



**LAND WEST OF THE INGLENOK HOTEL,
PAGHAM ROAD, BOGNOR REGIS PO21
3QB**

PROPOSED RESIDENTIAL DEVELOPMENT

Flood Risk Assessment & Drainage Strategy

Prepared on Behalf of

Mr. A Honour

D2310/FRA1.1

March 2025

DOCUMENT CONTROL

Project: Land west of the Inglenook Hotel, Pagham Road, Bognor Regis PO21 3QB
Proposed residential development

Document: Flood Risk Assessment & Drainage Strategy

Client: Mr. A Honour

Reference: D2310/FRA1.1

Document Checking:

Author:	S Burnett	Date: 26/03/2025
Checked by:	M Akmenkalns	Date: 28/03/2025
Approved by:	M Akmenkalns	Date: 28/03/2025

Status:

Issue	Date	Status	Issued by
1.0	28/03/2025	FIRST ISSUE	SPB
1.1	17/04/2025	FINAL	SPB

© Copyright BP Civils 2025

No part of this publication may be reproduced by any means without the prior permission of BP Civils.

CONTENTS

1	INTRODUCTION	6
1.1	Background.....	6
2	SITE LOCATION AND DESCRIPTION	7
3	GROUND CONDITIONS	8
3.2	Groundwater.....	10
4	EXISTING DRAINAGE	13
4.1	Surface Water	13
4.2	Foul Water.....	13
4.3	Highway Drainage.....	14
5	PROBABILITY	15
5.1	Sources of Information	15
5.2	Flood Map Analysis.....	15
5.3	Historic Flooding.....	17
5.4	Summary of Flood Risk.....	18
6	PROPOSED DEVELOPMENT	19
6.1	Description of Development	19
7	SEQUENTIAL AND EXCEPTION TESTS	20
7.1	Sequential Test	20
7.2	Exception Test	20
8	PROPOSED DRAINAGE STRATEGY	21
8.1	Surface Water	21
8.2	Treatment	22
8.3	Foul Water Drainage	23
8.4	Climate Change	23
8.5	Urban Creep	24
9	RESIDUAL RISK AND MITIGATION	25
9.1	Residual Risk.....	25
9.2	Mitigation.....	25
10	FLOOD RISK MANAGEMENT	26
10.1	Safe Access and Egress	26
10.2	Flood Warning	26

11	MAINTENANCE.....	27
11.1	Proposed Maintenance Regime	27
12	OFF SITE IMPACTS	28
13	SUMMARY.....	29

DRAWINGS

- PL001** Topographic Survey with Contours
- PL002** Impermeable Areas
- PL003** Existing Drainage
- PL004** Conceptual Surface Water Drainage Strategy

APPENDICES

- Appendix A** Site Layout
- Appendix B** Topographic Survey
- Appendix C** Site Investigation
- Appendix D** Public Sewer Records
- Appendix E** Flood Maps for Planning Extracts
- Appendix F** Strategic Flood Risk Assessment Extracts
- Appendix G** Greenfield Run-off Calculations
- Appendix H** Proposed Surface Water Drainage Calculations

1 INTRODUCTION

1.1 Background

- 1.1.1 BP Civils is instructed by Mr. A Honour to prepare a flood risk assessment and drainage strategy for the construction of 6 No. residential properties at land west of the Inglenook Hotel, Pagham Road, Bognor Regis PO21 3QB.
- 1.1.2 This report has been undertaken in accordance with National Planning Policy Framework (NPPF) and The Planning Practice Guidance on the use of SuDS for achieving sustainable development.
- 1.1.3 The proposed development will involve the construction of 6 No. residential properties as demonstrated by the development proposals contained within **Appendix A**.
- 1.1.4 In preparing this report, BP Civils has referred to the following documents and information:
- Arun District Council Strategic Flood Risk Assessment
 - British Geological Survey (BGS) Information and Records
 - Environment Agency (EA) Flood Maps for Planning
 - Flood Estimation Handbook (FEH) Catchment Data
 - Ground Management Ltd Intrusive Site Investigation
 - Long Term Flood Risk Maps for Rivers or the Sea, Surface Water and Reservoirs
 - Southern Water Public Sewer Records
- 1.1.5 This report has been prepared to assess flood risk at the site, and to advise of any mitigation which may be required in order to ensure that the proposed development remains safe for its design life in accordance with current design standards.
- 1.1.6 This report has been prepared for the benefit of the named client only.

2 SITE LOCATION AND DESCRIPTION

- 2.1.1 A site location plan has been prepared and is included within this report.
- 2.1.2 The National Grid Reference is SZ 89110 98722.
- 2.1.3 The site is located in a built up residential area, to the west of the Inglenook Hotel and to the south of properties located in Millfarm Drive. Platinum Gardens – 9 No. recently constructed residential properties – is located immediately to the west of the site. Spinnaker Drive is located to the south of the site.
- 2.1.4 The site measures 2,399m² (0.24Ha) and is occupied by a number of semi-permanent structures, including static caravans and timber sheds.
- 2.1.5 The client's planning consultant has provided a site topographic survey which identifies levels broadly in the range of 5.600m AOD and 6.300m AOD.
- 2.1.6 Drawing PL200 (Topographic Survey with Contours) has been prepared to illustrate the trends in topography at the site.
- 2.1.7 The topographic survey does not demonstrate prevailing falls across the site in any given direction. The site is therefore considered to be flat.

3 GROUND CONDITIONS

- 3.1.1 The BGS Geology of Britain Viewer indicates a 'London Clay Formation – Clay, silt and sand' bedrock geology.

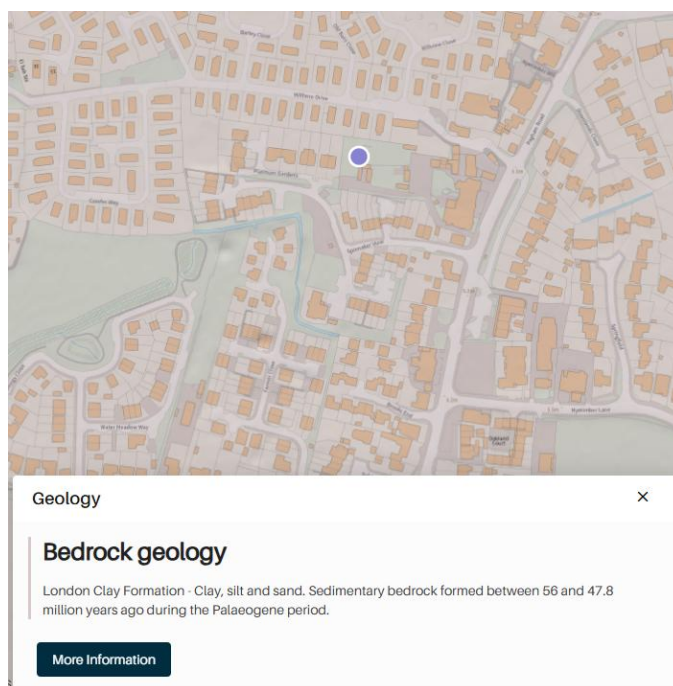


Figure 1. Geology of Britain Viewer – Bedrock Geology (BGS)

- 3.1.2 Superficial deposits are recorded as 'River Terrace Deposits – Sand, silt and clay.'

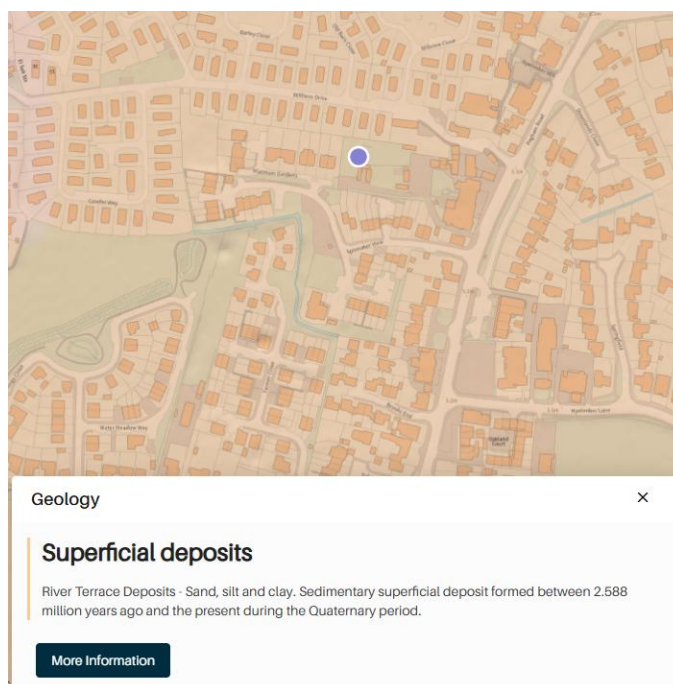


Figure 2. Geology of Britain Viewer – Superficial Deposits (BGS)

- 3.1.3 Intrusive site investigation has been undertaken at the site by Ground Management Ltd. The site works were undertaken in December 2024.

