Pirbright Camp, Brunswick Road, Surrey

Flood Risk Assessment and Drainage Strategy Phase 2

For Landmarc

Issue 1

FAIRHURST

CONTROL SHEET

CLIENT	**Landmarc**
PROJECT TITLE:	**Pirbright Camp, Brunswick Road, Surrey**
REPORT TITLE:	**Flood Risk Assessment and Drainage Strategy Phase 2**
PROJECT REFERENCE:	**133561 – BW – FRA – 101**

Issue and Approval Schedule:

ISSUE 1	Name	Signature	Date
Prepared by	Neil Sproat	[redacted]	02.12.2020
Reviewed by	Matt Foster	[redacted]	02.12.2020
Approved by	Mark Hayward	[redacted]	02.12.2020

Revision Record:

Issue	Date	Status	Description	By	Chk	App

This report has been prepared in accordance with procedure OP/P02 of Fairhurst's Quality Management System.

Fairhurst,
Clifton Heights, Triangle West, Clifton, Bristol. BS8 1EJ
T: 0117 925 0259 Fax: 0844 381 4412 E-mail: Bristol@fairhurst.co.uk

The report has been produced for Landmarc. But should any other parties rely on the findings they do so at their own risk unless confirmed by Fairhurst in writing from a Partner that they can do so.

FAIRHURST

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1.0 Introduction

1.1 Fairhurst have been commissioned by Landmarc to undertake a Flood Risk Assessment and Drainage Strategy for the construction of three new accommodation buildings at Pirbright Camp off Brunswick Road, Surrey.

2.0 Site Location and Description

2.1 The site is located to the east of the village of Deepcut between Farnborough and Woking with the centre of the site having an approximate Grid Reference of SU923567, and a nearest post code of GU24 0QQ. See figure 1 and 2

2.2 The site is bounded to the North by Pirbright Camp then firing ranges, to the east is Pirbright Camp then woodland, to the south is the Basingstoke Canal then woodland then the south western railway line and to the west Pirbright camp then woodland.

2.3 A Topographical survey shows that the site is generally flat with a 400mm fall from north to south and 400mm fall from west to east. See Appendix A for topographical survey.

3.0 Development Proposals

3.1 The proposed development is for the construction of four new two story accommodation blocks comprising of a total area of approximately 1800m² and will include all necessary infrastructure works associated with a building of this nature. See Appendix B for development proposals.

