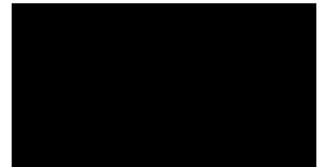




The Civil Engineering Practice
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Flood Risk Assessment

Proposed Residential Development on

Land at Stakers Farm, Yapton, West Sussex

On behalf of

Granite Gate Ltd

June 2017

Document History and Status

Project Reference: 22814

Date	Version	Prepared By	Reviewed By	Approved By
26/05/17	1.0	Bava Sathan CEng MICE FIHE	Stuart Magowan IEng MICE	Bava Sathan CEng MICE FIHE
02/06/17	1.1	Bava Sathan CEng MICE FIHE	Stuart Magowan IEng MICE	Bava Sathan CEng MICE FIHE

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1 Non Technical Summary

- 1.1 This Flood Risk Assessment has been undertaken in accordance with the National Planning Policy Framework on behalf of Granite Gate Ltd in support of an Outline Planning Application for the construction of 70 dwellings with associated access roads, car parking and landscaping areas on land at Stakers Farm, North End Road, Yapton, West Sussex.
- 1.2 This Assessment is to be read in conjunction with all planning, architectural and other reports that accompany the Outline Planning Application for the proposed development.
- 1.3 The site is shown on the Environment Agency flood modelling data to be within Flood Zone 1. This Assessment confirms that the site is not at risk of flooding from tidal or fluvial sources, overland flows or from groundwater flooding.
- 1.4 The surface water drainage system will be designed in accordance with the Non Statutory Technical Guidance for SuDS and sufficient to accommodate pluvial events up to the 1 in 100 year storm return period including an additional 40% increase in rainfall intensity to account for Climate Change.
- 1.5 Surface water from the new development will be attenuated onsite using a combination of filter drains and individual soakaways discharging to ground and mimicking the existing drainage.
- 1.6 Foul drainage will be discharged through the adjoining site benefiting from extant Planning Permission Y/93/14/OUT and into the existing public sewer in North End Road.
- 1.7 The site is within the Lidsey Foul Water Treatment Catchment Area but with proposed foul discharge into the public sewers. There is no requirement for an Environmental Assessment to justify the proposed foul discharge into the public sewer network.
- 1.8 This report concludes that the proposed development is suitable at this location and there are no significant flooding or drainage risks.

2 Planning Policy Context

2.1 National Planning Policy Framework

2.1.1 National Planning Policy Framework aims to reduce flood risk through development opportunities. The policy framework aims to ensure flood risks and the predicted effects of climate change have been taken into account and appropriate measures put in place to ensure that:

- The development is safe
- Where possible the flood risk overall is reduced
- Increased flood risk does not occur elsewhere
- Appropriate mitigation measures are employed to deal with these effects and risks.

2.1.2 The National Planning Policy Framework requires Planning Authorities to apply a sequential approach to planning and flood risk by placing development in areas of low flood risk before allocating sites in areas of higher risk sequentially and by exception following the processes of the Sequential and Exception Tests.

2.2 Arun District Council Emerging Local Plan 2011 – 2031

2.2.1 The Arun Local Plan 2011 – 2031 (Publication Version) is the most recent version of the emerging Local Plan.

2.2.2 The Arun District Local Plan 2011-2031 and supporting documents were submitted on 30 January 2015 for independent examination to the Secretary of State for Communities and Local Government via the Planning Inspectorate.

2.2.3 On 5 March 2015 the Inspector issued preliminary questions which were responded to by Arun District Council on 17 March 2015.

2.2.4 A procedural meeting was held on 16 July 2015 to discuss the implications of the Council's revised position on the 'objectively assessed needs for market and affordable housing'.

2.2.5 On 2nd February 2016 the Inspector provided his conclusions on Objectively Assessed Needs. The Inspector has suspended the Examination until completion of Arun District Council's agreed work plan.

2.2.6 In response to the Planning Inspector's comments Arun District Council have proposed a series of modifications to the Local Plan. The consultation on the proposed main modifications runs from 10 April 2017 to 30 May 2017.

2.2.7 Until the Local Plan is adopted by the District Council the statutory development policies currently consists of:

- The saved policies within the Arun District Local Plan (2003)
- The Arun District Proposals Map
- The saved policies within the West Sussex Minerals Local Plan (2003)

2.3 Arun District Council Local Plan (2003)

2.3.1 The Arun District Council Local Plan 2003 saved policies will remain effective until replaced by the new Arun Local Plan.

