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Warblington Road
Emsworth



FLOOD RISK ASSESSMENT

On Behalf Of
Mr. Charles Glanville

ITR/5042/FRA.4

June 2019



Partners:
GD Bellamy BSc CEng MICE
IT Roberts MCIHT

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1.0 INTRODUCTION

1.1 Bellamy Roberts LLP has been retained by Mr. Charles Glanville to undertake a Flood Risk Assessment (FRA) in support of a planning application for a residential development on land south of Warblington Road, Emsworth.

1.1 This assessment has been undertaken to ascertain whether there are any constraints to the development of this site, and to assess the impact of the proposal, with regard to flood risk.

1.2 The site has an approximate area of 0.83ha and is located in Flood Zone 1. Government guidance states that Flood Risk Assessments are generally only necessary in Flood Zone 1 when the development area is greater than 1ha. However, an FRA is required for developments of less than 1ha when the proposed development will provide a more vulnerable use class.

1.3 Notwithstanding this, this Assessment has been prepared to accompany an indicative sustainable drainage design, and will also consider the expected greenfield run-off rates, soil types, and Environment Agency (EA) Flood Mapping.

1.4 A previous version of the FRA was submitted to the EA in August 2017 for their comment. In response, the EA stated they had no comments or objections to the proposal. There have been no material changes to the scheme in the intervening period. A copy of the EA comments are provided at **Appendix 1**.

Site Location and Features

1.5 The National Grid reference for the site is 474407, 105452. For clarity, a site location plan is provided at Figure 1.



Figure 1: Site Location Plan

Appropriateness of Development Proposal

- 1.6 National guidance states that Flood Zone 1 is suitable for all types of development. Reproduced below is an extract from the EA Flood Zone map which clearly demonstrates that the site is located wholly within Flood Zone 1.
- 1.7 The topography falls from 6.75m in the northern corner to 1.98m in the southern corner. (Source: LIDAR) – Figure 2.

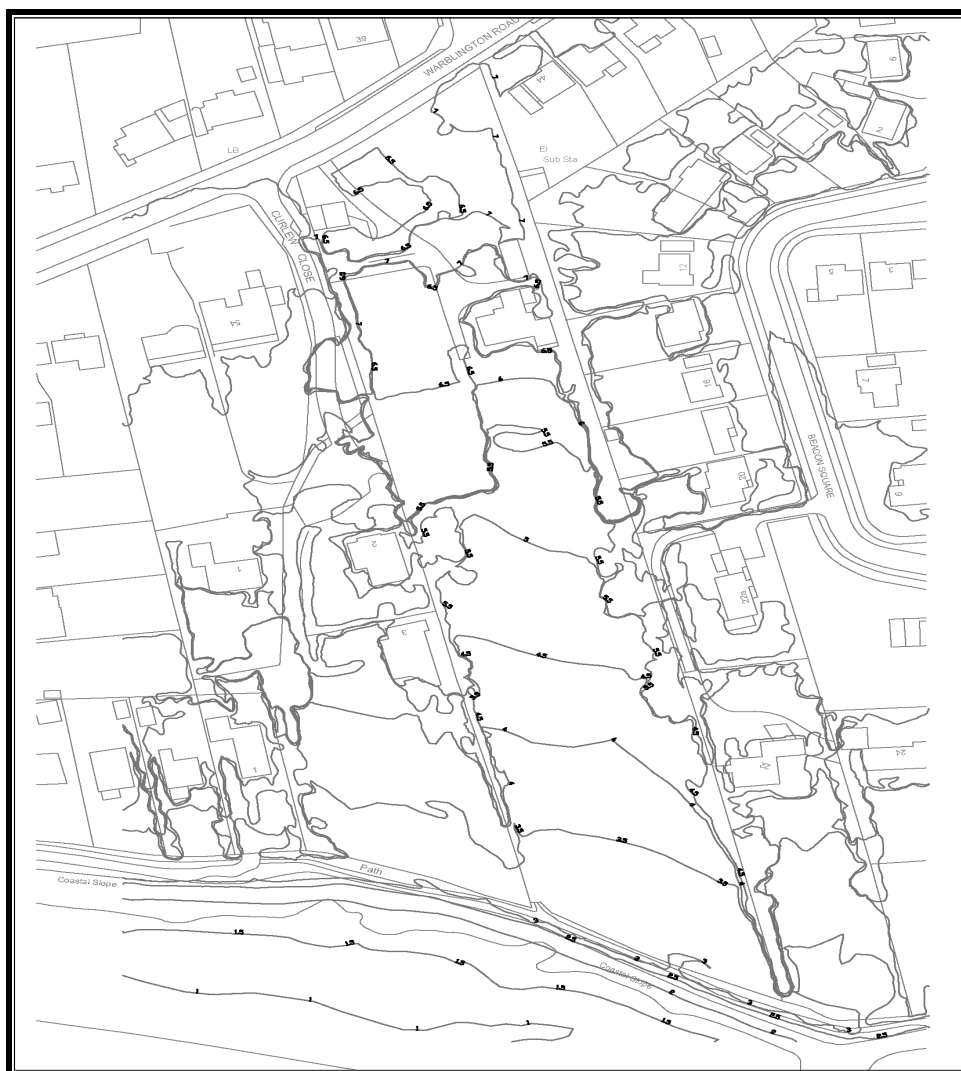


Figure 2: (Source LIDAR) – Topography of site.

- 1.8 The site is accessed off Warblington Road which borders the northern boundary of the site. Residential development is located on all sides other than the southern boundary which is bound by Chichester Harbour.

Appropriateness of Development Proposal

- 1.9 National guidance states that Flood Zone 1 is suitable for all types of development. Reproduced at Figure 3 is an extract from the EA Flood Zone map which demonstrates that the proposed dwellings will lie within Flood Zone 1.

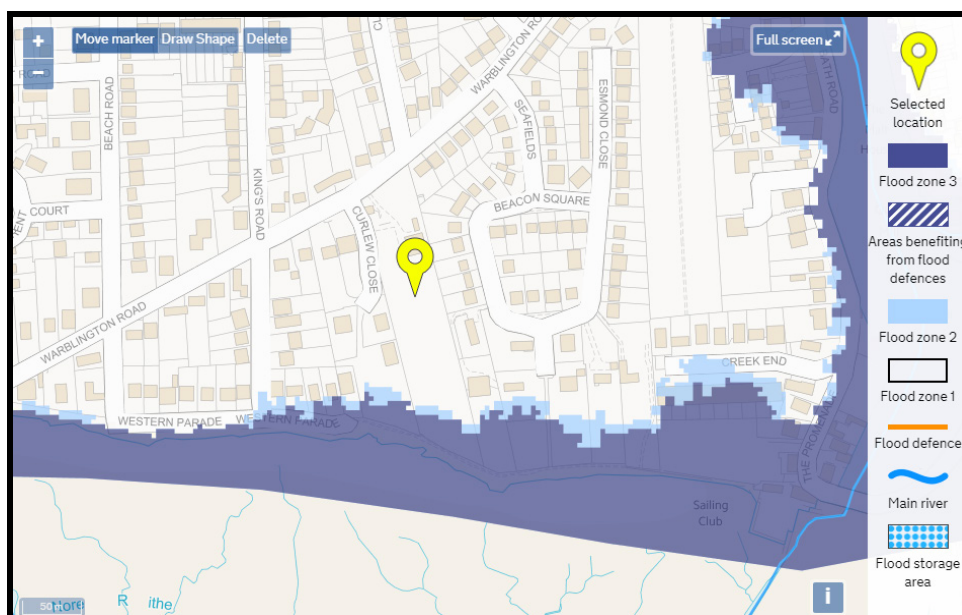


Figure 3: Flood Zone Map (Source: EA)

1.10

An extract from the EA surface water flood risk map is provided in Figure 4. This demonstrates that the site is not at risk of flooding from this source.



Figure 4: Surface Water Flood Risk Map (Source: EA)

- 1.11 In addition to surface water flood risk, it is also important to consider the risk of flooding from rivers and the sea. In this regard, EA mapping has further been interrogated to determine the risk posed from this type of flooding (see Figure 5).