3.2 Existing buildings comprising of approximately 2490m² are to be demolished as part of the works.

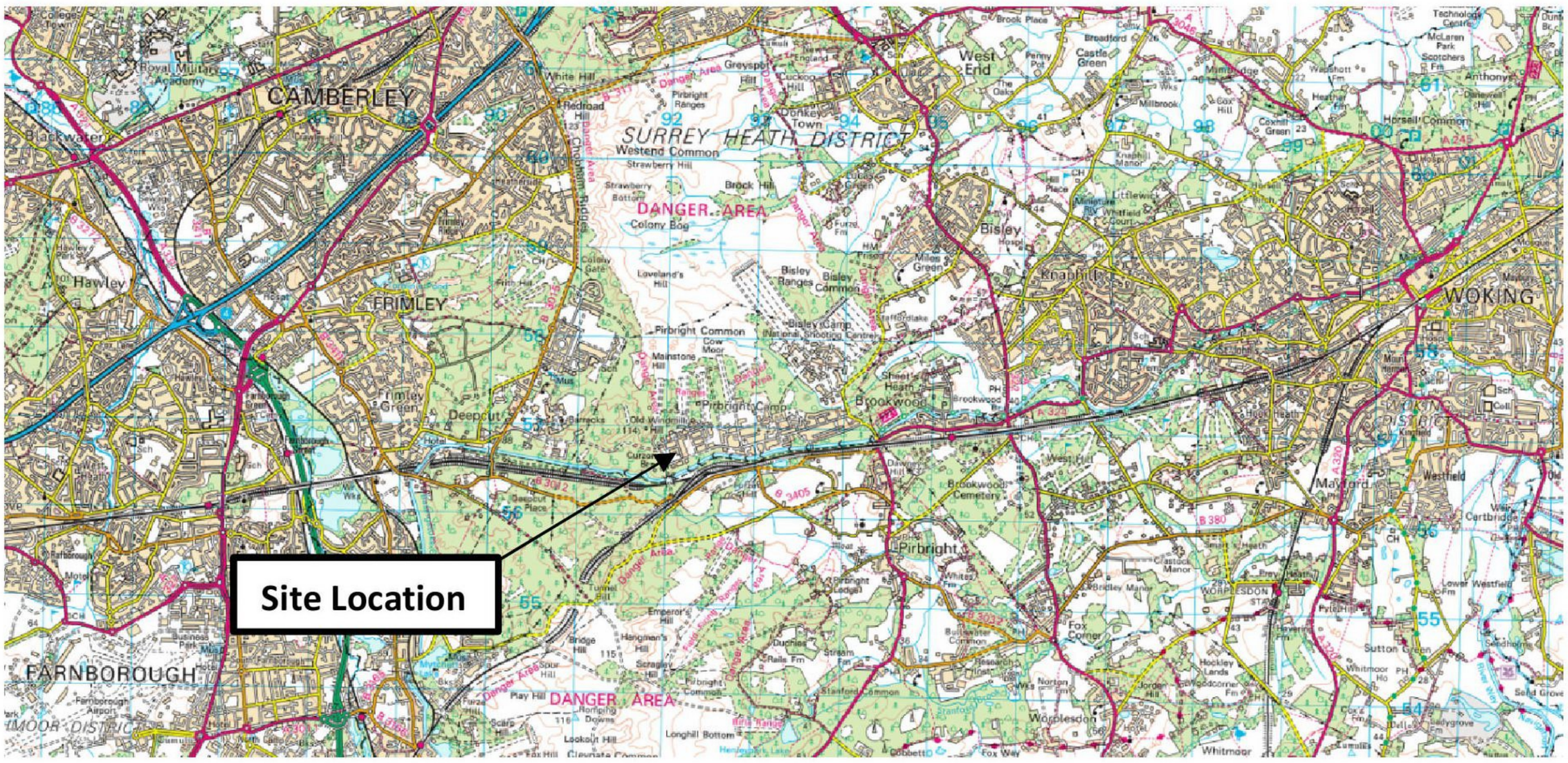

Figure 1 – OS location map

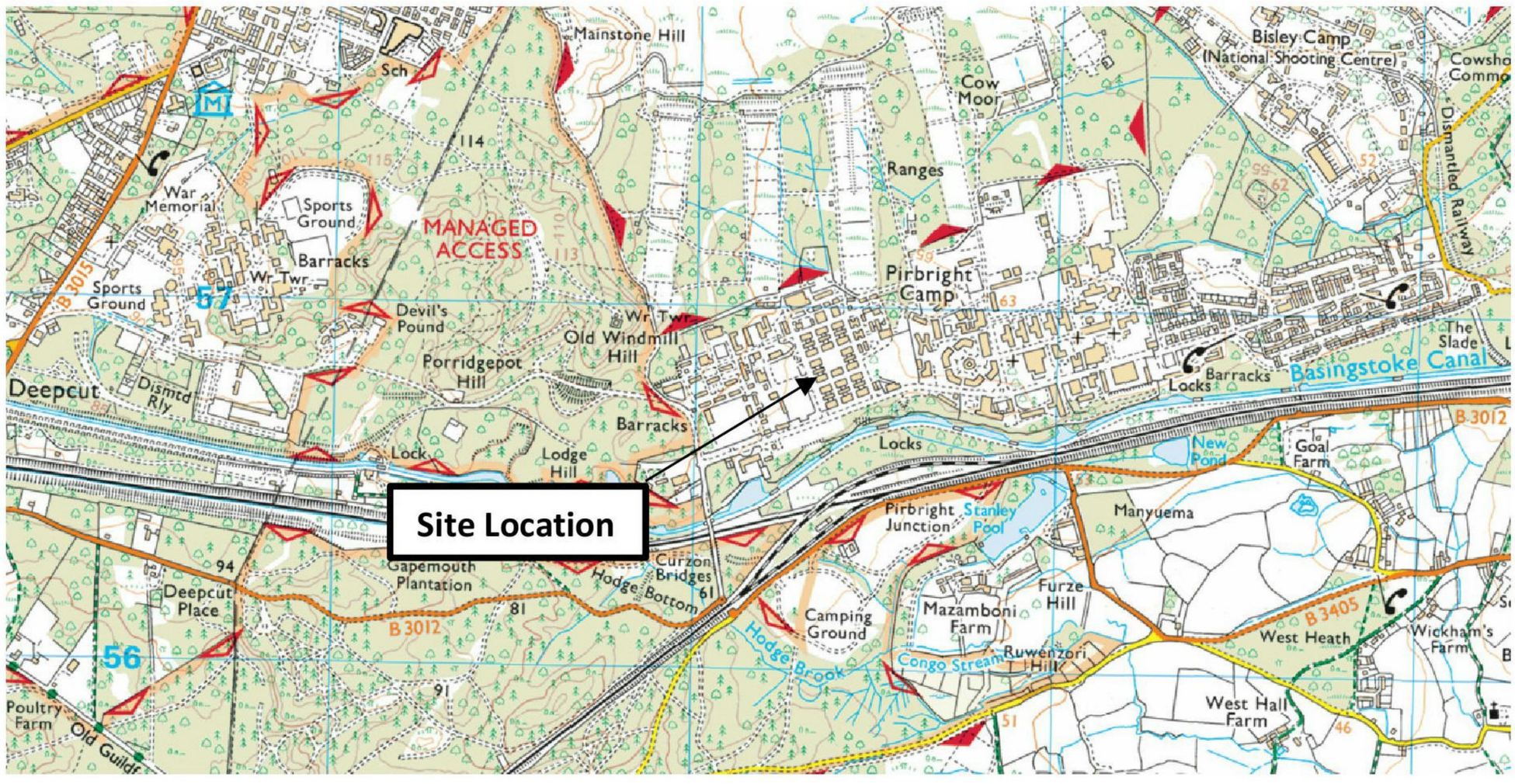

Figure 2 – OS location map

4.0 Geology

4.1 Information on the British Geological Survey (BGS) website indicates the site is not underlain by any superficial deposits, and is instead sat directly on bedrock of Camberley Sand Formation. Camberley Sand Formation is a fine grained sand which is naturally wet and generally considered impermeable. See figure 3.

