7	0.6	0.7

Highway	Mitigation Indices		
SuDS Type			
	Total suspended solids (TSS)	Metals	Hydro-carbons
Filter Drain	0.4	0.4	0.4
Dry Swale	0.5 x 0.5	0.6 x 0.5	0.6x0.5
Total:	0.65	0.7	0.7

The mitigation indices for the existing and proposed car parking and access area are all in excess of the minimum level required to achieve effective treatment as suggested in C753 The SuDS Manual and therefore the risk of pollution of receiving water from the site has been mitigated.

A copy of the proposed surface water drainage layout is attached in Appendix 5 at the rear of this Statement.

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Indicative Schedule of Maintenance

Once appointed the Contractor will prepare a site specific method statement for the control of silt and other pollutants during construction. CIRIA Report C532, Control of water pollution from construction sites, provides further guidance on this.

The Contractor will maintain the proposed drainage system during construction and until the handing over of the site. Upon completion the maintenance will be passed on to the property owner.

The attached maintenance schedule details the typical tasks to be undertaken at different intervals.

Indicative Schedule of Maintenance for the Proposed Drainage System:

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from silt trap chambers and inlet chambers	6 monthly
	Litter and debris removal – above ground	Monthly or as required
	Litter and debris removal – catch pits/flow control	Monthly or as required
	Surface pipe work – jetting/rodding	Every 2 years or as required
	Manage other vegetation and remove nuisance plants – aesthetics	As required
	Visual inspection of permeable driveway for defects and settlement	Annually
	Sweeping/brushing of permeable driveway	Twice Annually
Irregular Maintenance	Remove debris/blockages to silt traps/flow control	As required
Corrective Maintenance	Repairs to access chambers/MH covers	As required
	Replace any broken permeable blocks/surface, remedial works to any depressions or rutting	As required
	Inspect flow control manhole for blockages, standing water and clear	As required

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Kings Leisure Centre Access, Henfield
Drainage System Maintenance Summary Sheet:
For Property Owner

Inspection/ Action Required	Catchpits/ Silt Traps/ Flow Control	Surface Pipework	Permeable Surface
After leaf fall in Autumn	✓		✓
6 Months	✓		
1 Year			✓
2 Years		✓	

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List of Appendices

Appendix 1	Site Location Plan, Existing and Proposed Site Layouts
Appendix 2	British Geological Survey Borehole Logs, ASI Report Extracts and Infiltration Test Results
Appendix 3	Proposed Site Catchment Area Plan
Appendix 4	Surface Water Drainage Calculations
Appendix 5	Proposed Surface Water Drainage Layout and Construction Details

Appendix 1

Site Location

Existing Site Layout

Proposed Site Layout



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N
SITE LOCATION
Henfield
Hylands
Brightham's Farm
Brightham's Farm Cottage
Bines Farm Barn
Betley Bridge
Great Betley Farm
Little Betley
Cibess Cottage
Kidders Lane
Birchfield House
Birchfield Nursery
Chestham Park
Liddo Hill Farm
Kidders Barn
Hill House
Liddo Hill Lodge
Lodge
Crouch Hill Gate
Gainsborough
Hollinger
Parsonage Wood
Chess Bridge
Park Farm
Woolfly Farm
Woolfly Wood
Chess Barn
Stonelands Farm
Wantley Hill Estate
Recn Gd
Parsonage Farm
Chates
Furze Field
Woodhouse Farmhouse
Reservoir
School
Lashmars Hall
Squirrels Farm
Amays
Stonepit Cottage
Turnham's Gill
Bylsborough
Field House
Furners Farm
The Paddocks
Dear's Farm
Backsettown Farm
Backsettown House
Swains Gill
Holders
Sandgate Nurseries
Depot Wks
Oakfield House
Hollands Lane
Rye House
Little Barn
Rushmear Nursery
Windmill Hill
Pine Lands
Victoria House
Spring Hill
Brockings
Dykes
Henfield Common
Cricket Ground
East House
Barrowhill
Horsham
Haywards Heath
Burgess Hill
Tunbridge Wells
Crawley
Brighton
Worthing
Littlehampton
-100m 0 100m 200m 300m 400m
TITLE
Site Location
Postcode: BN5 9QE
Grid Ref: TQ 211 164
SCALE
1:10000
DRG No
1



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-10m 0 10m 20m 30m 40m

Scale 1:1000

TITLE
Existing Site Layout

SCALE
1:1000

DRG. No.
2

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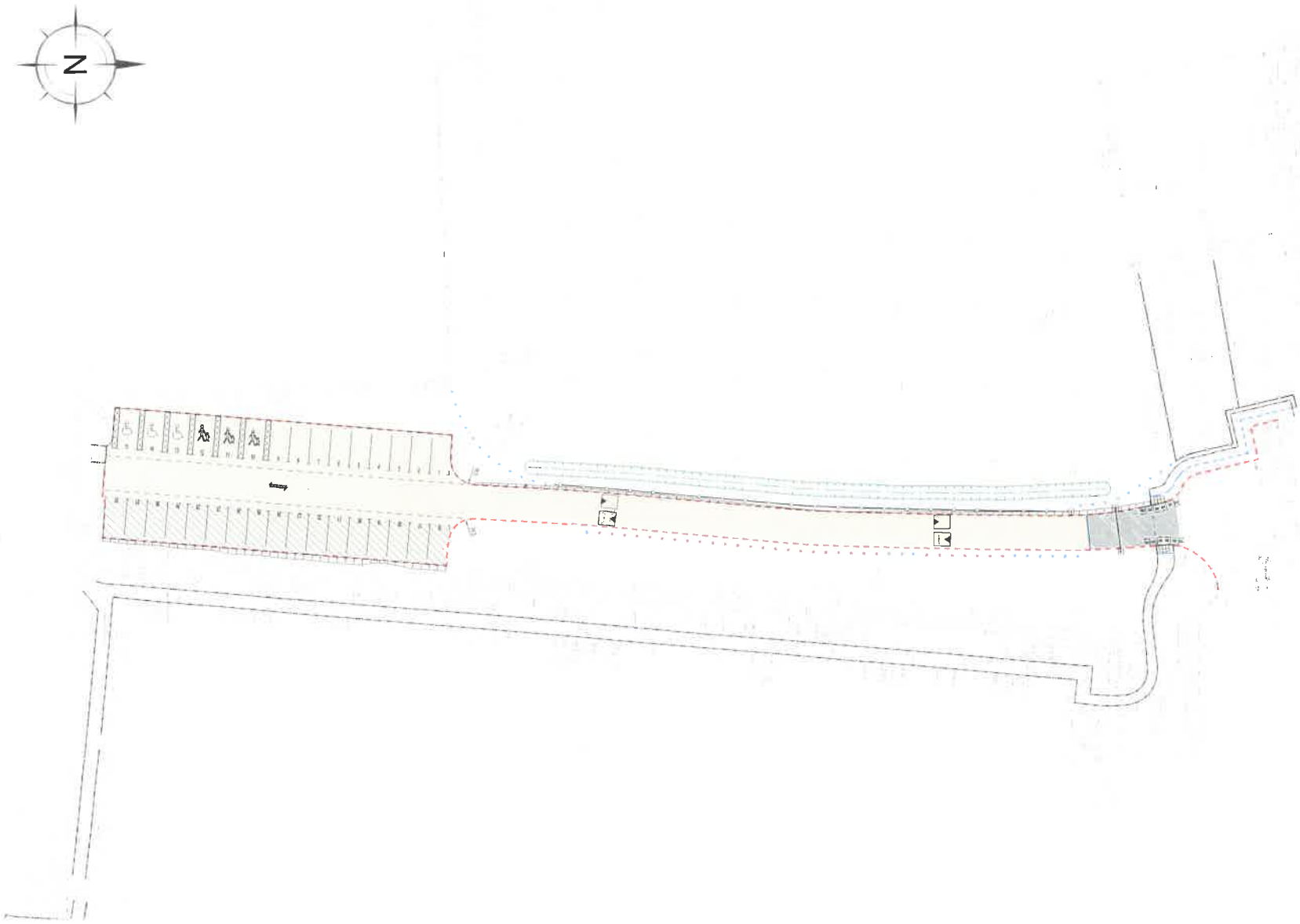