3.1.4 2 No. boreholes were excavated on site to depths of 3.00m below ground level to allow groundwater monitoring to be undertaken. The groundwater monitoring standpipes were installed on 5th December 2024.

3.1.5 A summary of the encountered geology for both boreholes is provided below:

BH1		
Encountered Geology	Thickness	Depth (m below ground level)
Topsoil	0.30m	0.00 – 0.30m
Firm orange brown silty CLAY with occasional subangular fine flint gravel	1.05m	0.30m – 1.35m
Orange brown and yellow brown coarse medium and fine angular to subangular flint GRAVEL with some silty to fine to medium sand. Some silty clay from 2.1m to 2.3m	1.05m	1.35m – 2.40m
Yellow brown slightly silty fine to medium SAND with a little coarse medium and fine rounded to subrounded flint gravel	0.60m	2.40m – 3.00m

BH2		
Encountered Geology	Thickness	Depth (m below ground level)
Topsoil	0.30m	0.00 – 0.30m
Firm orange brown silty CLAY. A little coarse medium and fine subrounded and rounded flint	0.90m	0.30 – 1.20m

gravel below 1.00m		
Firm orange brown and yellow brown sandy (medium and fine) CLAY / SILT with some coarse medium and fine angular to subangular flint gravel.	1.20m	1.20 – 2.40m
Orange brown slightly silty fine to medium SAND	0.50m	2.40 – 2.90m
Firm to stiff brown CLAY	0.10m	2.90 – 3.00m

3.1.6 Ground Management Ltd's reporting is contained within **Appendix C**.

3.2 Groundwater

- 3.2.1 Groundwater investigation and monitoring has been undertaken by Ground Management Ltd in respect of their intrusive site investigation.
- 3.2.2 During installation of the 2 No. boreholes, seepage was recorded at both BH1 and BH2 below 1.00m below ground level.
- 3.2.3 The water level was recorded at 0.89m below ground level after 30 minutes at BH1 and at 0.65m below ground level after 30 minutes at BH2.
- 3.2.4 Groundwater monitoring has been undertaken between 5th December 2024 and 28th March 2025.
- 3.2.5 The peak groundwater levels recorded during this period are 0.55m below ground level at BH1 and 0.41m below ground level at BH2.
- 3.2.6 Ground Management Ltd's reporting is contained within **Appendix C**.
- 3.2.7 Mapping managed by MAGIC (magic.defra.gov.uk) provides geographic information concerning the natural environment from across government.
- 3.2.8 The site is located within an area identified as being an 'Unproductive' bedrock aquifer, in addition to a 'Secondary A' superficial drift aquifer.

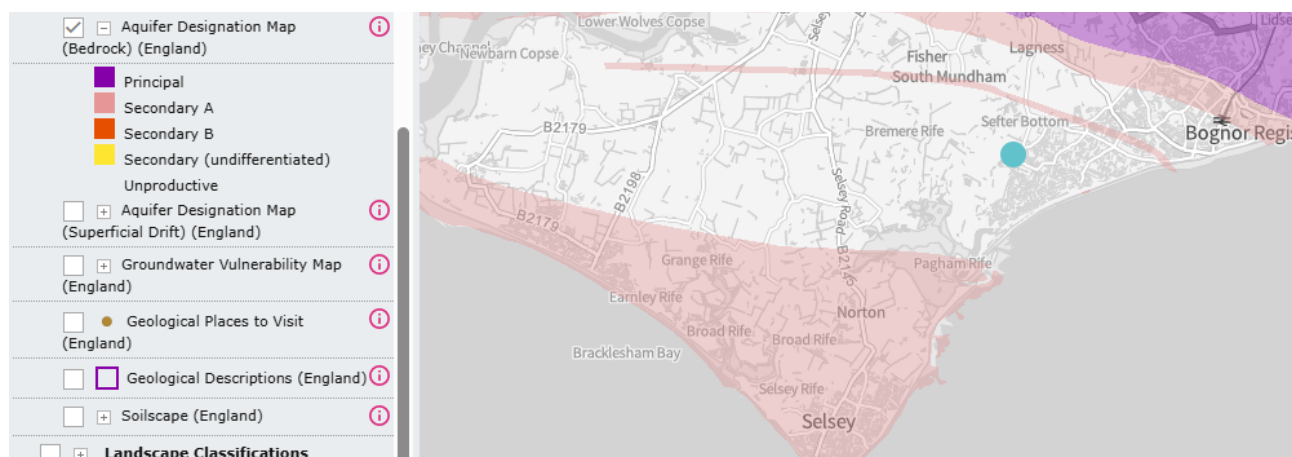


Figure 4. Aquifer Designation Map - Bedrock Aquifer (DEFRA)



Figure 5. Aquifer Designation Map – Superficial Drift (DEFRA)

3.2.9 The site is located within a 'Medium - Low' groundwater vulnerability zone.

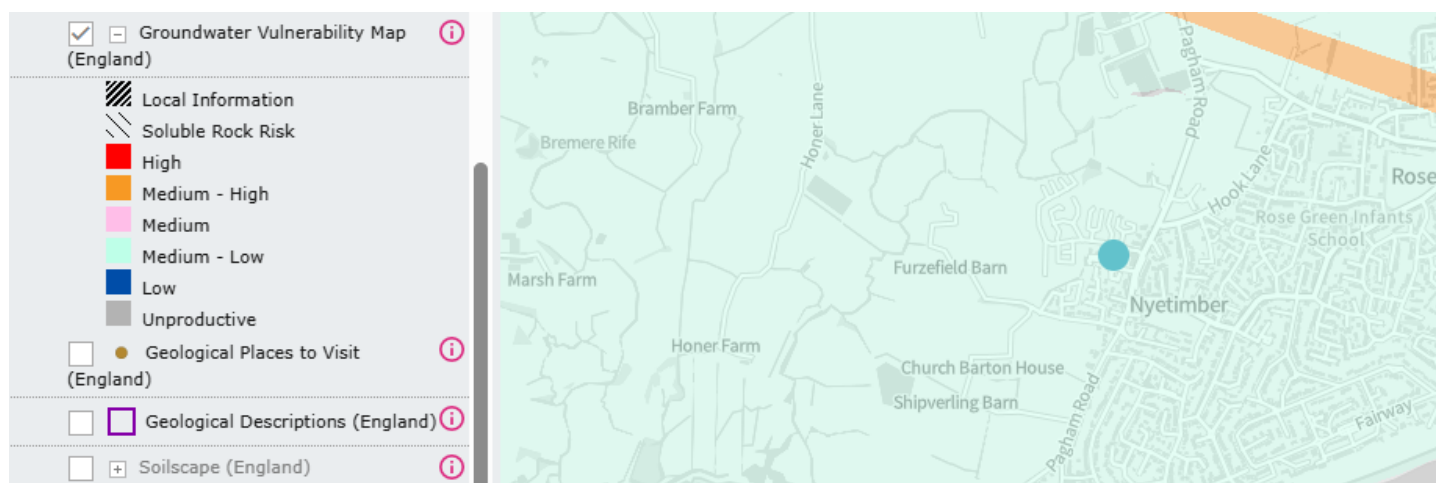


Figure 6. Groundwater Vulnerability Map (DEFRA)

3.2.10 The site does not fall within any drinking water protected areas (surface water), drinking water safeguard zones (surface water or groundwater) or source protection zones.