4.2 There are Borehole records which are in close proximity to the development area on the BGS website. These suggest to confirm that beneath the top soil which is within the range of 300mm deep sits sands and gravels which are consistent with the Camberley Sand Formations. Selected BGS bore hole records can be found in Appendix C. One of the borehole record which was dug down to a depth of 10m did not encounter any ground water, however the second record which is approximately 100m away did come across ground water at around 7m below ground.

4.3 Due to the Camberley Sand Formations geology, it would suggest that infiltration in the area would be limited and would indicate that infiltration techniques may not be a suitable as a means of stormwater drainage.

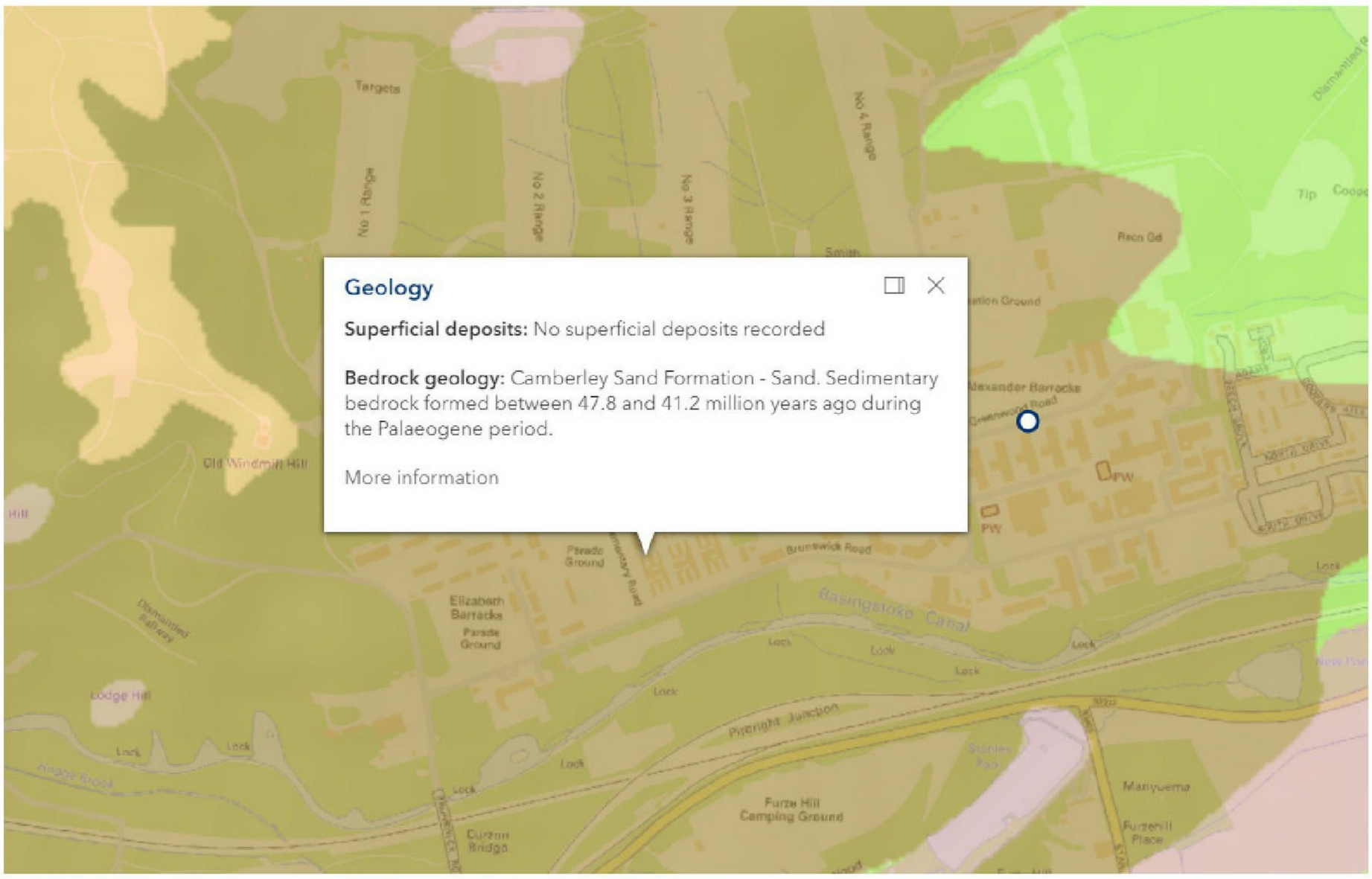

Figure 3 – BGS geology mapping

5.0 Hydrology

5.1 The nearest main river watercourse is Trulley Brook which lies approximately 2.5km to the north of the development.

5.2 There are a number of smaller unnamed ditches/land drains which surround the development. There is also the Basingstoke Canal which lies 120m to the south of the development.