-10m 0 10m 20m 30m 40m

Scale 1:1000

TITLE Proposed Site Layout

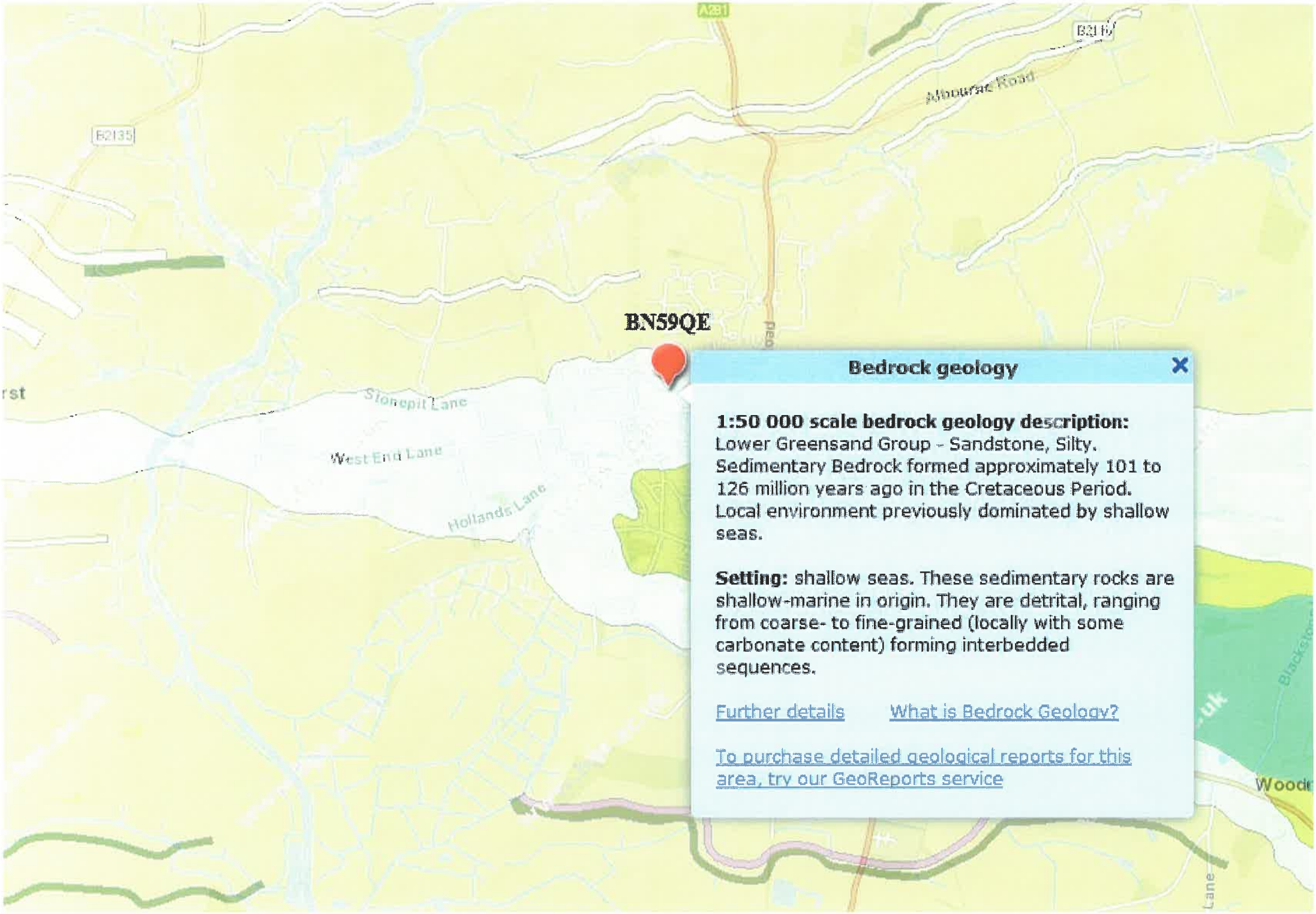
SCALE 1:1000

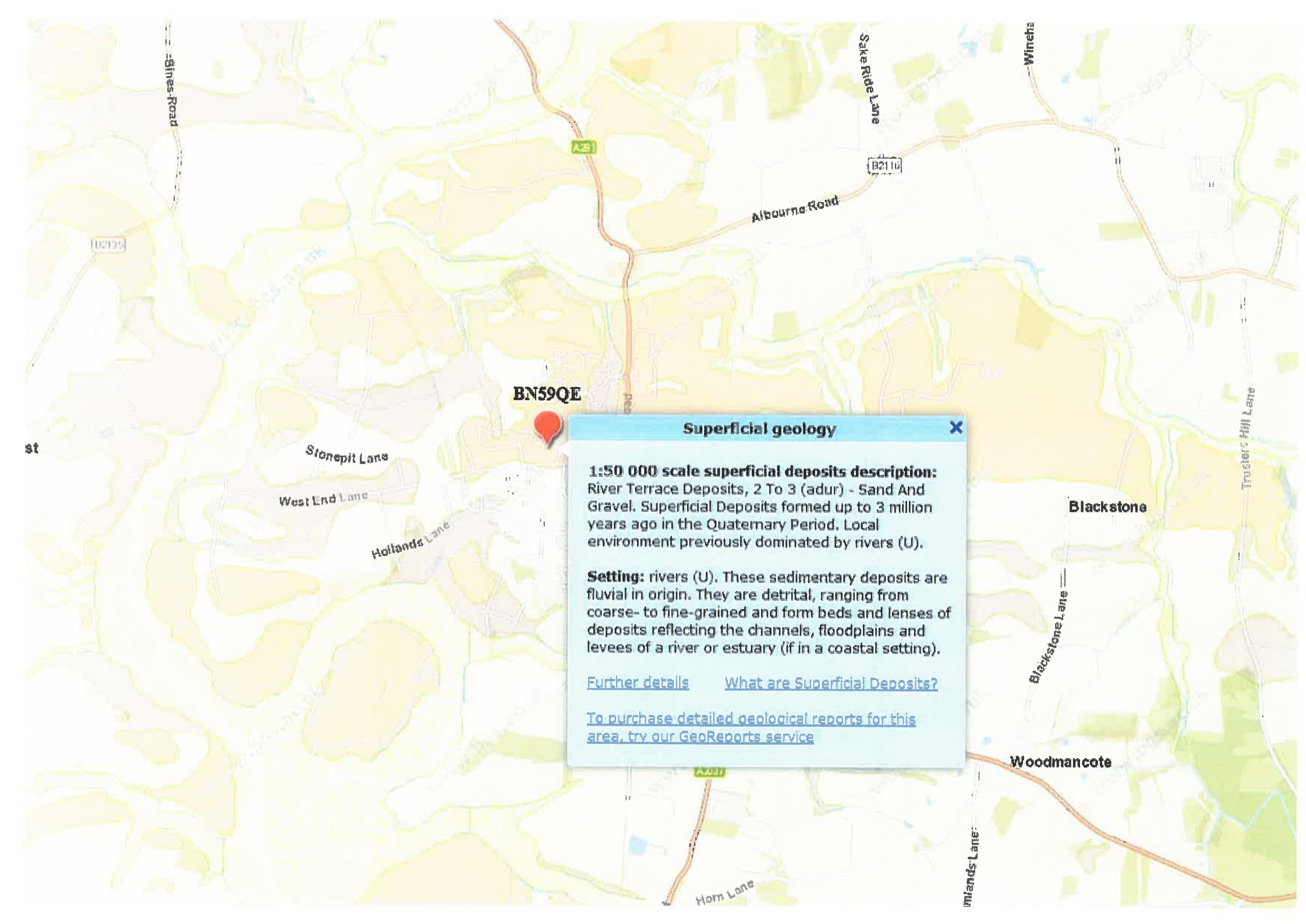
DRG. No. 3

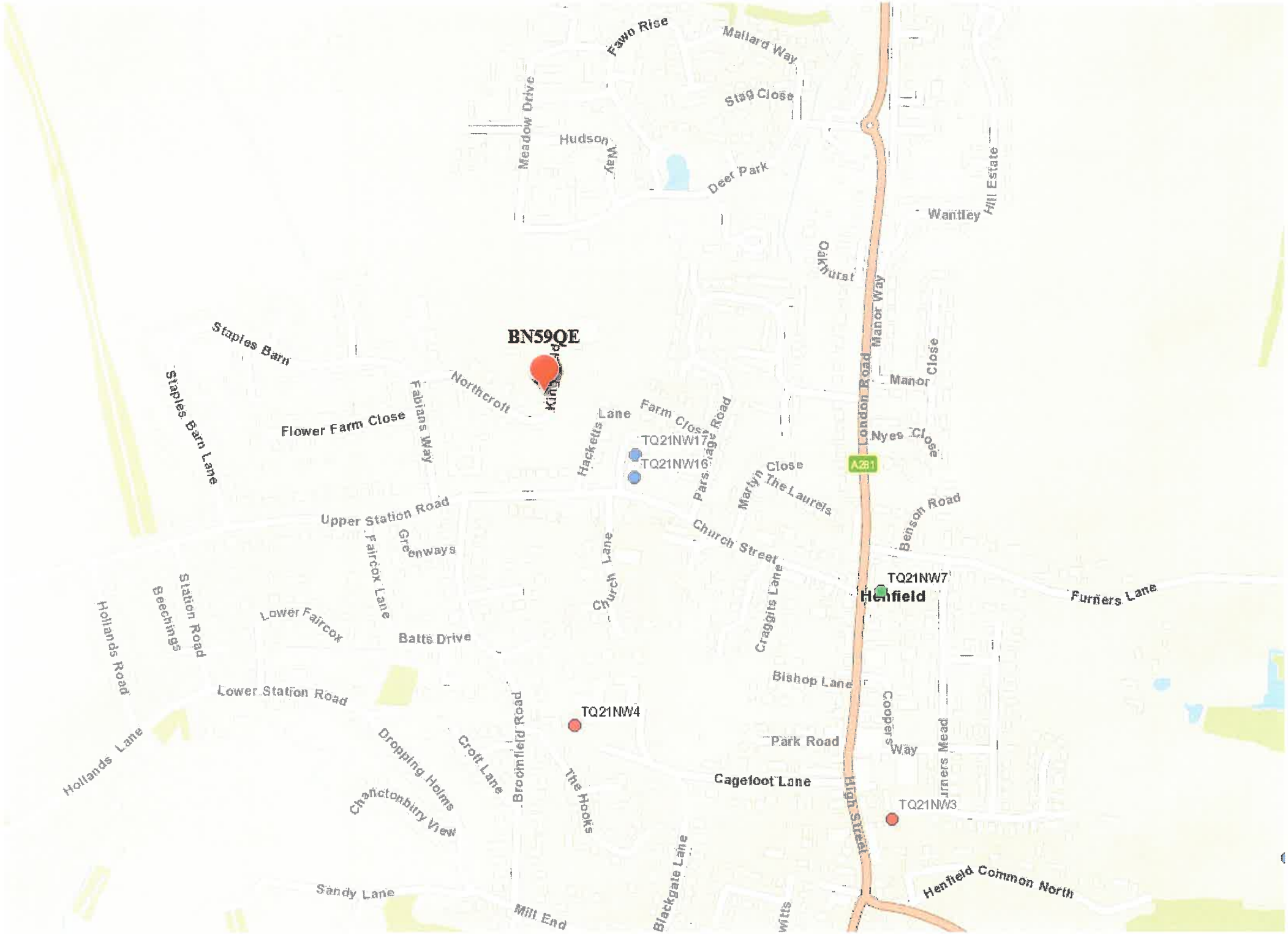
Appendix 2

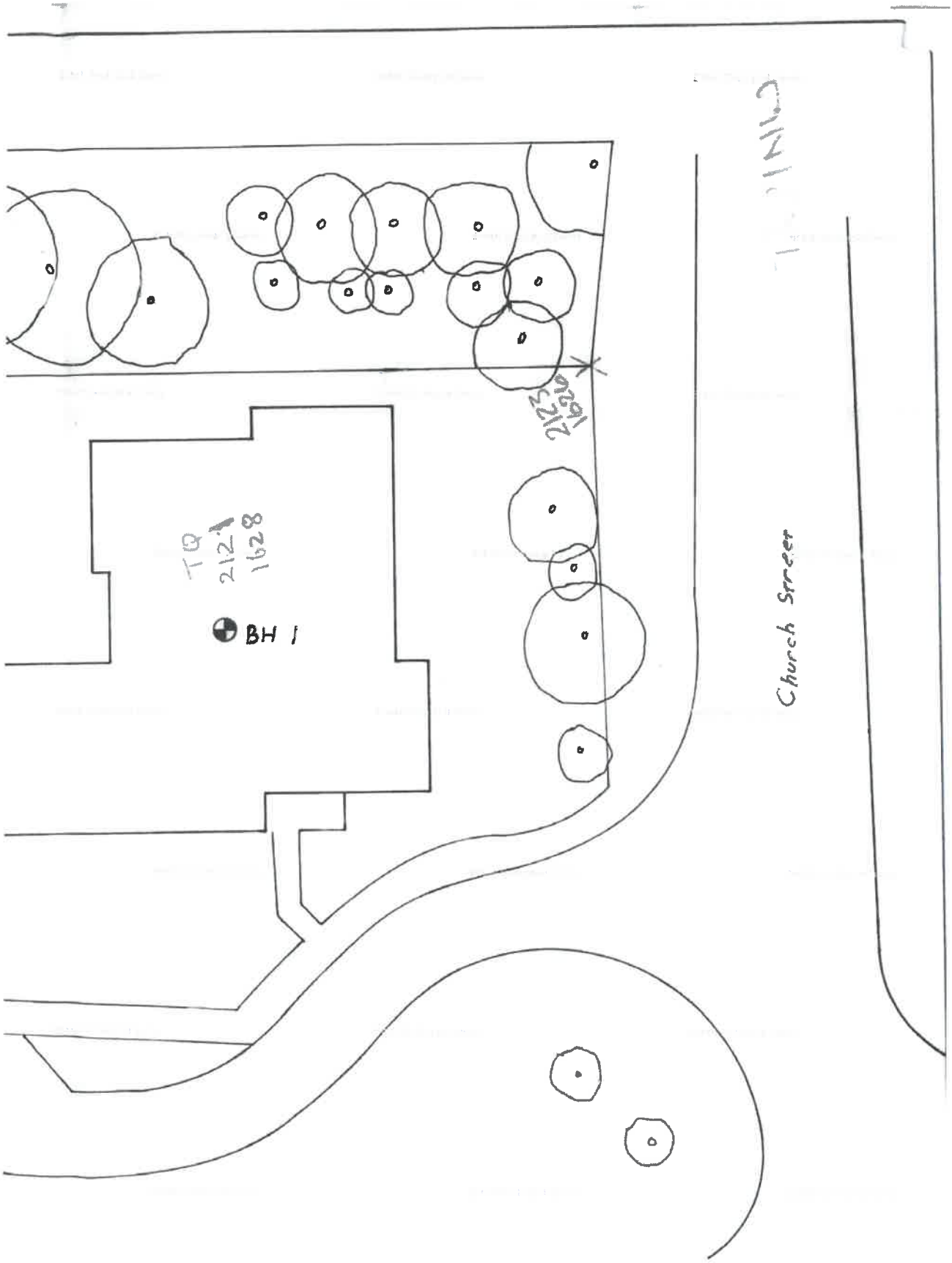
British Geological Survey Borehole Logs

ASI Report Extract and Infiltration Test Results


A281
B2116
Mourne Road
B2135
BN59QE
Stonepit Lane
West End Lane
Hollands Lane
Bedrock geology
1:50 000 scale bedrock geology description:
Lower Greensand Group - Sandstone, Silty.
Sedimentary Bedrock formed approximately 101 to 126 million years ago in the Cretaceous Period.
Local environment previously dominated by shallow seas.
Setting: shallow seas. These sedimentary rocks are shallow-marine in origin. They are detrital, ranging from coarse- to fine-grained (locally with some carbonate content) forming interbedded sequences.
Further details
What is Bedrock Geology?
To purchase detailed geological reports for this area, try our GeoReports service


BN59QE
Superficial geology
1:50 000 scale superficial deposits description:
River Terrace Deposits, 2 To 3 (adur) - Sand And Gravel. Superficial Deposits formed up to 3 million years ago in the Quaternary Period. Local environment previously dominated by rivers (U).
Setting: rivers (U). These sedimentary deposits are fluvial in origin. They are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the channels, floodplains and levees of a river or estuary (if in a coastal setting).
Further details
What are Superficial Deposits?
To purchase detailed geological reports for this area, try our GeoReports service
Stonepit Lane
West End Lane
Hollands Lane
Albourne Road
Sake Ride Lane
Blackstone
Blackstone Lane
Woodmancote
Horn Lane
A23
B2116


BN59QE
Fawn Rise
Mallard Way
Stag Close
Meadow Drive
Hudson
View
Deer Park
Wantley Hill Estate
Oakhurst
London Road
Manor Way
Manor Close
Staples Barn
Staples Barn Lane
Northcroft
Fabians Way
Flower Farm Close
Hacketts Lane
Farm Close
Parsonage Road
TQ21NW17
TQ21NW16
Martyn Close
The Laurels
Nyes Close
A281
Upper Station Road
Greenways
Faircox Lane
Church Lane
Church Street
Craggits Lane
Benson Road
TQ21NW7
Henfield
Furners Lane
Station Road
Beechings
Hollands Road
Lower Faircox
Batts Drive
Lower Station Road
Bishop Lane
Cooper's Way
Furners Mead
TQ21NW4
Broomfield Road
Dropping Holms
Crott Lane
Chanctonbury View
The Hooks
Park Road
Cagefoot Lane
High Street
TQ21NW3
Hollands Lane
Sandy Lane
Mill End
Blackgate Lane
Henfield Common North



	Date 14.9.77	Report No. S.27/531	Figure No. 1

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 13327659 : BGS Reference: TQ21NW17
British National Grid (27700) : 521220,116310 Report an issue with this borehole

<< < Prev Page 1 of 2 Next > >>

Contract Name	HENFIELD	Borehole No. 2
		Sheet 1 of 1

Method of boring	Shell and Auger	Ground level	26.6 m OD
Diameter	200 mm nominal	Start	25.8.77
		Finish	25.8.77

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
			J			0.50	Made ground (brown clayey sand with pebbles and brick fragments)
			U	0.50	26.10		
25/8			J				
			U				
			J			6.00	Stiff to very stiff light brown clayey silt and fine sand
			U				
			J				
			U				
			J				
			U	6.50	20.10		
			J			2.50	Hard grey and brown clayey silt and fine sand
			U				
25/8			J	9.00	17.60		Bottom of Borehole

Notes no groundwater seen during drilling

Contract Name	HENFIELD	Borehole No. 1
		Sheet 1 of 1

Method of boring	Shell & Auger	Ground level	26.6 m OD
Diameter	200 mm nominal	Start	23.8.77
		Finish	24.8.77

Daily progress	Water levels	In-situ tests	Samples	Depth (m)	Reduced level (m O.D.)	Thickness (m)	Description of Strata
			J	0.40	26.20	0.40	Made ground(black topsoil, brown sand and brick fragments)
			U				
23/8			J				
24/8			U			6.05	Stiff to very stiff brown clayey silt and fine sand
			J				
			U				
			J				
			U				
			J				
			U				
			J	6.45	20.15		
			J	6.70	19.90	0.25	Dark grey siltstone
23/8			U			2.30	Hard grey and brown clayey silt and fine sand
			J				
24/8				9.00	17.60		Bottom of Borehole

Notes

2 hours clearing brambles in places 2.5 m high
1½ hours chiselling from 6.45 to 6.70 m siltstone
no groundwater seen during drilling

Terresearch Limited	Report No. S.27/531	Appendix 1 Sheet 1

ASHDOWN SITE INVESTIGATION
L•I•M•I•T•E•D

GEOTECHNICAL
AND
ENVIRONMENTAL
ENGINEERS

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Swanborough Farm
Lewes
East Sussex
BN7 3PF

Telephone
01273 483119

Website
www.AshdownSI.co.uk

Email
contact@AshdownSI.co.uk

Company Registration Number
242 6786

Date: 2nd November 2016 **Our Ref:** R16-11710

Tomas Zajac
The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
West Sussex
BN41 1RA

Dear Tomas,

Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex
Ground Investigation

Outlined below are the findings from the recent works carried out in connection with the development proposals for the site, which are understood to comprise the construction of a link road together with a new car park.

The objectives of the works were to:
a) Investigate the shallow ground and groundwater conditions prevailing at the site; and
b) provide advice to assist others in undertaking pavement and soakaway design.

The scope of the commission and the terms and conditions under which the work was undertaken are set out within the offer letter Q16-5193 dated 9th September 2016. The instruction to proceed was received on behalf of the client, Henfield Parish Council, in an email dated 3rd October 2016.

The analysis and discussions contained in this report are based on the ground and groundwater conditions encountered during the site work and in situ testing procedures. The possibility of a variation in ground and groundwater conditions away from the points investigated should not be overlooked. Groundwater conditions can vary both seasonally and due to other effects.

It is noted that the groundworks were undertaken and the report was prepared specifically for the Client's project and the recommendations given may not be appropriate to alternative schemes. The copyright for the report and licence for use shall remain vested in Ashdown Site Investigation Ltd (the Company) who disclaim all responsibility or liability (whether at common law or under the express or implied terms of the Contract between the Company and the Client) for any loss or damage of whatever nature in the event that this report is relied on by a third party, or is issued in circumstances or for projects for which it was not originally commissioned, or where the exploratory records and test results contained therein are interpreted by anyone other than the Company.

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Site Works

The site work was carried out on the 17th October 2016. Two boreholes (designated BH1 and BH2) were drilled by dynamic sampling techniques to a depth of 3.00m below ground level. In addition two hand dug pits (designated TH1 and TH2) were excavated to respective depths of 0.70m and 0.90m. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

Laboratory Testing

Geotechnical testing was undertaken by Ashdown Site Investigation Ltd in accordance with the methods given in BS1377:1990 Parts 1 to 8 'Methods of test for soils for civil engineering purposes'.

Ground Conditions

The exploratory hole logs, in situ and laboratory test results are attached to this report. Notes to assist in the interpretation of the records are also attached.

Stratigraphy

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

Underlying the surfacing, the investigation progressed into undisturbed stiff to very stiff slightly sandy slightly silty clay deposits which were recorded to the full depth of trial pits TH1 and TH2, and to depths of 0.85m and 1.1m in boreholes BH1 and BH2, respectively. These soils are considered to be presentative of the River Terrace Deposits indicated on the published geological map.

Beneath the River Terrace Deposits, where penetrated, the boreholes encountered stiff to very stiff silty clays to the full depth of the investigation at 3.00m below ground level.

The latter undisturbed soils are considered to be representative of the Weald Clay Formation indicated on the British Geological Survey 1:50,000 map.

Groundwater and Stability

Each of the exploratory holes was recorded as being dry and stable during the course of excavation.

Geotechnical Assessment

The geotechnical assessment has been prepared in connection with the development proposals shown on the drawing produced by The Civil Engineering Practice (Reference 22631, dated 101 A).

In summary this drawing indicates the proposed development to comprise the construction of a link road connecting to a new car park.

Pavement Design

Cone penetrometer tests undertaken to establish the California bearing ratio (CBR) of the in situ soils indicated CBR values ranging between 3% and >10% but typically in the range 5% to 10% in the underlying fine grained River Terrace Deposits at the time of the investigation. It is noted that CBR values are, in part, dependent on the moisture content of the tested soils and are consequently subject to seasonal variation.

Equilibrium CBR values (with reference to Transport Research Laboratory (TRL) Report LR1132 'Structural design of Bituminous Roads') are derived from knowledge of soil classification data (plasticity index for soils exhibiting cohesion (clay type) and particle size distribution for granular soils), the location of the water table, pavement thickness, and weather conditions at the time of construction. This guidance document suggests a design equilibrium CBR value of 2.5% to 3% would be applicable to the natural fine grained soils for the construction of thin (300mm) pavement under poor to average construction conditions and assuming a low groundwater table.

Based upon review of the in situ test results and the quoted guidance it is recommended that, for the fine grained soils encountered at this site, a CBR value of no greater than 3% should be adopted for preliminary pavement design.

All formations should be proof rolled and any excessively large, soft, degradable or otherwise unsuitable materials thus identified should be removed and be replaced with well compacted coarse grained fill. Prepared subgrades should be protected from severe adverse weather by ensuring they are graded to falls to prevent ponding, and they should be reasonably protected from trafficking during construction.