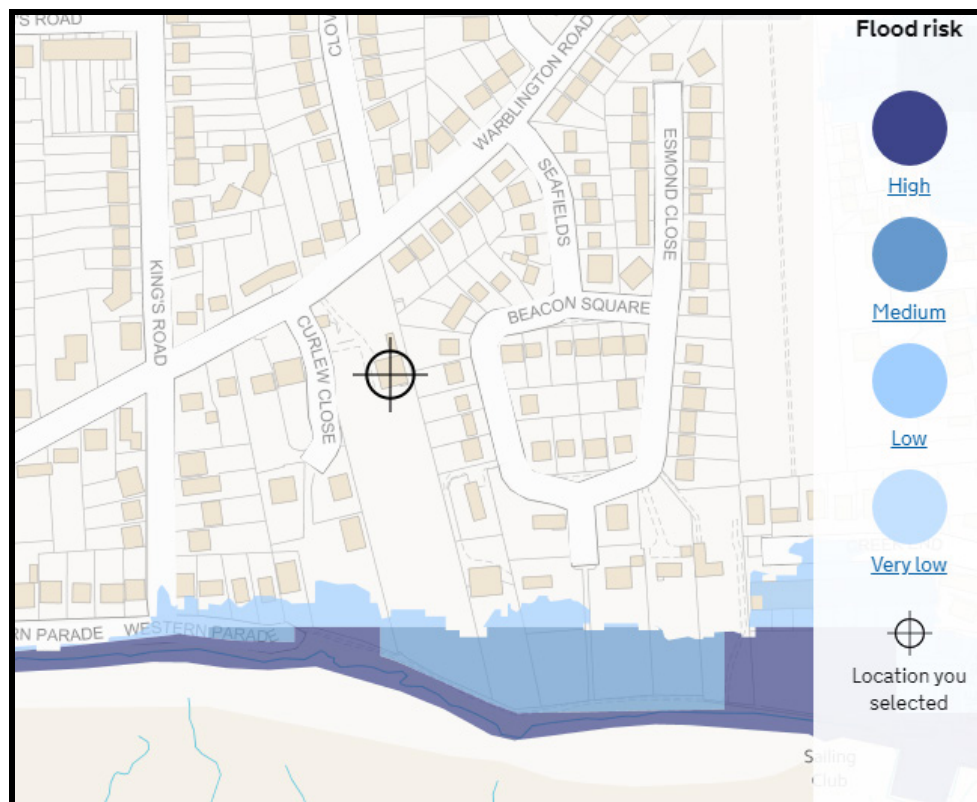


Figure 5: Rivers/Sea Flood Risk Map (Source: EA)

- 1.12 Figure 5 demonstrates that the southern extremity of the site has a low to medium risk of river or sea flooding.
- 1.13 The proposed development has been designed with due regard to this potential risk. As such, the proposed units have not been located within the area at risk of flooding.
- 1.14 When considering climate change the site specific flood data was requested for the EA. This illustrates the tidal model for 2115 which considers likely climate change (see Figure 6). The level indicated on the mapping provides a flooding level for 2115 of 4.5m AOD.



Figure 6: Tidal Model for 2115

1.15 Due to the topography of the application site, part of the proposed built development falls within the estimated future tidal flood risk area for 2115 and as such can be designed to mitigate this potential impact.

1.16 In this regard, floor levels of the southernmost properties could be designed to be above the 2115 estimated flood level of 4.5m AOD.

Ground Investigation Data

1.17 Soakaway testing, in accordance with BRE365, has previously been undertaken at the site. The testing observed that no infiltration was possible and concluded that the soils are not likely to perform to a satisfactory standard. The full testing results are attached at **Appendix 2**.

1.18 British Geological Survey mapping indicates that there are superficial deposits of sand, silt and clay (fluvial in origin), and the bedrock at the site is chalk. The BGS mapping extract is provided at **Appendix 3**.

2.0 FLOOD RISK ASSESSMENT

Flood Risk Assessment Methodology and Objectives

2.1 It is recognised that developments that are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. Current guidance on development and flood risk identifies several key aims for a development to ensure that it is sustainable in flood risk terms. These aims are as follows:

- the development should not be exposed to flood risk such that the health, safety and welfare of the users of the development, or the population elsewhere, are threatened;
- the development should not be at a significant risk of flooding and should not be susceptible to damage due to flooding;
- safe access to and from the development should be possible during flood events;
- the development should not increase flood risk elsewhere;
- the development should not prevent safe maintenance of watercourses or maintenance and operation of flood defences;
- the development should not be associated with an onerous or difficult operation and maintenance regime to manage flood risk. The responsibility for any operation and maintenance required should be clearly defined;
- future users of the development should be made aware of any flood risk issues relating to the development;
- the development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues;
- the development should not lead to degradation of the environment, and;
- the development should meet all of the above criteria for its entire lifetime, including consideration of the potential effects of climate change.

2.2 This Assessment has been prepared with due consideration of these sustainability aims, to inform the proposed scheme. A development lifetime of

100 years has been assumed in line with PPG guidance on residential development life cycles.

Project Scope

2.3 In order to achieve the aims outlined above, this Assessment has been undertaken in accordance with current best-practice guidance.

2.4 A scoping study was initially undertaken to identify all potential sources of flooding at the site, which may warrant further consideration.

2.5 Any potential flooding issues identified in the scoping study have subsequently been considered within this Assessment. The aim of the scoping study is to review all available information and provide a qualitative assessment of the flood risk to the site and the impact of the site on flood risk elsewhere.

2.6 The Report has been undertaken with due regard to the EA's National Standing Advice on Development and Flood Risk.

Existing Greenfield Run-off Rates

2.7 The existing greenfield run-off rates have been obtained from www.uksuds.com and are summarised in Table 1. The full output is attached at **Appendix 4**.

Table 1: Existing Greenfield Run-off Rates

Return Period (Years)	IH 124 Run-off Rates
	l/s for 0.83ha
1 in 1 year	1.33
1 in 30 years	3.60
1 in 100 years	5.00
1 in 100 years (+40%)	7.00

2.8 The soil has been categorised by UK Suds as being 'type 2'. Soil type 1 is sandy highly permeable material with permeability reducing as the Soil value increases. Soil type 4 is heavy clay and 5 (which is rarely applied) is exposed rock.

3.0 DRAINAGE STRATEGY

Disposal of Surface and Foul Water

3.1 The existing dwelling utilises the Southern Water surface water and foul water sewers located in the vicinity of the application site. The location of Southern Water foul and surface water sewers has been provided on the plan attached at **Appendix 5**.

3.2 The surface water sewer borders the western boundary of the application site and outfalls into Chichester Harbour. There are two foul water sewers in the vicinity of the site, one bisects the application site on a broadly west/east alignment and the other is present within Warblington Road.

Surface Water

3.3 In accordance with SuDS principles, the proposal will initially seek to provide soakaway drainage to serve each plot.

3.4 However, based on the results of the infiltration testing previously undertaken at the site, the sub-strata is not suitable for soakaway drainage (see Appendix 2).

3.5 In this regard, an alternative option has been considered which will provide storage tanks for each property. Each tank will discharge into the nearby surface water sewer. The discharge rate will be controlled via a hydro-brake, and will be limited to 2.0l/s.

Foul Water

3.6 With regards to the foul water strategy, it is proposed that plots 5 and 6 will connect to the existing foul water sewer within Warblington Road, and plots 1-4 will connect to the foul water sewer that bisects the site.

3.7 The proposed surface and foul water drainage strategy, along with MicroDrainage analysis of the surface water strategy, has been provided at **Appendix 6**.

Maintenance and Management

- 3.8 The continued management and maintenance of the drainage system will be essential in ensuring the continued protection of the development from the surface water flooding.
- 3.9 Visual inspection of the drainage network and outfalls should be undertaken on a regular basis to identify any siltation/blockage/disrepair of the drainage network and attenuation facilities.
- 3.10 A surface water management system therefore needs to be drawn up as part of any planning consent that is issued for the site.

4.0 SUMMARY AND CONCLUSIONS

- 4.1 Bellamy Roberts LLP has been retained by Mr. Charles Glanville to undertake a Flood Risk Assessment (FRA) in support of a planning application for a residential development on land south of Warblington Road, Emsworth.
- 4.2 Environment Agency mapping has been reviewed and it has been determined that the site lies wholly within Flood Zone 1, and no risk of flooding from sources such as surface water and rivers.
- 4.3 Surface water storage tanks will be provided for each property. Each tank will discharge into the nearby surface water sewer. The discharge rate will be controlled via a hydro-brake, and will be limited to 2.0l/s.
- 4.4 With regards to the foul water strategy, it is proposed that plots 5 and 6 will connect to the existing foul water sewer within Warblington Road, and plots 1-4 will connect to the foul water sewer that bisects the site.