5.3 The Environment Agency (EA) Flood Map for Planning shows that the site is situated entirely within Flood Zone 1, and is therefore not at risk of fluvial flooding in the event of a storm event with up to a 1 in 1000 year return period (0.1% Annual Exceedance Probability). See figure 4.

5.4 There is some surface water flooding in the area however in the vicinity of the development it is contained to the highway adjacent to the development and therefore should not impact the proposed buildings.

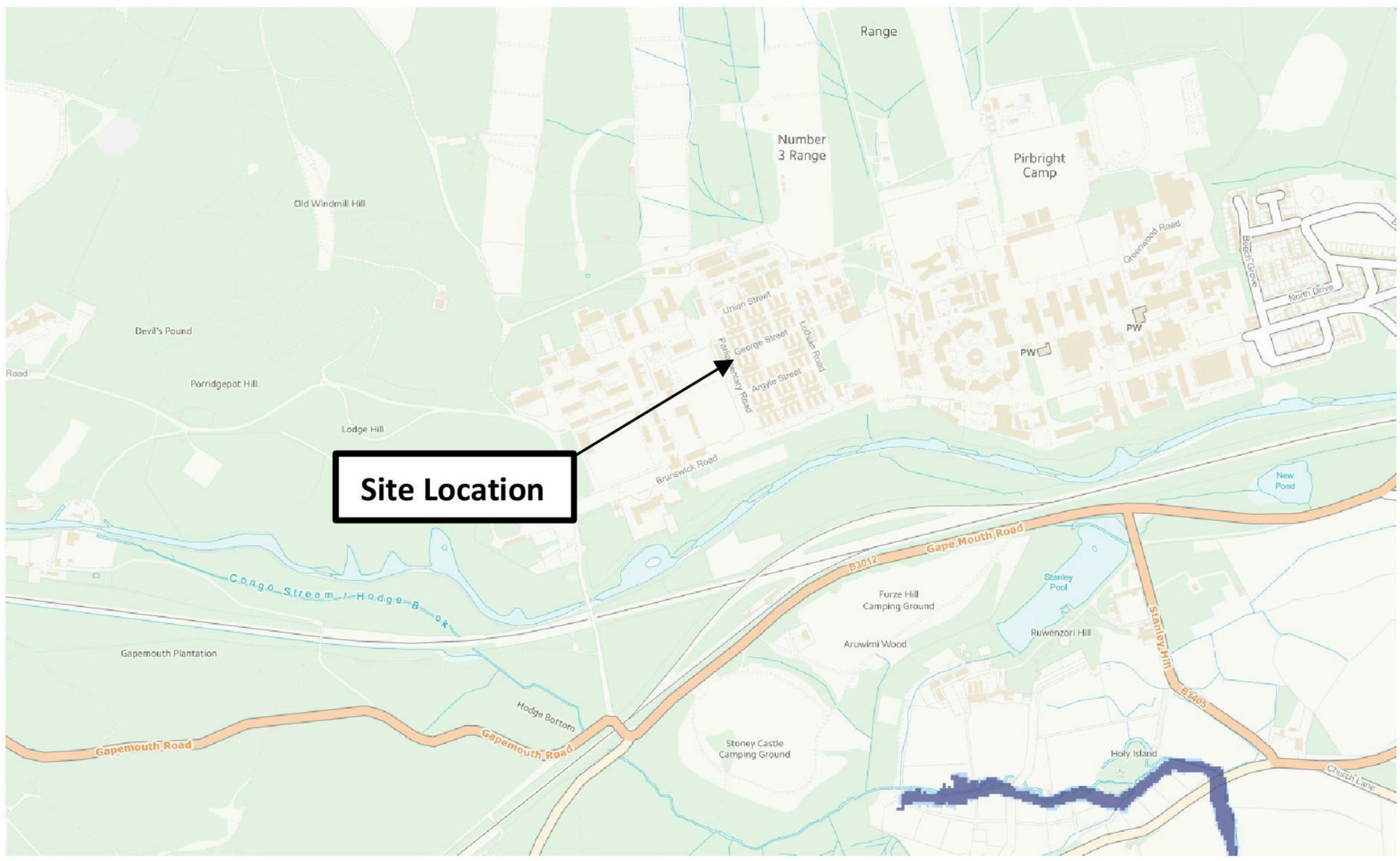

Figure 4 – EA River Flooding Map

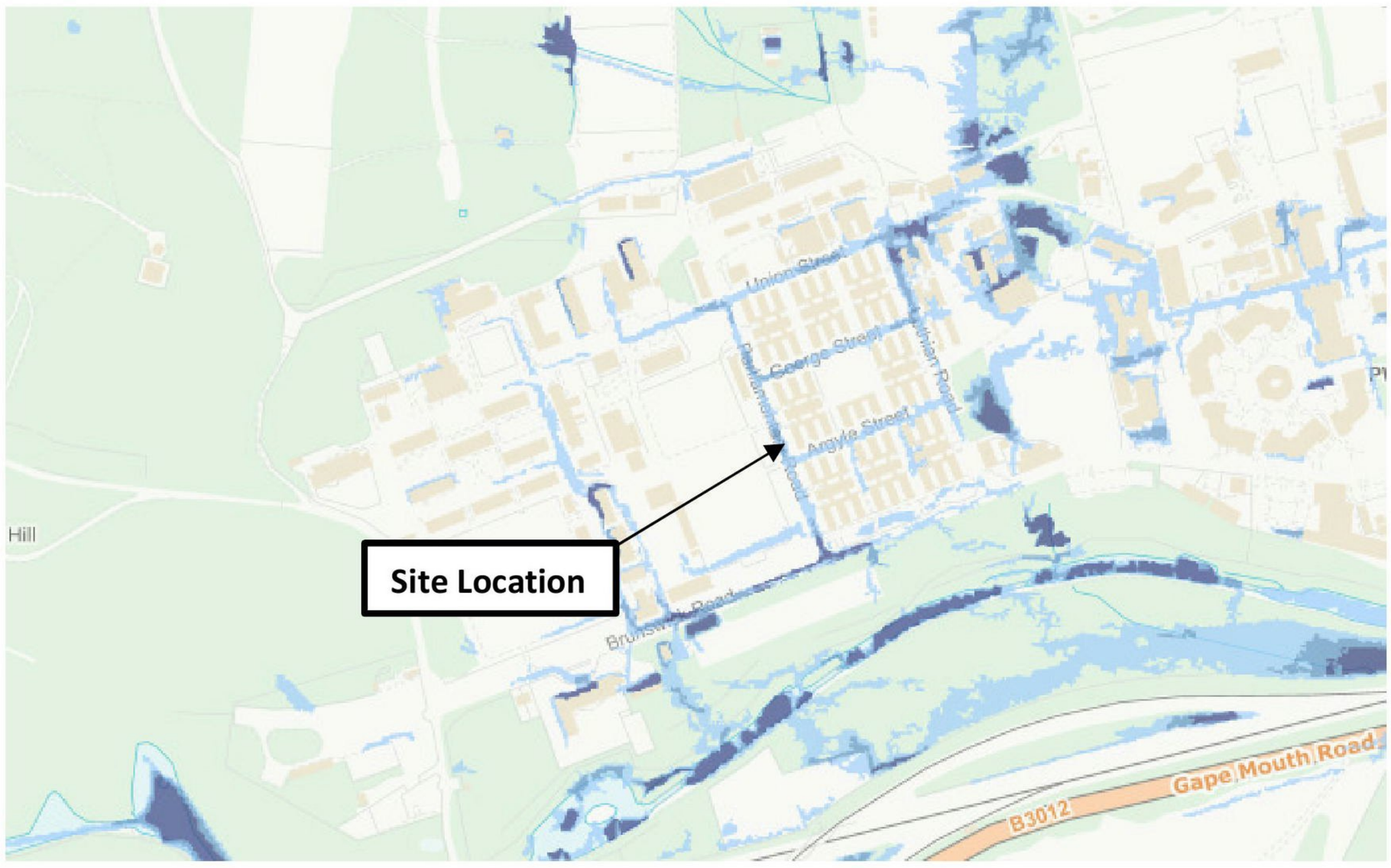

Figure 5 – EA surface water flooding map

6.0 Hydrogeology

6.1 The bedrock stratum beneath the site is designated as a Secondary A aquifer, pointing to the potential permeability of the bedrock.

6.2 The site does not have a superficial drift layer and therefore does not have an aquifer designation.

6.3 The Guildford Borough Strategic Flood Risk Assessment (SFRA) dated July 2016 has identified the site as having limited potential for groundwater flooding. The SFRA groundwater flooding map can be found in Appendix D

7.0 Flood History and Records

7.1 The DEFRA data services platform of historic flood mapping does not identify any areas of historic floods that have affected the site.

8.0 Sequential and Exception Tests

8.1 As this development is for accommodation which includes sleeping quarters, it is considered that the development has a flood risk vulnerability classification of More Vulnerable. See Appendix E.

Sequential test

8.2 Sequential testing is aimed at steering new developments to areas with the lowest probability of flooding. Appendix E shows the Flood Risk Vulnerability Classification as defined by the Environment Agency and the type of development compatible with that particular classification.

8.3 As the site is located entirely within Flood Zone 1, a sequential Test will not be required.

Exception test

8.4 Exception testing is to demonstrate that the development provides wider sustainability benefits to the community that outweighs the flood risk if development is to take place outside of Flood Zone 1. As the entire site is within Flood Zone 1, an exception test is not required.