2.3.2 The policies of the currently adopted Local Plan which are relevant to this development are as follows:

2.3.2.1 **POLICY GEN9** Foul and Surface Water Drainage states that *'planning permission for development which will materially increase foul and/or surface water discharges will be refused unless the Local Planning Authority is satisfied that either adequate drainage capacity exists or appropriate drainage capacity can be provided as part of the development. Consideration should also be given to the use of Sustainable Urban Drainage Systems (SUDS) as alternatives to conventional drainage where appropriate.'*

2.3.2.2 **POLICY GEN10** Tidal Flooding and Coastal Defence states that *'planning permission will be refused for development which would be at an unacceptable risk of tidal flooding and/or where proposals are detrimental to the integrity of tidal defences or the ability to maintain or improve them.'*

2.3.2.3 It continues *'within the built-up areas, planning permission will only be granted where the local planning authority is satisfied that appropriate flood and coastal defence and mitigation measures have been provided so that the development will not itself be at unacceptable risk and furthermore does not pose an unacceptable risk to existing development in the area.'*

2.3.2.4 **POLICY GEN11** Inland Flooding states that *'permission for development which would be at risk from flooding and/or materially decrease the capacity of a floodplain to store or pass flows of floodwater, will be refused unless the Local Planning Authority is satisfied that compensatory flood storage/waterway areas can be provided as part of the development and the function and effectiveness of existing watercourses, or their replacements, are not adversely affected.'*

2.4 Strategic Flood Risk Assessment

2.4.1 Capita Symonds produced a Strategic Flood Risk Assessment on behalf of Arun District Council in February 2008.

2.4.2 The SFRA has been reviewed and is referenced within this Assessment.

2.5 Lead Local Flood Authority

2.5.1 West Sussex County Council became a Lead Local Flood Authority under the Flood and Water Management Act 2010 and was given a series of new responsibilities to coordinate the management of local flood risk.

2.5.2 As part of their role the County Council have produced a Preliminary Flood Risk Assessment which is referenced within this Assessment.

3 Existing Site

3.1 Site Location

3.1.1 The development site is located on an open field at Stakers Farm, Yapton, West Sussex. The nearest postcode is BN18 0DU, Ordnance Survey reference SU977034.

3.1.2 The site is bounded to the north by the proposed development site under extant Planning Permission Y/93/14/OUT, on its east side by Yapton Church of England School and The Croft residential Units and open fields to its south and west.

3.1.3 A copy of the site location plan is located in Appendix 1 at the rear of this Assessment.

3.2 Site Description

3.2.1 The development site is approximately 3 hectares in area and currently comprises undeveloped agricultural land with some outbuildings.

3.2.2 The levels across the site vary between 7.0m and 5.8m AOD generally sloping towards the northern and western boundary of the site with a high point at the south eastern corner.

3.2.3 A copy of the existing site layout plan is located in Appendix 2 at the rear of this Assessment.

3.3 Geology and Groundwater

3.3.1 Borehole records hosted by the British Geological Survey provide an indication of the geology in the vicinity of the site.

3.3.2 The site is shown to be within an area underlain by Arun Terrace Deposits over Lewes Nodular Chalk.

3.3.3 From the available borehole log information for the area the geology is anticipated to be a mixture of sandy gravel and clay over chalk.

3.3.4 A copy of the borehole records is located in Appendix 3 at the rear of this Assessment.

3.4 Drainage

3.4.1 There is no formal drainage system for the existing site and any runoff from the outbuildings runs to ground and disperses over the fields.

3.4.2 There is no apparent watercourse adjoining the site boundaries.

- 3.4.3 Details from the Environment Agency note a Main River south of the B2233 Main Road and approximately 250m to the south western corner of the site.
- 3.4.4 Details obtained from Southern Water indicate that there are public foul sewers along both Main Road and North End Road.
- 3.4.5 The Greenfield runoff from the site has been determined using the IH124 method with a mean annual runoff (QBar) value of 5.84l/s.
- 3.4.6 A copy of the Greenfield runoff calculation and Southern Water records are located in Appendix 4 at the rear of this Assessment.

4 Flood Zone and Flood History

4.1 Flood Zone

4.1.1 The Environment Agency's online mapping confirms that the site is located in Flood Zone 1 and is not at risk of flooding from rivers or the sea from anything less extreme than a 1 in 1000 year flood event.

4.1.2 The Environment Agency has noted that the site is in close proximity to an area defined as Flood Zone 2 but this does not affect the site.

4.2 Flood History

4.2.1 Environment Agency

4.2.1.1 The Environment Agency has confirmed that they hold no data related to flooding of the site.

4.2.2 West Sussex County Council

4.2.2.1 The Preliminary Flood Risk Assessment prepared by West Sussex County Council in May 2011 does not identify any specific flood incidents at the proposed development site.