APPENDICES

APPENDIX 1

Debby Wise

From: PlanningSSD <PlanningSSD@environment-agency.gov.uk>
Sent: 15 August 2017 16:06
To: Ian Roberts
Subject: RE: Warblington Road, Emsworth - 5042

Good Afternoon Mr Roberts,

My name is Jon Maskell and I am the Environment Agency officer responsible for planning matters for Havant Borough Council.

Thank you for emailing us with the Flood Risk Assessment (FRA) associated for this site.

Having had a look at the FRA it shows that the proposed red line boundary is located wholly inside flood zone 1 and therefore, in line with national policy, in an area at lowest risk of flooding. Therefore we would not be a statutory consultee at the planning stage. With this in mind, we are pleased to see that the development is outside of current day flood zones and considers the site over the lifetime of the development. Therefore we have no comments or objections to the proposal.

I would say that it may be worth consulting with the relevant Lead Local Flood Authority (LLFA) to discuss any matters pursuant to surface water disposal.

I hope that this is of assistance

Kind Regards

Jon

Jon Maskell | Sustainable Places Advisor | Solent and South Downs Area | Environment Planning and Engagement
Environment Agency | Romsey District Office | Canal Walk | Romsey | Hampshire | SO51 7LP

Tel: 020 8474 5888

jon.maskell@environment-agency.gov.uk

We offer a cost recovery service for bespoke pre-application advice. For more information go to: gov.uk or [email us](#)

Flood Risk Standing Advice was updated on 15 April 2015. For more information please follow the links below:

For developers: [FRSA developers page](#)

For councils: [FRSA council's page](#)



Our **climate change allowances** for planning were updated on 19 February 2016. The guidance is accessible here: [Flood risk assessment: Climate change allowances](#)

From: Ian Roberts [<mailto:ianroberts@bellamyroberts.co.uk>]
Sent: 11 August 2017 13:18
To: PlanningSSD <PlanningSSD@environment-agency.gov.uk>
Subject: Warblington Road, Emsworth - 5042

For the Attention of Hannah Highland

Dear Hannah

We have been requested by our client to obtain the Environment Agency's view on the Flood Risk Assessment which has been undertaken in respect of the site at Warblington Road, Emsworth. The scheme involves a development of the rear garden of the existing property and providing six dwellings in addition to the existing house.

We would be grateful for your views and should you have any queries regarding the FRA please feel free to call me.

Many thanks

Kind regards

Ian Roberts



Clover House
Western Lane
Odiham
Hampshire
RG29 1TU

Tel: 01256 703355
Fax: 01256 704934

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APPENDIX 2

CLIENT	Charles Glanville c/o Re-Format Limited
SITE ADDRESS	Fowley Cottage, 46 Warblington Road, Emsworth, Hampshire PO10 7HD
REPORT REFERENCE	GWPR1704
ENGINEER	Joshua Laite, Ground and Water Limited
INVESTIGATION LOCATIONS	Please see Figure 1 attached. Site works were undertaken on 20 th June 2016 and comprised the excavation of six trial pits (TP1-TP6) with soakaway testing in accordance with the principles of BRE365 in TP1-TP3 and TP5-TP6.

GROUND CONDITIONS ENCOUNTERED

Summary of Strata Encountered (TP1-TP6)		
Strata	Depth Encountered (m bgl)	Thickness (m)
TOPSOIL: Mid brown silty sandy gravelly clay. Sand is fine grained. Gravel is rare to occasional, sub-angular to sub-rounded, fine to coarse flint.	GL	0.15 – 0.30
MADE GROUND (TP6): Light brown silty sandy gravelly clay. Sand is fine to medium grained. Gravel is fine to abundant, fine to coarse, angular to sub-rounded flints, chalk and bricks.	0.20	0.60
RIVER TERRACE DEPOSITS: Mottled light / mid brown / orange, silty sandy gravelly CLAY. Sand is fine grained. Gravel is rare to occasional, fine to medium, sub-angular to sub-rounded flint.	0.15 – 0.30	0.90 – 1.55
RIVER TERRACE DEPOSITS: Mottled light / mid brown / orange silty sandy gravelly CLAY. Sand is fine to medium grained. Gravel is abundant, fine to coarse, sub-rounded to sub-angular flints and chalk.	0.80 – 1.70	0.90 - 2.90
RIVER TERRACE DEPOSITS (TP1 and TP4): Light brown / off white sandy gravelly CLAY. Sand is fine to coarse grained. Gravel is abundant, fine to medium, sub-angular to sub-rounded, flint and chalk.	2.90 - 3.90	0.20 – 0.40
LEWES NODULAR CHALK FORMATION (TP3): Structureless CHALK composed of cream gravelly sandy SILT. Gravel are moderately weak, high density, white and sub-angular. Locally white / light brown with a trace of light brown clay.	2.40	0.60

ROOTS	Roots were noted between 0.70 - 1.80m bgl.
GROUNDWATER	Groundwater was not encountered during this investigation.

INFILTRATION RATE

Soakaway tests, in accordance with the principles of BRE365, were undertaken at depths from 3.10m bgl – 4.30m bgl (TP1, TP3, TP5 and TP6) within the soils of the 1st River Terrace Deposits, comprising a silty sandy gravelly clay.

No infiltration was recorded and therefore soakaways constructed within the soils of the 1st River Terraced Deposits are **not** likely to perform to a satisfactory standard.

Soakaway Testing (TP1, TP2, TP5 and TP6)				
Trial Hole	Starting Depth (m bgl)	Final Depth (m bgl)	Time Elapsed (mins)	Infiltration Rate (m/sec)
TP1	2.50	2.49	125	0
TP2	2.03	2.01	156	0
TP5	1.82	1.80	154	0
TP6	2.10	2.20	190	0

A soakaway test, in accordance with the principles of BRE365, was undertaken at a depth of 3.00m bg in TP3 within the soils of the Lewes Nodular Chalk Formation, comprising a cream gravelly sandy SILT. No infiltration was noted and therefore the soils of the Lewes Nodular Chalk Formation are also **not** likely to perform to a satisfactory standard.

Soakaway Testing (TP3)				
Trial Hole	Starting Depth	Final Depth	Time Elapsed	Infiltration Rate
TP3	1.10m bgl	1.10m bgl	116 min	0 m/sec

The site was located within a **Secondary A Aquifer** relating to superficial deposits of the River Terrace Deposits, beneath a **Principal Aquifer** comprising the bedrock deposits of Lewes Nodular Chalk Formation is present.

Examination of the Environment Agency records showed that the site **was not** located within a **Groundwater Source Protection Zone** as classified in the Policy and Practice for the Protection of Groundwater.

Consultation with the Environment Agency must be sought regarding any use that may have an impact on groundwater resources.

ANTICIPATED VOLUME CHANGE POTENTIAL

RIVER TERRACE DEPOSITS: Likely to have moderate to high volume change potential.

LEWES NODULAR CHALK FORMATION: Likely to have no volume change potential.

All in accordance with NHBC Standards Chapter 4.2 and BRE240. Subject to confirmation of results of geotechnical classification testing.

FOUNDATION RECOMMENDATIONS

At the time of reporting, June 2016, it is our understanding that the proposed development will incorporate the retention of the existing property and construction of 6No. detached properties with gardens in the surrounding grounds. Ancillary structures, such as site access, parking areas and private gardens will also be formed.