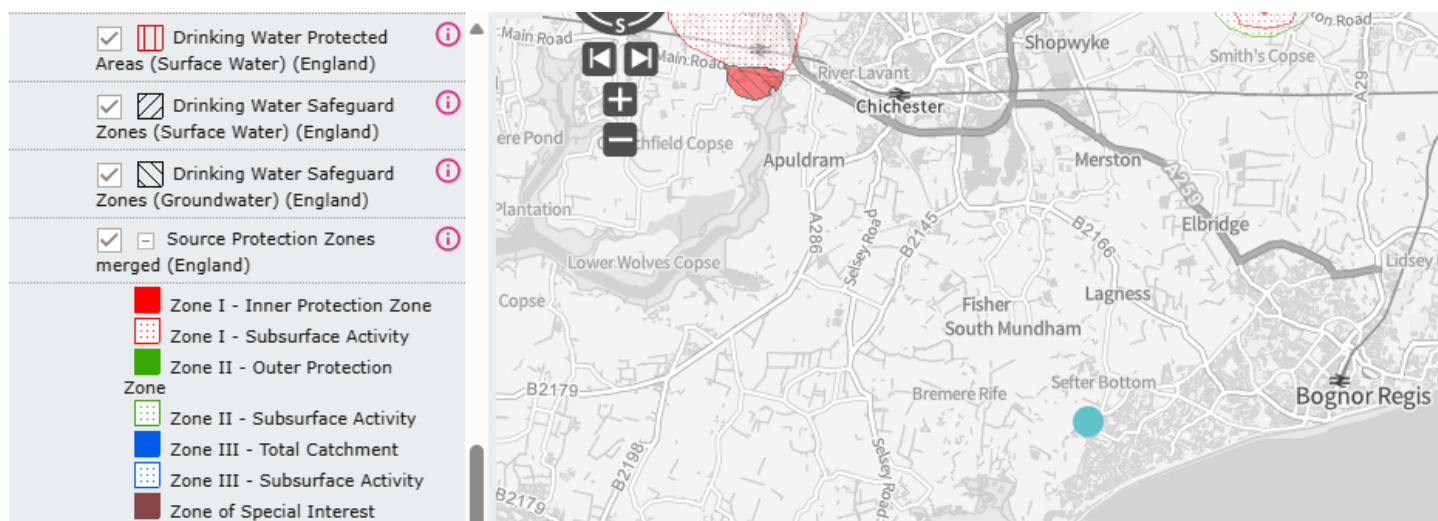


Figure 7. Drinking Water Protected Areas (Surface Water), Drinking Water Safeguard Zones (Surface Water and Groundwater and Source Protection Zone Map (DEFRA)

4 EXISTING DRAINAGE

4.1 Surface Water

- 4.1.1 The local sewerage authority is Southern Water.
- 4.1.2 Public sewer records have been obtained from Southern Water, as contained within **Appendix D**.
- 4.1.3 Southern Water's public sewer records identify a 225mm dia. public surface water sewer beneath Pagham Road, to the east of the site.
- 4.1.4 The 225mm dia. public surface water sewer is shown to be flowing in a northerly direction.
- 4.1.5 The site is not currently served by any positive drainage infrastructure and drains naturally.
- 4.1.6 There are no ordinary watercourses and/or Main Rivers within the vicinity of the site.
- 4.1.7 Millfarm Drive, to the north of the site, and Spinnaker View, to the south of the site, are both private, unadopted roads. As such drainage arrangements are unknown and records are not available.
- 4.1.8 Platinum Gardens, immediately to the west of the site, is served by a connection to the Southern Water public surface water sewer beneath Pagham Road. The surface water drainage system serving Platinum Gardens remains private, and has not been adopted by Southern Water. The Management Company is under the ownership of the residents of Platinum Gardens.
- 4.1.9 A greenfield run-off rates have been established in relation to the site area (2,399m²) using HR Wallingford's 'Greenfield run-off rate estimation' tool.
- 4.1.10 Greenfield run-off rates have been calculated as follows;
 - $Q_{BAR} = 0.68 \text{ l/s}$
 - 1 in 1 Year – 0.58 l/s
 - 1 in 30 Year – 1.57 l/s
 - 1 in 100 Year – 2.18 l/s
 - 1 in 200 Year – 2.55 l/s

4.2 Foul Water

- 4.2.1 Southern Water's public sewer records identify public foul water sewers beneath Pagham Road, to the east of the site.
- 4.2.2 1 No. 150mm dia. public foul water sewer is shown to flow in a southerly direction.
- 4.2.3 A second 150mm dia. public foul water sewer is shown to the north-east of the Inglenook Hotel, also beneath Pagham Road. This sewer is shown to flow in a northerly direction.

- 4.2.4 Platinum Gardens is served by a pumped foul water drainage arrangement which discharges, indirectly, to Southern Water's public foul water sewer network and the 150mm dia. public foul water sewer which flows in a southerly direction.

4.3 Highway Drainage

- 4.3.1 Pagham Road is served by traditional road gullies which are assumed to discharge to Southern Water's public surface water sewer network.

5 PROBABILITY

5.1 Sources of Information

5.1.1 The National Planning Policy Framework (NPPF) requires that all sources of flooding are considered being tidal, fluvial, pluvial, groundwater, sewers and man-made canals/reservoirs.

5.1.2 The likelihood of the site flooding has been established by reviewing the following information:

- Arun District Council Strategic Flood Risk Assessment
- Environment Agency Flood Maps for Planning
- Long-Term Flood Risk Map Service

5.2 Flood Map Analysis

5.2.1 The site is located fully within Flood Zone 1.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b).
Zone 2 Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map).
Zone 3a High Probability	Land having a 1% or greater annual probability of river flooding; or land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map).
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of function floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • Land having a 3.3% or greater annual probability of flooding, with any existing flood management infrastructure operating effectively; or • Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional

floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map).

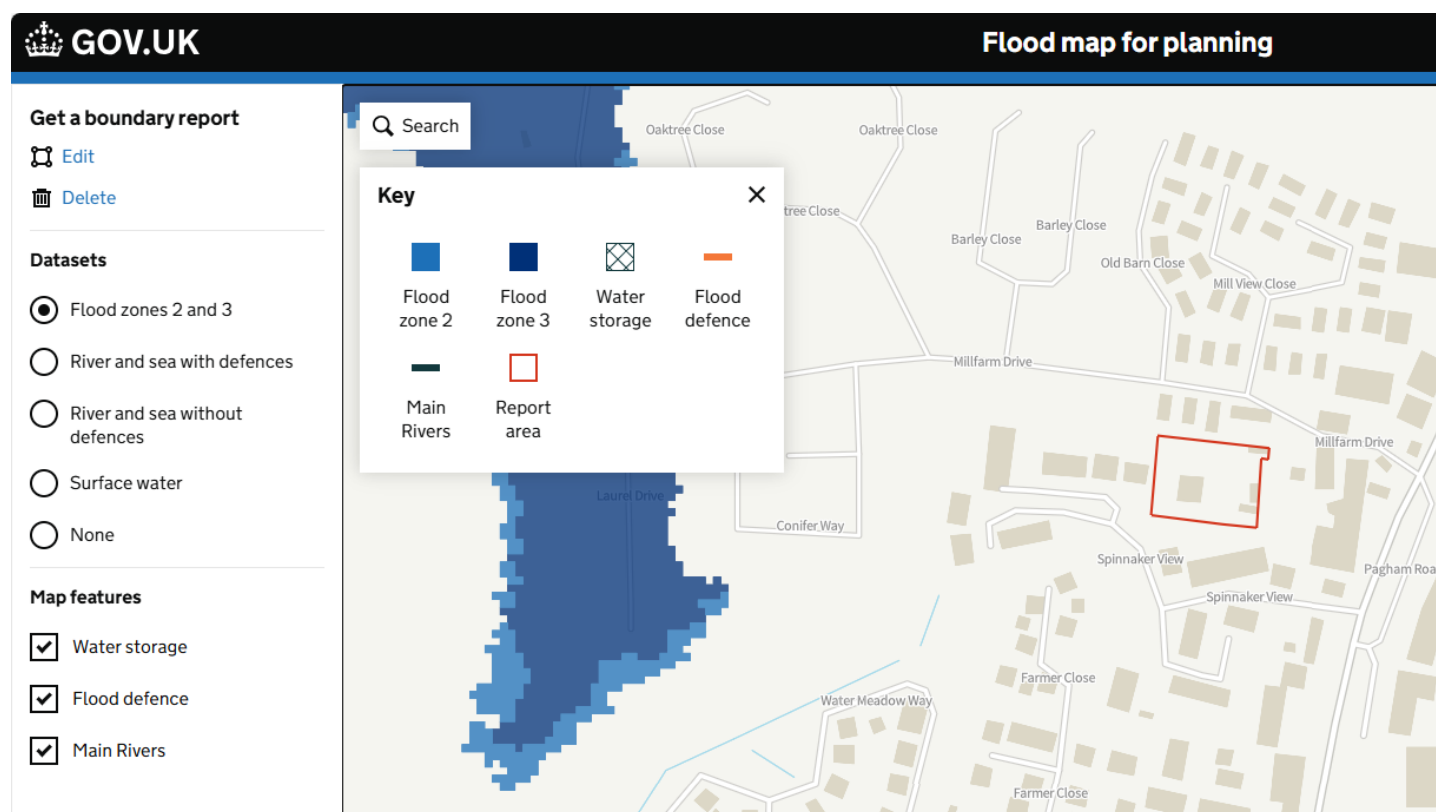


Figure 8. Flood Maps for Planning (Gov.uk)

