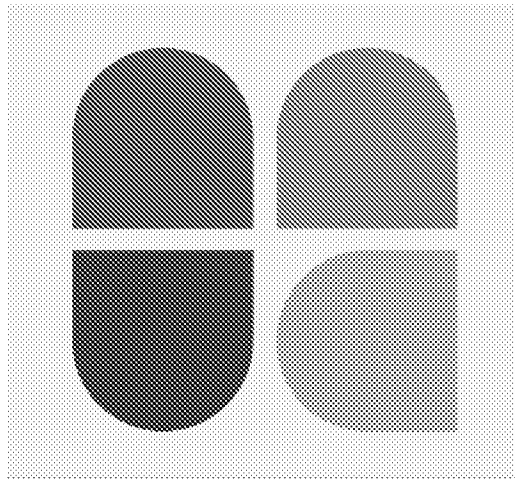




BRIGHT PLAN CIVILS

**ROOKERY COTTAGE, HOE LANE,
FLANSHAM, BOGNOR REGIS PO22 8NT**

PROPOSED DWELLING EXTENSION

Surface Water Drainage Strategy

Prepared on Behalf of

Lara Mackendrick

MACK/19/D1828/DS1.1

25 February 2020

DOCUMENT CONTROL

Project: Rookery Cottage, Hoe Lane, Flansham, Bognor Regis PO22 8NT
Proposed Dwelling Extension

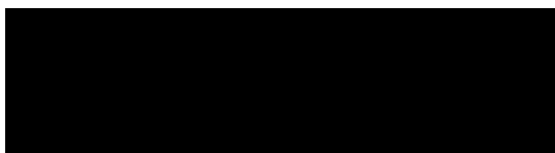
Document: Surface Water Drainage Strategy

Client: Lara Mackendrick

Reference: MACK/19/D1828/DS1.1

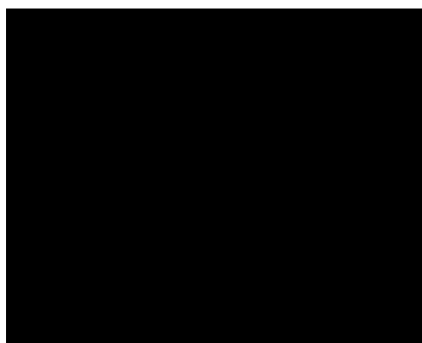
Document Checking:

Author: DJL



Date: 25 February 2020

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Date: 25 February 2020

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Date: 25 February 2020

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- Appendix F** Drainage Strategy Calculations

1 INTRODUCTION

1.1 Background

1.1.1 RGP Design Ltd is instructed by Lara Mackendrick to prepare a Surface Water Drainage Strategy to support a planning application for a Proposed Dwelling Extension at Rookery Cottage, Hoe Lane, Flansham, Bognor Regis PO22 8NT.

1.1.2 The proposed development will involve the construction of an extension to the side of the existing property at Rookery Cottage - as demonstrated within the preliminary site layout, contained within **Appendix A** of this report.

1.1.3 In preparing this report, BPC has referred to the following documents and information:

- Environment Agency Flood Maps for Planning
- Long Term Flood Risk Information; Flood Risk Maps
- Local Authorities Strategic Flood Risk Assessment
- Southern Water and Local Authority Drainage Records
- Site-specific Environmental Investigation Report
- British Geological Survey & Records

1.1.4 This document has been prepared to assess if the proposed development is suitable for the site and confirms if mitigation is required to ensure that flood risk is not increased, and that the proposed development remains safe during its design life.

1.1.5 This report has been prepared for the benefit of the named Client only.

1.2 Site Location and Description

1.2.1 The property is located within the hamlet of Flansham, on the outskirts of Bognor Regis in West Sussex.

1.2.2 The site is bounded by agricultural land to the north and south, commercial units to the southeast and residential properties to the west.

1.2.3 A topographical survey of the site has been undertaken and provided by the client. It is included in **Appendix B** of this report.

1.2.4 The topographical survey shows that the site is between 48.97m and 59.18m AOD. The site has generally minimal fall across the majority of the site, however there is a fall towards the blind ditches along the north boundary of the site – as detailed in Drawing **PL100**.

- 1.2.5 The existing site building drains runoff from the roofs to a well in the front garden of the site, and site runoff is expected to collect in the ditch to the north and drain via infiltration as there is no other formal drain on the site.
- 1.2.6 The nearest watercourse appears to be the head of a manmade ditch on Hoe Lane, which runs north into the Ryebank Rife, which is a main river approximately 0.5km northeast of the site.
- 1.2.7 The existing site has a total area of approximately 2,566m² (0.257 Ha), with approximately 180m² of existing impermeable area – as seen in Drawing **PL200**.

1.3 Ground Conditions

- 1.3.1 In the absence of a site-specific geotechnical investigation, reference has been made to the British Geological Survey (BGS) website.
- 1.3.2 The BGS geology viewer states that the bedrock geology is likely to consist of 'Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (undifferentiated)', as seen in **Figure 1**.

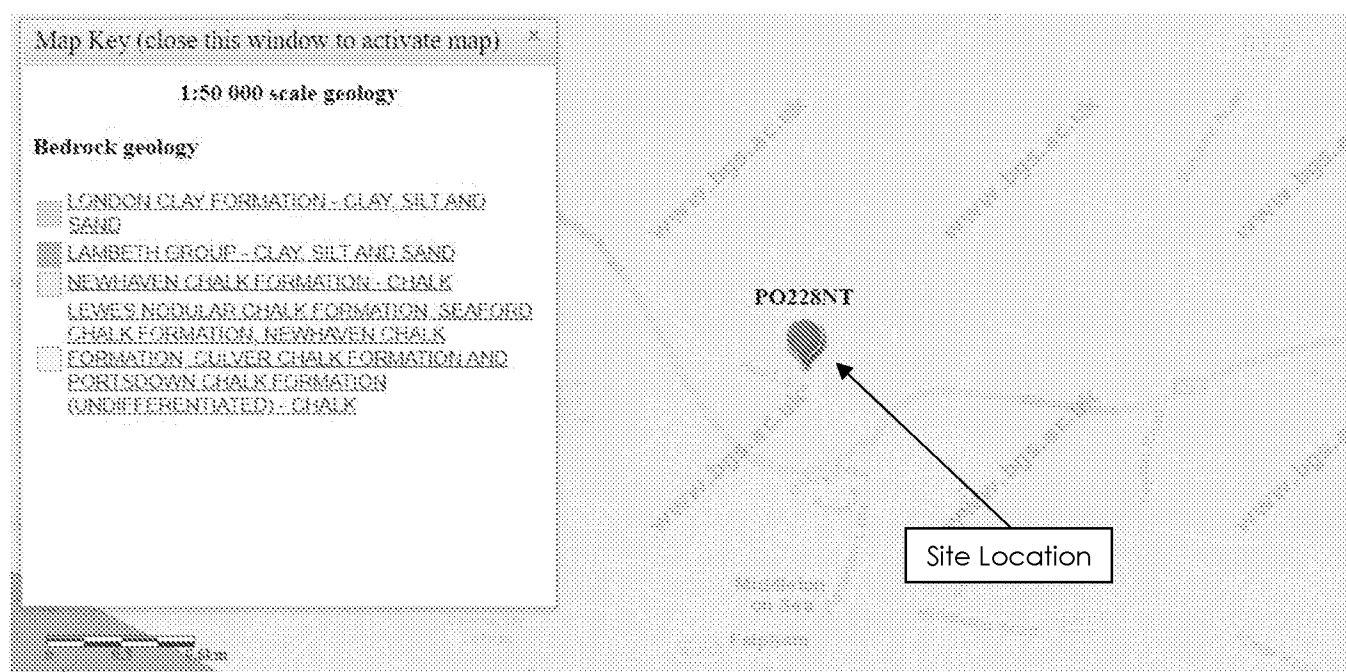


Figure 1. BGS website Bedrock geology

- 1.3.3 The BGS geology viewer states that the superficial deposits are likely to consist of 'River Terrace Deposits (undifferentiated) - Sand, Silt and Clay', as seen in **Figure 2**.