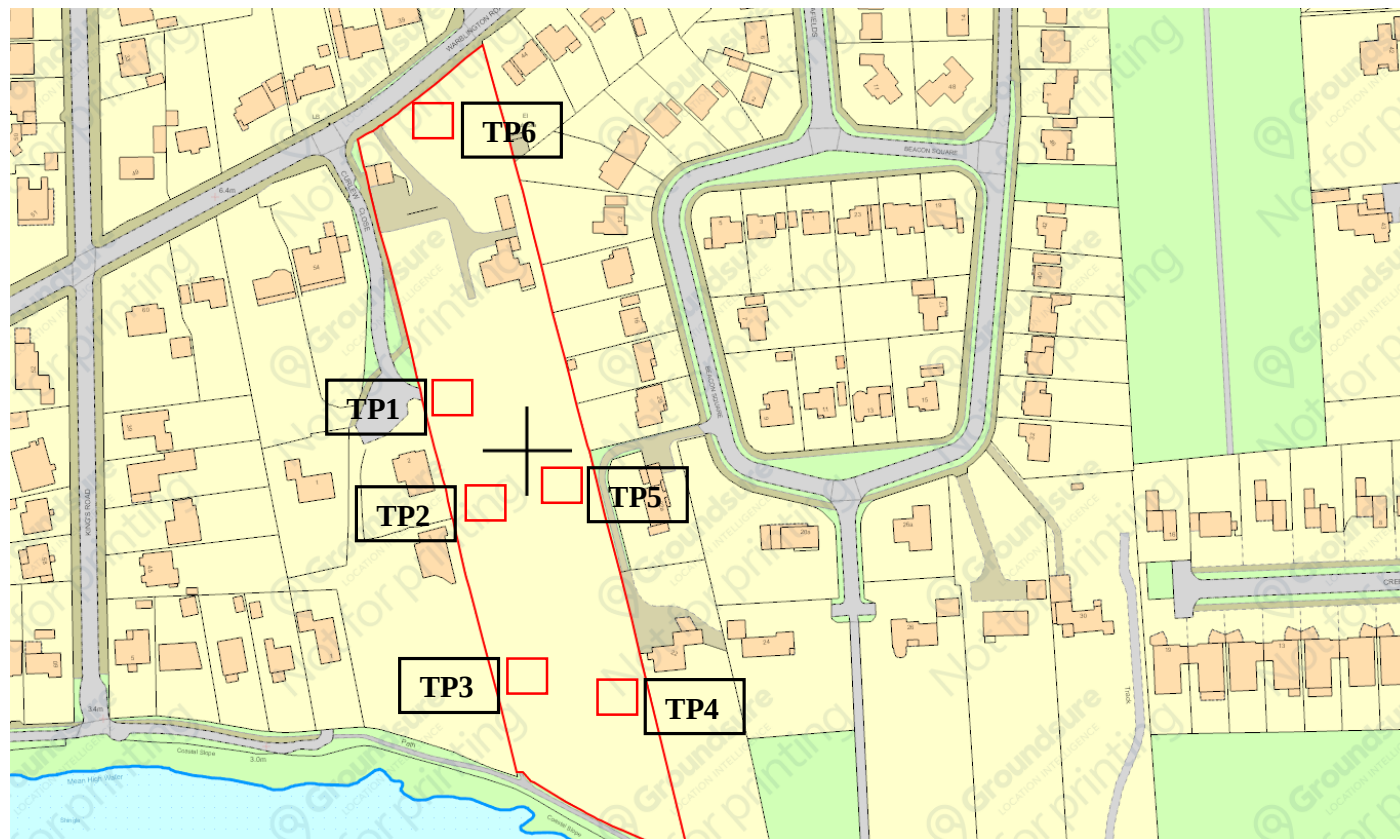
Foundations must not be placed within cohesive root penetrated and/or desiccated soils and the influence of the trees surrounding the site must be taken into account. The base of foundation excavations must extend at least 300mm into non-root penetrated soils. Should trees be removed from footprint of proposed development then a piled foundation should be considered.

Roots were generally noted ranging between 0.70 - 1.80m bgl, foundations minimum foundations depths rare likely to range from 1.00 - 2.10m bgl into the River Terrace Deposits.

Foundations constructed on the River Terrace Deposits at 1.00m bgl can be designed based on a presumed safe bearing capacity of 75kN/m², increasing to 100kN/m² at 2.10m bgl. This is based on trial hole records, inspection of samples recovered, geotechnical laboratory results, and referral to BS 8004:1986, Code of Practice for Foundations, the results of the insitu testing, and based on a 5m long by 1.0m wide foundation and a maximum settlement of ~25mm.

Given that the cohesive soils of the 1st River Terrace Deposits are likely to have a volume change potential in accordance with BRE Digest 240 and NHBC Chapter 4.2, a suspended slab should be considered. The volume change potential of the shallow surface soils must be taken into account in final design (underfloor void diameter/compressible material/void formers etc).

This preliminary information may be subject to amendment in the final report and no liability can be accepted for any actions based on this preliminary information.



NOT TO SCALE

 APPROXIMATE SITE BOUNDARY

Project:

Fowley Cottage, 46 Warblington Road, Emsworth, Hampshire PO10 7HD

Client:

Charles Glanville c/o Re-Format Limited

Date:

July 2016

Trial Hole Location Plan

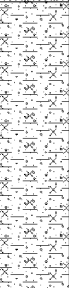
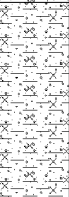
Ref:

GWPR1704

Figure 1

ground&water

Ground and Water Ltd						Trialpit No TP1 Sheet 1 of 1	
Project Name Fowley Cottage			Project No. GWPR1704		Co-ords: - Level: -		Date 20/06/2016
Location: 46 Warblington Road, Emsworth, Hampshire PO10 7HD					Dimensions: - Depth 4.30m		Scale 1:25 Logged By JL
Client: Charles Glanville c/o Re-Format Ltd							

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	D		0.30			TOPSOIL: Mid brown silty sandy gravelly clay. Sand is fine grained. Gravel is rare to occasional, sub-angular to sub-rounded, fine to coarse flint.	1
0.50	D					RIVER TERRACE DEPOSITS: Mottled light/mid brown/orange silty sandy gravelly CLAY. Sand is fine grained. Gravel is rare to occasional, fine to medium, sub-angular to sub-rounded flint.	
0.80	D						
1.20	D		1.30			RIVER TERRACE DEPOSITS: Mottled light brown/orange silty sandy gravelly CLAY. Sand is fine to medium grained. Gravel is abundant, fine, sub-angular to sub-rounded flint and chalk fragments.	2
1.50	D						
1.80	D						
2.20	D		2.00			RIVER TERRACE DEPOSITS: Mottled light brown/grey/orange silty sandy gravelly CLAY. Sand is fine grained. Gravel is abundant, fine, sub-angular to sub-rounded chalk fragments.	3
2.50	D						
2.80	D						
3.00	D		3.90			RIVER TERRACE DEPOSITS: Light brown/off white sandy gravelly CLAY. Sand is fine to coarse grained. Gravel is abundant, fine to medium, sub-angular to sub-rounded flint and chalk.	4
3.40	D						
3.80	D						
4.30	D		4.30			Trialpit Complete at 4.30 m	

Remarks:	Roots noted to 1.80m bgl.
Groundwater:	No groundwater encountered.



Ground and Water Ltd						Trialpit No TP2 Sheet 1 of 1	
Project Name Fowley Cottage			Project No. GWPR1704		Co-ords: - Level: -		Date 20/06/2016
Location: 46 Warblington Road, Emsworth, Hampshire PO10 7HD					Dimensions: - Depth 3.40m		Scale 1:25
Client: Charles Glanville c/o Re-Format Ltd							Logged By JL
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	D		0.30			TOPSOIL: Mid brown silty sandy gravelly clay. Sand is fine grained. Gravel is rare, sub-angular to sub-rounded, fine to coarse flint.	1
0.50	D					RIVER TERRACE DEPOSITS: Mottled light brown/orange silty sandy gravelly CLAY. Sand is fine grained. Gravel is rare, fine to medium, sub-angular to sub-rounded flint.	
0.80	D						
1.20	D		1.30			RIVER TERRACE DEPOSITS: Mottled light brown/orange silty sandy gravelly CLAY. Sand is fine to medium grained. Gravel is abundant, fine, sub-angular to sub-rounded flint and chalk.	2
1.50	D						
1.80	D						
2.20	D		2.10			RIVER TERRACE DEPOSITS: Light brown/orange/grey silty sandy gravelly CLAY. Sand is fine grained. Gravel is abundant, fine to medium, sub-angular to sub-rounded flint and chalk.	3
2.50	D						
2.80	D						
3.40	D		3.40			Trialpit Complete at 3.40 m	4
Remarks: Roots noted to 0.80m bgl							
Groundwater: No groundwater encountered.							