- 5.2.2 Flood Maps for Planning, Rivers and the Sea, do not identify the site as at risk of flooding from such sources in the current day and/or in respect of climate change considerations, with defences.
- 5.2.3 The site is identified as being partially at risk of flooding from such sources in respect of climate change, without defences. The site is defended however, therefore, the risk is in the event of exceedance and/or breach of the present defences.
- 5.2.4 Flood Maps for Planning, Surface Water, identify the site as being at 'Low' risk of surface water flooding (1 in 1000) at the southern/south-eastern extents of the site.
- 5.2.5 Flood Maps for Planning extracts are contained within **Appendix E**.
- 5.2.6 The Long-term Flood Risk Service states that flooding from groundwater and/or reservoirs is 'unlikely' in this area.

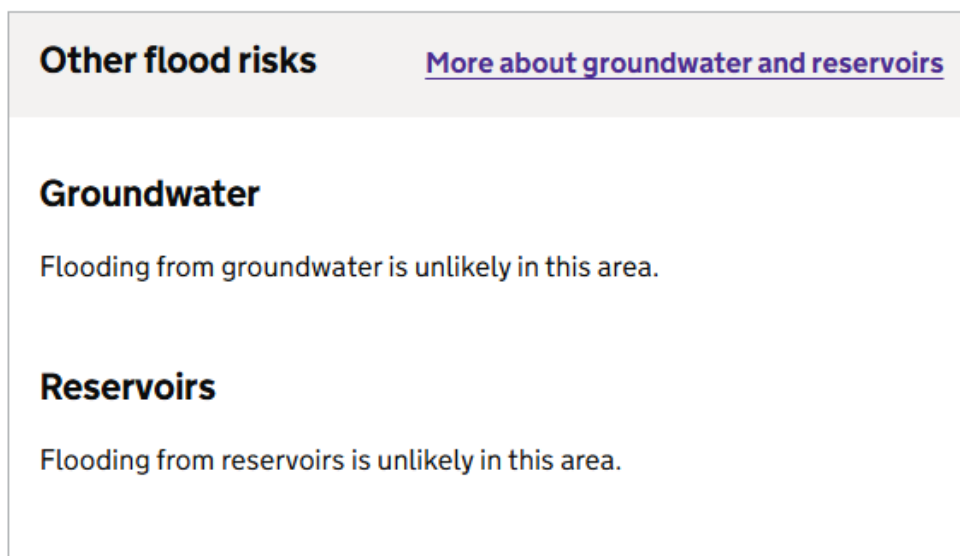


Figure 9. Long-term Flood Risk Service – Groundwater & Reservoir Flood Risk (Gov.uk)

5.3 Historic Flooding

- 5.3.1 No instances of historic flooding have been identified at the site, upon review of the information available at the time of undertaking this flood risk assessment.

5.4 Summary of Flood Risk

5.4.1 The potential sources of flooding are:

Source of Flooding	Level of Risk
Rivers and Coastal	Very Low The site is located fully within Flood Zone 1. Flood Maps for Planning identifies the site as being at risk of flooding from Rivers and the Sea without defences with climate change considerations applied. The site is defended, therefore the site is at risk in an exceedance or breach scenario.
Surface Water	Very Low to Low Flood Maps for Planning, Surface Water, identify the site as being at 'Low' risk of surface water flooding at the southern/south-eastern extents of the site only.
Groundwater	Low to Medium Groundwater monitoring has been undertaken at the site by Ground Management Ltd. Groundwater peaked at 0.55m below ground level at BH1 and at 0.41m below ground level at BH2.
Sewers	Very Low No instances of historic sewer flooding have been identified in the undertaking of this flood risk assessment.
Artificial Sources	None The site is not identified as being at risk of flooding from such sources.

5.4.2 The site has been assessed as being at 'Very Low' or 'Low' risk of flooding from all of the potential sources of flooding as identified in the above table, with the exception of groundwater ('Low' to 'Medium').

5.4.3 The drainage design for the proposed development should ensure that capacity up to the design event is provided whilst potential exceedance routes should also be considered, so as to not increase the risk of surface water flooding on or off the site.

6 PROPOSED DEVELOPMENT

6.1 Description of Development

- 6.1.1 The proposed development will involve the construction of a 6 No. residential properties as demonstrated by the development proposals contained within **Appendix A**.
- 6.1.2 The type of development proposed falls within the "More Vulnerable" flood risk vulnerability classification (Annex 3: Flood risk vulnerability classification, NPPF) and is appropriate in Flood Zone 1 (Flood Risk and Coastal Change Table 2).

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1	✓	✓	✓	✓	✓
Flood Zone 2	✓	Exception Test Required	✓	✓	✓
Flood Zone 3a†	Exception Test Required †	✗	Exception Test Required	✓	✓
Flood Zone 3b*	Exceptions Test Required *	✗	✗	✗	✓*
✓ = Development is appropriate ✗ = Development should not be permitted					

- 6.1.3 The proposed development will see the introduction of impermeable surfaces at the site, which can lead to an increase in the rate of run-off generated. SuDS measures will be used where possible in order to mitigate this.
- 6.1.4 The post-development impermeable area has been determined to be 1,169m² (0.12Ha).
- 6.1.5 The use of SuDS methods and techniques, where site conditions and constraints allow, will be utilised to assist in the management of surface water run-off generated by the proposed development, whilst adhering to the SuDS hierarchy as stated within Building Regulations (Part H) and The SuDS Manual (C753).
- 6.1.6 The specific Surface Water and Foul Water drainage proposals are detailed in **Section 8** of this report.

7 SEQUENTIAL AND EXCEPTION TESTS

7.1 Sequential Test

- 7.1.1 The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account.
- 7.1.2 Where it is not possible to locate development in low-risk areas, the Sequential Test should look to compare reasonably available sites within medium risk areas, and then only where there are no reasonably available sites in low and medium risk areas, within high-risk areas.
- 7.1.3 The site is located fully within Flood Zone 1, and has been assessed as being at 'Very Low' or 'Low' risk of flooding from all of the potential sources of flood risk considered, with the exception of groundwater ('Low' to 'Medium').
- 7.1.4 In view of the above factors, the Sequential Test is passed.

7.2 Exception Test

- 7.2.1 The Exception Test requires two additional elements to be satisfied, as set out in paragraph 178 of the NPPF before development can be permitted in situations where suitable sites at lower risk of flooding are not available following application of the Sequential Test.
- 7.2.2 The Exception Test requires the applicant to demonstrate that;
- i. development that has to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk, and;
 - ii. the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
- 7.2.3 Flood Risk and Coastal Change, Table 2 (see 6.1.2) confirms that "More Vulnerable" development is acceptable in Flood Zone 1, and therefore application of the Exception Test is not required.

8 PROPOSED DRAINAGE STRATEGY

8.1 Surface Water

8.1.1 The SUDS Manual (CIRIA C753) and Building Regulations, Approved Document H (Drainage and Waste Disposal) 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 appropriate in view of the development proposals
Basins and Ponds (such as Wetlands, Balancing Ponds, Detention Basins, Retention Ponds)	No	Not appropriate in view of shallow groundwater depths in addition to spatial constraints on site.
Filter strips and swales	No	Not appropriate in view of shallow groundwater depths in addition to spatial constraints on site.
Infiltration Devices - Soakaways - Infiltration trenches and basins	No	Shallow groundwater depths dictate that infiltration is not viable.
Permeable surfaces and filter drains (such as gravelled areas and porous block paving)	Yes	Will need to be lined/tanked in view of groundwater levels, however can be used to provide attenuation.
Tanked systems (such as oversized pipes or cellular tanks)	Yes	No initial constraints, however higher-ranking drainage opportunities should be prioritised and considered before such measures are proposed.