The subgrade may be assumed not to be susceptible to frost heave.

Stormwater Infiltration Systems

In situ soakage testing was carried out within the shallow hand dug pits TH1 and TH2 in general accordance with the requirements of BRE 365 'Soakaway Design'.

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

During the second test performed in each pit, the water level within the test pits did not fall below 25% of the initial test depth and calculation of the soil infiltration rates in accordance with the BRE digest was not possible. For these tests, the soil infiltration rate has therefore been

calculated by dividing the volume of water lost during the test by the product of the average surface area of the trial pit in contact with water during the test period and the test duration in seconds.

In addition falling head soakage testing was carried out within boreholes BH1 and BH2 in general accordance with 'The Soakaway Design Guide' published by Kent County Council (July 2000). From the results of the tests, calculations were made in accordance with the guide to estimate the infiltration rate that could be expected for soakaways constructed to discharge into the underlying soils within the test zone.

The infiltration rates derived from the tests are summarised in the following table.

Exploratory Hole	Test Response Zone Depth (m)		Stratum	Infiltration Rate (m/sec)	Driving Head of Water (m)
	Top	Bottom			
TH1 Test 1	0.40	0.70	River Terrace Deposits	1.7×10^{-5}	-
TH1 Test 2	0.40	0.70	River Terrace Deposits	4.5×10^{-6}	-
TH2 Test 1	0.60	0.90	River Terrace Deposits	1.5×10^{-5}	-
TH2 Test 2	0.57	0.90	River Terrace Deposits	1.5×10^{-5}	-
BH1	2.00	3.00	Weald Clay Formation	3.4×10^{-6}	2.0
BH2	2.00	3.00	Weald Clay Formation	3.4×10^{-6}	2.0

It is considered that the River Terrace Deposits may be capable of accepting surface water run-off via permeable paving, though it should be noted, given the shallow thickness of these soils and the low infiltration rates of the underlying Weald Clay Formation soils, the storage capacity within the River Terrace Deposits will be limited.

It is considered that the underlying Weald Clay Formation soils are unlikely to be suitable for discharging water to the ground via soakaways.

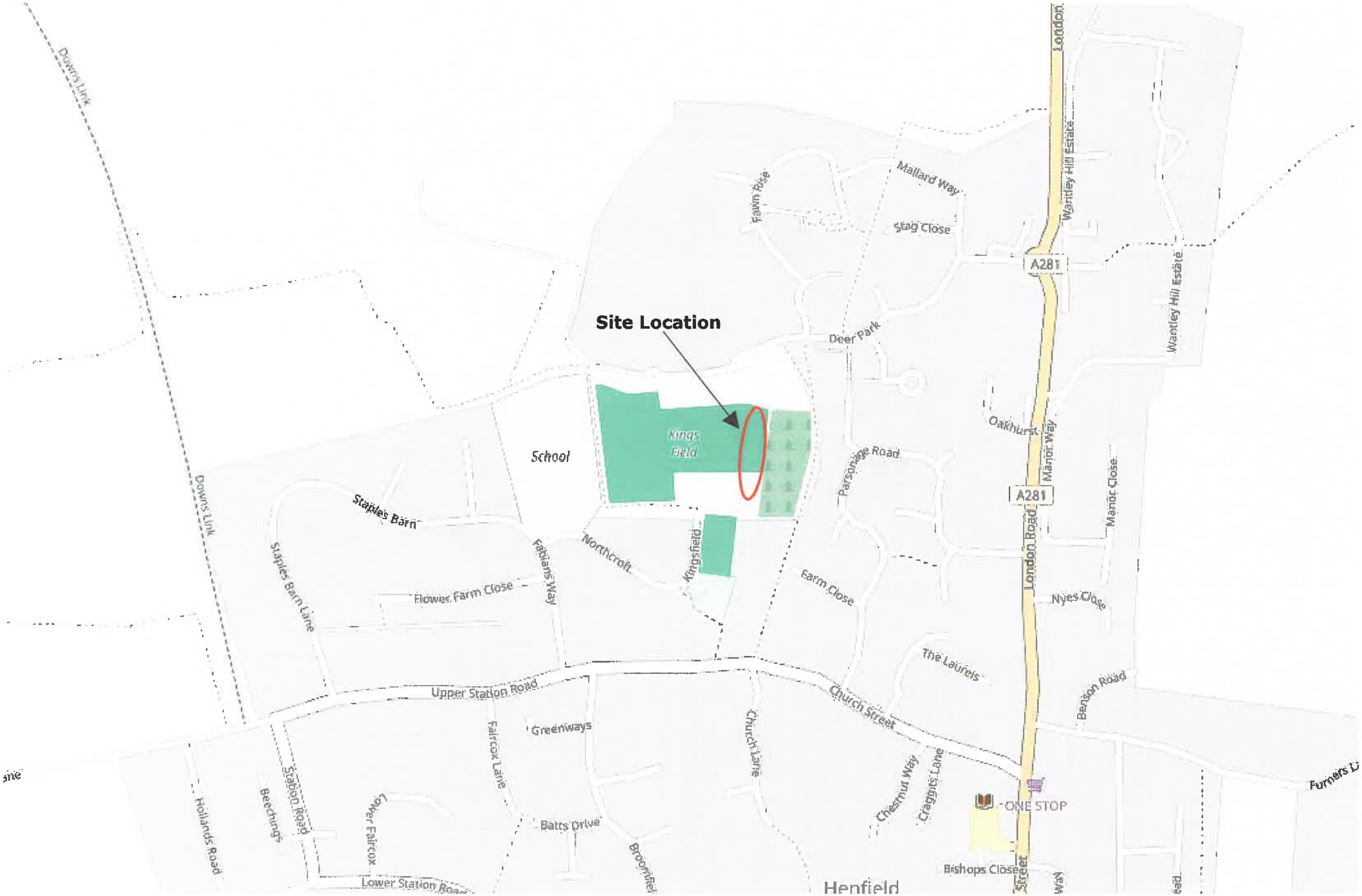
In the event that discharge to ground via infiltration systems is proposed, to minimise the risk of subsidence, point discharging infiltration systems (conventional ring or trench soakaways) should be constructed a minimum of 5.0m away from proposed or existing buildings. It is also recommended that designers of the system provide for the prevention of pollution of groundwater. In this regard appropriate consideration should be given to whether there is a need for inclusion of interceptors and oil separators. The Local Authority and/or relevant water company should be consulted in relation to consent for discharge of water from rooftops, areas of hardstanding and roadways to drains.

If you have any questions regarding the above, please do not hesitate to contact us.

Yours sincerely



Lucy Griffiths
for Ashdown Site Investigation Limited
encl.



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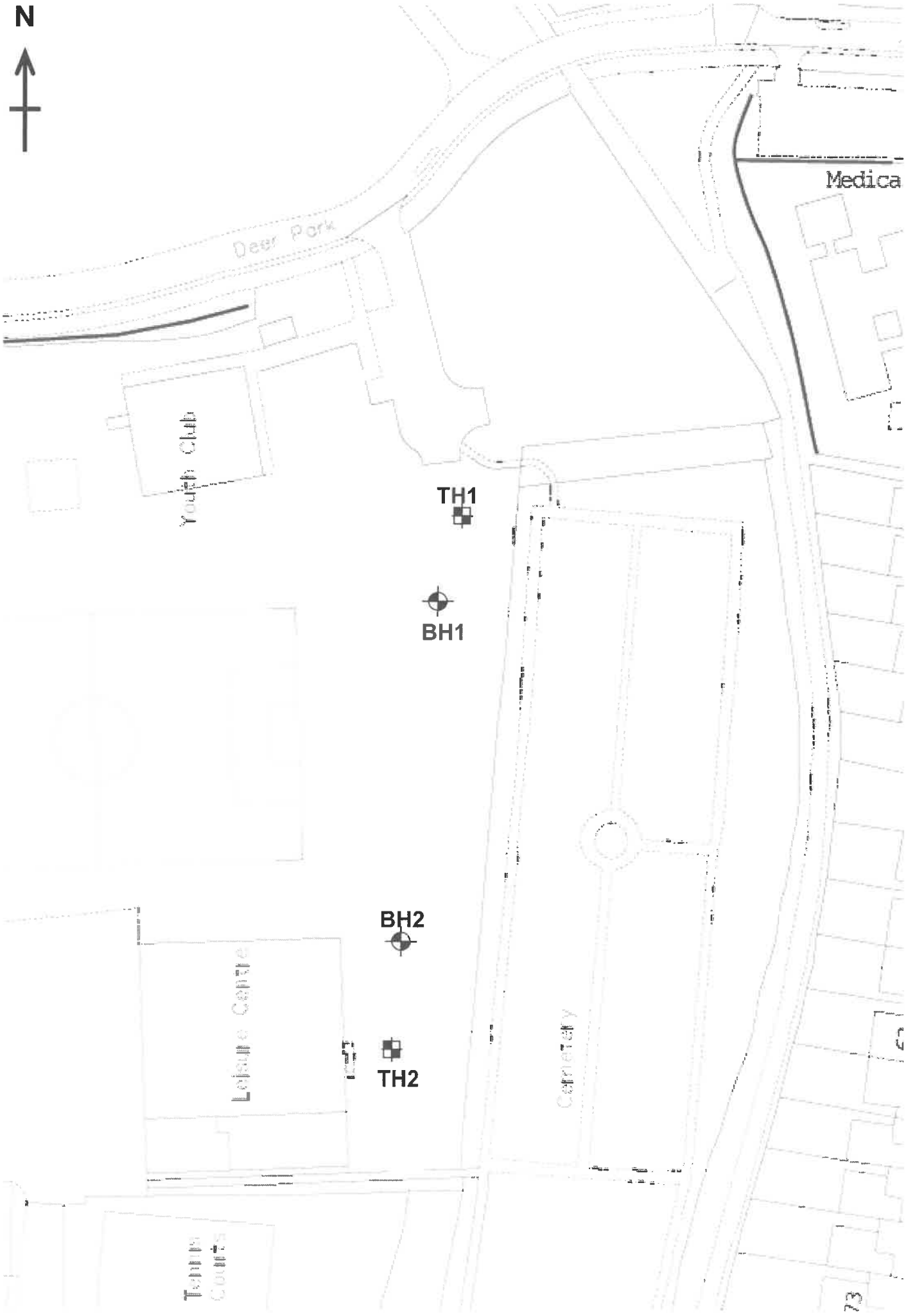
HDOWN SITE VESTIGATION	Site: : Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex	Site Location Plan. Not To Scale	Figure 1



ASHDOWN SITE INVESTIGATION	Site: Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex	Site Plan Not To Scale	Figure 2 P16-11710

NOTES FOR THE INTERPRETATION OF EXPLORATORY HOLE RECORDS

1 Symbols and abbreviations

Samples

U 'Undisturbed' Sample: - also known as 'U100' or 'U4' - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Uo Sample not obtained.
U* Full penetration of sample not obtained.
Pi Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D Disturbed Sample.
R Root Sample.
B Bulk Disturbed Sample.
W Water Sample.
J Jar Sample (sample taken in amber glass jar fitted with gas tight lid)
T Tub Sample
Vi Vial Sample

In situ Testing

S Standard penetration test (SPT): In the borehole record the depth of the test is that at the start of the normal 450mm penetration. The number of blows per 75mm penetration is recorded, with the initial 150mm for seating blows being recorded followed by the blows recorded for the remaining 300mm of the test. The total blows to achieve the standard penetration of 300mm, discounting the seating blows, is noted as the N value on the log. Where the full penetration of the test cannot be achieved (a refusal) the number of blows achieved and the penetration achieved will be reported.

C Standard Penetration Test (SPT) conducted usually in coarse grained soils or weak rocks using the same procedure as for the SPT but with a 50mm diameter, 60° apex solid cone fitted in place of the sampler. Variations in test results are indicated by the same symbols as for the SPT (above).

V Shear Vane Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.

H Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.

P Perth Penetrometer Test: See "In Situ Testing Notes" for full description. Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column. In sand the number of blows is approximately equivalent to the SPT "N" value.

Excavation Method

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

2 Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002+A1:2013) and Part 2 Principles of classification (BS EN 14688-2:2004+A1:2013) as well as the BS5930:2015 code of Practice for Ground Investigations.

Fine Grained Soils

The consistency of fine grained soils given in the report is based on visual inspection of the samples and the strength is based on results of in situ and/or laboratory undrained shear strength tests when carried out.

The consistency is determined on the following basis:

Consistency	Manual Test
Very Soft	Soil exudes between fingers when squeezed in hand
Soft	Soils can be moulded by light finger pressure
Firm	Cannot be moulded by finger but rolled to 3mm threads without breaking/crumbling
Stiff	Crumbles/breaks when rolled to 3mm thick threads but can be moulded into a lump again
Very Stiff	Cannot be moulded and crumbles under pressure, can be indented by thumbnail

The terms used for the designation of the undrained shear strength are as follows:

Undrained Shear Strength	
Extremely to Very Low	<20 kPa
Low	20-40 kPa
Medium	40-75 kPa
High	75-150 kPa
Very High	150-300 kPa
Extremely high	300-600 kPa

Note: The undrained shear strength of the soils is measured either by laboratory testing or in the field using hand shear vane.

It is recognised that any coarse grained soil that has in excess of approximately 35% fine grained soil (clay and silt) can often be expected to behave as a fine grained soil despite the dominance of coarse grained material within the soil mass. To reflect this, it is the soil type that dominates the behaviour of the soil mass that appears on the exploratory hole records.

Coarse Grained Soils

The relative densities of coarse grained soils (sand and gravel) given in the report are based on field estimations and the results of the Standard Penetration Test (SPT) and equivalent correlation from other testing. The classification in terms of "N" Values is as follows:

SPT 'N' Value	Relative Density
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Greater than 50	Very Dense

3 Rock Description

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1:2003) as well as the BS5930:2015 code of Practice for Ground Investigations.

The description of rock mass includes the type of rock, structure, discontinuities and weathering.

The unconfined compressive strength of rock material is determined on the following basis:

Term	Field Identification	Unconfined Compressive Strength (MPa)
Extremely Weak	Indented by thumbnail	Less than 1
Very Weak	Crumbles under firm blows with point of geological hammer, peeled by pocket knife	1 to 5
Weak	Peeled by pocket knife with difficulty, shallow indentations made by firm blow with geological hammer	5 to 25
Medium Strong	Cannot be peeled or scraped with knife, can be fractured with single firm blow of geological hammer	25 to 50
Strong	Requires more than one blow of geological hammer to fracture	50 to 100
Very Strong	Requires may blows of geological hammer to fracture it	100 to 250
Extremely Strong	Can only be chipped with geological hammer	Greater and 250

The terms describing discontinuity and bedding spacing are as follows:

Bedding Thickness	
Very Thick	>2000mm
Thick	2000-600mm
Medium	600-200mm
Thin	200-60mm
Very Thin	60-20mm
Thickly Laminated	20-6mm
Thinly Laminated	<6mm

Discontinuity Spacing	
Very Wide	>2000mm
Wide	2000-600mm
Medium	600-200mm
Close	200-60mm
Very Close	60-20mm
Extremely Close	<20mm

Chalk

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

IN SITU TESTING NOTES

1 Standard Penetration Testing

Standard penetration testing (SPT) is carried out within a cased cable percussion borehole. The test is performed using a either a split spoon (barrel) sampler in finer grained deposits, or, in coarser grained soils or weak rocks, using a 50mm diameter, 60° apex solid cone fitted in place of the sampler.

The sampler is driven into the deposits at the base of the borehole by means of a 63.5kg hammer falling freely through 760mm.

In the borehole record the depth of the test is that at the start of the normal 450mm penetration, the number of blows to achieve the standard penetration of 300mm (the "N" value) is shown after the test index letter, but the seating blows through the initial 150mm penetration are not reported unless the full penetration of 450mm cannot be achieved.

(BS EN ISO 22476-3:2005+A1:2011, Geotechnical investigation and testing – Field Testing, Part 3 and BS5930:2015 code of practice of for ground investigations)

2 Dynamic Probe Testing

The DPH (heavy) dynamic probing rig drives a 32mm diameter rod with a $15cm^2$ area, 90° end cone into the ground by means of a 50kg hammer which falls freely through a distance of 0.5m. The number of blows per 100mm penetration (N_{100}) is recorded.