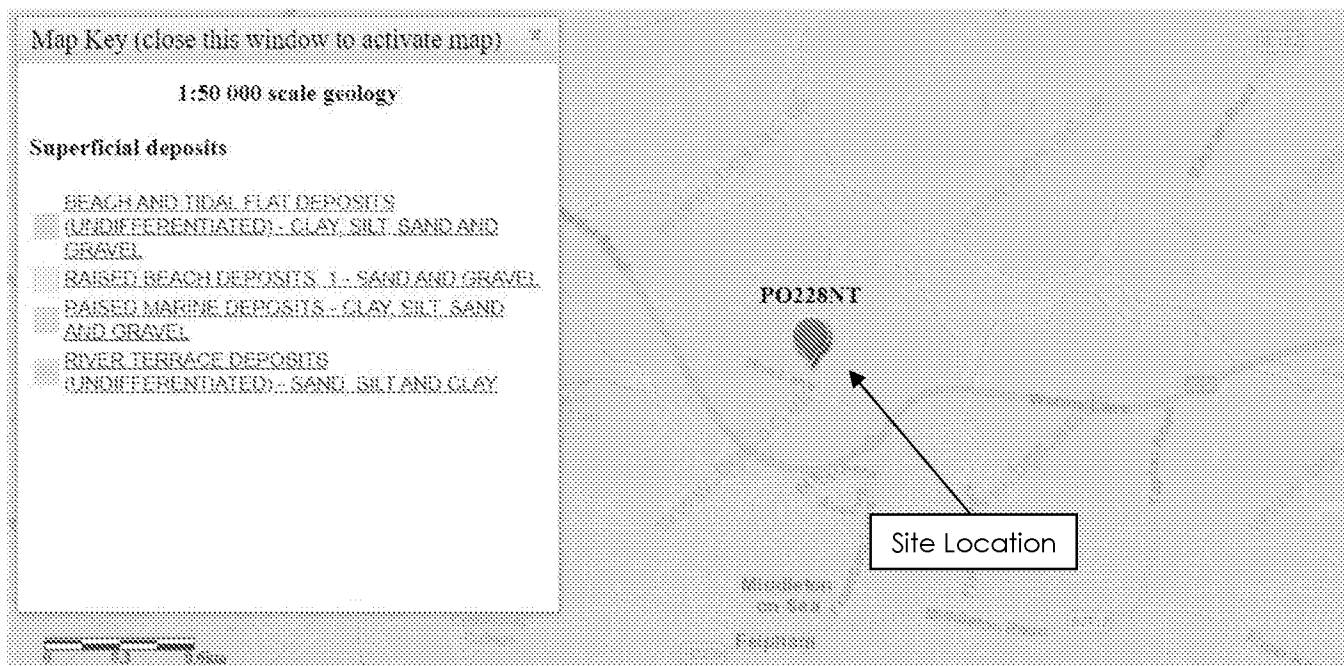


Figure 2. BGS website superficial deposits

- 1.3.4 Historic borehole records from the Single Onshore Boreholes Index (SOBI) on the BGS website have also been reviewed in the absence of a site-specific geotechnical investigation, as depicted in Figure 3.

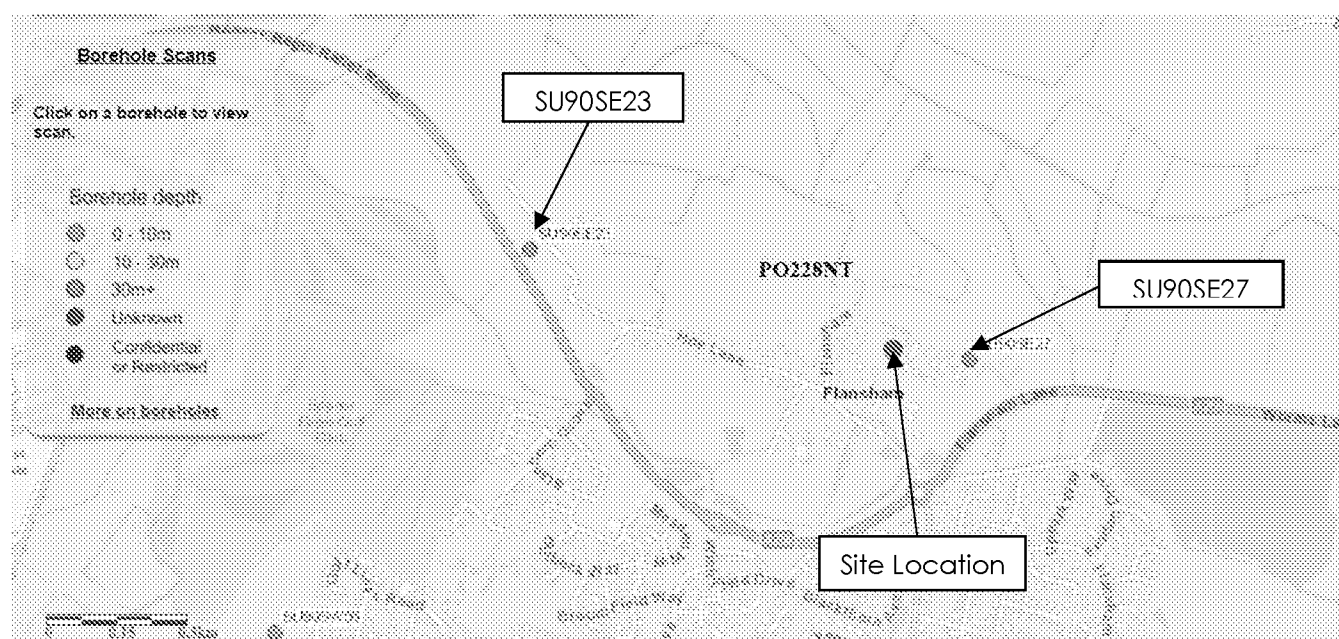


Figure 3. BGS website borehole locations

- 1.3.5 A borehole 100m east of the site was assessed in comparison to the site, as seen in **Figure 3**. This borehole has similar geotechnical strata according to the BGS online mapping.
- 1.3.6 The log at SU90SE27 indicates the borehole had a surface ground level of 3.7mAOD and states that the geological composition encountered consisted of a 0.4m layer of soil underlain by Brickearth Clay to a depth of 2.8mbgl (metres below ground level).

- 1.3.7 Raised Beach deposits (silt, very sandy, chalky, with chalk pebbles) were then encountered to a depth of 4.7mbgl before a bedrock of Upper Chalk to the borehole depth of 6.2mbgl.

1.4 Groundwater

- 1.4.1 The recorded borehole SU90SE27 is located approximately 100m east of the site and struck groundwater at 4.5mbgl.
- 1.4.2 Mapping managed by MAGIC (magic.defra.gov.uk) provides geographic information concerning the natural environment from across government. This mapping tool has been referred to in order to confirm whether the site is located within either any groundwater source protection zones or groundwater vulnerability zones. The site is situated within a 'Principal' Bedrock Aquifer and 'Secondary A' Superficial Drift Aquifer, as seen in **Figure 4**.
- 1.4.3 This refers to bedrock geology that typically exhibits permeability and provides groundwater storage or supply.