- 8.1.2 Infiltration is not viable in view shallow groundwater depths established on site further to winter groundwater monitoring.
- 8.1.3 There are no watercourses within the vicinity of the site to which surface water could discharge to.
- 8.1.4 It is proposed that the site will drain to the private surface water sewer serving Platinum Gardens which discharges to Southern Water's public sewer beneath Pagham Road.
- 8.1.5 Flows will be restricted to a maximum of 2.00 l/s.
- 8.1.6 The proposed access road will be of a free-draining root protection construction in view of arboricultural constraints.
- 8.1.7 The proposed private driveways will be of a permeable construction which will be tanked, discharging to the piped system.
- 8.1.8 Run-off from the proposed roof area(s) will discharge to the permeable paving sub-base.
- 8.1.9 It is proposed that all captured run-off from the proposed hardstanding areas is captured up to the 100-year event including 45% climate change without exceedance.

8.2 Treatment

- 8.2.1 In accordance with the CIRIA SuDS Manual C753 regarding methods for managing pollution risks, the risk posed by surface water run-off 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).
- 8.2.2 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.
- 8.2.3 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).
- 8.2.4 In accordance with C753 Table 26.2, the proposed land uses at the site are categorised as follows:
 - Residential roofs – Very low/TSS=0.2/M=0.2/H=0.05
 - Individual property driveways and low traffic roads – very low/TSS=0.5/M=0.4/H=0.4
- 8.2.5 In accordance with C753 Table 26.3, the values of SuDS Mitigation indices are provided for permeable paving:

- Permeable Paving – $TSS=0.7/M=0.6/H=0.7$

- 8.2.6 The use of a permeable paving will ensure that run-off from the site receives a level of treatment required by the SuDS Manual, with hydrocarbons being filtered by the aggregate and geotextile layers.
- 8.2.7 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.

8.3 Foul Water Drainage

- 8.3.1 Foul water from the proposed development will discharge, indirectly, to Southern Water's public foul water sewer network beneath Pagham Road.
- 8.3.2 The 6 No. units will require pumping owing to site levels and levels associated with the public sewer. The pumping arrangement is subject to detailed design.
- 8.3.3 The 6 No. properties will generate peak foul water flows of 0.27 l /s (based on 4000 litres /day, as per Sewer Sector Guidance, Appendix C – Design & Construction Guidance).

8.4 Climate Change

- 8.4.1 Gov.uk provides guidance for local planning authorities preparing strategic flood risk assessments and developers and their agents preparing flood risk assessments for planning applications, and development consent orders for nationally significant infrastructure projects.
- 8.4.2 Climate change allowances are predictions of anticipated change for peak river flow, peak rainfall intensity, sea level rise and offshore wind speed and extreme wave height.
- 8.4.3 Allowance for climate change shall be provided in the undertaking of site-specific flood risk assessments where new development is proposed to minimise vulnerability and provide resilience to flooding and coastal change.
- 8.4.4 The 'Peak Rainfall Allowances Map' shows anticipated changes in peak rainfall intensity.
- 8.4.5 Based on the latest allowances, for the 3.3% annual exceedance rainfall event, an increase of 40% should be applied to peak rainfall in relation to the proposed development.
- 8.4.6 For the 1% annual exceedance rainfall event, an increase of 45% should be applied to peak rainfall in relation to the proposed development.

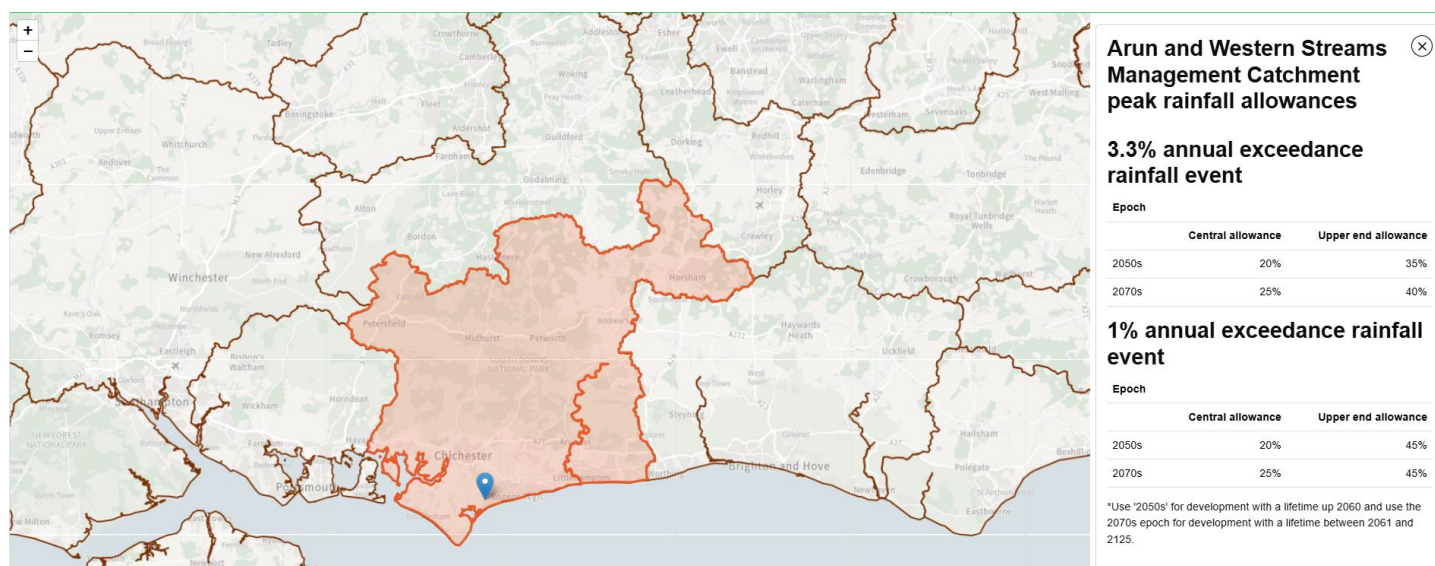


Figure 10. Climate Change Allowances – Peak Rainfall Allowances (Gov.uk)

8.5 Urban Creep

- 8.5.1 In accordance with West Sussex County Council's policies in relation to the management of surface water, and allowance of 10% has been made in the surface water drainage calculations prepared for the proposed development in respect of urban creep.

9 RESIDUAL RISK AND MITIGATION

9.1 Residual Risk

9.1.1 The following residual risks have been identified in relation to the proposed development:

- i. Extreme rainfall events that exceed the design criteria used for the drainage system causing surface water flooding
- ii. Blockage/failure of the proposed drainage system causing flooding to the site
- iii. Groundwater flooding to the site caused by groundwater levels exceeding the ground surface level
- iv. Surface water flooding of proposed buildings

9.2 Mitigation

9.2.1 Consideration has been taken to the residual risks stated in Section 9.1, and the following mitigation measures are proposed:

- i. The surface water drainage design has considered the current design standards and is able to accommodate a 1 in 100-year storm event, inclusive of an allowance of 45% for the potential impacts of climate change. Should a more extreme storm event occur, the system will be exceeded. In exceedance events, run-off will follow the topography of the site. Given the lack of fall in any given direction in view of the low lying nature of the site, exceedance flows could pond within the extents of the permeable paving.
- ii. Maintenance plays a vital role in managing and reducing flood risk. The proposed surface water drainage system is able to accommodate a 1 in 100-year storm event, inclusive of an allowance of 45% for the potential impacts of climate change. Should blockage or failure of the system occur, it is possible that flooding may occur. A detailed maintenance document shall be prepared prior to completion of the proposed development and implementation of the proposed drainage system. Initial maintenance requirements are detailed within Section 11.
- iii. Groundwater has been observed as shallow as 0.41m below ground level. Should groundwater emergence occur, there is potential for groundwater flooding to occur. Should groundwater emerge on site, this would follow the topography of the site. As already confirmed, with the site being flat with little to no prevailing falls, ponding would likely occur on site. Finished floor levels are to be set above finished ground levels to provide mitigation.
- iv. The site is identified as being at risk of surface water flooding (1 in 1000 – 'Low' risk). The introduction of impermeable surfaces on site will result in an increase in run-off, which is to be managed by the proposed surface water drainage system. Should surface water flooding be experienced on site, given the lack of prevailing falls, ponding would likely occur. Finished floor levels are to be set above finished ground levels to provide mitigation.