9.0 Forms of Flooding

9.1 Flooding can originate from a number of different sources and CIRIA C624: Development and Flood Risk Guidance provides a list of those which need to be considered.

9.2 These are summarised in Table 1.0 below with a schedule of whether they need to be considered at this site.

Source	Requires considering for this site?
Fluvial	√
Coastal and Tidal	x
Estuarine and Tidal Affected Watercourses	x
Groundwater	√
Overland flow and surface water flooding	√
Artificial Drainage Systems e.g. reservoirs	√
Infrastructure Failure e.g. water mains and sewers.	√

Table 1.0 Forms of Flooding

9.3 Fluvial – As previously discussed in Section 5, the site lies entirely within Flood Zone 1, and as such is considered to not have a significant fluvial flood risk.

9.4 Groundwater – As previously discussed in Section 6.3, the site has limited potential for ground water flooding and it is therefore considered as being at a negligible risk of groundwater flooding.

9.5 Overland Flow and Surface Water Flooding – This can occur when the local drainage infrastructure cannot cope with the volume of rainfall in extreme events and exceed the design capacity of the surface water system. As shown in figure 5, there is some surface water flooding around the development area however this would appear to be confined to the highways of the site and does not seem to affect the buildings

9.6 Artificial Drainage Systems – Artificial drainage systems are manmade structures that are designed and have the capability to hold water such as reservoirs or canals, and if they failed would cause catastrophic flooding downstream. EA mapping shows that the site is not susceptible to reservoir flooding and the Basingstoke Canal is at a lower elevation than the site and therefore would not affect it.

9.7 Infrastructure Failure – This can be caused if a high pressure water main bursts or a sewer blocks and floods. Whilst these types of events occur they are very uncommon, therefore not considered to be an issue at this site.

10.0 Flood Risk, Flood Compensation and Mitigation Measures

10.1 As the site is situated entirely within Flood Zone 1, and is not at risk of flooding from rivers, the sea or surface water, no flood risk mitigation or compensation measures will be required.

10.2 Although EA mapping shown in figure 5 does not so the development flooding from surface water, it does show the adjacent highway flooding. Therefore to mitigate any potential risk of flooding from surface water it is proposed to have the finished floor levels at a minimum of 150mm higher than the surrounding ground level.

11.0 Climate Change

11.1 Climate change is a well-documented occurrence which needs to be taken into account when looking at flooding. Based on the fact that the area of site proposed for development lies within Flood Zone 1 it is considered that the effects of climate change over the accepted lifetime of the development with regard to flood risk will not be an issue.

11.2 The proposed drainage infrastructure will be designed to take climate change into account therefore mitigating its' effects. Surrey County Council SuDS

Design Guidance: states in Section 5.4.2 that climate change allowances of 20% for residential developments and should be applied with the 40% climate change flooding implications being understood. As the proposed buildings are sleeping accommodation, these buildings are to be considered a residential development. Therefore a 20% allowance for climate change is to be used.

12.0 Existing Drainage

12.1 The utilities search which can be found in Appendix F shows that there is a separate storm and foul water sewers in the vicinity of the proposed location of the development

13.0 Proposed Surface Water Drainage Strategy

13.1 Building Regulations Part H3 states that storm water should discharge (in descending order of priority) to:

1. An adequate soakaway or some other adequate infiltration system: or where that is not reasonably practicable,
2. A watercourse or where that is not reasonably practicable,
3. A segregated drainage system for storm and foul or if that is not possible,
4. A combined sewer.

13.2 As discussed in Section 4.0 it has been identified that the sites underlying geology may not support infiltration as a means of discharging storm water.

13.3 Testing carried out by Tweedie Evans Consulting and which can be found in Appendix G has shown that the ground has no infiltration rate. It is therefore considered the site is not suitable for the use on soakaways as a form of stormwater discharge.

13.4 As infiltration has been discounted due to inadequate infiltration, next is to discharge to a watercourse. However there no watercourse is located in the vicinity that can provide a suitable means of discharge. Discharging to the canal south of the site is not viable due to the heavy restrictions on discharging stormwater to canals.

13.5 As discharging surface water to infiltration or a watercourse has been discounted, it is proposed to discharge to a segregated stormwater system. Services plans which can be found in Appendix F show that there is a storm water sewers running in around the proposed development.

13.6 The Surrey County Council SuDS Design Guidance States in section 5.4.1 that *"Brownfield sites should be limited as close to greenfield rates as is reasonably practicable."* It goes on to say that if this cannot be achieved then evidence should be provided. The greenfield rate for the proposed buildings is 0.8l/s. However it is considered that this rate is to low which can be safely achieved by current flow control devices and may cause flooding should such a device get blocked. It is therefore proposed that a discharge rate of 2l/s be used. Calculations show that the previous building being demolished discharges unrestricted at a rate of around 36.6l/s, therefore the proposed discharge rate of 2l/s is around 95% betterment

13.7 Using a discharge rate of 2l/s and a 1 in 100 year storm event plus 20% climate change and a simple orifice plate, drainage calculations show that 98m³ of attenuation is required.