The DPSH (super heavy) dynamic probing rig drives a 35mm diameter rod with a $20cm^2$ area, 90° end cone into the ground by means of a 63.5kg hammer that falls freely through a distance of 0.75m. The number of blows per 100mm penetration (N_{100}) is recorded. The results can provide a useful indication of the relative strength of the material. The dynamic probing is carried out in accordance with BS EN ISO 22476-2:2005+A1:2011 and BS5930.

3 Perth Penetrometer Test

In this test a hardened stainless steel rod is driven into the deposit by a 9.5kg sliding hammer falling freely through 600mm. After an initial penetration of 150mm the number of blows required to drive the rod a further 300mm is recorded. In sand the Perth blow count gives a close correlation to the "N-value" that could be expected from a standard penetration test (SPT) made in similar materials. The results are less reliable in coarser grained materials but can give an indication of their engineering properties. The perth penetrometer test is carried out in accordance with the Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes, there is no European equivalent code.

4 Undrained Shear Strength

Undrained shear strength determinations are made in situ within the fine grained soils using a Geonor hand shear vane or (usually in the case of window sampler boreholes) a hand penetrometer. The test records the undrained shear strength (cohesion) in kN/m^2. The shear vane records a maximum shear strength of $130kN/m^2$ and the hand penetrometer records a maximum shear strength of $250kN/m^2$.

3 California Bearing Ratio Test

In this test a hand held Farnell cone penetrometer apparatus is pushed into the deposits for the estimation of the California bearing ratio of the subgrade (for use in pavement design). The test equipment is design for the estimation of the bearing ratio of fine grained soils (clay and silt) only and is unsuitable for use in coarse grained soils and rock.

ASHDOWN SITE INVESTIGATION
L•I•M•I•T•E•D
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Site Name: Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex

Job Number: R16-11710

Start Date: 17/10/2016

End Date: 17/10/2016

Borehole Number: **BH1**

Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	Depth	Stratum Description
				Samples and In Situ Testing / Dynamic Probe Blows/100mm 0 5 10 15 20 25 30			
						0.00	Topsoil.
						0.15	Very stiff light grey brown mottled light orange brown slightly gravelly silty CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	D	0.30					
	H	0.30		>250			
	H	0.60		>250			
						0.85	Stiff to very stiff light orange brown and light grey slightly sandy silty CLAY. Sand is fine to medium. (Weald Clay Formation)
	D	0.90					
	H	0.90		170			
	V	1.00		110			
	H	1.20		155			
	H	1.40		140			
	D	1.60					
	H	1.60		170			
						1.80	Stiff light grey mottled light orange brown slightly sandy silty CLAY. Sand is fine to medium. (Weald Clay Formation)
	V	2.00		100			
	H	2.20		155			becoming very stiff below 2.20m depth.
	D	2.30					
	H	2.40		170			
	H	2.70		170			with a band of dark brown grey/ black slightly sandy clayey gravel of ironstone/ mudstone below 2.90m depth.
						3.00	End of borehole at 3.00m

Remarks

Groundwater: Borehole dry on completion.

Stability: Borehole cased to 2.00m depth.

Notes: n/a

Excavation Method: WLS

Borehole Diameter: Various

Made By: ML

ASHDOWN SITE INVESTIGATION
L•I•M•I•T•E•D
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Site Name: Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex

Job Number: R16-11710

Start Date: 17/10/2016

End Date: 17/10/2016

Borehole Number: **BH2**

Standpipe	Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Dynamic Probe Blows/100mm 0 5 10 15 20 25 30	Legend	Depth	Stratum Description
							0.00	Topsoil.
	D	0.20					0.15	Very stiff light grey brown mottled light orange brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	H	0.20		250				
	H	0.70		250				
	D	0.90						
	V	1.00		>130				
	H	1.20		225			1.10	Very stiff light orange brown and light grey slightly sandy silty CLAY. Sand is fine to medium. (Weald Clay Formation)
	D	1.40						
	H	1.40		195			1.50	Very stiff light grey mottled light orange brown slightly sandy silty CLAY. Sand is fine to medium. (Weald Clay Formation)
	H	1.60		185				
	H	1.80		185				
	V	2.00		100				
	D	2.10						
	H	2.20		210				with a layer of sandy clayey subangular to subrounded fine to medium mudstone below 2.40m depth.
	D	2.50					2.50	Stiff to very stiff dark grey, brown and yellow grey silty CLAY. (Weald Clay Formation)
	H	2.50		210				
	H	2.70		140			2.70	Stiff to very stiff dark grey silty CLAY. (Weald Clay Formation)
	V	3.00		100			3.00	End of borehole at 3.00m
	V	3.00		100				

Remarks

Groundwater: Borehole dry on completion.

Stability: Borehole cased to 2.00m depth.

Notes: n/a

Excavation Method: WLS

Borehole Diameter: Various

Made By: ML

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LIMITED
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Web: www.ashdownsi.co.uk
Tel: 01273 483119

Site Name: Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex

Job Number: R16-11710

Start Date: 17/10/2016

End Date: 17/10/2016

Trial Pit Number: **TH1** Sheet 1 of 1

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
D	0.10				0.00	Topsoil.
					0.15	Very stiff light grey brown mottled light orange brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
H	0.30		>250			
D	0.40					
V	0.50		>130			
H	0.60		>250			
D	0.70				0.70	End of trial pit at 0.70m
V	0.70		>130			

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: n/a

Excavation Method: HDP

Pit Length: 0.40m

Pit Width: 0.30m

Made By: ML

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Tel: 01273 483119

Site Name: Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex

Job Number: R16-11710

Start Date: 17/10/2016

End Date: 17/10/2016

Trial Pit Number: **TH2**

Samples and In Situ Testing						
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result	Legend	Depth/ Reduced Level	Stratum Description
D	0.10				0.00	Topsoil.
					0.15	Stiff light grey brown mottled light orange brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
D	0.40					
V	0.40		110			
D	0.80					
V	0.90		95		0.90	End of trial pit at 0.90m

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: n/a

Excavation Method:	HDP
Pit Length:	0.30m
Pit Width:	0.30m
Made By:	ML

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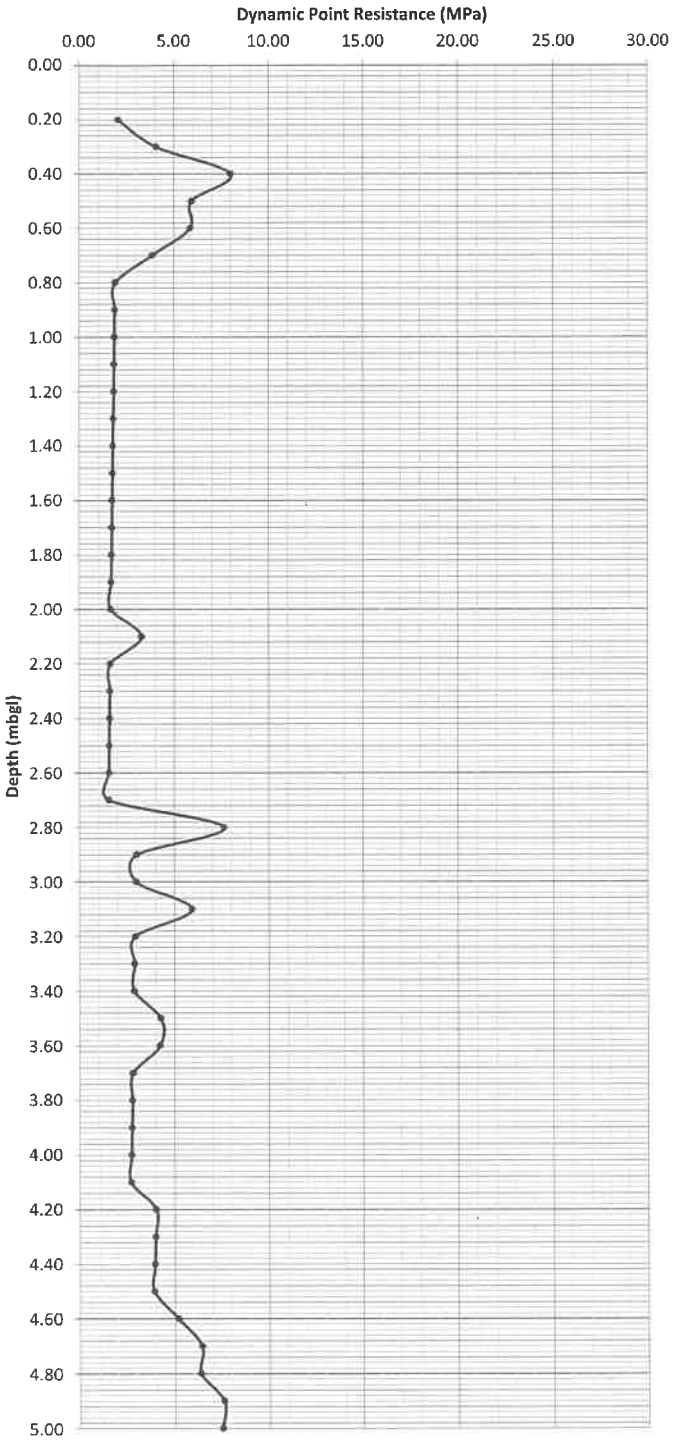
Dynamic Probe Record

SITE Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex **Report Ref.** R16-11710

Test Location Reference	BH1

Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	1	0.10	2.14	2.05
0.30	2	0.05	4.29	4.05
0.40	4	0.03	8.57	8.00
0.50	3	0.03	6.43	5.93
0.60	3	0.03	6.43	5.85
0.70	2	0.05	4.29	3.85
0.80	1	0.10	2.14	1.90
0.90	1	0.10	2.14	1.88
1.00	1	0.10	2.14	1.86
1.10	1	0.10	2.14	1.83
1.20	1	0.10	2.14	1.81
1.30	1	0.10	2.14	1.79
1.40	1	0.10	2.14	1.77
1.50	1	0.10	2.14	1.75
1.60	1	0.10	2.14	1.73
1.70	1	0.10	2.14	1.71
1.80	1	0.10	2.14	1.69
1.90	1	0.10	2.14	1.68
2.00	1	0.10	2.14	1.66
2.10	2	0.05	4.29	3.28
2.20	1	0.10	2.14	1.62
2.30	1	0.10	2.14	1.61
2.40	1	0.10	2.14	1.59
2.50	1	0.10	2.14	1.57
2.60	1	0.10	2.14	1.56
2.70	1	0.10	2.14	1.54
2.80	5	0.02	10.71	7.64
2.90	2	0.05	4.29	3.02
3.00	2	0.05	4.29	3.00
3.10	4	0.03	8.57	5.93
3.20	2	0.05	4.29	2.94
3.30	2	0.05	4.29	2.91
3.40	2	0.05	4.29	2.88
3.50	3	0.03	6.43	4.29
3.60	3	0.03	6.43	4.25
3.70	2	0.05	4.29	2.81
3.80	2	0.05	4.29	2.78
3.90	2	0.05	4.29	2.76
4.00	2	0.05	4.29	2.73
4.10	2	0.05	4.29	2.71
4.20	3	0.03	6.43	4.03
4.30	3	0.03	6.43	3.99
4.40	3	0.03	6.43	3.96
4.50	3	0.03	6.43	3.92
4.60	4	0.03	8.57	5.19
4.70	5	0.02	10.71	6.43
4.80	5	0.02	10.71	6.38
4.90	6	0.02	12.86	7.59
5.00	6	0.02	12.86	7.53



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m^2
E_{theor}	473 J
Energy Ratio	0.86
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

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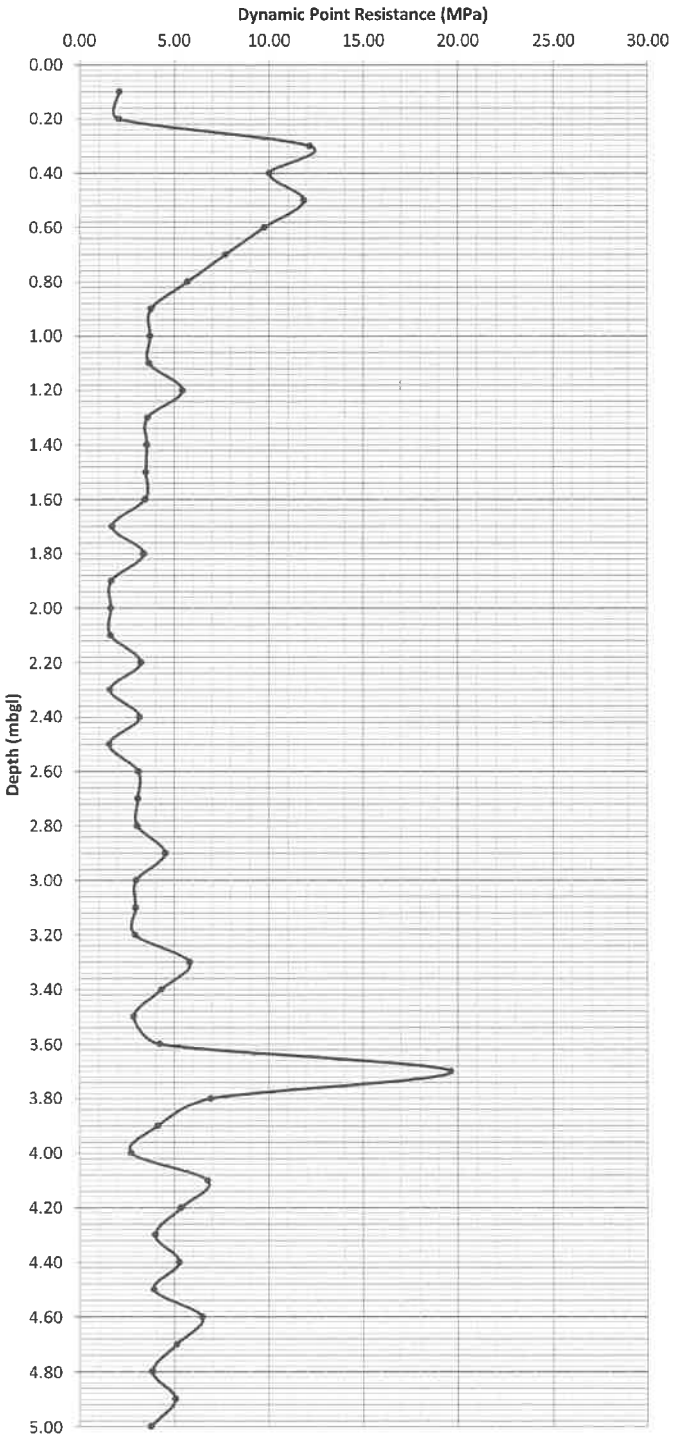
Dynamic Probe Record

SITE Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex **Report Ref.** R16-11710

Test Location Reference	BH2

Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10	1	0.10	2.14	2.08
0.20	1	0.10	2.14	2.05
0.30	6	0.02	12.86	12.16
0.40	5	0.02	10.71	10.00
0.50	6	0.02	12.86	11.85
0.60	5	0.02	10.71	9.75
0.70	4	0.03	8.57	7.70
0.80	3	0.03	6.43	5.71
0.90	2	0.05	4.29	3.76
1.00	2	0.05	4.29	3.71
1.10	2	0.05	4.29	3.67
1.20	3	0.03	6.43	5.44
1.30	2	0.05	4.29	3.58
1.40	2	0.05	4.29	3.54
1.50	2	0.05	4.29	3.50
1.60	2	0.05	4.29	3.46
1.70	1	0.10	2.14	1.71
1.80	2	0.05	4.29	3.39
1.90	1	0.10	2.14	1.68
2.00	1	0.10	2.14	1.66
2.10	1	0.10	2.14	1.64
2.20	2	0.05	4.29	3.25
2.30	1	0.10	2.14	1.61
2.40	2	0.05	4.29	3.18
2.50	1	0.10	2.14	1.57
2.60	2	0.05	4.29	3.12
2.70	2	0.05	4.29	3.08
2.80	2	0.05	4.29	3.05
2.90	3	0.03	6.43	4.54
3.00	2	0.05	4.29	3.00
3.10	2	0.05	4.29	2.97
3.20	2	0.05	4.29	2.94
3.30	4	0.03	8.57	5.82
3.40	3	0.03	6.43	4.33
3.50	2	0.05	4.29	2.86
3.60	3	0.03	6.43	4.25
3.70	14	0.01	30.00	19.64
3.80	5	0.02	10.71	6.95
3.90	3	0.03	6.43	4.13
4.00	2	0.05	4.29	2.73
4.10	5	0.02	10.71	6.77
4.20	4	0.03	8.57	5.37
4.30	3	0.03	6.43	3.99
4.40	4	0.03	8.57	5.28
4.50	3	0.03	6.43	3.92
4.60	5	0.02	10.71	6.49
4.70	4	0.03	8.57	5.15
4.80	3	0.03	6.43	3.83
4.90	4	0.03	8.57	5.06
5.00	3	0.03	6.43	3.77