4.2.2.2 West Sussex County Council has confirmed that they do not hold any record of flooding for the site.

4.2.3 Arun District Council

4.2.3.1 The Strategic Flood Risk Assessment (SFRA) includes maps of historic flood incidents in the District.

4.2.3.2 The SFRA identifies two small areas affected by surface water flooding in the past along Main Road B2233 and North End Road with neither of those events directly affecting the site.

4.2.4 An extract of the correspondence with the Environment Agency including their Flood Maps and an extract from the Arun District Council SFRA are located in Appendix 5 at the rear of this Assessment.

5 Flooding Potential

5.1 Fluvial Flooding

- 5.1.1 The area of the proposed site is within Flood Zone 1 and is not at risk of flooding from rivers or the sea from anything less extreme than a 1 in 1000 year flood event.

5.2 Groundwater Flooding

- 5.2.1 West Sussex County Council has indicated that the site is within an area at low risk of groundwater flooding.
- 5.2.2 Borehole logs hosted on the British Geological Survey website confirm that groundwater has not been recorded in close proximity to ground level.
- 5.2.3 There is no indication in the Preliminary Flood Risk Assessment or other available flood maps of groundwater flooding affecting the site.

5.3 Surface Water Flooding

- 5.3.1 The Environment Agency have produced an Updated Flood Map for Surface Water which is included in Arun District Council SFRA.
- 5.3.2 The SFRA identifies part of North End Road which is on the eastern side of the site to be affected by surface water flooding for the extreme 1 in 1000 year event. The site is not shown to be affected by any flooding.
- 5.3.3 West Sussex County Council has indicated that the site is at low risk from surface water flooding.
- 5.3.4 An extract from Arun District Council SFRA surface water flood map together with a copy of the correspondence from West Sussex County Council are located in Appendix 6 at the rear of this Assessment.

5.4 Flood Routing

- 5.4.1 As mentioned previously the site slopes towards the north into open fields. From the available soil information and evidence of the Greenfield runoff calculations it is not anticipated that there would be significant runoff from the site.
- 5.4.2 It is anticipated that any water accumulation resulting from severe rainfall events will collect naturally along the far north western part beyond the site boundary as indicated by the surface water flood map.
- 5.4.3 To alleviate this potential issue West Sussex County Council have indicated that there should be no raising of ground levels across the site.

6 Development Proposals

6.1 Description

6.1.1 The development proposals are for the construction of a new residential development comprising up to 70 dwellings with associated access roads, car parking and landscaping areas on land at Stakers Farm, North End Road, Yapton, West Sussex.

6.1.2 A copy of the proposed site layout is located in Appendix 7 at the rear of this Assessment.

6.2 Surface Water Drainage Strategy

6.2.1 Based upon information available from British Geological Survey it is anticipated that discharge of surface water runoff by infiltration will be feasible.

6.2.2 The surface water drainage system will be designed to comply with National Planning Policy Framework and its supporting guidance documents including the Non Statutory Technical Standards for SuDS.

6.2.3 The proposed drainage strategy includes a Climate Change allowance of 40% in accordance with the latest guidance published by the Environment Agency.

6.2.4 In accordance with the guidance document supporting the Non Statutory Technical Standards for SuDS an allowance for Urban Creep of 10% for increase to impermeable area has also been included in the design for the drainage system. This is based on the proposed residential development density of less than 25 dwellings per hectare.

6.2.5 The proposed development will comprise approximately 8,000m² of roof areas, patios and driveways with approximately 3,500m² of access roads.

6.2.6 Based upon a proposed development of 70 residential units the average impermeable area per residential unit is 114m² including the roof, patio and driveway areas. Allowing for Urban Creep the average impermeable area per unit is approximately 125m².

6.2.7 Preliminary calculations have been undertaken based on an assumed infiltration rate of 1.0x10⁻⁵m/s which is a conservative infiltration rate for Chalk. Further site investigations will be undertaken including infiltration testing to BRE Digest 365 requirements to inform the detailed design.

6.2.8 From the preliminary calculations individual cellular crate soakaways 3m x 3m and 3 crates deep will be sufficient for the residential units to drain up to the 1 in 100 year rainfall event including an allowance for climate change and future increase in impermeable area.

6.2.9 Surface water runoff from the access road areas can be accommodated within a trench soakaway 1m wide 2.5m deep beneath the access roads. From the preliminary calculations 375m of trench soakaway will be required to cater for the 1 in 100 year rainfall event including climate change allowance.