10 FLOOD RISK MANAGEMENT

10.1 Safe Access and Egress

- 10.1.1 Access to the site will be available via the existing access which serves Platinum Gardens, off of Spinnaker View.
- 10.1.2 Access/escape to/from the site, to/from Pagham Road is impacted in the 'without defences' scenarios, with climate change factors taken into consideration. Flood depths are not stated by the Environment Agency. The site is defended and is not identified as at risk of flooding in such scenarios.
- 10.1.3 The site is fully within Flood Zone 1 and has been assessed as being at 'Very Low' or 'Low' risk of flooding from all of the sources of potential flood risk considered in the undertaking of this flood risk assessment, with the exception of groundwater ('Low' to 'Medium'). It is therefore considered that safe access and egress is available from a flood risk perspective.

10.2 Flood Warning

- 10.2.1 The site is located fully within Flood Zone 1 as has been assessed as being at 'Very Low' or 'Low' risk of flooding from all of the sources of potential flood risk considered in the undertaking of this flood risk assessment, with the exception of groundwater ('Low' to 'Medium'). As such, there is no requirement for a Flood Warning System, Flood Plan or Flood Evacuation Plan to be provided in relation to the site and/or the proposed development, although the owner/occupier may still wish to consider preparing a Flood Plan for the development/site.

11 MAINTENANCE

11.1 Proposed Maintenance Regime

- 11.1.1 Maintenance is required to ensure the long-term operational performance of the proposed surface water drainage system.
- 11.1.2 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 the table below, along with the required frequency of works.

Drainage System feature	Proposed maintenance / remedial works	Required frequency of works
Permeable Paving	Surface sweeping to reduce silt and debris accumulation.	Every 8 to 12 weeks
	Removal / management of weed growth	At least once a year
Diffuser units & 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
Flow Control Chambers / Devices	Clean out chamber / sump	Monthly for first 3 months then twice annually
	Inspect flow control unit and remove debris	

- 11.1.3 The responsibility of any drainage infrastructure supporting a single dwelling/plot will be the sole responsibility of the owner/occupier of the associated dwelling.
- 11.1.4 Any infrastructure that is shared, serving more than 1 No. plot will be the responsibility of an appointed management company.

Accidental Spillages

- 11.1.5 It is not envisaged that any materials are to be stored on site 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.
- 11.1.6 Minor spillages of fuels and oils will be dealt with by the permeable paving, by bio-degrading and collecting the hydrocarbons respectively.

Future Alterations to the Development

- 11.1.7 Any future alterations to the permeable paving should be confirmed by a specialist. Where possible any future services are to avoid being located through areas of permeable paving. If new services are required to run through areas of permeable paving, services should be installed below the depth of permeable paving with the permeable system reinstalled above.

12 OFF SITE IMPACTS

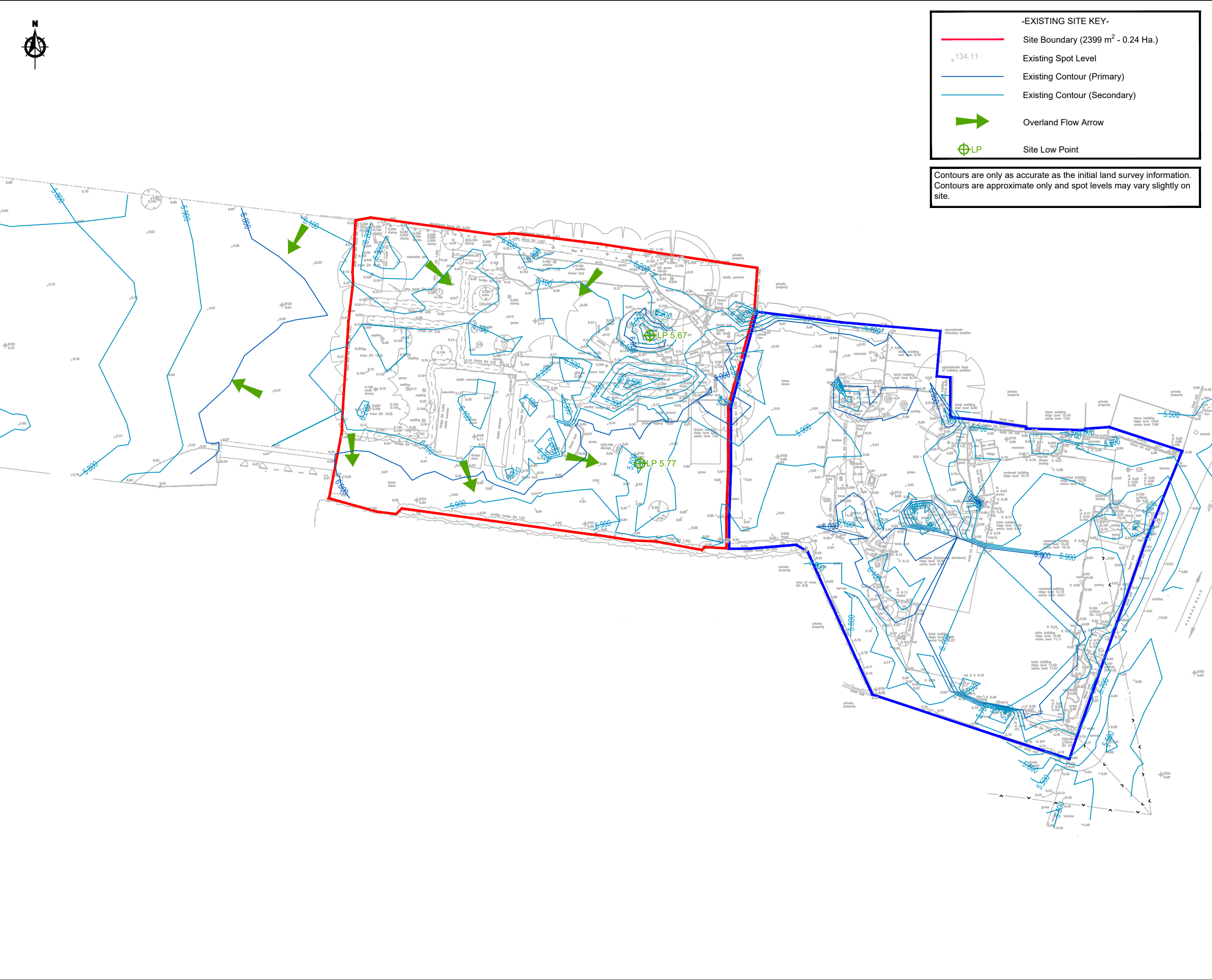
- 12.1.1 Surface water is to discharge, indirectly to Southern Water's public surface water sewer beneath Pagham Road. Flows are to be restricted to 2.00 l/s.
- 12.1.2 Foul water is to be pumped to Southern Water's public foul water sewer beneath Pagham Road. The pumping arrangement is subject to detailed design.
- 12.1.3 Connections to Southern Water's public sewer networks is subject to S106 approval.

13 SUMMARY

- 13.1.1 The proposed development will involve the construction of 6 No. residential properties as demonstrated by the development proposals contained within **Appendix A**.
- 13.1.2 The site is located in a built up residential area, to the west of the Inglenook Hotel and to the south of properties located in Millfarm Drive. Platinum Gardens – 9 No. recently constructed residential properties – is located immediately to the west of the site. Spinnaker Drive to located to the south of the site.
- 13.1.3 The site measures c. 2,399m² (0.24Ha) and is occupied by a number of semi-permanent structures, including static caravans and timber sheds.
- 13.1.4 The site topographic survey identifies levels broadly in the range of 5.600m AOD and 6.300m AOD. It does not demonstrate prevailing falls across the site in any given direction. The site is therefore considered to be flat.
- 13.1.5 Ground investigation has been undertaken at the site by Ground Management Ltd. Borehole records for the 2 No. boreholes excavated on site are contained within **Appendix C**.
- 13.1.6 Groundwater monitoring has been undertaken at the site. Groundwater levels peaked at 0.55m below ground level at BH1 and 0.41m below ground level at BH2.
- 13.1.7 In it's current form, the site drains naturally.
- 13.1.8 The site is located in Flood Zone 1 and has been assessed as being at 'Very Low' to 'Low' risk of flooding from all of the potential sources considered.
- 13.1.9 In view of site constraints, the proposed development will drain – with attenuation – to the private surface water sewer that was constructed to serve the adjacent Platinum Gardens development. This sewer discharges to Southern Water's public surface water sewer beneath Pagham Road.
- 13.1.10 Additional permeable paving will be introduced in respect of the proposed private driveways. The access road will be of a free-draining root protection construction.
- 13.1.11 Flows will be restricted to 2.00 l/s.
- 13.1.12 Foul water from the development will be pumped to Southern Water's public foul water sewer beneath Pagham Road. The pumping arrangement is subject to detailed design.
- 13.1.13 The completion of the development will not increase flood risk on or off the site.
- 13.1.14 In conclusion, this development is suitable with regards to flood risk and surface water drainage.