Ground and Water Ltd						Trialpit No TP4 Sheet 1 of 1		
Project Name Fowley Cottage			Project No. GWPR1704		Co-ords: - Level: -		Date 20/06/2016	
Location: 46 Warblington Road, Emsworth, Hampshire PO10 7HD					Dimensions: - Depth 3.10m		Scale 1:25	
Client: Charles Glanville c/o Re-Format Ltd							Logged By JL	
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
Depth (m)	Type	Results						
0.15	D		0.15			TOPSOIL: Mid brown silty sandy gravelly clay. Sand is fine grained. Gravel is rare, fine to coarse, sub-angular to sub-rounded flint.		
0.30	D					RIVER TERRACE DEPOSITS: Light brown/mid-brown/orange silty sandy gravelly CLAY. Sand is fine grained. Gravel is rare to occasional, fine to medium, sub-angular to sub-rounded flint.		
0.90	D		1.70				1	
1.20	D							
1.50	D							
1.80	D		2.10			RIVER TERRACE DEPOSITS: Light brown/orange silty sandy gravelly CLAY. Sand is fine to medium grained. Gravel is abundant, fine, sub-angular to sub-rounded flint and chalk.	2	
2.20	D					RIVER TERRACE DEPOSITS: Light brown/orange silty sandy gravelly CLAY. Sand is fine grained. Gravel is abundant, fine to coarse, flint and chalk.		
2.50	D		2.90				3	
3.00	D					RIVER TERRACE DEPOSITS: Light grey/off white sandy gravelly CLAY. Sand is fine to coarse grained. Gravel is abundant, sub-angular to sub-rounded, fine to coarse flint and chalk.		
Trialpit Complete at 3.10 m								
								4
Remarks: Roots noted to 1.00m bgl.								
Groundwater: No groundwater encountered.								

Ground and Water Ltd						Trialpit No TP5 Sheet 1 of 1	
Project Name Fowley Cottage			Project No. GWPR1704		Co-ords: - Level: -		Date 20/06/2016
Location: 46 Warblington Road, Emsworth, Hampshire PO10 7HD					Dimensions: - Depth 3.90m		Scale 1:25
Client: Charles Glanville c/o Re-Format Ltd							Logged By JL
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	D		0.20			TOPSOIL: Mid brown silty sandy gravelly clay. Sand is fine grained. Gravel is rare, fine to medium, sub-angular to sub-rounded flint.	
0.50	D					RIVER TERRACE DEPOSITS: Mid brown/orange silty sandy gravelly CLAY. Sand is fine grained. Gravel is rare, fine to medium, sub-angular to sub-rounded flint.	
0.80	D						
1.20	D		1.10			RIVER TERRACE DEPOSITS: Light brown/orange/grey silty sandy gravelly CLAY. Sand is fine to medium grained. Gravel is abundant, fine to coarse, sub-angular to sub-rounded flint and chalk. Coarse chalk fragments noted from 2.40m bgl.	1
1.50	D						
1.80	D						
2.20	D						2
2.70	D						
3.40	D						3
3.80	D		3.90				
						Trialpit Complete at 3.90 m	4
Remarks: Roots to 1.30m bgl.							
Groundwater: No groundwater encountered.							



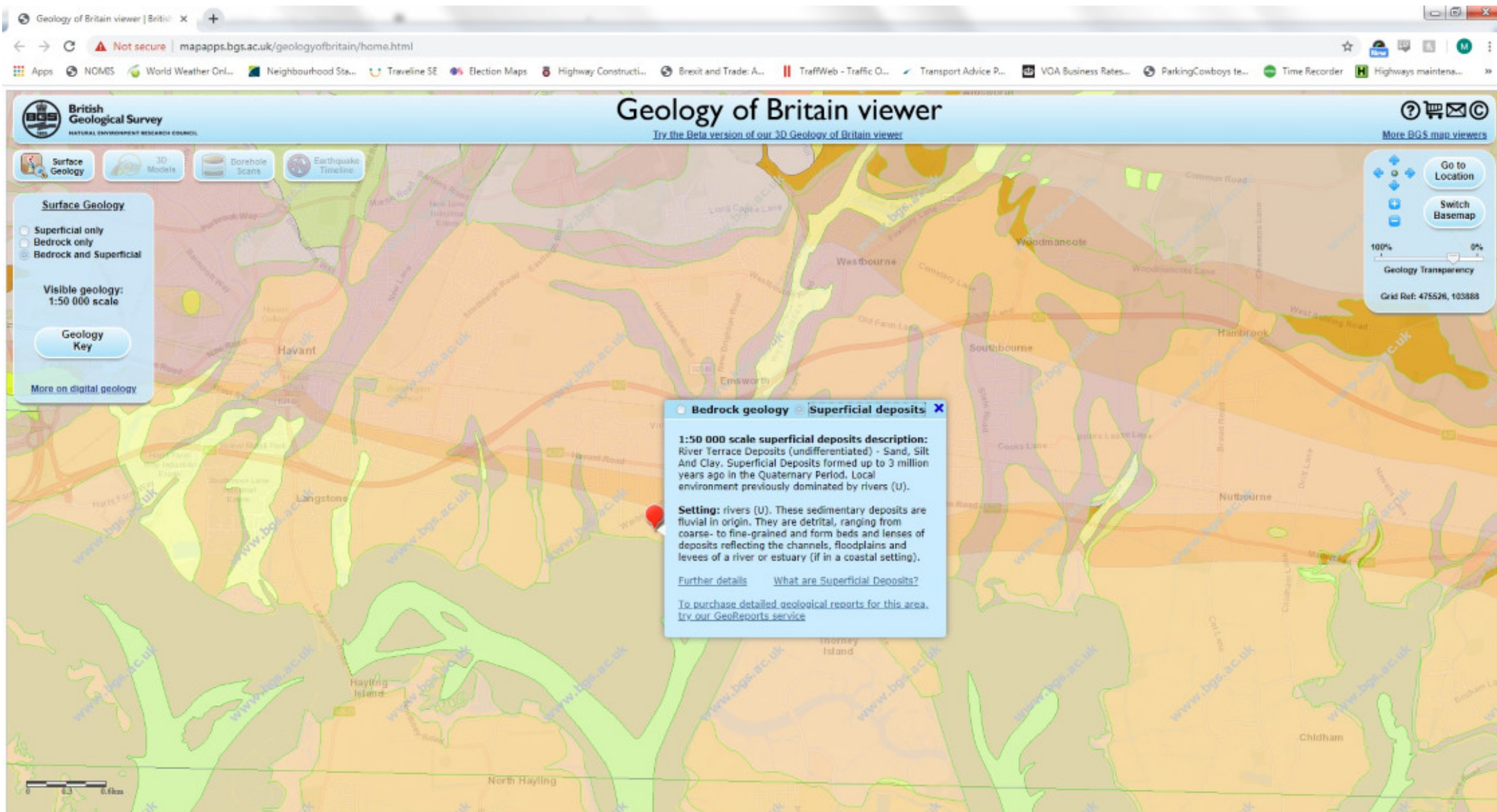
TP5BASE 3.1 (Bul 42220) Standard Trialpit Log V2 dated 27th Nov 03