6.3 Foul Water

6.3.1 The anticipated peak foul sewer discharge from the proposed development is 3.2 l/s based upon Sewers for Adoption 7th Edition.

6.3.2 Southern Water has undertaken an initial Level 1 Foul Capacity Check and indicated that there was no capacity within their foul sewer network in North End Road. Southern Water have further confirmed that there is available capacity at their sewerage treatment works at Lidsey and that subject to further modelling of their network offsite upgrading or improvement works could be identified to enable discharge from the site through into their network and into the sewerage treatment works at Lidsey.

6.3.3 The site on the northern boundary of the proposed development site benefits from an extant Planning Permission Y/93/14/OUT. It is understood that the proposed drainage scheme for that site was based on network modelling undertaken by Southern Water at the time of the application and which proposed a discharge point into North End Road to service that site with offsite network reinforcement works. Southern Water noted that a section of the existing public foul sewer would require upsizing to provide additional capacity within the network to accommodate discharge from the approved scheme.

6.3.4 From discussions with Southern Water it is understood that a similar approach can be adopted for the proposed new development incorporating the one under extant Planning Permission Y/93/14/OUT.

6.3.5 Southern Water have indicated that a Sewer Requisition under Section 98 of the Water Industry Act 1991 would be required to cover both existing and proposed site for modelling of the network with a view of identifying sections of the network that would need to be upgraded.

6.3.6 Subject to any required upgrading or improvement works to the existing public foul sewer network there is no proposal to discharge foul sewer within the site through bespoke treatment plants. The proposed foul sewer discharge system sits outside the requirements for an Environmental Assessment with regard to foul drainage discharge.

6.3.7 A copy of the Level 1 Capacity Check result is located in Appendix 8 at the rear of this Assessment.

6.3.8 A copy of the supporting calculations, drainage components including typical details together with the proposed drainage layout are located in Appendix 9.

7 Water Quality

7.1.1 The proposed development is for residential use only. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for such type of development is considered low.

7.1.2 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 runoff from residential roofs to be at very low risk potential for pollution. Runoff from individual property driveways, residential car park and associated low traffic roads are considered to be at low risk potential for pollution. The table below summarises the anticipated pollution index from the proposed development.

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential Roofs	Very Low	0.20	0.20	0.05
Individual property driveways, residential car park, low traffic roads	Low	0.50	0.40	0.4
Total:		0.70	0.60	0.45

7.1.3 Tables 26.4 and 26.15 of the SuDS Manual provide details of treatment effectiveness of different drainage components which are summarised below:

SuDS Type	Mitigation Indices		
	Total suspended solids (TSS)	Metals	Hydro-carbons
Permeable paving	0.7	0.6	0.7
Filter Drain	0.4	0.4	0.4
Conventional Gully (Table 26.15)	1.0	1.0	1.0

7.1.4 From the table above individual cellular soakaways over a minimum of 300mm good contamination attenuation potential soil are sufficient to effectively treat roof runoff.

7.1.5 Runoff from the access road can be drained through either a combination of permeable paving and filter drain or through conventional gully and pipe system discharging into filter drains.

7.1.6 Where multiple drainage components are used in series the individual mitigation index of secondary and tertiary components are lowered due to reduced performance associated with primary treatment. A combined use of drainage components for the access roads will exceed the target treatment level required for runoff with low risk of pollution potential thus demonstrating that the surface water drainage system for the site adequately mitigates against the risk of pollution. The table below illustrates the combined impact of using multiple drainage components in series.

SuDS Type	Mitigation Indices		
	Total suspended solids (TSS)	Metals	Hydro-carbons
Permeable paving	0.7	0.6	0.7
Filter Drain	0.4 x 0.5	0.4 x 0.5	0.4 x 0.5
Total Mitigation Indices =	0.9	0.8	0.9

7.1.7 The proposed drainage strategy will incorporate measures exceeding the water quality target requirements and therefore complies with the Water Framework Directives for discharge of runoff into controlled waters.

8 Safe Development

8.1 Safe Access

- 8.1.1 The site and its wider area are in Flood Zone 1 and will remain so into the foreseeable future.

8.2 Risk to Others

- 8.2.1 The proposed surface water drainage system will be designed to current standards incorporating SuDS elements providing treatment, attenuation and storage which will minimise runoff leaving the site during times of heavy rain.
- 8.2.2 Allowance has been made for 40% increase in rainfall intensities which is in accordance with the latest figures published by the Environment Agency and in accordance with the requirements under the National Planning Policy Framework.
- 8.2.3 A further allowance has been made for potential future increase in impermeable areas as a result of property owners extending their properties in future. An allowance of 10% Urban Creep has been made which is in accordance with the guidance document supporting the Non Statutory Technical Standards for SuDS.
- 8.2.4 The proposed drainage system will incorporate treatment prior to final discharge destination thus mitigating the risk of pollution from the site.
- 8.2.5 Foul flows from the residential development will be discharged to the public sewer beneath North End Road subject to approval from Southern Water and details from the Sewer Requisition.
- 8.2.6 The risk of flooding to others due to the development proposals is negligible.