DRAWINGS

- PL001** Topographic Survey with Contours
- PL002** Impermeable Areas
- PL003** Existing Drainage
- PL004** Conceptual Surface Water Drainage Strategy



1. This drawing is to be read in conjunction with all other BP Civils 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. BP Civils 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. The main contractor is responsible for checking all information on site prior to work commencing and taking due care whilst undertaking the works.
5. 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.
6. The electronic information from this drawing can not be guaranteed as dimensionally drawn exact. Figured dimensions must be used for setting out and detailing. BP Civils logos and company information must be removed from copies if information is re-used.
7. Where used, this map is based on or reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the controller of His Majesty's Stationary Office (c) Crown Copyright. Licence number: 100022432. BP Civils accept no liability for any inaccuracies with the data.

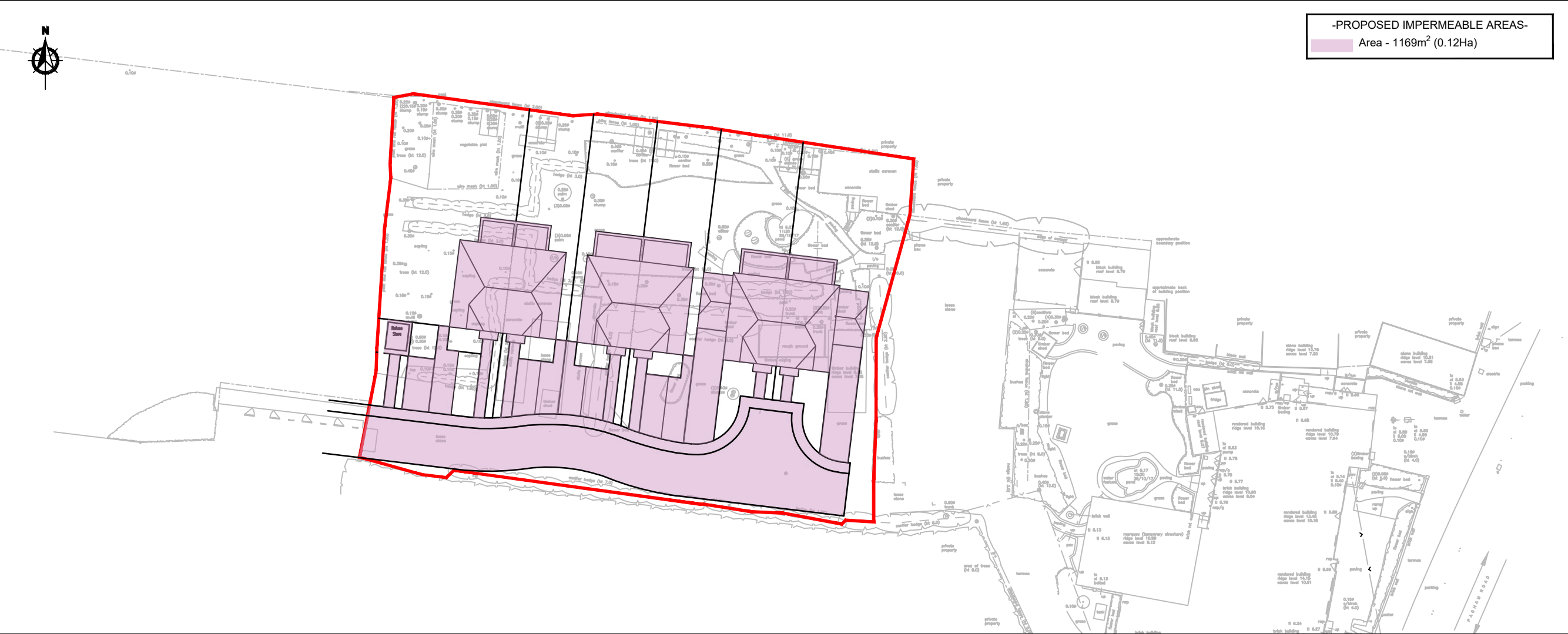
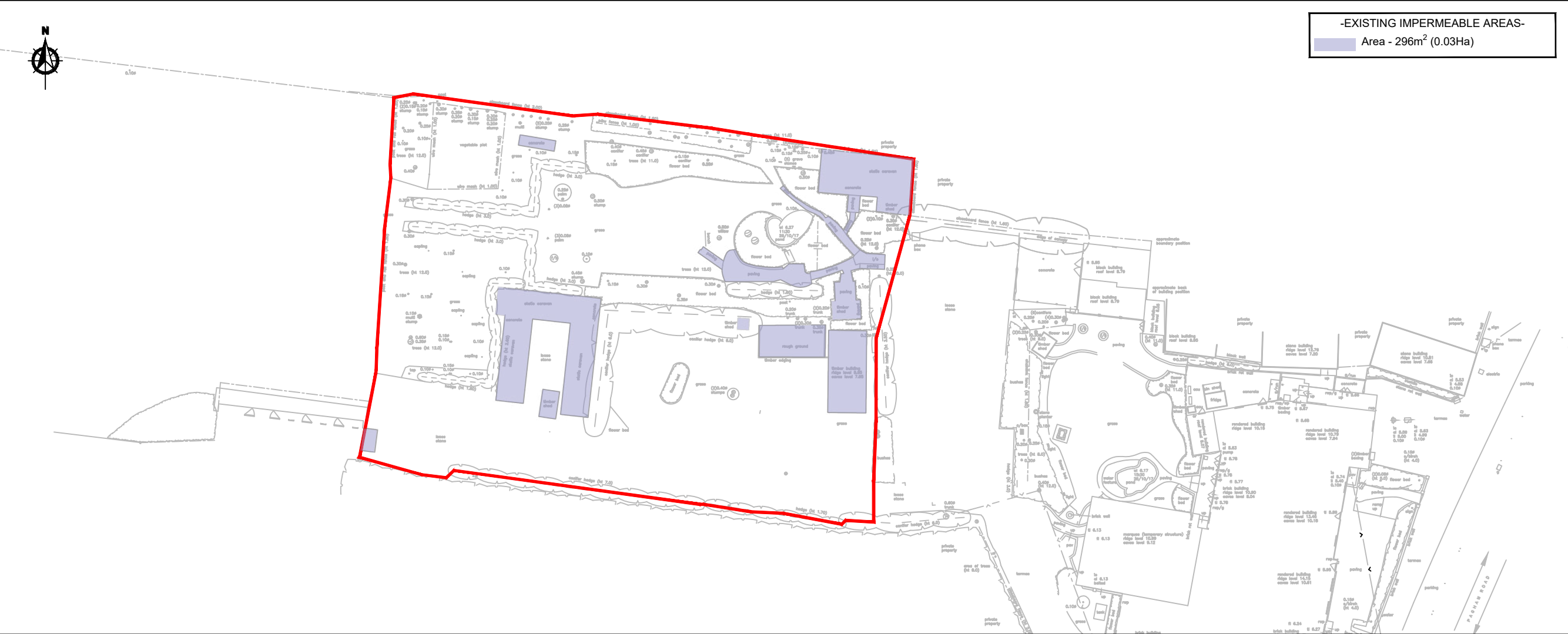
		Original Issue
Rev.	Date	Amendments



BP CIVILS

Infrastructure Design and Transport Planning Consultants
2 West Barn, Norton Lane, Chichester, West Sussex PO20 3AF
Tel: 01243 210418
www.bpcivils.co.uk enquiries@bpcivils.co.uk

Drawing Status	PLANNING NOT FOR CONSTRUCTION		
Client	Mr. A Honour		
Project	Land to East of Inglenook Hotel, Pagham Road, PO21 3QB		
Drawing Title	Topographic Survey with Contours		
Scale at A3	Date	Drawn By	Checked By
1:500	Jan 25	JHL	DJL
Drawing Code	Drawing No.	Rev.	Project No.
000-BPC-WD-ZZ-D-C	PL001	P-	D2310



NOTES

A3

1. This drawing is to be read in conjunction with all other BP Civils 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. BP Civils 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. The main contractor is responsible for checking all information on site prior to work commencing and taking due care whilst undertaking the works.

5. 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.