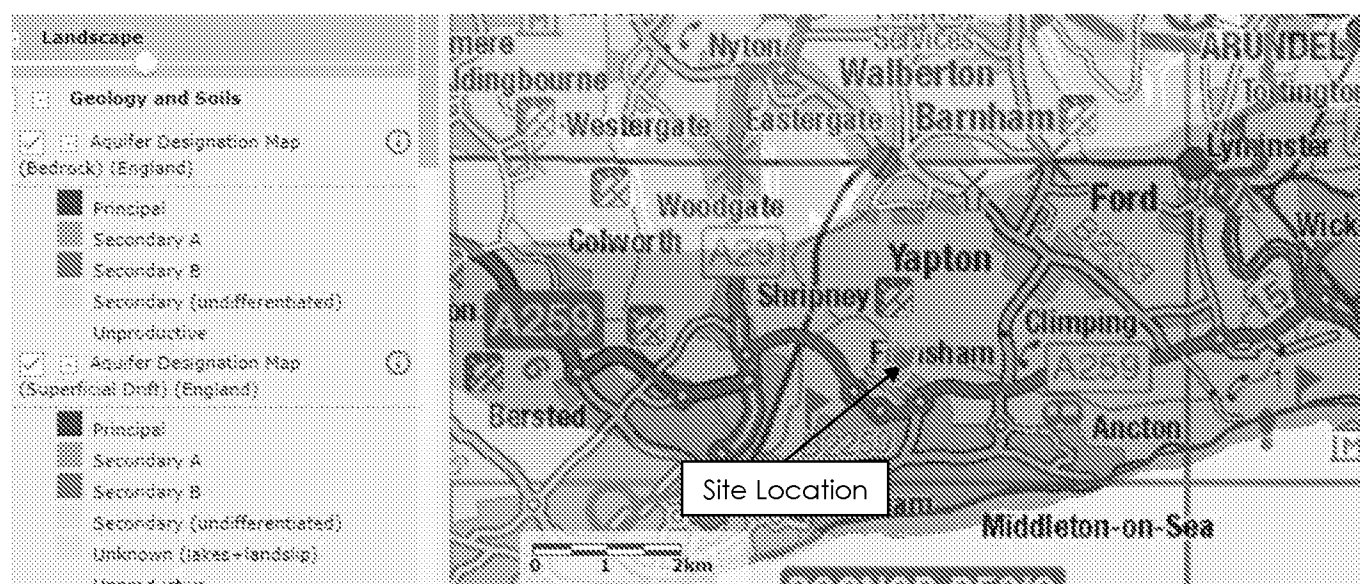


Figure 4. DEFRA Aquifer Designation Map

- 1.4.4 The Groundwater Vulnerability Map (**Figure 5**) confirms that the site falls within a medium groundwater vulnerability zone with soluble rock risk.

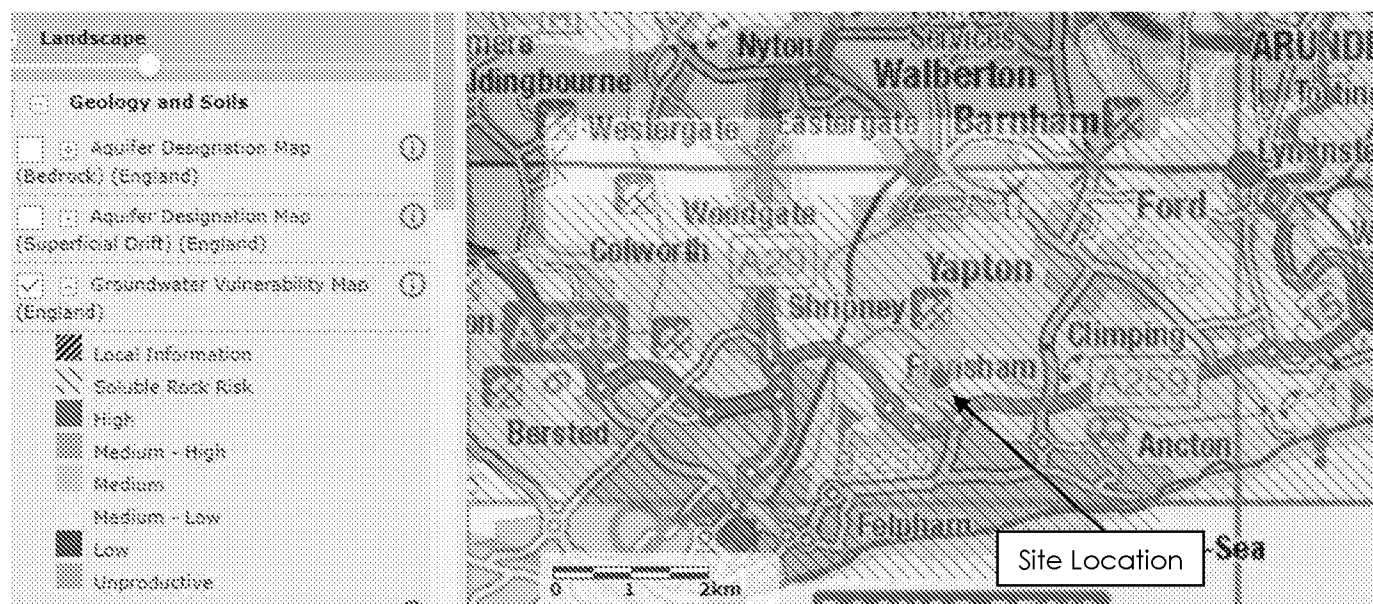


Figure 5. DEFRA Groundwater Vulnerability Map

1.4.5 The site is not indicated as within a Drinking Water Safeguard Zone or a Source Protection Zone.

1.5 Flood Risk

1.5.1 Consideration of the Environment Agency's Flood Map for Planning shows the site in Flood Zone 1, and not in proximity to an area of Flood Zone 2 or 3. Flood Zone 1 is defined as land having a less than 1 in 1,000 annual probability of river or sea flooding.

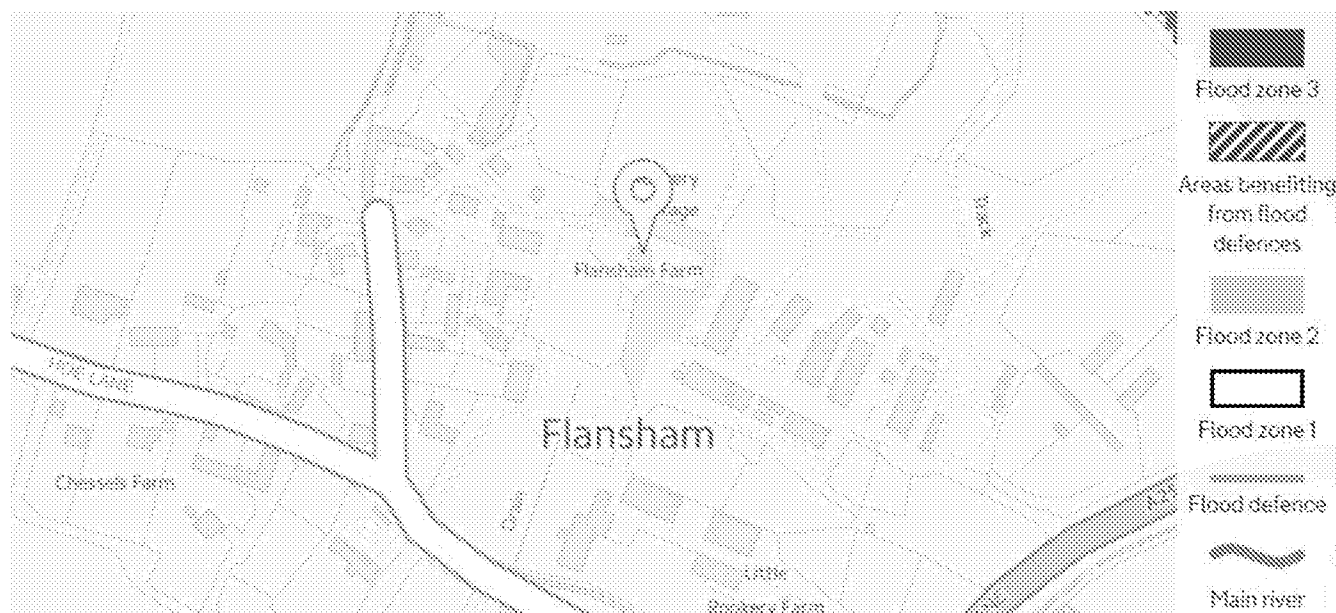


Figure 6. Flood Map for Planning

1.5.2 In addition, the Environment Agency's long-term flood risk maps show no risk to the site from rivers or the sea, 'very low' flood risk to the site as a result of surface water and no risk of flooding from reservoirs.