13.8 When applying a 40% climate change, there is 15m³ of flooding which is considered will remain on site until such time it can re-entre the drainage network.

See drawing BR/133561/3303 in Appendix G for proposed drainage.

14.0 Proposed Foul Drainage

14.1 It is proposed to re-utilise the existing sewer connections and connect the proposed foul drainage into the foul sewer adjacent to the buildings.

See drawing BR/133561/3304 In Appendix G for proposed drainage.

15.0 Maintenance

15.1 The Maintenance Strategy found in Appendix J contains the following components:-

- Person / organisation etc. responsible for the maintenance.
- Type of Maintenance – Nature of task and frequency of activity.
- Ad-hoc maintenance – Details of what action will be taken in an emergency and who will be responsible.
- Details of response time for emergency and non-emergency works

16.2 The frequency of maintenance tasks outlined in the strategy will be conducted for the first annual maintenance assessment period and reviewed accordingly to determine a more effective long term strategy tailored to suit the specific needs of the site.

15.2 As the site is privately owned, it is assumed that all drainage will also remain private. Therefore the drainage will need to be maintained by a private management company.

15.3 All maintenance must be carried out by a suitably competent person with relevant experience in maintenance of drainage system and have all the relevant risk and method assessments in place.

16.0 Defence Related Environmental Assessment Method (DREAM)

16.1 As well as meeting the requirements of the local LLFA, the Ministry of Defence have their own environmental standards which must be examined.

16.2 To meet the DREAM requirements the drainage only needs to comply with the building regulations that flooding does not occur on any part of the site for a 1 in 30 year rainfall event, or during a 1 in 100 year rainfall event in any part of a building (including a basement) or a utility plant susceptible to water (eg pumping station or electricity substation) within the development.

16.3 The stormwater drainage is designed not to flood for the 1 in 100 year plus 20% factor for climate change storm event.

16.4 As the DREAM requirements are in line with that which have already been designed as part of the wider drainage strategy, no additional features are required to comply with the DREAM requirements.

17.0 Conclusion

17.1 The site is located to the east of the village of Deepcut between Farnborough and Woking with the nearest post code of GU24 0QQ.

17.2 The development proposals are for the building of four new two story accommodation blocks on site of existing buildings be demolished as part of the works.

17.3 The geology of the site is made up of a bed rock of Camberley Sand Formations with no superficial deposits.

17.4 The nearest main river watercourse is Trulley Brook which lies approximately 2.5km to the north of the development, there are other ditches and land drains just north of the site and a canal to the south.

17.5 Testing carried out by Tweedie Evans Consulting showed that infiltration is not an option as a viable means of discharging of the stormwater. With no watercourse in the vicinity it is proposed to discharge to the developments sewers which are adjacent to the site.

17.6 The proposals are for the stormwater to discharge to the existing stormwater sewers which run adjacent to the proposed buildings and be restricted to 2l/s discharge rate with 98m^3 of attenuation, subject to detailed design.

17.7 The foul drainage will connect to the sites existing foul sewers which also runs adjacent to the proposed buildings. The existing foul will have to be relocated around the buildings due to the restricted room between the proposed building and the road.

17.8 The proposed drainage drawing BR133561/3304 can be found in Appendix I

17.9 Based on the above it is deemed that there is no reason why the development should not proceed from a flood risk and drainage standpoint.

References:-

- CIRIA C753 The SUDS Manual
- CIRIA C574 Engineering in Chalk
- CIRIA C624: Development and Flood Risk Guidance.
- The Building Regulations 2015 – Drainage and Waste Disposal Part H
- https://www.gov.uk/government/organisations/environment-agency
- https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs
- www.bgs.co.uk
- https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-2-Flood-Risk-Vulnerability-Classification
- Sewerage Sector Guidance
- BS8582 2013 Code Of Practice For Surface Water Management For Development Sites.
- Environment agency document - Delivering Benefits Through Evidence Report SC030219
- Surrey County Council Lead Local Flood Authority guidance

Appendix A

Topographical survey

Underground Utility Surveys - PAS 128 - Quality Levels

	Survey Type	Quality Level	Post Processing	Location Accuracy Horizontal	Location Accuracy Vertical	Supporting Data
D	Desktop Utility Records Search	D	-	Undefined	Undefined	-
C	Site Reconnaissance	C	-	Undefined	Undefined	Location demonstrated by Topographical Features or Reinstatement Scar
B	Detection	B4	No	Undefined	Undefined	Suspected to exist, but undetected. Shown as "ASSUMED"
		B3	No	+/-500mm	Undefined - Not Reliable	Horizontal Position Only One location method only used
		B3P	Yes			
		B2	No	+/-250mm or +/-40% of Detected Depth Whichever is Greatest	+/-40% of Detected Depth	Horizontal and Vertical Detection One Detection Method Used
		B2P	Yes			
		B1	No	+/-150mm or+/-15% of Detected Depth Whichever is Greater	+/-15% of Detected Depth	Horizontal and Vertical Detection Multiple Detection Methods Used
		B1P	Yes			
A	Verification	A	-	+/-50mm	+/-25mm	Horizontal and Vertical Location of the top, and/or bottom of the utility