6. The electronic information from this drawing can not be guaranteed as dimensionally drawn exact. Figured dimensions must be used for setting out and detailing. BP Civils logos and company information must be removed from copies if information is re-used.

7. Where used, this map is based on or reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the controller of His Majesty's Stationary Office (c) Crown Copyright. Licence number: 100022432. BP Civils accept no liability for any inaccuracies with the data.

Original Issue

Amendments

BP CIVILS

Infrastructure Design and Transport Planning Consultants

2 West Barn, Norton Lane, Chichester, West Sussex PO20 3AF

Tel: 01243 210418

www.bpcivils.co.uk enquiries@bpcivils.co.uk

Drawing Status

PLANNING

NOT FOR CONSTRUCTION

Client

Mr. A Honour

Project

Land to East of Inglenook Hotel,
Pagham Road, PO21 3QB

Drawing Title

Impermeable Areas

Scale at A3

Date

Drawn By

Checked By

Project No.

1:500

Jan 25

JHL

DJL

D2310

Drawing Code

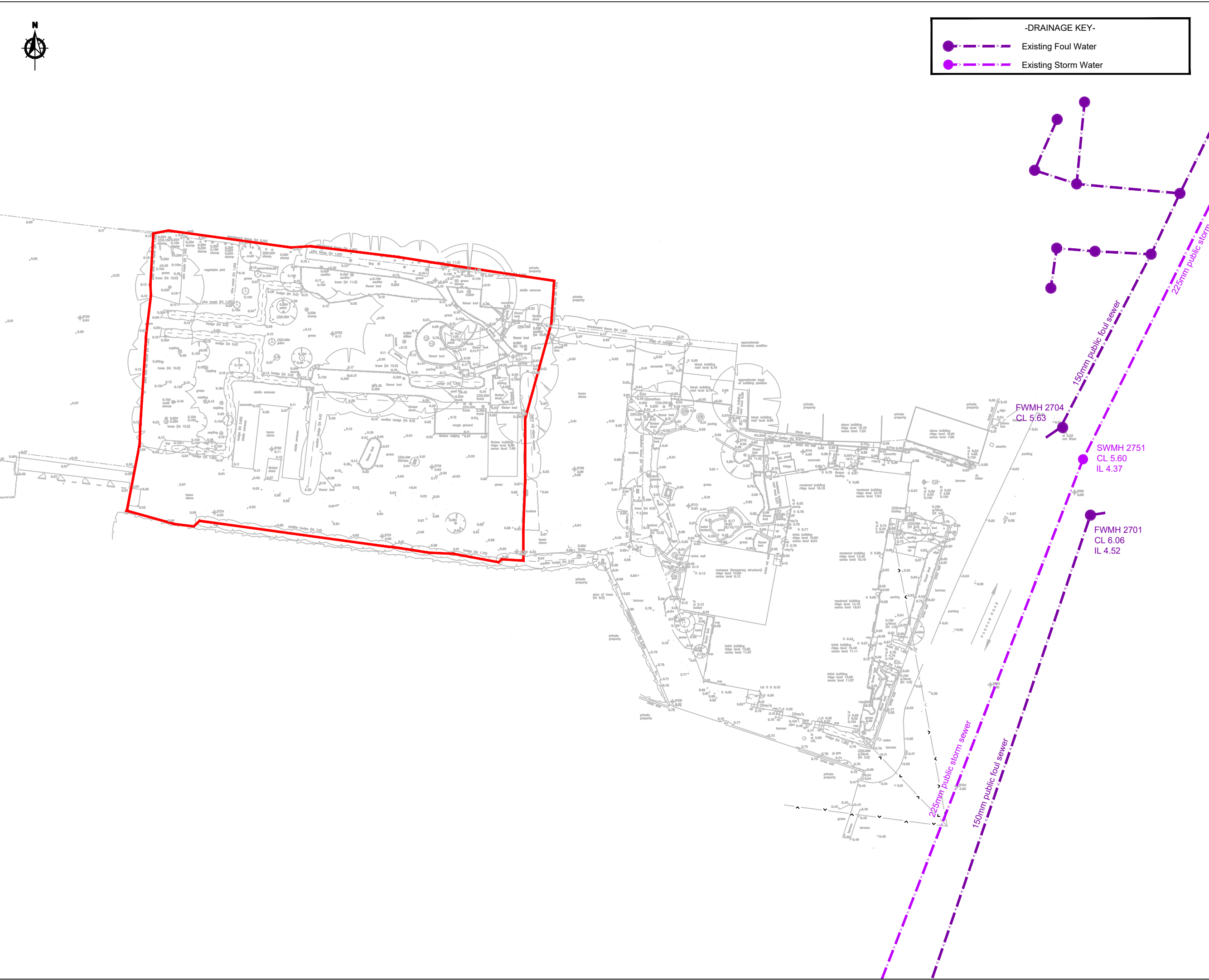
Drawing No.

Rev.

000-BPC-WD-ZZ-D-C

PL002

P-



NOTES

A3

1. This drawing is to be read in conjunction with all other BP Civils 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. BP Civils 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. The main contractor is responsible for checking all information on site prior to work commencing and taking due care whilst undertaking the works.

5. 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.

6. The electronic information from this drawing can not be guaranteed as dimensionally drawn exact. Figured dimensions must be used for setting out and detailing. BP Civils logos and company information must be removed from copies if information is re-used.

7. Where used, this map is based on or reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the controller of His Majesty's Stationary Office (c) Crown Copyright. Licence number: 100022432. BP Civils accept no liability for any inaccuracies with the data.

Original Issue

Rev.

Date

Amendments

BP CIVILS

Infrastructure Design and Transport Planning Consultants

2 West Barn, Norton Lane, Chichester, West Sussex PO20 3AF

Tel: 01243 210418

www.bpcivils.co.uk enquiries@bpcivils.co.uk

Drawing Status

PLANNING

NOT FOR CONSTRUCTION

Client

Mr. A Honour

Project

Land to East of Inglenook Hotel,
Pagham Road, PO21 3QB

Drawing Title

Exisring Drainage Plan

Scale at A3

Date

Drawn By

Checked By

Project No.

1:500

Jan 25

JHL

DJL

D2310

Drawing Code

Drawing No.

Rev.

000-BPC-WD-ZZ-D-C

PL003

P-



- DRAINAGE KEY -

- Existing Surface Water Drainage
- Proposed Surface Water Drainage
- Proposed Surface Water Flow Control
- Proposed Permeable Pavement (Tanked) 600mm sub-base
- Tree Root Protection Construction (Free-draining)
- Drainage Catchment (UC = Urban Creep Allowance)
- Proposed Contour (Primary)
- Proposed Contour (Secondary)
- Tree Root Protection Area (TBC)
- Proposed Spot Level
- Proposed Level

- NOTES**
- This drawing is to be read in conjunction with all other BP Civils drawings, and with all relevant Architect's and Engineer's drawings and specification. Any discrepancies found are to be reported immediately to the Engineer.
 - BP Civils accepts no responsibility for inaccuracies in data provided by third parties such as topographic surveys or Ordnance Survey mapping.
 - 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.
 - Any information given regarding existing underground services is given in good faith after consultation with the relevant authority, however accuracy is not certain. The main contractor is responsible for checking all information on site prior to work commencing and taking due care whilst undertaking the works.
 - 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.
 - The electronic information from this drawing can not be guaranteed as dimensionally drawn exact. Figured dimensions must be used for setting out and detailing. BP Civils logos and company information must be removed from copies if information is re-used.
 - Where used, this map is based on or reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the controller of His Majesty's Stationary Office (c) Crown Copyright. Licence number: 100022432. BP Civils accept no liability for any inaccuracies with the data.

P.	28/03/25	Original Issue
Rev.	Date	Amendments

BP CIVILS

Infrastructure Design and Transport Planning Consultants
2 West Barn, Norton Lane, Chichester, West Sussex PO20 3AF
Tel: 01243 210418
www.bpcivils.co.uk enquiries@bpcivils.co.uk

Drawing Status	PLANNING NOT FOR CONSTRUCTION		
Client	Mr. A Honour		
Project	Land to East of Inglenook Hotel, Pagham Road, PO21 3QB		
Drawing Title	Conceptual Surface Water Drainage Strategy		
Scale at A3	Date	Drawn By	Checked By
1:250	Jan 25	JHL	DJL
Drawing Code	000-BPC-WD-ZZ-D-C		Project No. D2310
Drawing No.	PL004	Rev.	P-