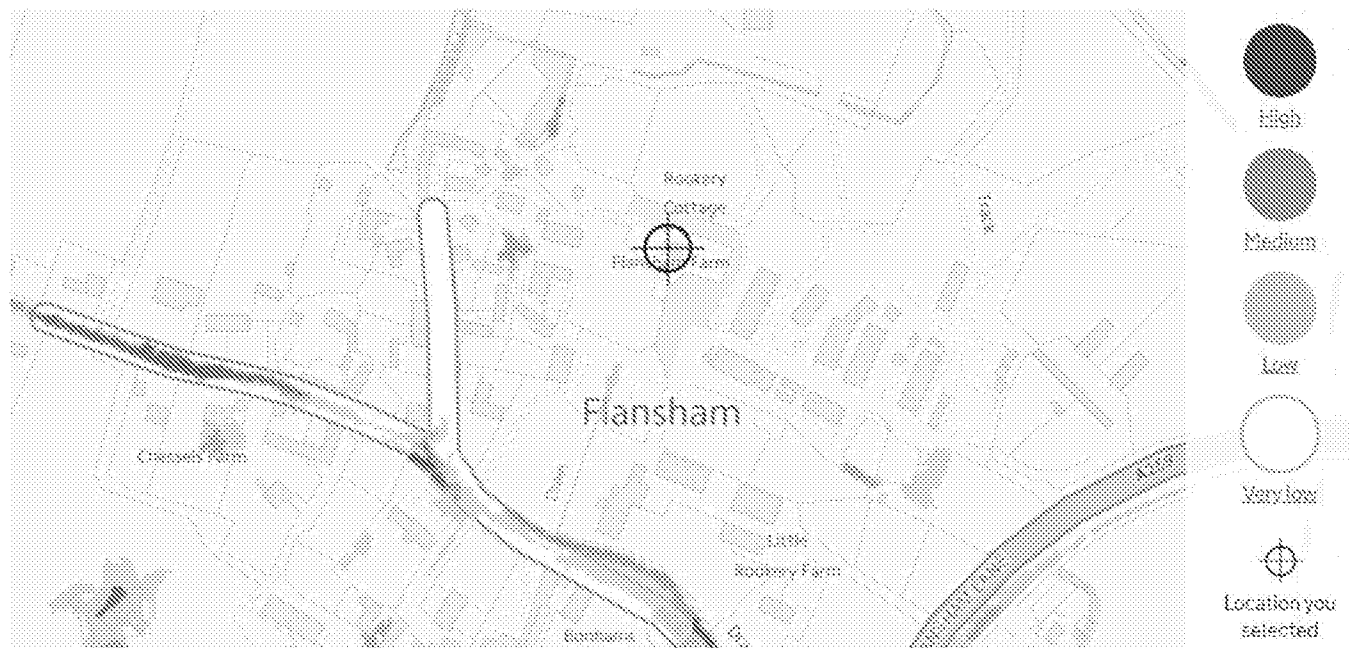


Figure 7. Long-term surface water flood risk

1.5.3 The site is not considered to be at risk of flooding from any other fluvial, tidal or artificial sources.

2 EXISTING DRAINAGE

2.1 Surface Water

- 2.1.1 The local Water Authority is Southern Water, who provide sewerage services within the area. Sewer records have been obtained, as contained within this report in **Appendix C**.
- 2.1.2 The public sewer records do not indicate a public surface water in the vicinity of the site and drainage of the existing site is thought to be via infiltration and overland runoff.
- 2.1.3 The existing buildings are drained by rainwater pipes to an existing well in the front of the site. The drainage of the existing garden areas is expected to be via infiltration and overland runoff.
- 2.1.4 The site has generally minimal fall across the majority of the site, however there is a fall towards the blind ditches along the north boundary of the site
- 2.1.5 There are a number of manmade ditches which feed into the Ryebank Rife to the north and west of the site however these do not reach the site and Third Party land prevents the ability to connect to any watercourse.
- 2.1.6 Greenfield runoff rate (Qbar) has been calculated to be 0.76l/s (**Appendix D**).

2.2 Foul Water

- 2.2.1 The existing site has a domestic foul drainage treatment plant. It is not expected that there will be any changes to the foul discharge and connections for any new soil vent pipes will be made to the existing foul drainage system.

2.3 Highway Drainage

- 2.3.1 There is no formal highway drainage along the adjacent section of Hoe Lane and the private highway is presumed to drain via overland runoff to nearby ditches.

3 PROPOSED DEVELOPMENT

3.1 Surface Water

3.1.1 The SUDS manual and Building Regulations set out a hierarchy of drainage methods to ensure that developments maximise the use of sustainable drainage techniques. The hierarchy favours infiltration methods of disposal over other methods such as watercourse and sewers, as detailed below;

- i. Utilise infiltration techniques
- ii. Attenuate rainwater in ponds or open water features for gradual release
- iii. Attenuate rainwater by storing in tanks or sealed water features for gradual release
- iv. Discharge rainwater direct to a watercourse
- v. Discharge rainwater to a surface water sewer/drain
- vi. Discharge rainwater to a combined sewer

SUDS Technique	Suitable	Comments
Living Roof	No	Not consistent with existing building or proposed extension layout – building not suitable for retrofitting either.
Basins and Ponds (such as Constructed Wetlands, Balancing Ponds, Detention Basins, Retention Ponds)	Yes*	Space available on site, however limited in potential depth by presence of high groundwater.
Filter strips and swales	Yes*	Space available on site, however limited in potential depth by presence of high groundwater.
Infiltration Devices - Soakaways - Infiltration trenches and basins	Yes*	Limited in potential depth by presence of high groundwater, and infiltration results indicated slow soakage rates.
Permeable surfaces and filter drains - Gravelled areas - Porous block paving	Yes*	No initial constraints, however there are limited proposed changes to external hardstanding or driveway areas so scope for new surfacing for SuDS is limited.

Tanked systems - Oversized pipes - Cellular tanks	Yes*	Limited in potential depth by presence of high groundwater.
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- 3.1.2 The proposed development is for an extension to the existing residential building whilst removing existing outbuildings, and a small amount of additional new external surface areas. There is an existing blind ditch to the north of the site which appears to take most of the existing runoff from surrounding areas and on previous site visit never appeared to be at or near full capacity despite high rainfall and high groundwater levels, and other ditches to the north and west being at full capacity.
- 3.1.3 Winter groundwater monitoring and infiltration testing was undertaken at the site, which indicated peak winter groundwater levels of 1.125mbgl and infiltration rates of 1.8×10^{-6} m/s giving some limited potential for the use of infiltration SuDS measures – as shown in the site testing results (**Appendix E**).
- 3.1.4 Other options for surface water discharge were considered, however there are no surface water sewers or drains within the vicinity of the site, and there are no watercourses that the site could utilise a connection to without access through Third Party land.
- 3.1.5 It is also important to note that having undertaken a site visit in February 2020, shortly after two severe named storms and it was found that whilst the nearby watercourses were at full capacity and the nearby Ryebank Rife flooded, the blind ditch on the site appeared to be only half full with a significant amount of additional available capacity.
- 3.1.6 It is therefore considered that the blind ditch should be extended and widened to allow for additional attenuation capacity within the blind ditch, which appears to slowly infiltrate into the underlying ground.
- 3.1.7 MicroDrainage calculations (**Appendix F**) indicate that the blind ditch would need to be extended by 18 square metres at 400mm deep, to allow for sufficient shallow attenuation. It is proposed that the blind ditch is extended by no less than 25 square metres at 400mm depth, to allow for any additional offsite runoff, urban creep or storm events above the design scenario.
- 3.1.8 It is proposed that all captured runoff from the proposed extension hardstanding area is captured up to the 100-year event including 40% climate change without exceedance.
- 3.1.9 The strategy above will ensure that there is no increase in the rate of run-off leaving the site, therefore no increase in the risk of flooding from this source.

3.2 Foul Water Drainage

- 3.2.1 The existing site has a domestic foul drainage treatment plant. It is not expected that there will be any changes to the foul discharge and connections for any new soil vent pipes will be made to the existing foul drainage system.

3.3 Climate Change

- 3.3.1 In February 2017 the Environment Agency updates the latest climate change allowances (available online at <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>), which supports the NPPF in making an allowance for climate change within flood risk assessment. The allowances provide predictions of anticipated change for peak river flow by river basin district and peak rainfall intensity.

- 3.3.2 The table below shows the anticipated changes in extreme rainfall intensity. For flood risk assessments, both the central and upper end allowances should be assessed to understand the range of impact.

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

- 3.3.3 Based on the latest allowances, an increase of 20% should be applied to peak rainfall to this development, with a review undertaken to determine the impact of a 40% increase.

3.4 Urban Creep

- 3.4.1 Based upon the assumption that there will be an urban creep on new developments through their lifetime, the impact of additional impermeable area has been considered. The proposed drainage strategy is designed to accommodate over 30% of urban creep.