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m^2
E_{theor}	473 J
Energy Ratio	0.86
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

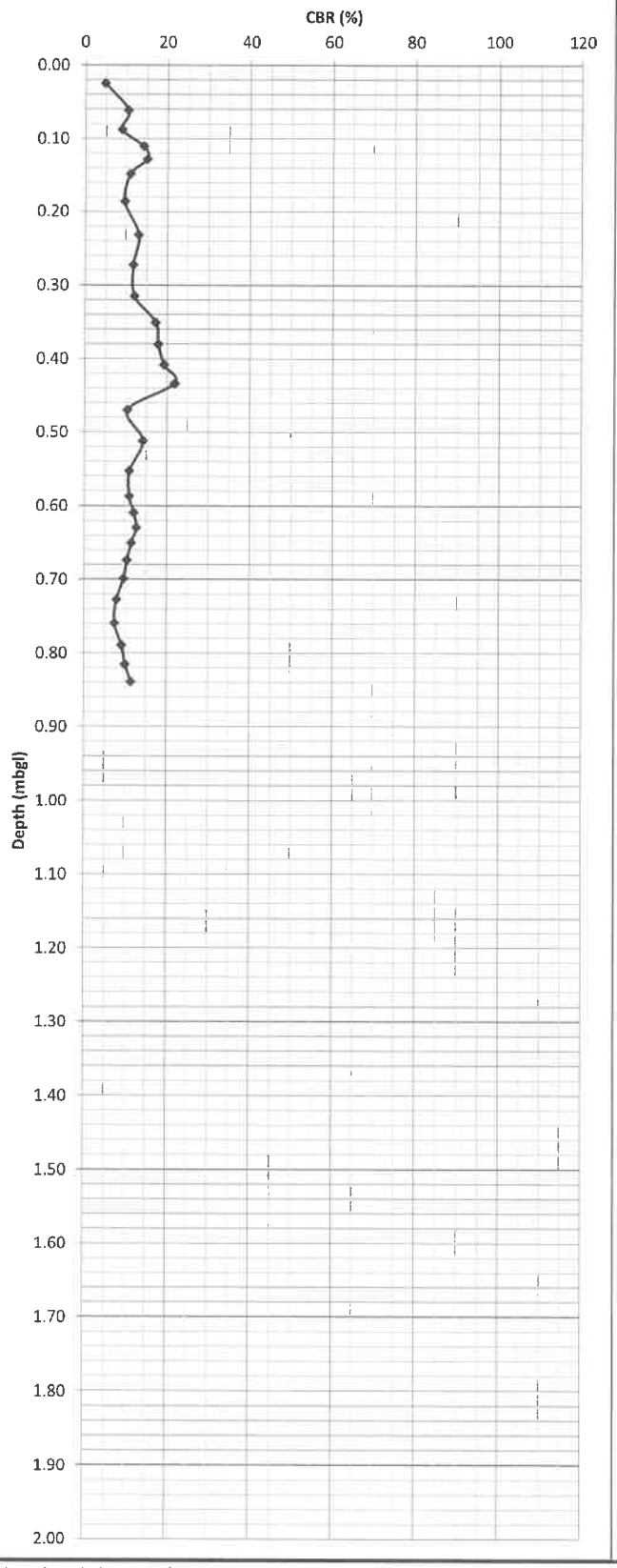
ASHDOWN SITE INVESTIGATION LTD

TRL Dynamic Cone Penetrometer Record

SITE Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex **Report Ref.** R16-11710

Test Location Reference	BH1
Depth of Start of Test (mbgl)	0.00

No. Blows	Total Blows	Reading (mm)	Depth (mbgl)	CBR%
DCP Zero Reading		60	0.00	
1	1	110	0.05	5
1	2	134	0.07	10
1	3	162	0.10	9
1	4	180	0.12	14
1	5	197	0.14	15
1	6	220	0.16	11
2	8	272	0.21	10
2	10	311	0.25	13
2	12	354	0.29	12
2	14	396	0.34	12
2	16	426	0.37	17
2	18	455	0.40	18
2	20	482	0.42	19
2	22	506	0.45	22
2	24	554	0.49	10
2	26	590	0.53	14
2	28	636	0.58	11
1	29	659	0.60	11
1	30	680	0.62	12
1	31	700	0.64	13
1	32	722	0.66	12
1	33	746	0.69	10
1	34	772	0.71	10
1	35	803	0.74	8
1	36	836	0.78	7
1	37	863	0.80	9
1	38	888	0.83	10
1	39	910	0.85	12



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

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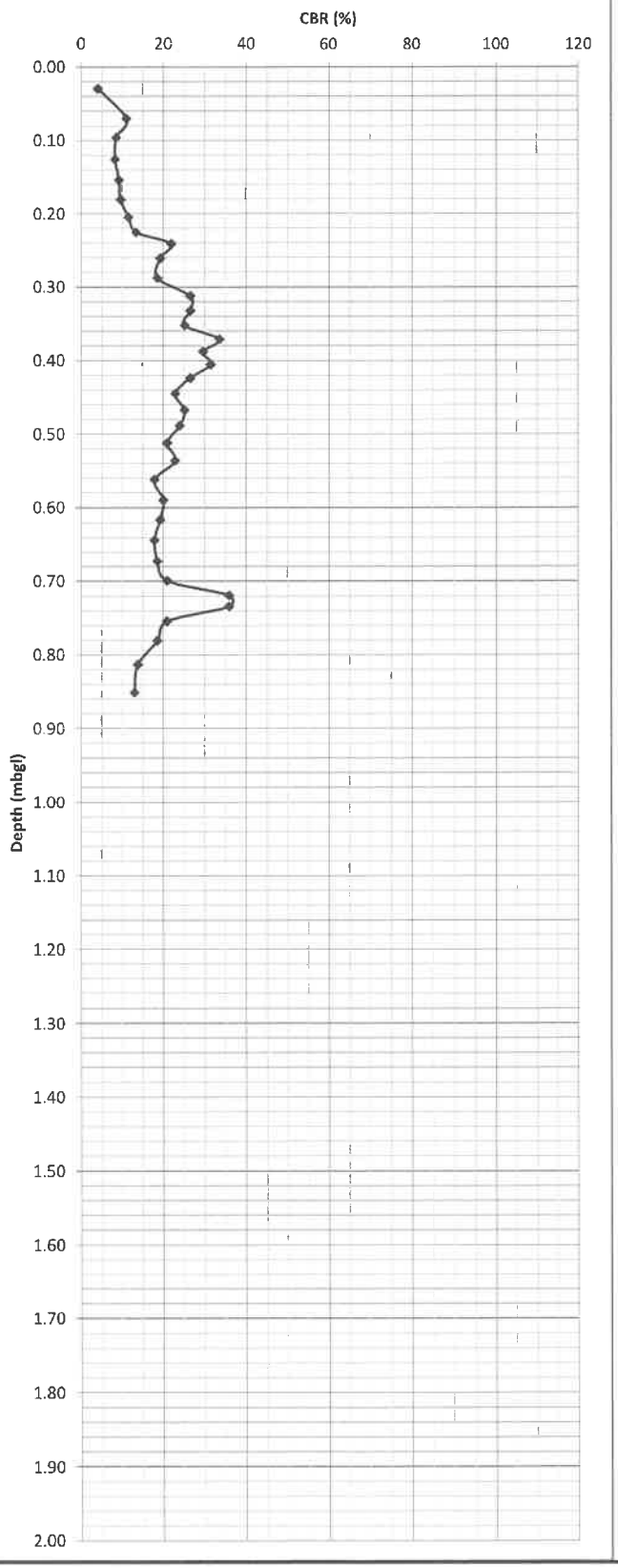
TRL Dynamic Cone Penetrometer Record

SITE Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex **Report Ref.** R16-11710

Test Location Reference	BH2
Depth of Start of Test (mbgl)	0.00

No. Blows	Total Blows	Reading (mm)	Depth (mbgl)	CBR%
DCP Zero Reading		70	0.00	
1	1	129	0.06	4
1	2	152	0.08	11
1	3	181	0.11	9
1	4	211	0.14	8
1	5	238	0.17	9
1	6	264	0.19	10
1	7	286	0.22	12
1	8	305	0.24	13
1	9	317	0.25	22
2	11	344	0.27	19
2	13	372	0.30	19
2	15	392	0.32	26
2	17	412	0.34	26
2	19	433	0.36	25
2	21	449	0.38	34
2	23	467	0.40	30
2	25	484	0.41	31
2	27	504	0.43	26
2	29	527	0.46	23
2	31	548	0.48	25
2	33	570	0.50	24
2	35	595	0.53	21
2	37	618	0.55	23
2	39	647	0.58	18
2	41	673	0.60	20
2	43	700	0.63	19
2	45	729	0.66	18
2	47	757	0.69	19
2	49	782	0.71	21
2	51	797	0.73	36
2	53	812	0.74	36
2	55	837	0.77	21
2	57	865	0.80	19
2	59	902	0.83	14
2	61	941	0.87	13



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

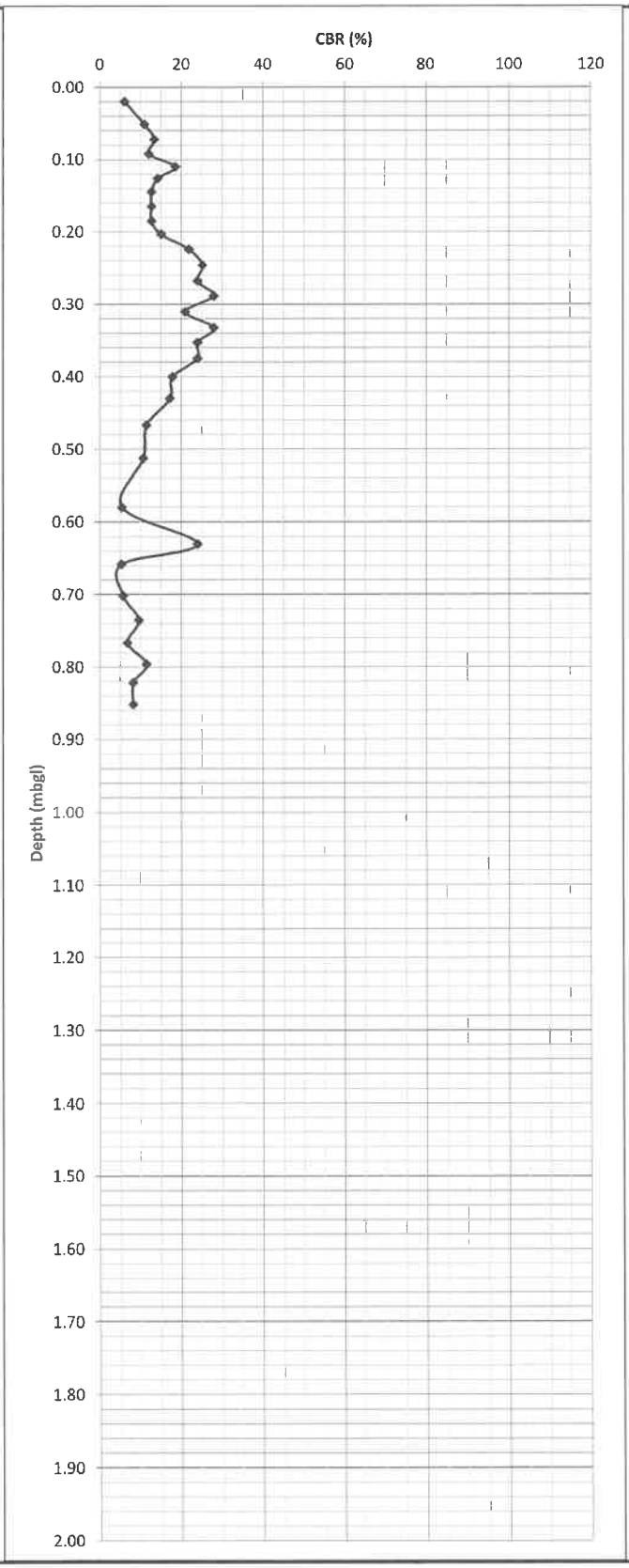
ASHDOWN SITE INVESTIGATION LTD

TRL Dynamic Cone Penetrometer Record

SITE Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex **Report Ref.** R16-11710

Test Location Reference	TH1
Depth of Start of Test (mbgl)	0.00

No. Blows	Total Blows	Reading (mm)	Depth (mbgl)	CBR%
DCP Zero Reading		65	0.00	
1	1	105	0.04	6
1	2	128	0.06	11
1	3	147	0.08	13
1	4	168	0.10	12
1	5	182	0.12	19
1	6	200	0.14	14
1	7	220	0.16	13
1	8	240	0.18	13
1	9	260	0.20	13
1	10	277	0.21	15
2	12	301	0.24	22
2	14	322	0.26	25
2	16	344	0.28	24
2	18	363	0.30	28
2	20	388	0.32	21
2	22	407	0.34	28
2	24	429	0.36	24
2	26	451	0.39	24
2	28	480	0.42	18
2	30	510	0.45	17
2	32	554	0.49	12
2	34	601	0.54	11
2	36	690	0.63	5
1	37	701	0.64	24
1	38	746	0.68	5
1	39	788	0.72	6
1	40	814	0.75	10
1	41	850	0.79	7
1	42	872	0.81	12
1	43	902	0.84	8
1	44	932	0.87	8



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

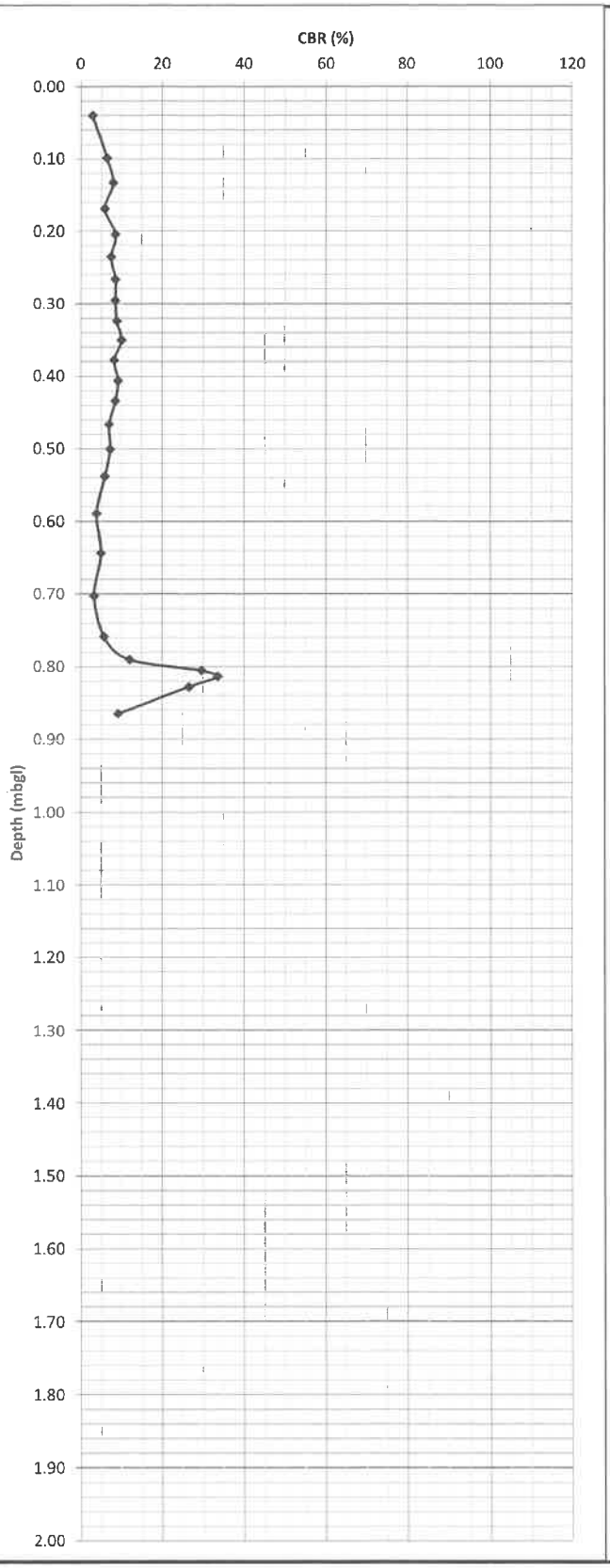
ASHDOWN SITE INVESTIGATION LTD

TRL Dynamic Cone Penetrometer Record

SITE Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex **Report Ref.** R16-11710