9 Conclusions

- 9.1 The site is located within Flood Zone 1 and is not at risk from any source of flooding.
- 9.2 There are no historic records of flooding affecting the site or its immediate area.
- 9.3 The geology of the area is predominantly Arun Terrace Deposit over Chalk with anticipated good infiltration characteristics.
- 9.4 Surface water runoff generated by the proposed development can be attenuated onsite for all rainfall events up to the 1 in 100 year event including an allowance for climate change and an additional allowance for future increase in impermeable areas.
- 9.5 Preference will be given to the use of different attenuation and infiltration techniques in accordance with National Planning Policy Framework.
- 9.6 The detailed design will be developed with input from landscape and ecology specialists to provide an integrated drainage solution.
- 9.7 Working with Southern Water sections of the local public sewer network that need improvement or upgrading will be identified through an application for Section 98 Sewer Requisition. This will allow foul sewer from the proposed development to be discharged into the existing public sewer beneath North End Road connecting into Lidsey treatment works where there is sufficient capacity to accommodate the development proposal without requiring an Environmental Assessment.
- 9.8 In terms of flood risk planning the proposed development is safe and suitable at this location and is considered appropriate.

10 List of Appendices

Appendix 1	Site Location Plan
Appendix 2	Existing Site Layout
Appendix 3	Extracts from British Geological Survey Data
Appendix 4	Greenfield Runoff Calculation and Southern Water Records
Appendix 5	Environment Agency Flood Maps and Extract from Adur District Council SFRA
Appendix 6	Surface Water Flood Map from Arun District Council and Correspondence from West Sussex County Council
Appendix 7	Proposed Site Layout
Appendix 8	Southern Water Correspondence
Appendix 9	Proposed Impermeable Areas, Preliminary Calculations and Proposed Drainage Strategy

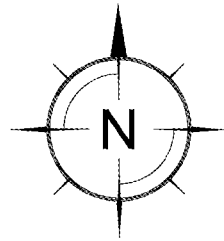
Appendix 1

Site Location Plan



Appendix 2

Existing Site Layout



-10m 0 10m 20m 30m 40m
Scale 1:1000



TITLE		Existing Site Layout	
SCALE	1:1000 @ A3		DRAW. No.
			2

Appendix 3
Extracts from
British Geological Survey Data

Geology of Britain viewer

[More BG S map viewers](#)

 **Surface Geology**

 **3D Models**

 **Borehole Scans**

 **Earthquake Timeline**

Surface Geology

- ☒ Superficial only
- ☐ Bedrock only
- ☐ Bedrock and Superficial

Visible geology:
1:50 000 scale

Geology
Key

[More on digital geology](#)

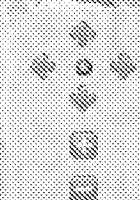
Map Key (close this window to activate map)

1:50 000 scale geology

Superficial deposits

- ☐ ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
- ☐ ARUN TERRACE DEPOSITS, 2 MEMBER - SAND AND GRAVEL
- ☐ ARUN TERRACE DEPOSITS, 4 MEMBER - SAND AND GRAVEL
- ☐ ALLUVIAL FAN DEPOSITS - GRAVEL, SAND, SILT AND CLAY
- ☐ BEACH AND TIDAL FLAT DEPOSITS (UNDIFFERENTIATED) - CLAY, SILT, SAND AND GRAVEL (UNLITHIFIED DEPOSITS)
- ☐ HEAD - CLAY, SILT, SAND AND GRAVEL
- ☐ HEAD - GRAVEL, SAND, SILT AND CLAY
- ☐ RAISED BEACH DEPOSITS, 1 - SAND AND GRAVEL
- ☐ RAISED BEACH DEPOSITS, 2 - SAND AND GRAVEL

BN180DU



Go to Location

Switch Basemap

100% 0%

Geology Transparency

Grid Ref: 485943, 104062

Litlington

Wotton Bassett



British
Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

Geology of Britain viewer



[More BG S map viewers](#)



Surface
Geology

20
Models



Borehole
Scans



Earthquake
Tsunami

Surface Geology

- ☐ Superficial only
- ☒ Bedrock only
- ☐ Bedrock and Superficial

Visible geology:
1:50 000 scale

Geology
Key

[More on digital geology](#)