SURVEY STATIONS

Name	Easting	Northing	Height	Remark
T1	492361.705	156962.433	66.452	Nail
T2	492390.260	156886.342	66.442	Nail
T3	492337.167	156858.062	67.662	Nail
T4	492305.357	156858.204	67.728	Nail
T5	492281.325	156921.588	68.038	Nail
T6	492321.464	156947.478	67.182	Nail

Underground Utilities Legend

- STORM WATER SEWER (SWS)
- FOUL WATER SEWER (FWS)
- COMBINED SEWER (CWS)
- ELECTRIC CABLE
- HV — HIGH VOLTAGE CABLE
- LV — LOW VOLTAGE CABLE
- BT — TELECOMS CABLE
- CATV — CABLE TELEVISION
- TLS — TRAFFIC LIGHT SIGNAL CABLE
- WATER — UNDERGROUND WATER SUPPLY
- GAS
- GAS (MP) — GAS MEDIUM PRESSURE
- GAS (IP) — GAS INTERMEDIATE PRESSURE
- GAS (HP) — GAS HIGH PRESSURE
- OIL — OIL PIPE
- MSR — MULTIPLE SERVICE ROUTE
- MSD — MULTIPLE SERVICE DUCT
- UNK — M — UNKNOWN SERVICE METALLIC
- UNK — GPR — UNKNOWN SERVICE FOUND WITH GPR
- UNK — CABLE — UNKNOWN SERVICE CABLE
- ED — EMPTY DUCT

BT 0.6 B2 — Type Depth Quality

R1 SURVEY STATION; GATE; BANK; FOLIAGE; CLIFF

50m — MAJOR CONTOUR

MINOR CONTOUR (0.25m interval)

UNDERGROUND UTILITY SURVEY NOTES:
This survey has been carried out to the standard, as described by The Survey Association (TSA), for a Level 4 Survey, (PAS128 Type B) Utilities on this drawing have been detected using non invasive technologies. The performance of these technologies can be adversely affected by ground conditions which are out of the control of Brunel Surveys . Consequently some utilities may be undetectable and therefore, whilst Brunel Surveys uses best endeavours to detect all utilities we cannot guarantee that 100% detection can always be achieved.
Irrespective of the information provided by a utility survey and statutory plans, any groundworks should be undertaken with extreme caution and in accordance with health and safety executive guidelines HSG 47 AVOIDING DANGER FROM UNDERGROUND SERVICES

Legend

AV	Air Valve	MK	Marker Post
BH	Bore Hole	MK-BT	Marker Post (Telecoms)
Bin	Litter Bin	MK-FH	Marker Post (Fire Hydrant)
BL	Bollard	MK-GV	Marker Post (Gas Valve)
BS	Bus Stop	MK-SV	Marker Post (Stop Valve)
BT	Telecom Cover	MK-WM	Marker Post (Water Meter)
BT CAB	Telecom Cabinet	OHC	Overhead Cable
CATV	Cable TV Cover	PB	Post Box
CL	Cover Level	RE	Rodding Eye
DP	Down Pipe	RS	Road Sign
EB	Electricity Box	SC	Stop Cock (Water)
ECAB	Electrical Cabinet	SL	Soffitt Level
EIC	Electrical Inspection Cover	SNP	Street Name Plate
EOT	End of Trace	SP	Sign Post
EP	Electricity Pole	SV	Stop Valve (Water)
ER	Earth Rod	THL	Threshold Level
FFL	Finished Floor Level	TL	Traffic Light
FH	Fire Hydrant	TL CAB	Traffic Light-Cabinet
FP	Fence Post	TP	Telegraph Pole
GP	Gate Post	TS	Traffic Sign
GPR	Ground Penetrating Radar	TVIC	Cable TV Inspection Cover
GV	Gas Valve	UTL	Unable to Lift
GY	Gulley	UTS	Unable to Survey
HI	Height	UTT	Unable to Trace
IL	Invert Level	VP	Vent Pipe
IG	Kerb Inlet	WL	Water Level
LC	Lamp Column	WM	Water Meter
MH	Manhole	WO	Wash Out

Brunel Surveys Ltd
UNIT 59, SHRIVENHAM HUNDRED BUSINESS PARK
WATCHFIELD, SWINDON, WILTSHIRE, SN6 8TY
TEL : (01793) 784700
WEB : www.brunelsurveys.com
Email:admin@brunelsurveys.com

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CLIENT

Fairhurst

Clifton Heights
Triangle West
Clifton
Bristol
BS8 1EJ

JOB TITLE

Topographical Survey

Accomodation Blocks G, H & J
Brunswick Camp

REVISIONS

SCALE	A0 Sheet @ 1 to 200
DATE	Nov 2020
SURVEYED BY	AW/DT/LB/MC/JD
DRAWN BY	AW/LB
CHECKED BY	PAH

DRAWING No.

22392-200-01 Topo