3.5 Treatment

- 3.5.1 The use of a pond and infiltration will ensure that run-off from the site receives a level of treatment required by the SuDS manual.
- 3.5.2 In accordance with the CIRIA SuDS Manual C753 regarding methods for managing pollution risks, the risk posed by surface water runoff to the receiving environment depends on the pollution hazard at the site (the source), SuDS treatment techniques (the pathway), and the sensitivity of the environment (the receptor).
- 3.5.3 The simple index approach considers whether SuDS techniques are appropriate for the site. The states that for SuDS components to deliver adequate treatment, the total pollution mitigation index for each contaminant type should equal or exceed the pollution hazard index.
- 3.5.4 The SuDS Manual outlines three categories of pollution hazard identification, which vary depending on proposed land use, which are as follows:
- Total Suspended Solids (TSS).
 - Metals (M).
 - Hydrocarbons (H).
- 3.5.5 In accordance with C753 Table 26.2, the proposed land uses at the site are categorised as follows:
- Residential Roofs and non-trafficked areas – very low/TSS=0.2/M=0.2/H=0.05
- 3.5.6 In accordance with C753 Table 26.3, the values of SuDS Mitigation indices are provided for permeable paving:

- Pond – $TSS=0.7/M=0.7/H=0.5$
- A soil with a good contaminant attenuation potential of at least 300mm in depth* –
 $TSS=0.4/M=0.3/H=0.3$

*Although the soil contaminant attenuation potential is unknown, the pond alone has sufficient mitigation capacity for the proposed uses.

3.5.7 As the pollution hazard index does not exceed any pollution mitigation index for any contaminant type, the proposed SuDS methods will provide sufficient treatment for the proposed development.

4 PROPOSED MAINTENANCE REGIME

- 4.1.1 Maintenance plays an important part in the long-term performance of a surface water drainage system and will be required to ensure that it remains fully operational.
- 4.1.2 The responsibility for the maintenance of the surface water drainage system will lie with the occupant (also Developer) who will be made aware of specific maintenance tasks to ensure that the surface water drainage system remains operational.
- 4.1.3 A proposed outfall will be required for the discharge from to the boundary blind ditch/pond. It is recommended that maintenance of the outfall feature and pond is carried out to prevent the risk of blockages and flooding, with measures as follows:
- Inspection, vegetation clearance and additional clearing/cleansing of potential outfall blockages will be required on an annual basis and after major storm events.
 - Desilting is recommended at least as follows: On completion of drainage works, Year 1, Year 3, then every 5 years.

4.2 Remedial/Repair Actions

- 4.2.1 Significant storm events may cause considerable damage to SuDS and their associated components. As such, it may be necessary to inspect and carry out essential recovery works to return the feature to full working order.

4.3 Maintenance Regime

- 4.3.1 The drainage system has been designed to minimise maintenance requirements; however a number of key tasks will need to be undertaken so that the system remains in optimal condition. These operations are summarised in Table 1 below, along with the required frequency of works.

Drainage System feature	Proposed maintenance / remedial works	Required frequency of works
Filter Strip (existing and proposed vegetation) & Pond	Inspection, vegetation clearance and additional clearing/cleansing of potential surface blockages	At least once a year
	Inspection and clearance of blockages	After major storm events
	Desilting	Year 1, Year 3, then every 5 years
Catch pits, gully sumps and drains	Inspection and additional cleansing as required.	Annual
	Desilting	Year 1, Year 3, then every 5 years
Pipework	Jetting to clear blockages	As required

Table 1. Proposed Maintenance Regime

- 4.3.2 It is also recommended that the level of silt in the system is recorded at each maintenance visit to help establish a more informed regime.

- 4.3.3 In addition to the intervals above, the condition of the surface water drainage system should be assessed following significant rainfall events to ensure that silt has not washed through and been deposited in a way that could affect the operation of the system.

4.4 Accidental Spillages

- 4.4.1 It is not envisaged that any materials are to be stored onsite once the development has been completed which could cause major spills and potential pollution issues within the drainage system. If this situation alters in the future consultation with a specialist will be required in order to confirm if any upgrades to the existing system are necessary.
- 4.4.2 Minor spillages of fuels and oils from motor vehicles will be dealt with by the filter strip (existing and proposed vegetation) and pond, by collecting and bio-degrading the hydrocarbons.

5 OFFSITE IMPACTS

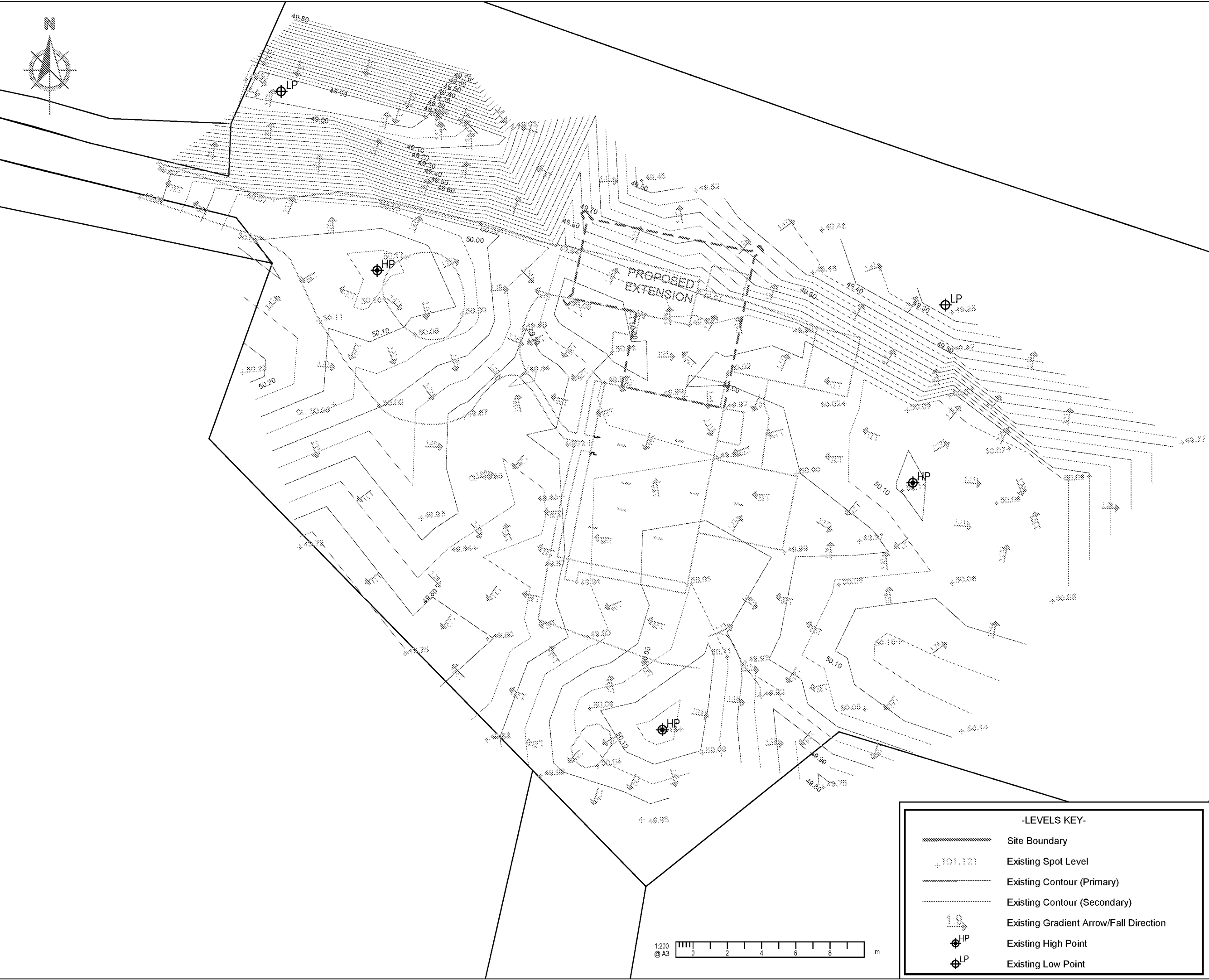
- 5.1.1 The proposed development will not result in any increase in runoff from the site, and therefore will not cause an increase in flood risk offsite.
- 5.1.2 It is not expected that there will be any changes to the foul discharge and connections for any new soil vent pipes will be made to the existing foul drainage system which discharges via a domestic foul treatment plant.
- 5.1.3 The effects of climate change have been considered in the design of the proposed surface water drainage system, to ensure there is no off-site impact.