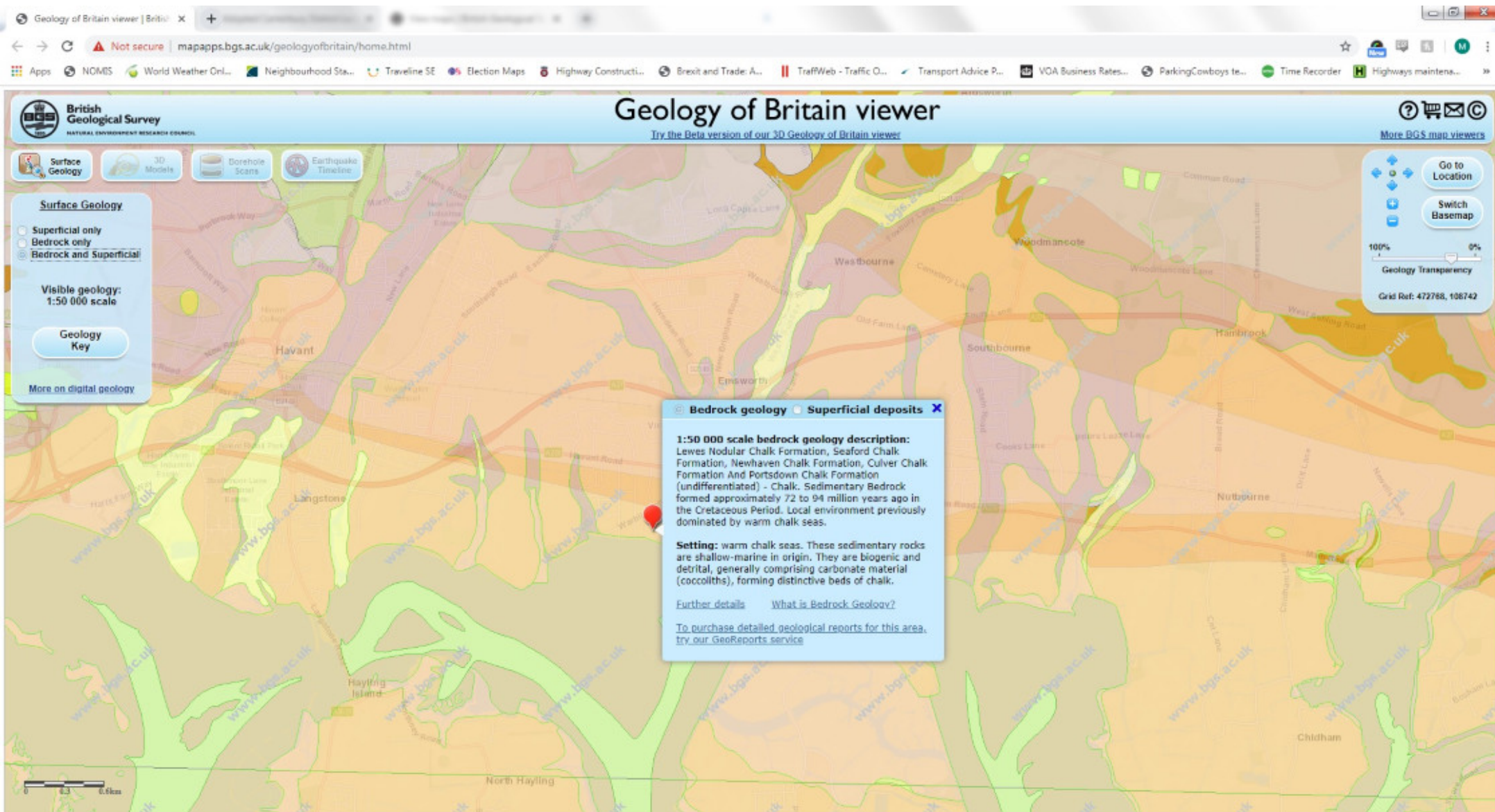
Ground and Water Ltd						Trialpit No TP6 Sheet 1 of 1	
Project Name Fowley Cottage			Project No. GWPR1704		Co-ords: - Level: -		Date 20/06/2016
Location: 46 Warblington Road, Emsworth, Hampshire PO10 7HD					Dimensions: - Depth 3.70m		Scale 1:25
Client: Charles Glanville c/o Re-Format Ltd							Logged By JL
Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	D		0.20			TOPSOIL: Mid to dark brown silty sandy gravelly clay. Sand is fine grained. Gravel is rare, fine to coarse, sub-angular to sub-rounded flint.	
0.50	D					MADE GROUND: Light brown silty sandy gravelly clay. Sand is fine to medium grained. Gravel is fine to abundant, angular to sub-rounded, fine to coarse flint, chalk and brick.	
0.80	D		0.80			RIVER TERRACE DEPOSITS: Mottled light brown/orange silty sandy gravelly CLAY. Sand is fine to medium grained. Gravel is abundant, fine to medium, sub-angular to sub-rounded flint and chalk.	1
1.20	D						
1.50	D						
1.80	D						2
2.20	D						
2.70	D						
			2.90			RIVER TERRACE DEPOSITS: Mottled light brown/orange silty sandy gravelly CLAY. Sand is fine grained. Gravel is abundant, sub-angular to sub-rounded, fine to medium chalk and flint.	3
3.20	D						
3.70	D		3.70			Trialpit Complete at 3.70 m	4
Remarks: Roots noted to 1.80m bgl.							
Groundwater: No groundwater encountered.							



TEMPLATE 3.1 (Rev 4/2010) Standard Trialpit Log V2 (Issued 27th Nov 03)

APPENDIX 3





APPENDIX 4

Calculated by:

Site name:

Site location:

Site coordinates

Latitude:

Longitude:

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference:

Date:

Methodology

IH124

Site characteristics

Total site area (ha)	0.83
----------------------	------

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	2	2
HOST class	---	---
SPR/SPRHOST	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm)	721	721
Hydrological region	7	7
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Notes:

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

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

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

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

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

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

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	1.57	1.57
1 in 1 year (l/s)	1.33	1.33
1 in 30 years (l/s)	3.6	3.6
1 in 100 years (l/s)	5	5

APPENDIX 5



Atkins Global
The Hub, 500
Park Avenue
Bristol
BS32 4RZ

Your ref 54886
Our ref 245484
Date 22 May 2017
Contact searches@southernwater.co.uk
Tel 0845 272 0845
0330 303 0276
Fax 01634 844514

Attention: Andrew Aitken

Dear Customer

Re: Provision of public sewer record extract

Location: Site surrounding Warblington Road, Emsworth, PO10 7HD

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

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

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

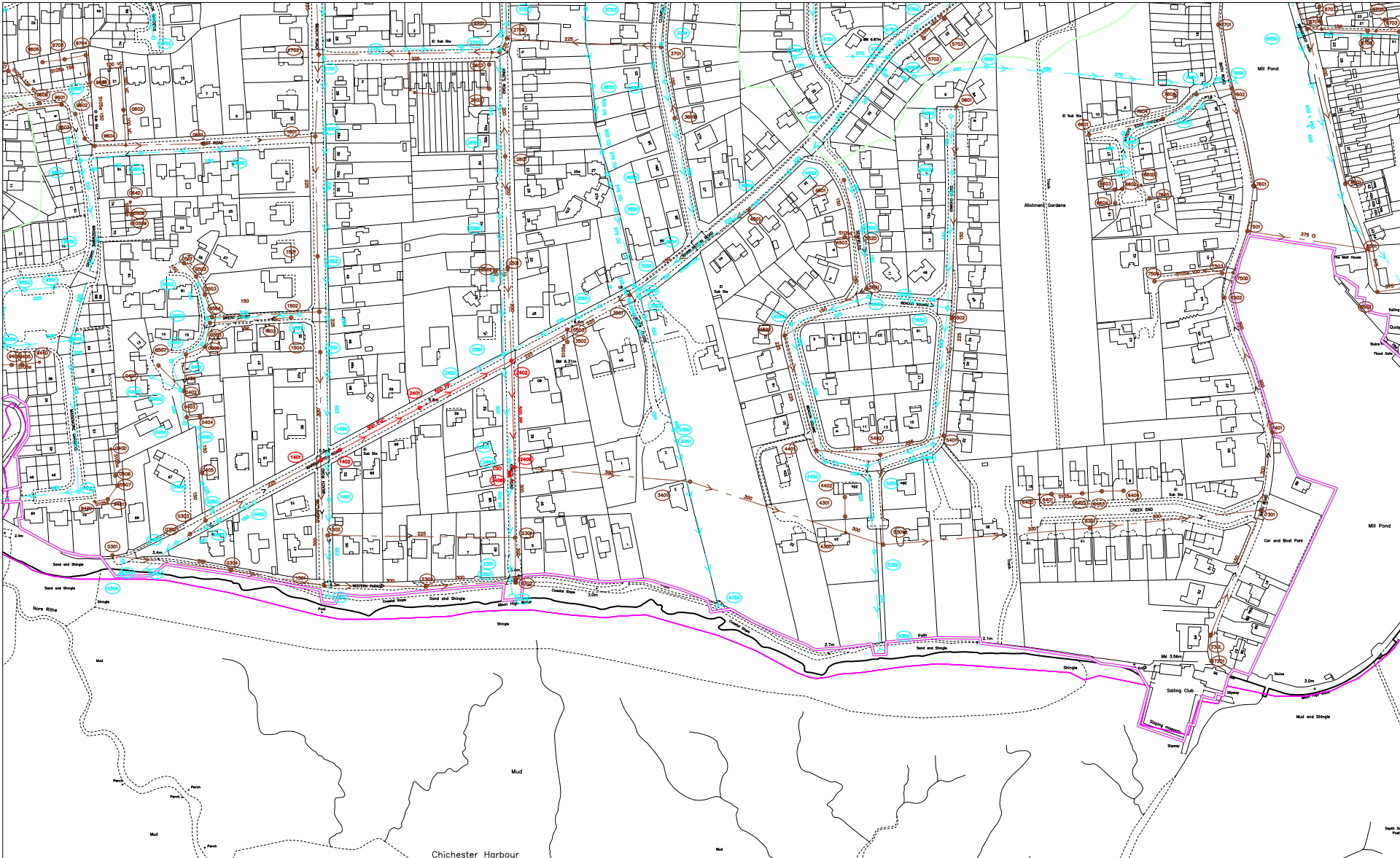
Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

SEWER RECORDS PAGE 1 OF 2

105739



105161

O.S. REF.