Test Location Reference	TH2
Depth of Start of Test (mbgl)	0.00

No. Blows	Total Blows	Reading (mm)	Depth (mbgl)	CBR%
DCP Zero Reading		72	0.00	
1	1	152	0.08	3
1	2	190	0.12	6
1	3	221	0.15	8
1	4	262	0.19	6
1	5	291	0.22	9
1	6	324	0.25	7
1	7	353	0.28	9
1	8	382	0.31	9
1	9	410	0.34	9
1	10	435	0.36	10
1	11	465	0.39	8
1	12	492	0.42	9
1	13	521	0.45	9
1	14	556	0.48	7
1	15	590	0.52	7
1	16	631	0.56	6
1	17	692	0.62	4
1	18	740	0.67	5
1	19	810	0.74	3
1	20	852	0.78	6
1	21	873	0.80	12
1	22	882	0.81	30
1	23	890	0.82	34
2	25	910	0.84	26
2	27	964	0.89	9



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

ASHDOWN SITE INVESTIGATION LIMITED

Site: Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex	Report No.: R16-11710 Sheet No.: 1 of 1

SUMMARY OF BOREHOLE FALLING HEAD SOAKAGE TEST RESULTS

BH1	
Time (mins)	Depth to water (m bgl)
0	0.13
1	0.14
3	0.16
6	0.18
15	0.30
41	0.51
87	0.81
168	1.18
208	1.31
Borehole Depth (m bgl)	3.00
Casing Depth (m bgl)	2.00
Borehole Diameter (mm)	92.00
Casing Diameter (mm)	105.00

BH2	
Time (mins)	Depth to water (m bgl)
0	0.09
1	0.10
5	0.14
12	0.25
37	0.33
120	0.62
165	0.71
Borehole Depth (m bgl)	3.00
Casing Depth (m bgl)	2.00
Borehole Diameter (mm)	92.00
Casing Diameter (mm)	105.00

Notes: bgl – below ground level.

ASHDOWN SITE INVESTIGATION LIMITED

Site:	Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex	Report No.:	R16-11710
		Sheet No.:	1 of 2

SUMMARY OF TRIAL PIT FALLING HEAD SOAKAGE TEST RESULTS

TH1 (Test 1)	
Time (mins)	Depth to water (m bgl)
0	0.40
1	0.43
3	0.45
8	0.48
18	0.52
33	0.56
63	0.63
123	Dry
Pit Length - 0.40m Pit Width - 0.30m Pit Depth - 0.70m bgl	

TH1 (Test 2)	
Time (mins)	Depth to water (m bgl)
0	0.40
1	0.40
2	0.40
5	0.41
10	0.42
20	0.44
35	0.46
65	0.48
95	0.50
Pit Length - 0.40m Pit Width - 0.30m Pit Depth - 0.70m bgl	

Remarks: bgl - below ground level.

ASHDOWN SITE INVESTIGATION LIMITED

Site:	Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex	Report No.:	R16-11710
		Sheet No.:	2 of 2

SUMMARY OF TRIAL PIT FALLING HEAD SOAKAGE TEST RESULTS

TH2 (Test 1)	
Time (mins)	Depth to water (m bgl)
0	0.60
1	0.61
2	0.62
5	0.65
10	0.68
20	0.72
35	0.76
65	0.83
80	0.88
Pit Length - 0.30m Pit Width - 0.30m Pit Depth - 0.90m bgl	

TH2 (Test 2)	
Time (mins)	Depth to water (m bgl)
0	0.57
1	0.59
3	0.61
7	0.64
17	0.67
32	0.72
62	0.79
Pit Length - 0.30m Pit Width - 0.30m Pit Depth - 0.90m bgl	

Remarks: bgl - below ground level.

GEOTECHNICAL LABORATORY TESTING NOTES

1 Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002+A1:2013) and Part 2 Principles of classification (BS EN 14688-2:2004 +A1:2013) as well as the BS5930:2015 code of Practice for Ground Investigations.

2 Index Tests

Index (Atterberg Limit) tests are undertaken on samples of fine grained soils provide the primary information for the classification of fine grained soils.

Fine grained soil is tested to determine its liquid and plastic limits, which are moisture contents that define boundaries between material consistency states. These tests are used to evaluate indices used for soil identification and to help determine the shrinkage and swelling characteristics of the soil under conditions of changing moisture content. The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

The consistency index is derived from the Index Tests and is summarized in the following table. These divisions may be approximate, particularly for low plasticity soils. The consistency recorded on the soil classification summary is derived from the consistency index.

Consistency	Consistency Index
Very Soft	<0.25
Soft	0.25 to 0.50
Firm	0.50 to 0.75
Stiff	0.75 to 1.00
Very Stiff	>1.00

3 Particle Size Distribution Tests

Sieve analyses are carried out soil samples to establish their particle size distribution that can assist in the assessment of the permeability and classification of granular soils.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

4 Natural Moisture/ Saturated Moisture Content Determination of Chalk

The results of natural moisture or saturated moisture content tests of disturbed samples of chalk are used to assist in the classification of the chalk to determine key geotechnical parameters of strength, density and crushing properties.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

5 Soil Suction Testing

Soil suction tests are undertaken for the determination of the state of desiccation in clay soils.

The testing is carried out in accordance with the Building Research Establishment Information Paper IP4/93, dated February 1993.

6 Triaxial Compression Tests

Undrained triaxial compression tests are carried out on undisturbed samples of cohesive soil in order to assist in the determination of the undrained shear strength of the soil. The results of moisture content and density determinations are also included.

The tests are carried out in accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

7 Shear Vane and Hand Penetrometer Testing

Undisturbed samples are tested in the laboratory using a Geonor Hand Shear Vane for the determination of their undrained shear strength.

The vane tests are carried out in general accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

8 One Dimensional Consolidation Tests

One-dimensional consolidation tests are performed on undisturbed soil samples to ascertain their settlement characteristics.

The tests are carried out in accordance with BS1377: Part 5: 1990 + A1:1994 Compressibility, Permeability and Durability tests.

9 Dry Density / Moisture Content Relationship (Compaction) Testing

Compaction testing for the determination of the dry density / moisture content relationship is carried out on using either a 2.5kg, 4.5kg hammer or a vibrating hammer.

The tests are carried out in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction-related tests.

10 California Bearing Ratio

The soil is usually compacted at the as dug "natural" moisture content and often at moisture contents around the natural moisture content.

The California bearing ratio is determined in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction related tests.

11 Chemical Testing

Soil samples are tested for their concentration of water soluble sulphate and pH for use in concrete mix design.

Water samples are tested for total sulphate concentration and pH value.

Where a water soluble sulphate content in soils or a total sulphate content in groundwater exceeds 3000mg/l SO_4 the magnesium sulphate content of the samples is required to be determined (BRE Special Digest 1:2005).

Swanborough Farm Swanborough Lewes, East Sussex BN73PF	**ASHDOWN SITE INVESTIGATION LTD** **Geotechnical and Geoenvironmental Engineers**	ASHDOWN SITE INVESTIGATION L·I·M·I·T·E·D

Site:	Leisure Centre, Kingsfield, Northcroft, Henfield, West Sussex.	Job No: Sheet No:	R16-11710 1

SOIL CLASSIFICATION SUMMARY

BH/TP No.	Depth (m)	Nat. Moist. Cont. (w %)	Equiv. Moist. Cont. (w_a %)	Atterberg Limits			Class'n	Cons. Index (I_c)	% passing 425 µm sieve	Visual Description of Sample
				W_l %	W_p %	I_p %				
BH1	0.90	31		87	27	60	CV	0.93*	100	Stiff grey mottled orange brown silty CLAY.
BH1	2.30	31		75	25	50	CV	0.88*	100	Stiff grey mottled orange CLAY.
BH2	0.20	13		35	19	16	Cl/CL	1.38*	75	Very stiff brown slightly gravelly sandy CLAY with few fine roots. Gravel is fine to medium lignite sandstone and flint.
BH2	1.40	24		65	23	42	CH	0.98*	100	Stiff grey mottled brown CLAY.

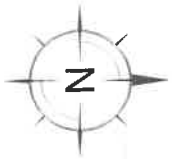
Test Method: Classification Tests BS1377: Part 2: 1990: Method 4.4, 5.3 and 5.4

* Consistency index based on natural moisture content and not the equivalent moisture content.

Appendix 3

Proposed Site Catchment Area Plan

the civil engineering practice



Existing Leisure Centre
Car Parking Area Approximately: 2,000m²

Proposed Access Road and Car Parking Area
Approximately: 1,000m²

-10m 0 10m 20m 30m 40m

Scale 1:1000

TITLE: Proposed Site Catchment Area Plan

SCALE: 1:1000

DRG No. 4

Appendix 4

Surface Water Drainage Calculations

Permeable Block Paving Access Road and Car Parking Area

the civil engineering practice

Project Name:	**Access Kings Leisure Centre, Henfield**
Project Number:	**22631**

Impermeable Area

Impermeable Area	1,000	m^2
Infiltration Rate	10	$x10^{-6}$ m/s
Base Area	1,000	m^2
Available Base Area	500	m^2
(Assuming base is	50%	silted)
Outflow	5.000	l/s

Return Storm Period Assessments available are: 1, 2, 5, 10, 20, 25, 50, 100 years.
Ratio r1 in the range 0.12, 0.15, 0.18, 0.21, 0.24, 0.27, 0.30-0.45
40% Additional Rainfall to account for Climate Change (Where Appropriate)

Storm Profiles

Return Period	100	years
M5-60	20	mm
Ratio r1	0.35	

Consider Storms Beyond 6 hour duration? Yes

Storm Duration (mins)	Z1	R M5-D (mm)	Z2	R M(x)-D (mm)	I (cu.m)	Outflow (cu.m)	Storage Required
5	0.36	7.20	1.84	18.55	18.55	1.50	17.05 m^3
10	0.51	10.20	1.91	27.27	27.27	3.00	24.27 m^3
15	0.62	12.40	1.95	33.85	33.85	4.50	29.35 m^3
30	0.79	15.80	1.99	44.02	44.02	9.00	35.02 m^3
60	1.00	20.00	2.03	56.84	56.84	18.00	38.84 m^3
120	1.23	24.60	2.01	69.22	69.22	36.00	33.22 m^3
180	1.37	27.40	1.99	76.34	76.34	54.00	22.34 m^3
240	1.51	30.20	1.97	83.29	83.29	72.00	11.29 m^3
300	1.60	32.00	1.96	87.58	87.58	90.00	0.00 m^3
360	1.69	33.80	1.94	91.80	91.80	108.00	0.00 m^3
480	1.82	36.30	1.93	97.83	97.83	144.00	0.00 m^3
600	1.94	38.80	1.91	103.75	103.75	180.00	0.00 m^3
840	2.09	41.89	1.88	110.49	110.49	252.00	0.00 m^3
1140	2.29	45.74	1.85	118.61	118.61	342.00	0.00 m^3
1440	2.48	49.60	1.82	126.38	126.38	432.00	0.00 m^3

Peak Storage

38.8 m^3

30% voided sub base
259 mm deep

Time to Half Empty = 1.1 hours

Summary of Results for 30 year Return Period

Half Drain Time : 364 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	24.463	0.963	1.2	27.4	O K
30 min Summer	24.533	1.033	1.3	35.9	Flood Risk
60 min Summer	24.592	1.092	1.5	44.3	Flood Risk
120 min Summer	24.638	1.138	1.6	51.5	Flood Risk
180 min Summer	24.655	1.155	1.6	54.4	Flood Risk
240 min Summer	24.661	1.161	1.6	55.5	Flood Risk
360 min Summer	24.666	1.166	1.6	56.2	Flood Risk
480 min Summer	24.666	1.166	1.6	56.3	Flood Risk
600 min Summer	24.664	1.164	1.6	55.9	Flood Risk
720 min Summer	24.661	1.161	1.6	55.3	Flood Risk
960 min Summer	24.651	1.151	1.6	53.6	Flood Risk
1440 min Summer	24.627	1.127	1.5	49.7	Flood Risk
2160 min Summer	24.591	1.091	1.5	44.1	Flood Risk
2880 min Summer	24.557	1.057	1.4	39.2	Flood Risk
4320 min Summer	24.497	0.997	1.3	31.4	O K
5760 min Summer	24.446	0.946	1.2	25.6	O K
7200 min Summer	24.401	0.901	1.1	21.2	O K
8640 min Summer	24.359	0.859	1.0	17.7	O K
10080 min Summer	24.322	0.822	0.9	15.1	O K
15 min Winter	24.492	0.992	1.3	30.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	75.764	0.0	22
30 min Summer	50.388	0.0	36
60 min Summer	32.061	0.0	66
120 min Summer	19.762	0.0	124
180 min Summer	14.702	0.0	182
240 min Summer	11.887	0.0	240
360 min Summer	8.801	0.0	296
480 min Summer	7.101	0.0	358
600 min Summer	6.008	0.0	426
720 min Summer	5.239	0.0	494
960 min Summer	4.218	0.0	632
1440 min Summer	3.103	0.0	910
2160 min Summer	2.279	0.0	1304
2880 min Summer	1.830	0.0	1700
4320 min Summer	1.341	0.0	2460
5760 min Summer	1.075	0.0	3176
7200 min Summer	0.906	0.0	3896
8640 min Summer	0.788	0.0	4592
10080 min Summer	0.701	0.0	5344
15 min Winter	75.764	0.0	22

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	24.565	1.065	1.4	40.4	Flood Risk
60 min Winter	24.628	1.128	1.6	50.0	Flood Risk
120 min Winter	24.679	1.179	1.7	58.4	Flood Risk
180 min Winter	24.698	1.198	1.7	62.0	Flood Risk
240 min Winter	24.707	1.207	1.7	63.6	Flood Risk
360 min Winter	24.711	1.211	1.7	64.3	Flood Risk
480 min Winter	24.711	1.211	1.7	64.2	Flood Risk
600 min Winter	24.707	1.207	1.7	63.6	Flood Risk
720 min Winter	24.701	1.201	1.7	62.5	Flood Risk
960 min Winter	24.687	1.187	1.7	59.9	Flood Risk
1440 min Winter	24.652	1.152	1.6	53.9	Flood Risk
2160 min Winter	24.600	1.100	1.5	45.5	Flood Risk
2880 min Winter	24.552	1.052	1.4	38.5	Flood Risk
4320 min Winter	24.469	0.969	1.2	28.1	O K
5760 min Winter	24.398	0.898	1.1	20.9	O K
7200 min Winter	24.335	0.835	0.9	15.9	O K
8640 min Winter	24.279	0.779	0.9	12.4	O K
10080 min Winter	24.229	0.729	0.8	9.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	50.388	0.0	36
60 min Winter	32.061	0.0	64
120 min Winter	19.762	0.0	122
180 min Winter	14.702	0.0	178
240 min Winter	11.887	0.0	234
360 min Winter	8.801	0.0	334
480 min Winter	7.101	0.0	378
600 min Winter	6.008	0.0	456
720 min Winter	5.239	0.0	532
960 min Winter	4.218	0.0	684
1440 min Winter	3.103	0.0	980
2160 min Winter	2.279	0.0	1392
2880 min Winter	1.830	0.0	1792
4320 min Winter	1.341	0.0	2552
5760 min Winter	1.075	0.0	3288
7200 min Winter	0.906	0.0	4032
8640 min Winter	0.788	0.0	4672
10080 min Winter	0.701	0.0	5440