6 SUMMARY

- 6.1.1 The existing site consists of a single residential dwelling at Rookery Cottage in Flansham, near Bognor Regis.
- 6.1.2 The topographical survey shows that the site is between 48.97m and 59.18m AOD. The site has generally minimal fall across the majority of the site, however there is a fall towards the blind ditches along the north boundary of the site.
- 6.1.3 The site area is 0.257Ha and has an impermeable area of 0.018Ha, which will increase to 0.024Ha as a result of the development.
- 6.1.4 The proposed development comprises demolishing the existing outbuildings and construction of an extension to the existing residential dwelling.
- 6.1.5 The development lies within Flood Zone 1, and is at low risk of surface water flooding. The existing run-off from the site is assumed to drain via a combination of infiltration and overland flow in the absence of formal drainage infrastructure, apart from the existing property roof which drains to a well.
- 6.1.6 Post-development surface water run-off will be managed through sustainable drainage measures, with the extension of a blind ditch/pond to attenuate and infiltrate the additional site runoff, without causing surface water flooding on site.
- 6.1.7 There will be no significant external changes to the foul drainage, with the existing domestic foul treatment plant and site infrastructure utilised and no significant increases expected.
- 6.1.8 The completion of the development will not increase flood risk on or off the site.
- 6.1.9 In conclusion, this development is suitable with regards to flood risk and surface water drainage.

DRAWINGS

- 100** Existing Topography & Overland Flow Routes
- 200** Impermeable Areas Comparison
- 300** Surface Water Drainage Strategy

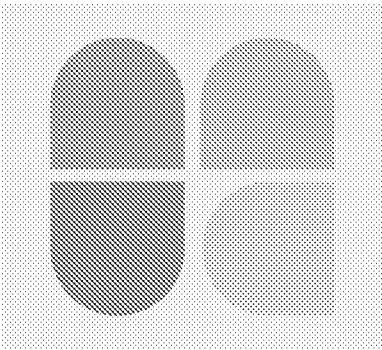


NOTES

A3

1. This drawing is to be read in conjunction with all other RSP drawings, and with all relevant Architect's and Engineer's drawings and specification. Any discrepancies found are to be reported immediately to the Engineer
2. RSP accepts no responsibility for inaccuracies in data provided by third parties such as topographic surveys or Ordnance Survey mapping.
3. Do not scale, work to figured dimensions only. All dimensions are in millimeters unless noted otherwise and all levels are in metres from the topographic survey datum.
4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority, however accuracy is not certain.

Rev.	Amendments	Date
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Drawing Status -

Client
Lara Mackendrick

Drawing Title
Existing Topography & Overland Flow Routes

Project
Rookery Cottage, Hoe Lane
Flansham, Bognor Regis PO22 8NT

Scale 1:200	Date Feb 2020	Drawn By DJL	Checked LDF
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Drawing No. 2020-D1828-PL100	Rev. -
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-LEVELS KEY-

- Site Boundary
- Existing Spot Level
- Existing Contour (Primary)
- Existing Contour (Secondary)
- Existing Gradient Arrow/Fall Direction
- Existing High Point
- Existing Low Point

1:200
@ A3



-KEY-

Site Boundary (2,566m² - 0.257Ha)

Existing Buildings Area (120m² - 0.012Ha)

Existing Hardstanding Area (60m² - 0.006Ha)

Proposed Buildings Area (172m² - 0.017Ha)

Proposed Hardstanding Area (73m² - 0.007Ha)

Proposed site information shown is based on drawings by O'Neill Architectural Services in October 2019. Ordnance Survey, (c) Crown Copyright 2019. All rights reserved. Licence number 100022432

NOTES

A3

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Drawing Status

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Client

Lara Mackendrick

Drawing Title

Impermeable Areas Comparison

Project

Rookery Cottage, Hoe Lane
Flansham, Bognor Regis PO22 8NT

Scale

1:500

Date

Feb 2020

Drawn By

DJL

Checked

LDF

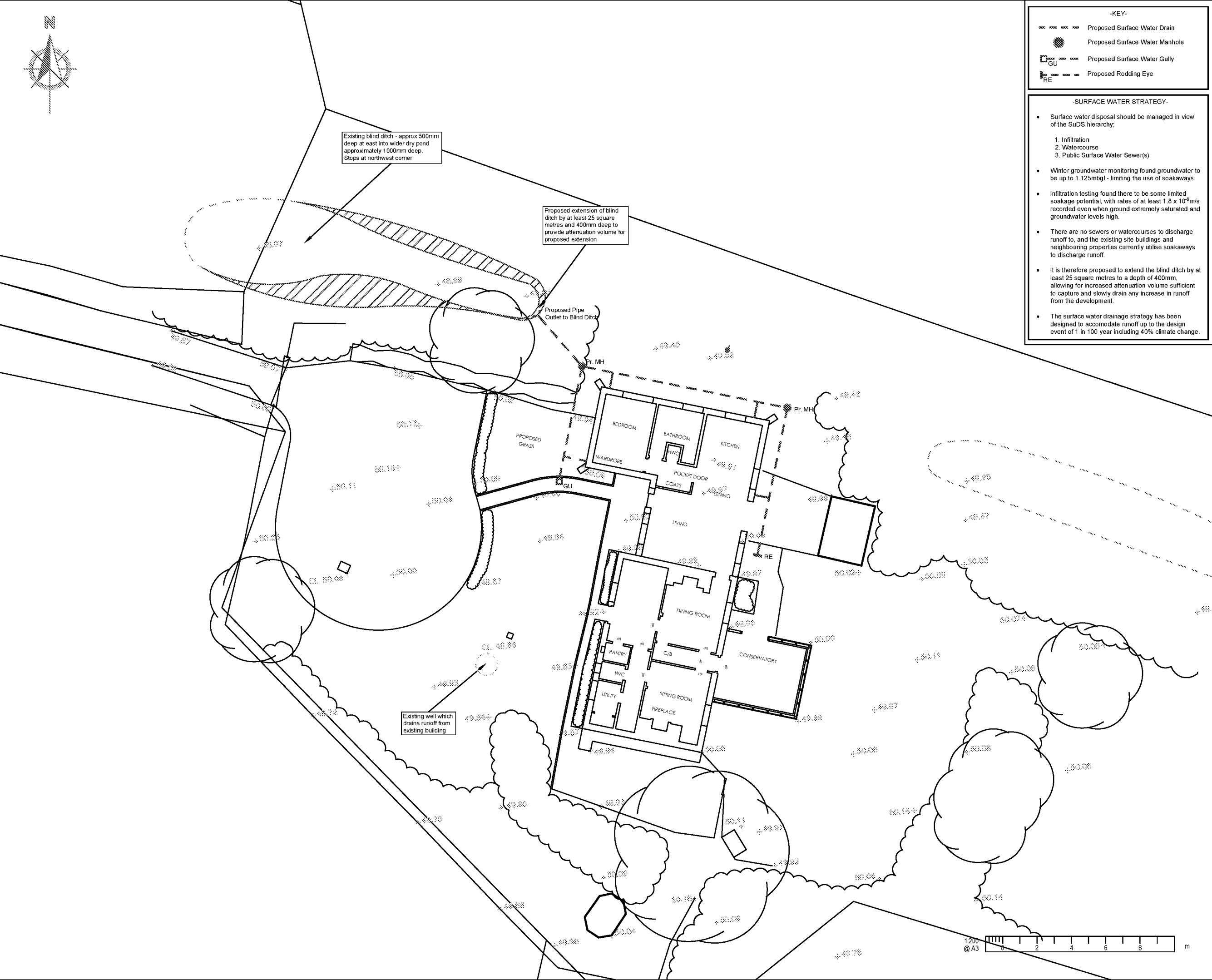
Drawing No.

D1828-PL200

Rev.

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ARJIN DISTRICT COUNCIL Y5020/DC



-KEY-

Proposed Surface Water Drain

Proposed Surface Water Manhole

Proposed Surface Water Gully

Proposed Rodding Eye

-SURFACE WATER STRATEGY-

- Surface water disposal should be managed in view of the SuDS hierarchy;
 - Infiltration
 - Watercourse
 - Public Surface Water Sewer(s)
- Winter groundwater monitoring found groundwater to be up to 1.125mbgl - limiting the use of soakaways.
- Infiltration testing found there to be some limited soakage potential, with rates of at least 1.8×10^{-6} m/s recorded even when ground extremely saturated and groundwater levels high.
- There are no sewers or watercourses to discharge runoff to, and the existing site buildings and neighbouring properties currently utilise soakaways to discharge runoff.
- It is therefore proposed to extend the blind ditch by at least 25 square metres to a depth of 400mm, allowing for increased attenuation volume sufficient to capture and slowly drain any increase in runoff from the development.
- The surface water drainage strategy has been designed to accomodate runoff up to the design event of 1 in 100 year including 40% climate change.