SU7405SW

Drawn by: yadavs

Scale: 1:2500

Title: 245484_Site surrounding Warbli

Date: 22/05/2017

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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Southern Water

474871

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape		
0301X	3.761	2.554	300	UNK	CIRC	2350X	3.269	1.749	500	UNK	CIRC	4652X	6.132	5.232	150	UNK	CIRC	8707Y				UNK	UNK	UNK	
0302X			UNK	UNK	CIRC	2401X	5.779	2.487	500	PP	CIRC	4751X	6.436		300	UNK	CIRC	870DX				UNK	UNK	CIRC	
0303X	4.279		225	UNK	CIRC	2402X	6.144		500	PP	CIRC	4752X	6.611		225	UNK	CIRC	8710Y				UNK	UNK	CIRC	
0304X	3.429	2.478	300	UNK	CIRC	2406Y	4.75		300	UNK	CIRC	*	5301X	3.761		300	UNK	CIRC	8750X	3.035		450	UNK	RECT	
0350X	4.382	3.312	225	UNK	CIRC	2406X	4.75	2.065	500	PP	CIRC	*	5350X	3.558	2.478	225	UNK	CIRC	9401X			UNK	UNK	CIRC	
0351X	4.281		300	UNK	CIRC	2408X	4.61	2.628	500	PP	CIRC	*	5401X	5.069	3.094	225	UNK	CIRC	9404X			UNK	UNK	CIRC	
0352X	3.562	2.652	300	UNK	CIRC	2450X			UNK	UNK	CIRC	*	5402X	4.721		UNK	UNK	CIRC	9405X			UNK	UNK	CIRC	
0354X	2.62	2.17	UNK	CIRC	C	2451X	4.8	3.277	500	PP	CIRC	*	5450X	4.82	3.43	225	UNK	CIRC	9450X			225	UNK	CIRC	
0401X	5.599	4.229	UNK	UNK	CIRC	2451Y	4.8	3.254	300	UNK	CIRC	*	5451X	4.536		225	UNK	CIRC	9550X	4.952	3.512	225	UNK	CIRC	
0402X	5.583	4.033	UNK	UNK	CIRC	2452X	4.61	2.796	500	PP	CIRC		5501X	5.974	4.325	150	UNK	CIRC	9551X	4.471	3.701	225	UNK	CIRC	
0403X	5.363	3.933	UNK	UNK	CIRC	2501X	6.334		200	UNK	CIRC		5502X	5.63	3.572	225	UNK	CIRC	9552X	4.469	3.619	225	UNK	CIRC	
0404X	5.397	3.907	150	UNK	CIRC	2502X			100	VC	CIRC		5520X			150	UNK	CIRC	9554X	4.054	3.478	225	UNK	CIRC	
0405X	4.398	3.258	UNK	CIRC	C	2503X			200	UNK	CIRC		5550X		6.155	5.055	150	UNK	CIRC	9555X	4.368		225	UNK	CIRC
0406X			UNK	UNK	CIRC	2550X	6.489	4.519	225	UNK	CIRC		5551X	5.922	4.792	150	UNK	CIRC	9601X			UNK	UNK	CIRC	
0407X			UNK	UNK	CIRC	2551X	6.244		300	UNK	CIRC	*	5552X	5.777	4.387	150	UNK	CIRC	9602X			UNK	UNK	CIRC	
040DX			UNK	UNK	CIRC	2601X	6.507	5.09	200	UNK	CIRC	*	5553X	5.624		225	UNK	CIRC	9603X			UNK	UNK	CIRC	
0450X	4.919	3.109	150	UNK	CIRC	2601Y	6.507		200	UNK	CIRC	*	555Z			225	UNK	CIRC	9604Y			UNK	UNK	CIRC	
0451X	5.558		225	UNK	CIRC	2602X			150	VC	CIRC	*	5601X	5.352	4.59	225	UNK	CIRC	9605X			150	UNK	CIRC	
0452X	5.642	4.362	225	UNK	CIRC	2603X			150	VC	CIRC	*	5650X	5.568		450	UNK	CIRC	9606X			150	UNK	CIRC	
0453X	5.758		225	UNK	CIRC	2630X			150	VC	CIRC	*	5651X	4.815	3.935	450	UNK	CIRC	9650X			225	UNK	CIRC	
0454X	5.33	4.18	UNK	UNK	CIRC	2640X			150	VC	CIRC	*	5652X	5.352	4.812	150	UNK	CIRC	9651X	5.669	4.109	225	UNK	CIRC	
0455X	4.635	3.835	225	UNK	CIRC	2650X	6.516	4.916	UNK	UNK	CIRC	*	5653X	5.902	4.602	150	UNK	CIRC	9652X			225	UNK	CIRC	
0456X	4.379	3.409	225	UNK	CIRC	2701X	6.57	4.596	225	UNK	CIRC	*	565Z			450	UNK	CIRC	9703X			150	UNK	CIRC	
0501X	5.7	4.15	150	UNK	CIRC	2702X	6.958		225	UNK	CIRC	*	5702X			150	PF	CIRC	9704X			150	UNK	CIRC	
0502X	5.61	3.99	150	UNK	CIRC	270DX			225	UNK	CIRC		5703X			150	PF	CIRC							
0503X	5.69	3.84	150	UNK	CIRC	271DX			225	UNK	CIRC		5750X	5.196	4.536	225	UNK	CIRC							
0504X	5.55	3.77	150	UNK	CIRC	2751X	6.938	6.288	225	UNK	CIRC		5751X	5.608	4.308	375	UNK	CIRC							
0505X	5.865	UNK	UNK	UNK	CIRC	2752X	7.155	1.950	150	UNK	CIRC	*	5752X	5.231		225	UNK	CIRC	*						
0506X	5.785	4.335	UNK	UNK	CIRC	2753X	6.541	5.301	225	UNK	CIRC	*	5752Y	5.231		150	UNK	CIRC	*						
0507X	5.525	4.205	150	UNK	CIRC	3401X	4.596	1.694	300	UNK	CIRC		575Z			375	UNK	CIRC							
0508X			UNK	UNK	CIRC	3450X			450	UNK	CIRC		6301X	3.529	0.884	300	UNK	CIRC							
0509X			UNK	UNK	CIRC	3451X			450	UNK	CIRC		6401X			UNK	UNK	CIRC							
0510X	5.994		UNK	CIRC	C	3501X	6.489	4.413	225	UNK	CIRC		6402X			UNK	UNK	CIRC							
0551X	5.826	4.816	225	UNK	CIRC	3502X			UNK	VC	CIRC		6403X			UNK	UNK	CIRC							
0552X			150	UNK	CIRC	3503X			225	UNK	CIRC		640DX			UNK	UNK	CIRC							
0601X			UNK	UNK	CIRC	3550X	6.478	4.998	225	UNK	CIRC		6601X			UNK	UNK	CIRC							
0602X			100	VC	CIRC	3551Z	6.56	5.36	225	CO	CIRC	*	6603X			UNK	PF	CIRC							
060DX			100	VC	CIRC	3551Y	6.56	5.36	225	CO	CIRC	*	6604X			UNK	PF	CIRC							
061DX			100	VC	CIRC	3551X	6.56	5.36	300	CO	CIRC	*	6650X	3.474	2.604	225	UNK	CIRC							
063DX			UNK	UNK	CIRC	3552Y	6.564		450	UNK	CIRC		6651X	3.287	2.291	225	UNK	CIRC							
0650X	6.35	5.52	150	UNK	CIRC	3553Y			225	UNK	CIRC		665Z			375	UNK	CIRC							
0651X	5.81	5.2	150	UNK	CIRC	3554X	6.693		125	UNK	CIRC	*	7201X	3.017	1.493	UNK	UNK	CIRC							
0652X	7.642	6.382	225	UNK	CIRC	3555X			375	UNK	CIRC	*	7301X	2.975	0.637	300	UNK	CIRC							
1301X	4.514	2.39	300	UNK	CIRC	3601X	6.431	5.294	150	UNK	CIRC	*	730LX			150	UNK	CIRC							
1302X	4.803	3.514	225	UNK	CIRC	3650Y	6.546		300	CO	CIRC	*	7401X	2.929	0.515	300	UNK	CIRC							
1401Y	5.443	2.649	300	PVC	C	3650X	6.546	6.046	300	CO	CIRC	*	7501X	3.011		375	CI	CIRC							
1401Y	5.443		300	UNK	CIRC	3651X	6.364	5.544	225	UNK	CIRC	*	7502X	3.006	0.283	300	UNK	CIRC							
1403X	5.443	3.58	300	PVC	C	3652X			375	UNK	CIRC	*	7503X			UNK	UNK	CIRC							
1450X	5.445	4.195	UNK	UNK	CIRC	3653X	6.529		375	CO	CIRC	*	7504X			100	VC	CIRC							
1451X	5.095	3.875	225	UNK	CIRC	3654X			375	CO	CIRC	*	750DX			300	UNK	CIRC							
1501X	6.431	3.222	225	UNK	CIRC	3701X	6.495		225	UNK	CIRC	*	7601X			UNK	UNK	CIRC							
1502X	6.15		225	UNK	CIRC	3751X	6.517	5.867	150	UNK	CIRC	*	7602X			UNK	UNK	CIRC							
1503X	6.343	5.083	300	UNK	CIRC	3753X			300	CO	CIRC	*	7603X			UNK	UNK	CIRC							
1504X	6.047	2.972	300	UNK	CIRC	4301X			UNK	UNK	CIRC	*	7604X			UNK	UNK	CIRC							
1550X	6.391	5.741	225	UNK	CIRC	430DX			300	UNK	CIRC	*	7605X			UNK	UNK	CIRC							
1551X	5.993	4.683	225	UNK	CIRC	4401X	4.88	3.612	225	UNK	CIRC	*	7650X	3.005	2.245	225	UNK	CIRC							
1552X	6.366	5.156	225	UNK	CIRC	4402X			225	UNK	CIRC	*	7651X	3.082	2.182	375	UNK	CIRC							
1601X	6.849		225	UNK	CIRC	4450X	5.677	4.447	225	UNK	CIRC	*	7701X	3.017	0.384	UNK	UNK	CIRC							
1650X	6.95	6	225	UNK	CIRC	4501X	6.443	5.108	150	UNK	CIRC	*	8501X	3.02		375	UNK	CIRC							
1702X	7.45		225	UNK	CIRC	4502X	5.806	4.017	225	UNK	CIRC	*	8502X	3.17		375	UNK	CIRC							
1751X	7.432	6.292	225	UNK	CIRC	4503X			UNK	UNK	CIRC	*	8601X	3.152	1.079	UNK	UNK	CIRC							
2301X			300	UNK	CIRC	4550X	5.677		225	UNK	CIRC	*	8703X	6.139	3.944	150	UNK	CIRC							
2302Y	3.304	2.249	UNK	UNK	C	4601X	6.114		150	UNK	CIRC	*	8704X		3.17	200	UNK	CIRC							
2302X	3.304	2.249	300	UNK	CIRC	4650X	6.503		225	UNK	CIRC	*	8705X			UNK	UNK	CIRC							
2303X	4.048	2.35	300	UNK	CIRC	4651Y	5.818		225	UNK	CIRC	*	8706X			150	UNK	CIRC							