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Model Details

Storage is Online Cover Level (m) 24.800

Dry Swale Structure

Infiltration Coefficient Base (m/hr)	0.03600	Trench Length (m)	60.0
Infiltration Coefficient Side (m/hr)	0.03600	Trench Infiltration Side (m/hr)	0.03600
Safety Factor	1.5	Trench Porosity	0.30
Porosity	1.00	Side Slope (1:X)	2.5
Invert Level (m)	23.500	Slope (1:X)	120.0
Trench Height (m)	0.500	Cap Volume Depth (m)	1.200
Trench Width (m)	0.8	Cap Infiltration Depth (m)	1.200

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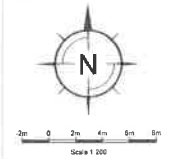
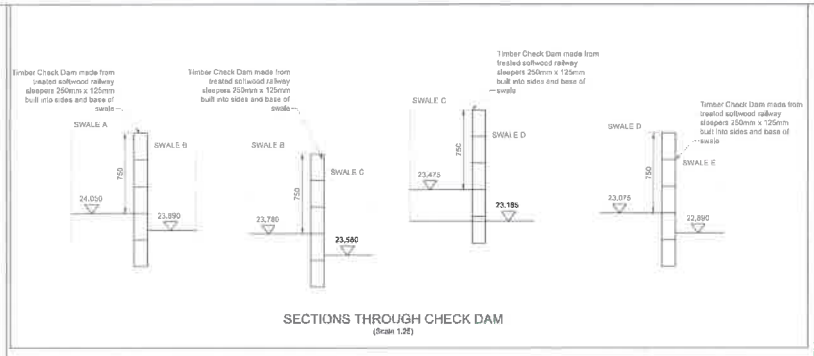
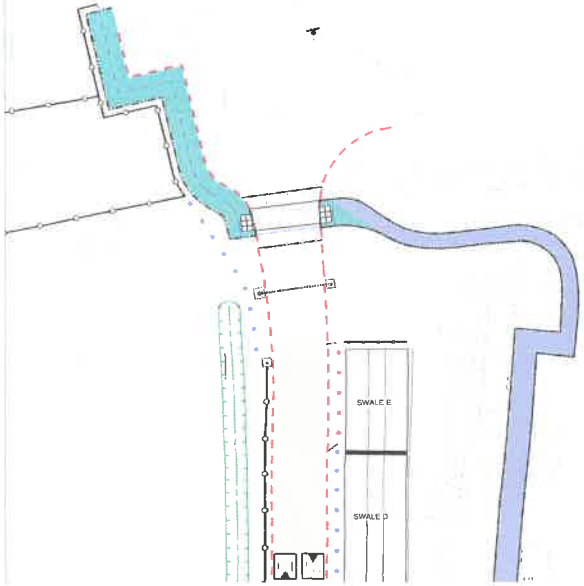
Appendix 5

Proposed Surface Water Drainage Layout and Construction Details





SECTIONS THROUGH CHECK DAM
(Scale 1:25)



KEY:
- Inspection Chambers
- CP Proposed Catchpits
- Proposed Perforated Pipe

STORM WATER MANHOLE SCHEDULE

MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH TO INVERT	DIAMETER / SIZE	COVER TYPE	MANHOLE TYPE
HB	25.300	24.300	1.000	1200mmØ	B125	TYPE 3
SW1 (*	25.250	23.965	1.285	450mmØ	A15	TYPE 4
SW2 CP	25.000	23.790	1.210	600mmØ	A15	TYPE 4

(* - for deep inspection chambers access to be restricted to max. 350mm

SWALE SCHEDULE SCHEDULE

SWALE REFERENCE	BASE WIDTH	DEPTH OF SWALE (min)	SIDE SLOPE	DEPTH OF TRENCH BELOW SWALE	LENGTH OF SWALE
SWALE A	0.8m	750mm	1:2.5	0.5m	13
SWALE B	0.8m	750mm	1:2.5	0.5m	13
SWALE C	0.8m	750mm	1:2.5	0.5m	13
SWALE D	0.8m	750mm	1:2.5	0.5m	13
SWALE E	0.8m	750mm	1:2.5	0.5m	8

NOTES:

1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.

2. This drawing is to be read in conjunction with all relevant Architects and Engineer's drawings and specification.

3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.

4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

5. All pipes, bends and junctions shall be clarified clay to BS EN 295-1, with flexible joints and internals certified. Alternatively all pipes and fittings can be UPVC conforming to BS EN 1401-1 and shall be laid in accordance with the manufacturers specification. If UPVC pipes are to be used then the manufacturer shall be approved by the Engineer prior to construction.

6. All Adoptable sewers shall be in strict accordance with the current edition of Sewers For Adoption. Unless otherwise stated adoptable sewers shall be 150mm diameter and shall be laid in a class B bedding. Where the depth to soffit is less than 1.2m under a public highway or 0.9m elsewhere the pipe shall be laid with a class Z bedding.

7. All private building drainage shall be constructed in strict accordance with BS EN 752:2008. Unless otherwise specified building drainage shall be 100mm diameter and shall be laid at a minimum gradient of 1 in 40 for foul drains and 1 in 80 for surface water drains. All building drains shall be laid in class B bedding unless otherwise specified.

8. Where a pipe is within 1m of a foundation the trench shall be filled with class GEN 3 concrete up to the lowest level of the foundation. Where the trench is further than 1m from the foundation, the trench shall be filled with class GEN 3 concrete to a level below the lowest level for the foundation equal to the distance from the foundation less 150mm. In both cases the pipe shall be bedded and surrounded in 150mm thick class GEN 3 concrete.

9. Where pipes, external to the structures, have a depth to soffit from ground level of less than 450mm they shall have a class GEN 3 concrete encasement (150mm thick). In all other cases the pipes shall be bedded and surrounded with 100mm thick granular material.

10. In any circumstances where pipes are bedded and surrounded in concrete flexible joints should be provided. Compressible boards (fibreboard or polystyrene) shall be provided at a maximum of 6m centres (coinciding with pipe joints). The boards shall be pre-cut to pipe diameter and to a height and width equal to the concrete cross section. A board thickness of 18mm for pipes up to 450mm nominal diameter and 38mm for pipes over 450mm nominal diameter.

11. All sumps shall have rodding access plates fitted at their bases (ground floor level).

12. Where existing pipes are to be abandoned they shall be dug out together with any abandoned manholes.

13. Any discrepancy between the drawing and site should be reported immediately to the Engineer.

14. This drawing should be read in conjunction with Sewers for Adoption 7th Edition.

	DATE	INT	DESCRIPTION	CHK
A	19.12.17	MG	Drainage Revised	

Issue Status: FOR APPROVAL

11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA
Tel: 01273 424424
Fax:01273 424425
email: design@civil.co.uk

the civil engineering practice

CLIENT: Henfield Parish Council
PROJECT: Access Kings Leisure Centre
Henfield
TITLE: Proposed Drainage
Dry Swale
Option 2 - Permeable Car Park Construction

DRAWN	DATE	PROJECT NO
M Glasgow	Dec 18	22631
ENGINEER	CHECKED	DRG NO. / REV
T Zajac	RS	202 A

SCALE: 1:200 @ A1

* Grading of Sub-base and Capping stone

SIEVE SIZE	% PASSING
100mm	100
63mm	90-100
37.5mm	60-80
20mm	15-30
10mm	0-5

CBR of sub grade %	<=2	2-3	3-5	5-7	7-20
Capping layer without Geotextile	N/A	325	250	150	100
Capping layer with Geotextile	300	225	150	N/A	N/A

Capping layer subject to CBR test results if required

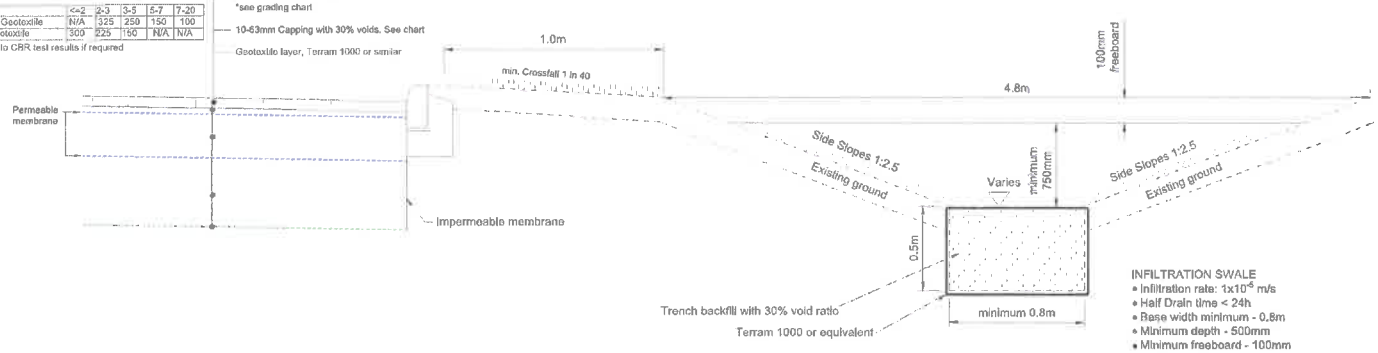
80mm Marshall's Priora blocks or similar laid in herringbone pattern and 1 no stretcher course at edges and around ironwork. Colour - Natural

30 - 50mm 5mm gnitstone

280mm voided subbase *see grading chart

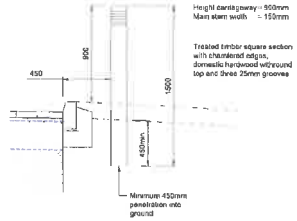
10-63mm Capping with 30% voids. See chart

Geotextile layer, Terram 1000 or similar

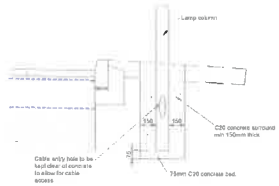


TYPICAL SECTION THROUGH SWALE
(NTS)

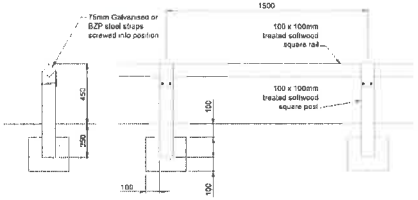
INFILTRATION SWALE
- Infiltration rate: $1x10^{-5}$ m/s
- Half Drain time < 24h
- Base width minimum - 0.8m
- Minimum depth - 500mm
- Minimum freeboard - 100mm
- Longitudinal grade - 1:120
- Gravel filled trench beneath swale depth - 0.5m



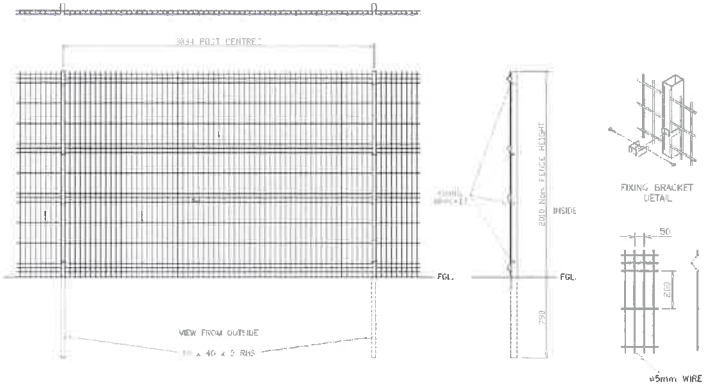
TIMBER BOLLARD DETAIL
(Scale 1:25)



CONCRETE FOUNDATION TO LAMP COLUMN
(Scale 1:25)



TYPICAL DETAIL OF TIMBER KNEE RAIL
(Scale 1:20)



PROPOSED 2.0mH EUROGUARD FENCE BY JACKSONS
(Not To Scale)

NOTES:

1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.

2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.

3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.

4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

5. All pipes, bends and junctions shall be vitrified clay to BS EN 295-1, with flexible joints and kitemark certified. Alternatively all pipes and fittings can be UPVC conforming to BS EN 1401-1 and shall be laid in accordance with the manufacturers specification. If UPVC pipes are to be used then the manufacturer shall be approved by the Engineer prior to construction.

6. All Acceptable sewers shall be in strict accordance with the current edition of Sewers For Adoption. Unless otherwise stated acceptable sewers shall be 150mm diameter and shall be laid in a class S bedding. Where the depth to soffit is less than 1.2m under a public highway or 0.9m elsewhere the pipe shall be laid with a class Z bedding.

7. All private building drainage shall be constructed in strict accordance with BS EN 752:2008. Unless otherwise specified building drainage shall be 100mm diameter and shall be laid at a minimum gradient of 1 in 40 for foul drains and 1 in 80 for surface water drains. All building drains shall be laid in class B bedding unless otherwise specified.

8. Where a pipe is within 1m of a foundation the trench shall be filled with class GEN 3 concrete up to the lowest level of the foundation. Where the trench is further than 1m from the foundation, the trench shall be filled with class GEN 3 concrete to a level below the lowest level for the foundation equal to the distance from the foundation less 150mm. In both cases the pipe shall be bedded and surrounded in 150mm thick class GEN 3 concrete.

9. Where pipes, external to the structures, have a depth to soffit from ground level of less than 450mm they shall have a class GEN 3 concrete encasement (150mm thick), in all other cases the pipes shall be bedded and surrounded with 100mm thick granular material.

10. In any circumstances where pipes are bedded and surrounded in concrete flexible joints should be provided. Compressible boards (fibreboard or polystyrene) shall be provided at a maximum of 6m centres (coinciding with pipe joints). The boards shall be pre-cut to pipe diameter and to a height and width equal to the concrete cross section. A board thickness of 18mm for pipes up to 450mm nominal diameter and 36mm for pipes over 450mm nominal diameter.

11. All pipe shall have rodding access plates fitted at their bases (ground floor level).

12. Where existing pipes are to be abandoned they shall be dug out together with any abandoned manholes.

13. Location of existing connection to both surface and foul public sewers to be confirmed on site and levels checked

14. Any discrepancy between the drawing and site should be reported immediately to the Engineer.

	DATE	INIT	DESCRIPTION	CHK
A	19.12.17	MG	Permeable block paving details added	SRW

Issue Status: FOR APPROVAL

11 Tungsten Building
George Street
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Tel: 01273 424424
Fax:01273 424425
email: design@civil.co.uk

the Civil Engineering Practice

CLIENT: Henfield Parish Council

PROJECT: Access Kings Leisure Centre Henfield

TITLE: Construction Details

DRAWN	DATE	PROJECT NO
S Burgess	Oct 2016	22631
ENGINEER	CHECKED	DWG NO / REV
T Zajac	B sathan	504 A
SCALE: As Shown @ A1		

MEC
Consulting Group

APPENDICES



APPENDIX G

Quotation for the supply of Rainwater Harvesting Equipment

Client :

Andy Boxall
Boxall Ward Limited

Site Reference :

Leisure Centre - Sussex

Prepared by:

Ian Woodcock

ianw@rainwaterharvesting.co.uk

01733 405104 / 07736 45 46 45

Our reference : IMW222907

Date of proposal : 30/07/2024

Your Proposal

Thank you for your time on the telephone earlier and as requested please find the following information regarding our proposed system.

SHALLOW DIG F-LINE TANK	7500	7500
Weight Kg	310	310
Length	3340	3340
Width	2310	2310
Overall Height	1415 - 1815	1415 - 1815
Ground to Invert VS60 (Pedestrian 635mm Shaft)	310 - 710	310 - 710
Invert to Outlet	162	162
EXCAVATION		**15000 (2 x 7500 side by side)**
Length	3740	3740
Width	2710	5520
Overall height VS60	1515 - 1915	1515 - 1915

Overall height allows for 100mm compacted aggregate

The overall height difference above is because up to 400 mm can be cut off of the 635 mm shaft on site so as to achieve your exact invert level.

The systems below have been upgraded with the higher duty 4.5 Bar Divertron pump and a Maxi Plus filter, this is good for roof areas up to 500 sqm, any more and the filter could get overwhelmed, if you are collecting off of a greater size roof you will need to add a 2nd filter at the cost of £450.00 ex vat.

400 sqm of collectable roof area will generate in excess of 200,000 litres per annum

Rainwater Harvesting Limited is a private family owned company, our strong service ethos has been built on many years of experience and this is reflected in our ability to offer both simple to install rainwater harvesting systems and mix and match components to provide bespoke solutions reflecting clients needs. At our 100,000sq ft warehouse in Peterborough we hold over 3000 stock items, we are the largest stockholder of the Shallow Dig Rewatec tanks in the UK and we regularly despatch to site complete rainwater harvesting systems within 5-7 days of order, we also provide full technical support on all our products.