Map Key (close this window to activate map)

1:50 000 scale geology

Bedrock geology

- ☒ LONDON CLAY FORMATION - CLAY, SILT AND SAND
- ☒ LAMBETH GROUP - CLAY, SILT AND SAND
- ☒ LEWES NODULAR CHALK FORMATION, SEAFORD
- ☐ CHALK FORMATION, NEWHAVEN CHALK FORMATION, CULVER CHALK FORMATION

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Basemap

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Geology Transparency

Grid Ref: 492568, 103627

BN180DU

Yapton

Shippesey

Climping



ARUN DISTRICT COUNCIL Y/44/17/OUT



SI  Earthquake
Timeline

100% 0%
Geology Transparency
Grid Ref: 500452, 103560

Switch
Basemap

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Geology Transparency

Grid Ref. 500452, 103550

EN180HZ

FORD

SUGGEST

by Yaptori

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SUGGESTS

esr



ARUN DISTRICT COUNCIL Y/44/17/OUT

SU 90 SE 29 9738 0335

North-east end of Drove Lane, Yapton

Surface level +6.6 m
Water struck at +1.9 m
October 1981

Block H
Overburden 2.9 m
Mineral 1.0 m
Bedrock 2.3 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.5	0.5
Brickearth	Clay, brown, silty	1.4	1.9
Raised Beach Deposits (younger)	Silt, chalky, with chalk pebbles	1.0	2.9
	'Very clayey' sandy gravel Gravel: coarse with flint dominant, and fine with chalk dominant; some cobbles Sand: fine with some medium and coarse; coarse mostly chalk Fines: silt and clay, chalky	1.0	3.9
Upper Chalk	Chalk, rubbly, soft, silty and sandy to 6.0 m	2.3+	6.2

GRADING

Mean for deposit percentages			Depth below surface (m)	Percentages						
Fines	Sand	Gravel		Fines	Sand			Gravel		
				-#	+# -#	+# -1	+1 -4	+4 -16	+16 -64	+64 mm
35	38	27	2.9-3.9	35	28	4	6	10	14	3

SU 90 SE 32

9822 0430

North End, Yapton

Surface level +6.0 m
Water not stuck
August 1981

Block H

Waste 3.3 m
Bedrock 1.2 m+

LOG

Geological classification	Lithology	Thickness m	Depth m
	Soil	0.3	0.3
Brickearth	Clay, brown, silty, with a few subangular flint pebbles. Very sandy near base	2.7	3.0
Raised Beach Deposits (younger)	Sand, mid to dark brown: fine to coarse; quartz with flint; silty and with angular to well rounded flint pebbles	0.3	3.3
Upper Chalk	Chalk, soft, rubbly	1.2+	4.5

SU 90 SE 33

9827 0349

Yapton Church

Surface level +6.4 m
Water not struck
September 1981

Block H

Waste 1.4 m
Bedrock 1.6 m+

LOG

Geological classification

Lithology

Thickness m Depth m

	Soil and made ground	0.3	0.3
Brickearth	Clay, very sandy, mottled brown and grey-brown; some small flint pebbles	1.1	1.4
Upper Chalk	Chalk, soft, weathered, pale yellowish brown; nodular flints	1.6+	3.0

Appendix 4

Greenfield Runoff Calculation

and Southern Water Records

Calculated by: Bava Sathan
Site name: Stakers Farm
Site location: Yapton

Site coordinates
Latitude: 50.82560° N
Longitude: 0.61532° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", WS-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 5943714
Date: 2017-05-10T15:11:04

Methodology	IH124
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Site characteristics

Total site area (ha)	3
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Methodology

Qbar estimation method	Calculate from SPR and SAAR	
SPR estimation method	Calculate from SOIL type	
	Default	Edited
SOIL type	2	2
HOST class	---	---
SPR/SPRHOST	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm)	741	741
Hydrological region	7	7
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Notes:

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

Normally limiting discharge rates which are less than 2.0 l/s/ha are set at 2.0 l/s/ha.

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

Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements

(3) Is $SPR/SPRHOST \leq 0.3$?