NOTES

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Rev.

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Minor Revisions

Rev.

Amendments

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Date

25/02/2020

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Client

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Drawing Title

Surface Water Drainage Strategy

Project

Rookery Cottage, Hoe Lane
Flansham, Bognor Regis PO22 8NT

Scale

1:200

Date

Feb 2020

Drawn By

DJL

Checked

LDF

Drawing No.

D1812-PL300

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A

ARJN DISTRICT COUNCIL

APPENDICES

Appendix A Preliminary Site Layout

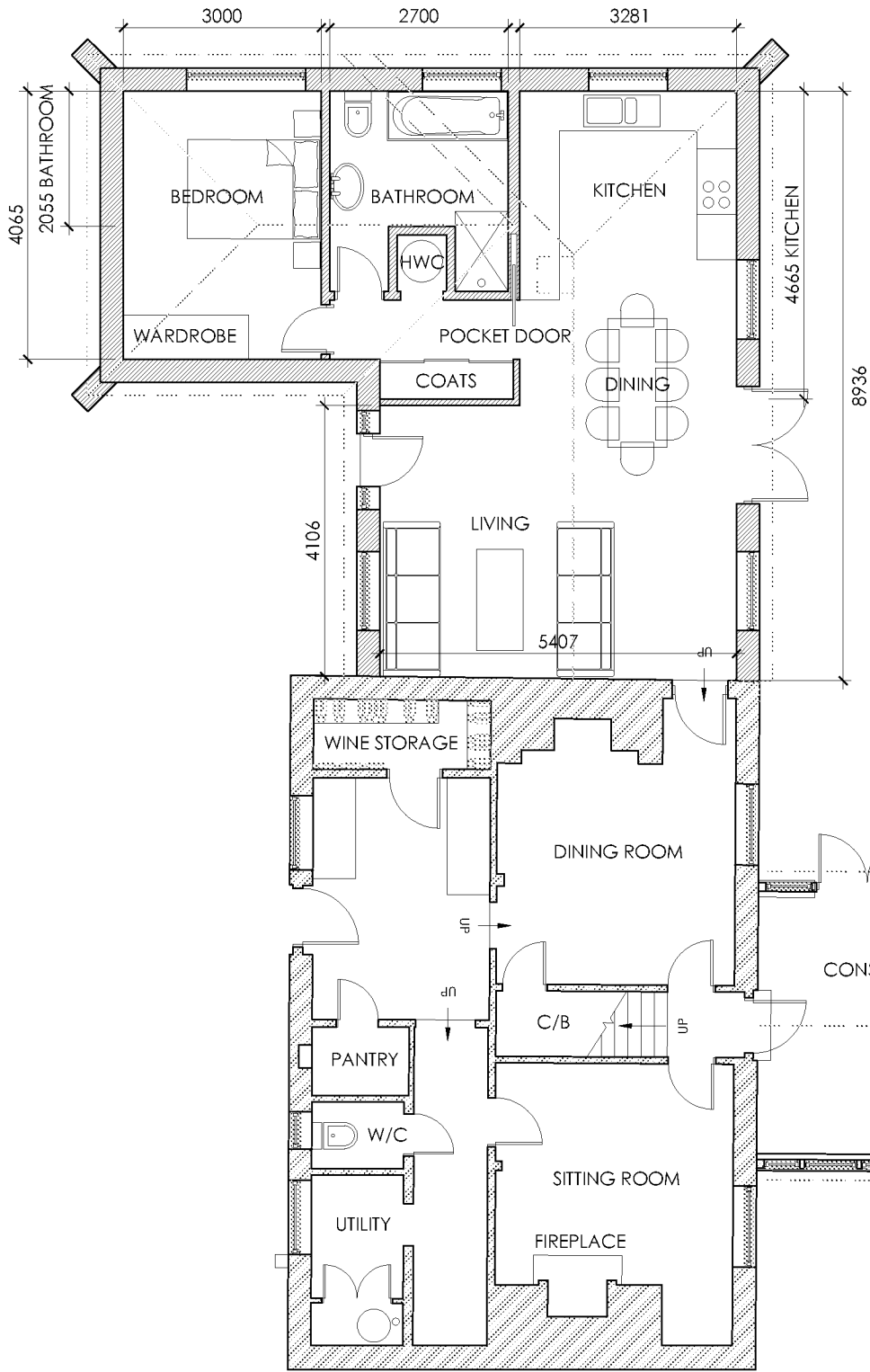
This drawing has been prepared for the purpose of gaining planning permission only and does not purport to be a working or contractual drawing and should not be used for any building or contractual purposes. This drawing has been prepared based on survey drawings and information prepared by others. All dimensions and levels on all drawings must be checked and verified on site before commencement of works

© VICTORIA HOLLAND ARCHITECTURE LTD 2019

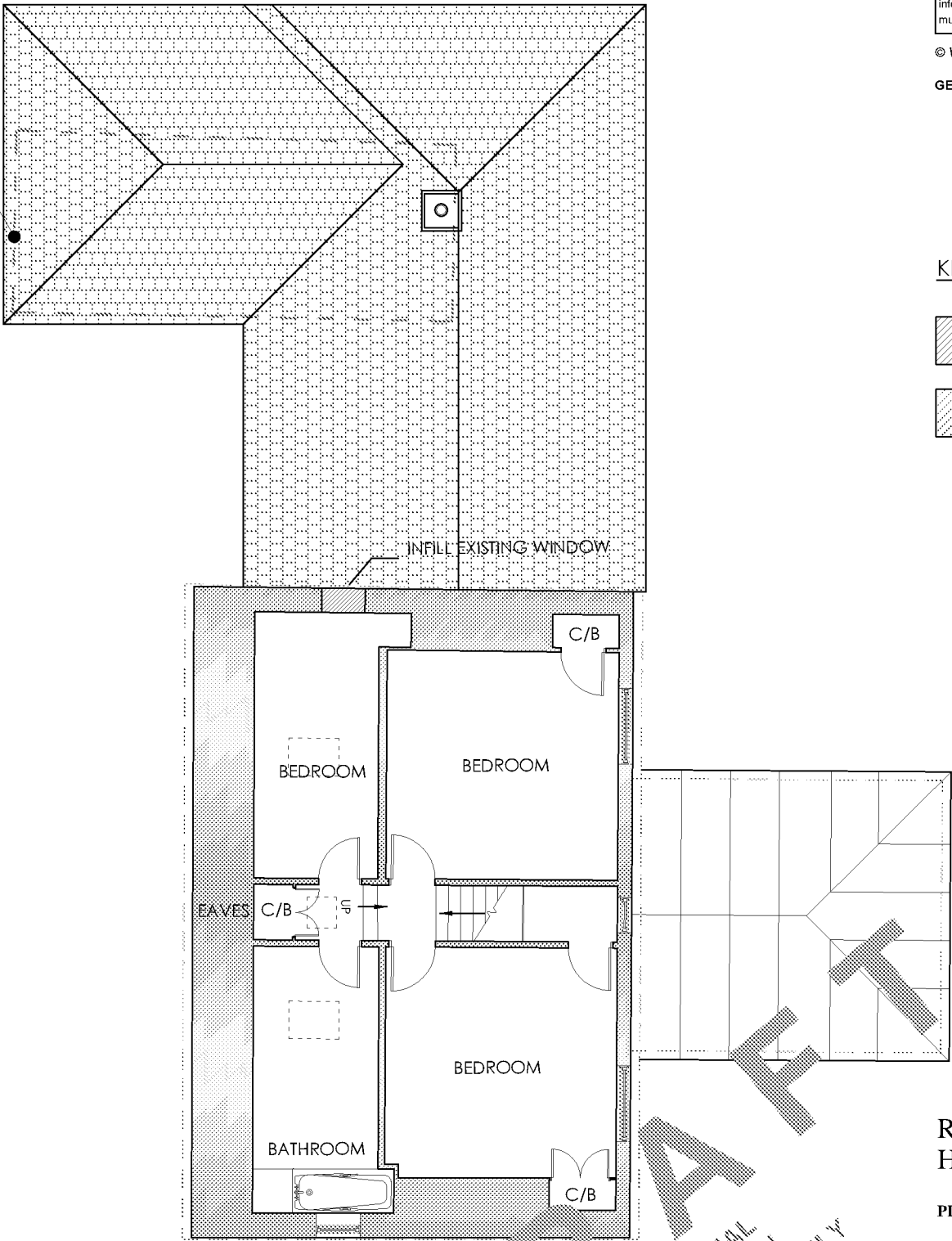
GENERAL NOTES

KEY

- PROPOSED
- EXISTING



PROPOSED GROUND FLOOR PLAN



PROPOSED FIRST FLOOR PLAN

ROOKERY COTTAGE
HOE LANE, PO22 8NT

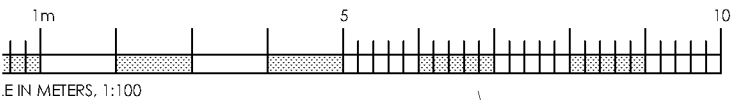
PLANNING APPLICATION

PROPOSED FLOOR PLANS

DATE. JULY 2019
SCALE. 1:100 @ A3
JOB No. 1045
DRWG No. 105 Rev.