[illegible]

Drawn by:	ya
Title:	245484_Sit
Date:	22

davsa	
e surrounding Warbli	
/05/2017	

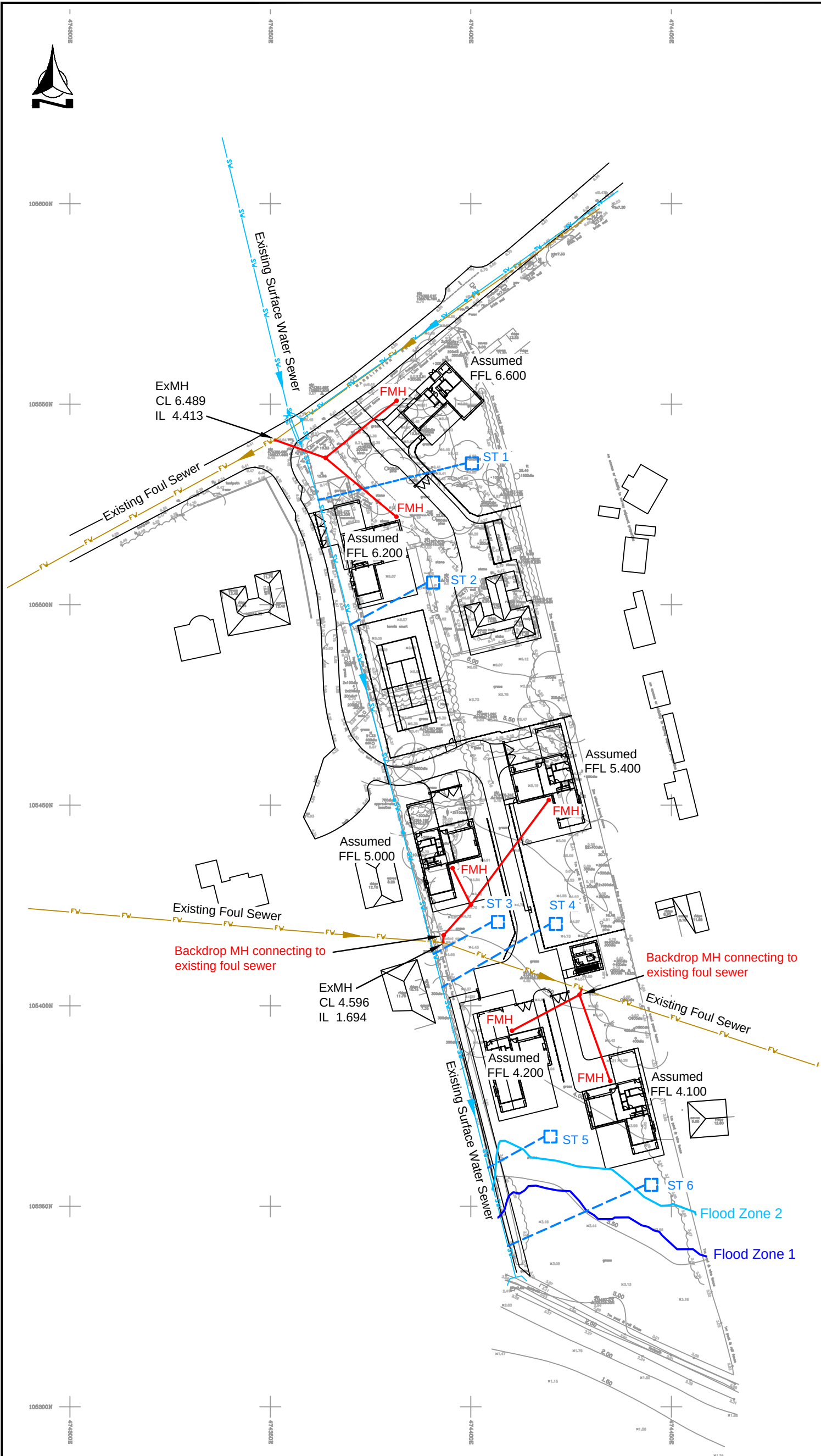
Drawn by: yadavsa

Title: 245484 Site surrounding Warbli

Date: 22/05/2017



APPENDIX 6



Notes

This drawing shall be read in conjunction with all other relevant Engineering, Architectural, Landscaping details, drawings and specifications and all relevant Highway Authority Plans.

Any works constructed prior to technical approval are at the contractors own risk.

All levels to be checked prior to any works undertaken. Existing surface water sewer along Warblington Road to be identified to ensure new proposed foul sewer doesn't conflict with any existing pipes.

Drainage calculations for soak-aways to Digest 365 have been undertaken by Ground & Water which has indicated that the existing ground make up is unsuitable for any type of infiltration.

Storage tanks for all plots have been calculated using Microdrainage and are designed to 1 in 100 yr storm plus 40% for climate change and discharge into the nearby existing surface water sewer controlled via a hydro-brake, restricted to 2.0l/s

ST 1 dimensions are 1.5m x 1.5m x 1.5m deep
ST 2-6 dimensions are 2m x 2m x 1.75m deep

A	Drawing updated following ground and water investigation report	JCB	MT
REVISION	AMENDMENT	DRN	CHK

Clover House
Western Lane
Odiham
Hampshire, RG29 1TU
Tel: 01256 703355
Email: info@bellamyroberts.co.uk

CLIENT	Premier Coastal Properties Ltd.		
PROJECT	Warblington Road, Emsworth		
TITLE	Foul and Surface Water Drainage Strategy		
DRAWN BY	JCB	DESIGN BY	JCB
DATE	30/05/19	CHK BY	MT
SCALE	1:1000 @ A2	DRAWING No.	5042 / 004
		REV No.	A