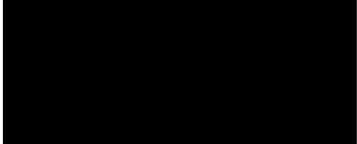
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	5.84	5.84
1 in 1 year (l/s)	4.97	4.97
1 in 30 years (l/s)	13.44	13.44
1 in 100 years (l/s)	18.64	18.64



The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
East Sussex
BN41 1RA

Your ref 22814
Our ref 237745
Date 21 March 2017
Contact 

Attention: Angela Waller

Dear Customer

Re: Provision of public sewer record extract

Location: Stakers Farm, North End Road, East Sussex, BN18 0DU

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

VAT receipt

Ordered by:

The Civil Engineering Practice
George Street
Fishersgate
East Sussex
BN41 1RA

VAT registration number: 813 0378 56

Order reference: 237745

Your reference: 22814

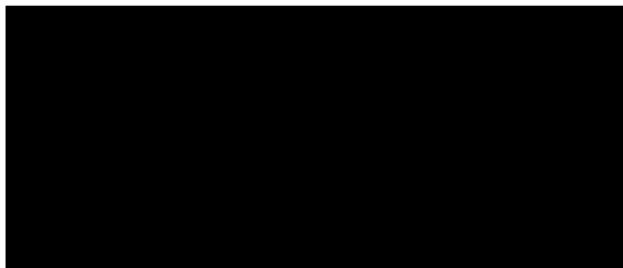
Receipt for provision of an extract from the public sewer and/or water main records.

Location	Costs
Stakers Farm North End Road East Sussex BN18 0DU	£41.60
Net total	£41.60
VAT	£8.32
Total	£49.92
Paid	Paid in full

Thank you for your payment:

Received on: 15 March 2017

For enquiries regarding the information provided in this receipt, please contact the LandSearch team:



LandSearch
Southern Water Services
Southern House
Capstone Road
Chatham
Kent
ME5 7QA

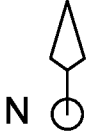


SEWER RECORDS PAGE 1 OF 2

103823



103245

497227	O.S. REF. SU9703NE	Drawn by: yadavs	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement	 
	Title: 237745_Stakers Farm, North End	Scale: 1:2500		
		Date: 21/03/2017	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.	

498167

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0301X	5.67	4.49	175	VC	CIRC	8701X	5.96	4.12	175	VC	CIRC												
0401X	5.92	4.58	150	VC	CIRC	8702X	5.76	3.83	175	VC	CIRC												
0402X	5.8	5.03	150	VC	CIRC	9301X	5.53	4.18	175	VC	CIRC												
0403X	6.32	5.24	150	VC	CIRC	9302X	5.56	4.18	175	VC	CIRC												
0404X	6.46	5.42	150	VC	CIRC	9303X	5.54	4.08	175	VC	CIRC												
0405X	6.55	5.38	150	VC	CIRC	9402X	6.999	5.79	150	VC	CIRC												
0406X	6.72	5.55	150	VC	CIRC	9502X	6.838	5.057	150	VC	CIRC												
0407X	7.03	5.69	150	VC	CIRC	9505X	7.037		150	VC	CIRC												
0408X	6.82	5.6	150	VC	CIRC	9601X	6.25	3.98	175	VC	CIRC												
0501X	5.69	4.78	175	VC	CIRC	9603X	6.298		175	VC	CIRC												
0502X	5.86	4.41	175	VC	CIRC																		
0503X	5.99		175	VC	CIRC																		
0504X	6.05	4.53	175	VC	CIRC																		
1501X	6.45	4.65	175	VC	CIRC																		
1502X	6.39	4.58	175	VC	CIRC																		
2601X	4.42	2.1	175	VC	CIRC																		
2701X	4.91	2.31	175	VC	CIRC																		
3401X	3.95	1.25	350	PF	CIRC																		
3501X	3.02	1.08	350	PF	CIRC																		
3502X	2.58	0.9	350	PF	CIRC																		
3601X	3.96	2.11	175	VC	CIRC																		
3602X	3.14	0.74	350	PF	CIRC																		
3604X	3.19	0.86	150	VC	CIRC																		
3605X	3.15		225	VC	CIRC																		
3605Y	3.15		225	VC	CIRC																		
3606X	3.42		150	VC	CIRC																		
360PX	3.42	3.41	300	BAC	CIRC																		
3701X	5	3.44	150	VC	CIRC																		
4301X	4.78	1.72	350	PF	CIRC																		
4401X	4.49	1.27	350	PF	CIRC																		
4601X	4.46	2.99	150	VC	CIRC																		
5301X	4.63	2.12	350	PF	CIRC																		
5302X	4.86	2.04	350	PF	CIRC																		
5303X	5.39	1.81	350	PF	CIRC																		
5304X	5.33	1.81	350	PF	CIRC																		
5305X	5.32	1.96	350	PF	CIRC																		
6203X	4.67	2.37	350	PF	CIRC																		
6301X	4.63	2.37	175	VC	CIRC																		
6304X	4.66	2.2	350	PF	CIRC																		
6305X			100	VC	CIRC																		
630DX			175	VC	CIRC																		
7201X	5.36	2.51	350	PF	CIRC																		
7202X	4.85	2.51	350	PF	CIRC																		
721DX			350	PF	CIRC																		
7302X	5.8	3.45	175	VC	CIRC																		
7401X	5.65	2.91	175	VC	CIRC																		
7402X	5.12	2.63	175	VC	CIRC																		
7501X	5.75	3.23	175	VC	CIRC																		
7502X	5.58	3.22	175	VC	CIRC																		
7503X	5.47	3.02	175	VC	CIRC																		
7601X			100	VC	CIRC																		
8202X	7.06	4.91	150	VC	CIRC																		
8203X	6.99	5.21	150	VC	CIRC																		
8301X	4.97	3.82	175	VC	CIRC																		
8302X	5.26	3.63	175	VC	CIRC																		
8303X	5.89	4.5	150	VC	CIRC																		
8304X	5.39	3.58	175	VC	CIRC																		
8305X	5.2	3.92	175	VC	CIRC																		
8402X	7.333	6.078	150	VC	CIRC																		
8501X	5.8	3.32	175	VC	CIRC																		
8502X	6.989	5.167	150	VC	CIRC																		
8503X	6.83	5.47	150	PVC	CIRC																		
8602X	5.57	3.56	175	VC	CIRC																		
8603X	6.03	3.67	175	VC	CIRC																		
861DX			175	VC	CIRC																		