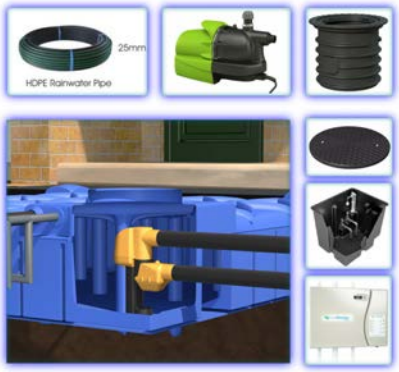
We would welcome the opportunity of supplying your rainwater harvesting system and I can easily be contacted either by phone or email as shown on the previous page

Components and Prices – Supply Only

Option 1

Product Code **: RWH-7599FL-DUK4.**

7500 Litre Shallow Dig Gravity Feed System



Components

Product Code	Description	Qty
RWFT7500	F-LINE 7500L TANK	1
RWDS0062	F-LINE TANK 635mm EXTENSION SHAFT - VS60	1
RWDS0066	F-LINE TANK WALK ON LID	1
RWH-RV01	RAINVANTAGE FILTER KIT INC SIPHON & OVERFLOW	1
DAB60209373	DIVERTRON 900 SSUBMERSIBLE PUMP	1
RWH-RD01	RAIN DIRECTOR CONTROL UNIT	1
RWH-HDPE25/50	25mm HDPE RAINWATER PIPE - 50m ROLL	1
RWH-PKFLINE-PRO	FLINE INSTALLATION PACK PRO / INC LABELS & 90° ELBOW	1
3P-4000600	FLOATING PUMP INTAKE	1
RWH-RDT-2OO	DOUBLE CAPACITY RAIN DIRECTOR HEADER TANK 200 LITRES (2 x 100 LITRE)	1
RWZT2152	FILTER MAXI PLUS	1

Price : £4,365.00 (£5,238.00 Inc. VAT)

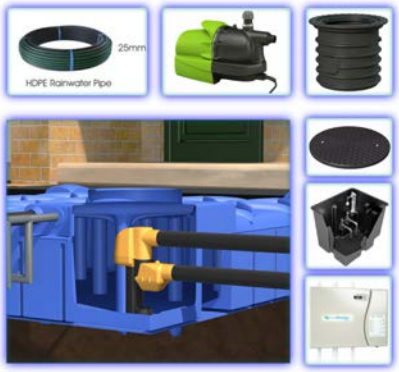
UK delivery is included in the price (Highlands and islands extra)

Components and Prices – Supply Only

Option 2

Product Code **: RWH-15599FL-DUK4.**

15000 Litre Shallow Dig Gravity Feed System



Components

Product Code	Description	Qty
RWFT7500	F-LINE 7500L TANK	2
RWDS0062	F-LINE TANK 635mm EXTENSION SHAFT - VS60	2
RWDS0066	F-LINE TANK WALK ON LID	2
RWH-RV01	RAINVANTAGE FILTER KIT INC SIPHON & OVERFLOW	1
DAB60209373	DIVERTRON 900 SSUBMERSIBLE PUMP	1
RWH-RD01	RAIN DIRECTOR CONTROL UNIT	1
RWH-HDPE25/50	25mm HDPE RAINWATER PIPE - 50m ROLL	1
RWH-PKFLINE-PRO	FLINE INSTALLATION PACK PRO / INC LABELS & 90° ELBOW	1
3P-4000600	FLOATING PUMP INTAKE	1
RWH-RDT-200	DOUBLE CAPACITY RAIN DIRECTOR HEADER TANK 200 LITRES (2 x 100 LITRE)	1
RWZT2152	FILTER MAXI PLUS	1
GF-332033	DN100 SEALS FOR TANK CONNECTION	2

Price : £6,565.00 (£7,878.00 Inc. VAT)

UK delivery is included in the price (Highlands and islands extra)

Mains backup and rainwater management

Rain Director mains backup and computer-controlled rainwater management system with smart header-tank

The Rain Director® ensures a constant head of clear rainwater under gravity for washing machines, toilets, the garden and other uses. A header tank in the home is controlled by electronic level sensors, valves and a control panel (fitted on a wall on the ground floor). The advantages over rainwater pumping systems like the Rain Manager are:



a) The header tank only refills once it's completely empty so wear on the pump and electricity usage are both reduced (by a factor of 8).

b) Provides a constant flow of rainwater under gravity at any time, including during power cuts.

c) Mains water backup is automated by 12v electric level sensors.



d) Rain Director®'s dashboard indicates present mode and allows special modes to be selected.

e) Rain Director®'s auto-flush function detects when the occupant is away from home (for example, for holidays) and puts mains into the header instead of rainwater: no stained toilet bowls.

f) Rain Director®'s set-up mode lets the control unit memorise the header tank size and flow rate of the mains and rain water inflow. This enables the time-out periods and operating water levels to be set.

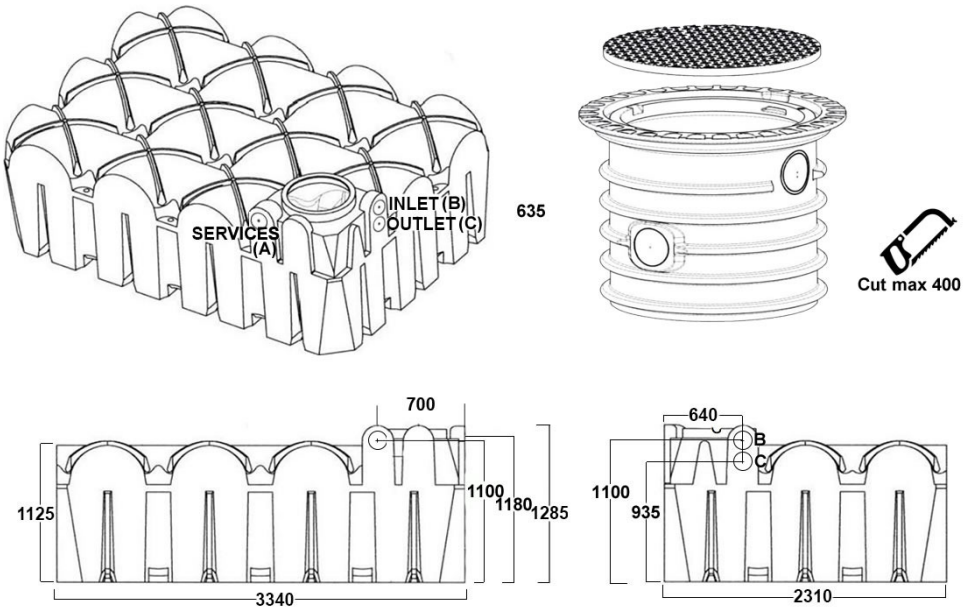
g) Rain Director® header tank has a built-in air gap as required by UK building regs.

h) Price is similar to, or lower than, that of rain managers and other mini header-tank systems.

i) Pump remains in the underground rain water tank so, there is no pump noise in the house.

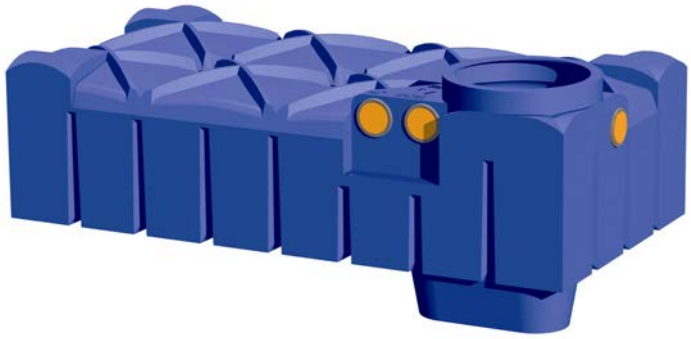
All components have been designed to comply with WRAS (Water Regulations Advisory Scheme) and UK Building Regulations.

7500L F-Line



15,000 is achieved by linking 2 x 7500L tanks together at low level using the DN100 seals supplied

F-Line Flat Tank shallow dig underground tank



Why buy this tank?

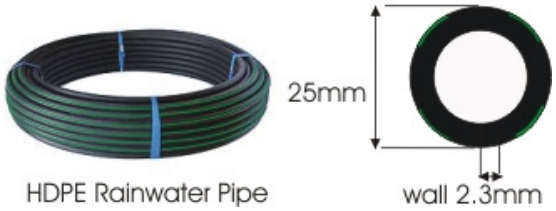
- The F-Line is a high quality, rotationally moulded, one piece rainwater tank that can be installed without the need for concrete, thereby minimising installation costs and supported by our long term 25 year tank guarantee.
- Minimal installation depth
- Easy and quick to install
- Small excavation pit and little earth excavation preserves your garden
- Ideal for installation in new or existing properties
- Can be installed in ground water up to tank shoulder
- Easy to install

The F-line flat tank can be installed into much higher water tables than a standard round tank. If you don't know what your water table will be like in the winter, you're safer to install a flat tank. The F-Line tanks are flat and the installation depth is up to 60% less than other rainwater tanks. The excavation can be up to 70% less, meaning little earth excavation, easy handling and less cost for you! The small excavation pit is easily filled in and your garden will look just like it did before.

Recommended Rainwater Pipe

Rainwater Pipe in HDPE (High Density Polyethylene) for rainwater use as recommended by Water Authorities is available as an option for all tanks and systems. Black with 4 green stripes and available in both 25mm and 32mm diameter. High quality HDPE.

RainWater Harvesting Limited has worked with the UK Rainwater Harvesting Association and listened to WRAS and several of the water companies, to bring to the market the pipe marked with four green stripes. The identification helps maintenance staff and the end user, after installation, to know which pipes on site carry rainwater (which is non-potable in the UK Building Regs). We stock the following two sizes preferred by contractors fitting rainwater systems.



25mm diameter,
flexible, in 25 or 50m coils
Product ID: RWH-HDPE25/25

Ship weight of one 25m coil: 4.3 kg



32mm diameter,
flexible, in 25 or 50m coils
Product ID: RWH-HDPE32/25

Ship weight of one 25m coil: 5.5 kg

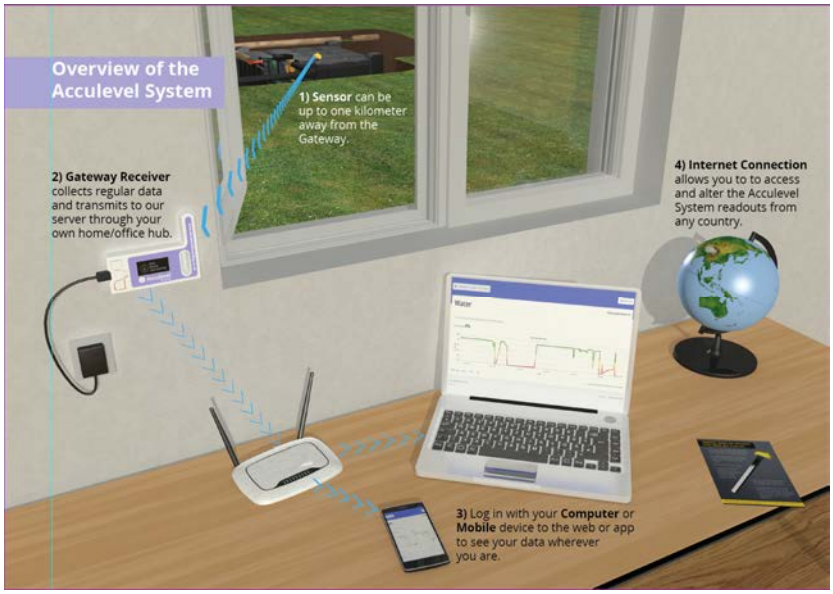
Other sizes available upon request

Rainwater Harvesting Limited, Unit A Harrier Park, Southgate way, Orton Southgate, Peterborough, PE2 6YQ
Tel : 01733 405111 Fax : 01733 230996 Email : info@rainwaterharvesting.co.uk
www.rainwaterharvesting.co.uk

Rain Acculevel
Rainwater Level Sensor

Add to your system for
£179.00 ex VAT

Wireless Tank Level Sensor for the F-Line Tank



The Rain Acculevel will accurately measure the water level in your rainwater tank giving readings that you can view on a PC or smart device. Using the latest wireless technology it works on tanks below or above ground and over long distances.
The level is measured every 15 minutes enabling you to build up a history of your water use.

Once placed in your water tank the Rain Acculevel sends signals to a small receiver called a Gateway. The gateway sends the data via your home hub to your own on-line account at tanklevels.co.uk
The Acculevel is powered by a long life battery (up to five years) and the Gateway via USB port or plug.
The Acculevel will work anywhere as long as the Gateway is within signal distance of your a home hub (or router).



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APPENDICES



APPENDIX H

Rainwater Harvest Tank Calculations

Tank Capacity	15000	
Roof Size (W x L)	10	40
Roof area (m2)	400	
Average Visitors/Day	585	

Curret

Average toilet flush (Lt)	11	From Survey and Water Bills Flush and Includes hand wash
Av. Consumption/day (Lt)	2226	Before Change to Flush Volume, From MOTION report and Water Bills
Yearly (m2)	812.49	

Post Toilet Update Est.

Average toilet flush (Lt)	5	After cystern change for water neutrality Full flush and Includes hand wash
Av. Consumption/day (Lt)	1012	
Toilet Utilisation %	20%	
Number of flushes per day	117	

Collection

Average Rainfall mm	80.45	56.7	45.66	45.13	45.93	46.68	54.18	58.73	59.13	82.2	90.37	87.45
Rainfall (M)	0.08045	0.0567	0.04566	0.04513	0.04593	0.0467	0.0542	0.0587	0.0591	0.0822	0.0904	0.0875
Roof Run Off (m3)	32	23	18	18	18	19	22	23	24	33	36	35
Water Collected (Lt)	32180	22680	18264	18052	18372	18672	21672	23492	23652	32880	36148	34980
Tank Fill Av %/Day	7%	5%	4%	4%	4%	4%	5%	5%	5%	7%	8%	8%
Tank Fill %/Mth	215%	151%	122%	120%	122%	124%	144%	157%	158%	219%	241%	233%

Taken from Max Met Office Data

Total Water Collection (m3)

301.04

Current Usage Toilets

Days/Month	31	29	31	30	31	30	31	31	30	31	30	31
Foot Fall Trend/day	730	720	680	620	500	425	320	525	580	680	750	650
Foot Fall Trend	22630	20880	21080	18600	15500	12750	9920	16275	17400	21080	22500	20150
Total Flushes	4526	4176	4216	3720	3100	2550	1984	3255	3480	4216	4500	4030
Trend Av. Consumption	49786	45936	46376	40920	34100	28050	21824	35805	38280	46376	49500	44330
Water Usage (m3)	49.79	45.94	46.38	40.92	34.10	28.05	21.82	35.81	38.28	46.38	49.50	44.33

Total Vistors/Yr

218765

Total water Use

481.28

Check Value with Bills

22%

Padel Impact

Max Padel Users	48	6 hour bookings a day x 2 courts = 12 hours x 4 players = 48 people a day
Spectators	24	Assume 2 cars with two drivers or passengers with each team
Toilet Utilisation %	25%	25% utilisation as games are 2hr long
Additional flushes/day	18	

Additonal Consumption	6138.0	5742.0	6138.0	5940.0	6138.0	5940.0	6138.0	6138.0	5940.0	6138.0	5940.0	6138.0
Additonal Consumption	6.1	5.7	6.1	5.9	6.1	5.9	6.1	6.1	5.9	6.1	5.9	6.1
Total with Padel (m3)	55.9	51.7	52.5	46.9	40.2	34.0	28.0	41.9	44.2	52.5	55.4	50.5
Tank Utilisation %	58%	44%	35%	39%	46%	55%	78%	56%	53%	63%	65%	69%

Less than 100% Means zero Runoff to drains

- CIVIL ENGINEERING
- TRANSPORT
- FLOOD RISK & DRAINAGE
- STRUCTURES
- GEO-ENVIRONMENTAL
- ACOUSTIC AIR
- UTILITIES
- GEOMATICS
- LIGHTING
- EXPERT WITNESS

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