Victoria Holland RIBA
71 Peppering High Barn · Burpham
Arundel · West Sussex · BN18 9RN
Tel 01903 882923



PROPOSED PLANS
SCALE 1:100



Appendix B Topographic Survey

Appendix C Sewer Records



Appendix D Greenfield Runoff Rates

Calculated by:	Daniel Lytton
Site name:	Rookery Cottage
Site location:	PO22 8NT

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

Site Details

Latitude:	50.80371° N
Longitude:	0.635° W
Reference:	2219027826
Date:	Feb 24 2020 14:33

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.257
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Methodology

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

Soil characteristics

	Default	Edited
SOIL type:	3	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.37	0.37

Hydrological characteristics

	Default	Edited
SAAR (mm):	719	719
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.76	0.76
1 in 1 year (l/s):	0.65	0.65
1 in 30 years (l/s):	1.75	1.75
1 in 100 year (l/s):	2.43	2.43
1 in 200 years (l/s):	2.85	2.85

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix E Site Infiltration Testing Results

Appendix F Drainage Strategy Calculations

RGP Design Limited				Page 1																																																																																																																																																																																																																			
2 West Barn Norton Lane Chichester PO20 3AF		D1828 Rookery Cottage Hoe Lane, Flansham Drainage Strategy																																																																																																																																																																																																																					
Date 24/02/2020 File D1828 Rookery Cottage D...		Designed by D Lytton Checked by																																																																																																																																																																																																																					
Innovyze		Source Control 2017.1																																																																																																																																																																																																																					
<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 4892 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>4.691</td><td>0.091</td><td>0.0</td><td>1.6</td><td>O K</td></tr><tr><td>30 min Summer</td><td>4.721</td><td>0.121</td><td>0.0</td><td>2.2</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>4.755</td><td>0.155</td><td>0.0</td><td>2.8</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>4.791</td><td>0.191</td><td>0.0</td><td>3.4</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>4.813</td><td>0.213</td><td>0.0</td><td>3.8</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>4.827</td><td>0.227</td><td>0.0</td><td>4.1</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>4.848</td><td>0.248</td><td>0.0</td><td>4.5</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>4.863</td><td>0.263</td><td>0.0</td><td>4.7</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>4.874</td><td>0.274</td><td>0.0</td><td>4.9</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>4.883</td><td>0.283</td><td>0.0</td><td>5.1</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>4.897</td><td>0.297</td><td>0.0</td><td>5.3</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>4.913</td><td>0.313</td><td>0.0</td><td>5.6</td><td>Flood Risk</td></tr><tr><td>2160 min Summer</td><td>4.924</td><td>0.324</td><td>0.0</td><td>5.8</td><td>Flood Risk</td></tr><tr><td>2880 min Summer</td><td>4.927</td><td>0.327</td><td>0.0</td><td>5.9</td><td>Flood Risk</td></tr><tr><td>4320 min Summer</td><td>4.923</td><td>0.323</td><td>0.0</td><td>5.8</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>4.916</td><td>0.316</td><td>0.0</td><td>5.7</td><td>Flood Risk</td></tr><tr><td>7200 min 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Summer</td><td>14.706</td><td>0.0</td><td>364</td></tr><tr><td>480 min Summer</td><td>11.818</td><td>0.0</td><td>484</td></tr><tr><td>600 min Summer</td><td>9.966</td><td>0.0</td><td>604</td></tr><tr><td>720 min Summer</td><td>8.665</td><td>0.0</td><td>722</td></tr><tr><td>960 min Summer</td><td>6.943</td><td>0.0</td><td>962</td></tr><tr><td>1440 min Summer</td><td>5.071</td><td>0.0</td><td>1442</td></tr><tr><td>2160 min Summer</td><td>3.696</td><td>0.0</td><td>2160</td></tr><tr><td>2880 min Summer</td><td>2.949</td><td>0.0</td><td>2880</td></tr><tr><td>4320 min Summer</td><td>2.142</td><td>0.0</td><td>3764</td></tr><tr><td>5760 min Summer</td><td>1.705</td><td>0.0</td><td>4552</td></tr><tr><td>7200 min Summer</td><td>1.427</td><td>0.0</td><td>5264</td></tr><tr><td>8640 min Summer</td><td>1.235</td><td>0.0</td><td>6056</td></tr><tr><td>10080 min Summer</td><td>1.093</td><td>0.0</td><td>6864</td></tr><tr><td>15 min 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2 West Barn Norton Lane Chichester PO20 3AF		D1828 Rookery Cottage Hoe Lane, Flansham Drainage Strategy			
Date 24/02/2020 File D1828 Rookery Cottage D...		Designed by D Lytton Checked by			
Innovyze		Source Control 2017.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	4.736	0.136	0.0	2.4	Flood Risk
60 min Winter	4.774	0.174	0.0	3.1	Flood Risk
120 min Winter	4.815	0.215	0.0	3.9	Flood Risk
180 min Winter	4.839	0.239	0.0	4.3	Flood Risk
240 min Winter	4.855	0.255	0.0	4.6	Flood Risk
360 min Winter	4.878	0.278	0.0	5.0	Flood Risk
480 min Winter	4.895	0.295	0.0	5.3	Flood Risk
600 min Winter	4.908	0.308	0.0	5.6	Flood Risk
720 min Winter	4.919	0.319	0.0	5.7	Flood Risk
960 min Winter	4.935	0.335	0.0	6.0	Flood Risk
1440 min Winter	4.955	0.355	0.0	6.4	Flood Risk
2160 min Winter	4.970	0.370	0.0	6.7	Flood Risk
2880 min Winter	4.975	0.375	0.0	6.8	Flood Risk
4320 min Winter	4.974	0.374	0.0	6.7	Flood Risk
5760 min Winter	4.964	0.364	0.0	6.6	Flood Risk
7200 min Winter	4.955	0.355	0.0	6.4	Flood Risk
8640 min Winter	4.946	0.346	0.0	6.2	Flood Risk
10080 min Winter	4.935	0.335	0.0	6.0	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	83.789	0.0	34		
60 min Winter	53.779	0.0	64		
120 min Winter	33.337	0.0	122		
180 min Winter	24.832	0.0	182		
240 min Winter	20.006	0.0	242		
360 min Winter	14.706	0.0	360		
480 min Winter	11.818	0.0	478		
600 min Winter	9.966	0.0	596		
720 min Winter	8.665	0.0	714		
960 min Winter	6.943	0.0	952		
1440 min Winter	5.071	0.0	1414		
2160 min Winter	3.696	0.0	2116		
2880 min Winter	2.949	0.0	2792		
4320 min Winter	2.142	0.0	4104		
5760 min Winter	1.705	0.0	5192		
7200 min Winter	1.427	0.0	5616		
8640 min Winter	1.235	0.0	6568		
10080 min Winter	1.093	0.0	7464		
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2 West Barn Norton Lane Chichester PO20 3AF	D1828 Rookery Cottage Hoe Lane, Flansham Drainage Strategy	
Date 24/02/2020 File D1828 Rookery Cottage D...	Designed by D Lytton Checked by	
Innovyze	Source Control 2017.1	

Model Details

Storage is Online Cover Level (m) 5.000

Infiltration Trench Structure

Infiltration Coefficient Base (m/hr)	0.00360	Trench Width (m)	3.0
Infiltration Coefficient Side (m/hr)	0.00360	Trench Length (m)	6.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	4.600	Cap Infiltration Depth (m)	0.000

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