LINE STYLES / COLOURS	MATERIALS	LEGEND - SEWERS
Brown ----- Foul ----- Foul Siphon Sewer ----- Foul Vacuum Main ----- Foul Rising Main	AK Alkali Resistant BAC Bonded Asbestos Cement BRC Bricks (Common) BRE Brick (Engineering) CC Concrete Box Culvert CI Cast Iron CO Concrete (In-Situ) CP Concrete (Pre-Cast) CSB Concrete Segments (bolted) CSU Concrete Segments (unbolted) DI Ductile Iron GRC Glass Reinforced Concrete GRP Glass Reinforced Plastic MAC Masonry in regular Courses MAR Masonry in random Courses PE Polyethylene PF Pitch Fibre PP Polypropylene PVC Polyvinyl Chloride RPM Reinforced Plastic Matrix SI Spun Iron ST Steel VC Vertifired Clay XXX Other ZZZ Unknown	Menhole (SW) Menhole (F&C) Lamp hole (SW) Lamp hole (F&C) Pumping Station (SW) Pumping Station (F&C) Side entry manhole (SW) Side entry manhole (F&C) Blind shaft (SW) Blind shaft (F&C) Ejector station (SW) Ejector station (F&C) Watertight door (SW) Watertight door (F&C) Flushing ch. Min-e (SW) Flushing ch. Min-e (F&C) Flushing ch. No-e (SW) Flushing ch. No-e (F&C) Demarcation Chamber Washout (SW) Washout (F&C) Rodding Eye (SW) Rodding Eye (F&C) Gauging point (SW) Gauging point (F&C) Intercept chamber (SW) Intercept chamber (F&C) Storm Tank (SW) Storm Tank (F&C) Vortex chamber (SW) Vortex chamber (F&C) Label ellipse Dummy/S24 manhole Outfall Penstock chamber Demiboards Storm Overflow Backdrop manhole Other (s) Other Change In sewer (s) Change In sewer Rafflux valve Flap valve Cascade Anode Valve Closed Valve Air Valve Hatch box (SW) Hatch box (F&C) Direction arrow Emptying valve Catchpit Soakaway Inlet Balancing Pond Wastewater treatment works Marine treatment works Outfall headworks Vent Vent column Tidal storage tank Blank end Head of Public Sewer Micro Pumping Station
Red ----- Combined ----- Combined Siphon Sewer ----- Combined Rising Main ----- Lateral Drain ----- Building Over Agreement Area Dark Blue ----- Treated Effluent Purple ----- Sludge ----- Sewer Catchment ----- Section 104 Area Light Blue ----- Surface Water ----- Surface Water Rising Main Yellow ----- Private Green ----- Access Shaft ----- Decommissioned		SHAPES (S) A Arched B Barrel C Circular E Egg H Horseshoe R Rectangular S Square T Trapezoidal U U Shape X Other NODE REFERENCING SYSTEM 1st digit: hundred metre easting identifier 2nd digit: hundred metre northing identifier sewer type identifier 0-4 = Foul/Combined 5-9 = Surface Water 4th digit: next sequential node

Drawn by:	yadavs	
Title:	237745_Stakers Farm, North End	
Date:	21/03/2017	