



The Civil Engineering Practice

11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA

T. 01273 424 424
E. design@civil.co.uk
www.civil.co.uk

Flood Risk Assessment

Proposed residential development on

Land to the east of Castle Avenue, Havant

On behalf of

Persimmon Homes South Coast

September 2018

Document History and Status

Project Number 23086

Date	Version	Prepared By	Reviewed By	Approved By
14 Sept 2018	1.0	Steve Doughty	Stuart Magowan IEng MICE	Stuart Magowan IEng MICE
21 Sept 2018	1.1	Steve Doughty	Stuart Magowan IEng MICE	Stuart Magowan IEng MICE

This document has been prepared in accordance with the scope of services for The Civil Engineering Practice's appointment with its client and is subject to the terms of the appointment. It is addressed to and for the sole use and reliance of The Civil Engineering Practice's client. The Civil Engineering Practice accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of The Civil Engineering Practice.

Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. In preparing this document, information and advice may have been sought from third parties. The Civil Engineering Practice cannot be held liable for the accuracy of third party information.

The information contained within this report takes precedence over that contained within any previous version of this report.

CONTENTS

1	Non Technical Summary	1
2	Planning Policy Context	2
2.1	National Planning Policy Framework	2
2.2	Lead Local Flood Authority	2
2.3	The Partnership for Urban South Hampshire	2
2.4	Havant Borough Council	2
2.5	Local Planning Policy	3
3	Existing Site	5
3.1	Site Location	5
3.2	Site Description	5
3.3	Existing Drainage	6
3.4	Geology and Groundwater	7
4	Flood Zone and Flood History	8
4.1	Flood Zone	8
4.2	Flood History	8
5	Flooding Potential	9
5.1	Tidal Flooding	9
5.2	Fluvial Flooding	9
5.3	Groundwater Flooding	9
5.4	Overland Flow	9
5.5	Flood Routing	10
6	Development Proposals	11
6.1	Description	11
6.2	Drainage Strategy	11
6.3	Foul Water	13
6.4	Water Quality	13
7	Safe Development	15
7.1	Safe Access	15
7.2	Risk to Others	15
8	Conclusions	16
9	List of Appendices	17

1 Non Technical Summary

- 1.1 This Flood Risk Assessment has been undertaken in accordance with the National Planning Policy Framework on behalf of Persimmon Homes South Coast in support of a Planning Application for the construction of 69 residential dwellings with associated access road, private drives and parking spaces, private gardens and landscaping on land to the east of Castle Avenue, Havant.
- 1.2 This Assessment is to be read in conjunction with all planning, architectural and other reports that accompany the Outline Planning Application for the proposed development.
- 1.3 The site is shown on the Environment Agency flood modelling data to be within Flood Zone 1. This Assessment confirms that the site is not at risk of flooding from tidal or fluvial sources, overland flows or significant risk of flooding from groundwater.
- 1.4 The proposed development will incorporate a sustainable drainage system which will discharge surface water at a suitably restricted rate and provide storage for all storm return periods up to and including the 1:100 year rainfall event with an allowance for climate change.
- 1.5 Foul water will be discharged to the existing public foul sewers beneath St. George's Avenue and Emsworth Road.
- 1.6 This report concludes that the proposed development is suitable at this location and there are no significant flooding or drainage risks.

2 Planning Policy Context

2.1 National Planning Policy Framework

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

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

2.2 Lead Local Flood Authority

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

2.2.2 As part of their role Hampshire County Council have produced the following documents

- Local Flood Risk Management Strategy dated July 2013
- Preliminary Flood Risk Assessment dated April 2011

2.2.3 The above documents have been reviewed in the preparation of this report.

2.3 The Partnership for Urban South Hampshire

2.3.1 The Partnership for Urban South Hampshire (PUSH) commissioned Atkins to produce a joint Strategic Flood Risk Assessment for the sub-region which is dated December 2007.

2.3.2 An update was issued in February 2016 but remains a final draft for approval.

2.3.3 The Strategic Flood Risk Assessment together with supporting documents have been reviewed in the preparation of this report.

2.4 Havant Borough Council

2.4.1 Havant Borough Council issued a Flood Risk Assessment dated November 2012 in support of their then DRAFT Local Plan (Allocations) Document and a Strategic Flood Risk Assessment Supplement dated October 2013.

2.4.2 These Flood Risk Assessments and their supporting documents have been reviewed in the preparation of this report.

2.5 Local Planning Policy

2.5.1 The Draft Havant Borough Local Plan 2036 went out to public consultation between 8th January and 16th February 2018. And at the time of writing (September 2018) has yet to be adopted.

2.5.2 The current Adopted Local Plan comprises the Core Strategy (2011) and the Site Allocations Plan (2014). These will remain in place until the Havant Borough Local Plan 2036 is adopted.

2.5.3 The following policies of the Adopted Local Plan are relevant to this Flood Risk Assessment:

2.5.4 **Policy CS15** - Flood and Coastal Erosion Risk states that *'development in areas at risk of flooding now and in the future as identified on the latest Environment Agency flood risk maps and Strategic Flood Risk Assessment climate change maps will only be permitted where:*

- 1. It meets the sequential and exception test (where required) in relation to PPS25.*
- 2. The site is located in a low hazard area as defined in the Strategic Flood Risk Assessment.*
- 3. A site-specific flood risk assessment demonstrates that the development will be safe, including the access, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*
- 4. The scheme incorporates flood protection, flood resilience and resistance measures appropriate to the character and biodiversity of the area and the specific requirements of the site.*
- 5. Appropriate flood warning and evacuation plans are in place.*
- 6. New site drainage systems are designed taking account of events which exceed the normal design standard.*

All development will be required to ensure that there is no net increase in surface water run off. Priority should be given to incorporating Sustainable Drainage Systems (SuDS) to manage surface water drainage, unless it is proven that SuDS are not appropriate.

Where SuDs are provided arrangements must be put in place for their whole life management and maintenance.

The council will work with partners to implement the Coastal Policy Zones in the North Solent Shoreline Management Plan to ensure that development avoids areas at risk from coastal erosion and coastal flooding and that areas required to offset coastal squeeze and prevent habitat fragmentation, to allow species to adapt to climate change, are identified and protected from development.'

3 Existing Site

3.1 Site Location

- 3.1.1 The development site is located on land to the east of Castle Avenue, Havant at Ordnance Survey grid reference SU 730 063. The nearest postcode is PO9 2RY.



- 3.1.2 The site is bounded to the north by the West Coastway Railway Line, the east by undeveloped land, the west by residential dwellings and the south by Emsworth Road.

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

3.2 Site Description

- 3.2.1 The site is approximately 2.19ha in area and currently undeveloped land and includes a circular pond at the western site boundary approximately two thirds the distance from the northern site boundary to the southern site boundary. Measured to the top of bank the pond is approximately 363m² in area.
- 3.2.2 Existing ground levels are highest at the northwest corner of the site at approximately 11.95m AOD. The site falls towards its southwest corner to a level of approximately 10m AOD.
- 3.2.3 The sewer records supplied by Southern Water indicate a ditch located at the southeast corner of the site. This is not included on the site survey and its presence or otherwise will need to be confirmed.
- 3.2.4 A copy of the existing site layout plan is located in Appendix 2 at the rear of this report.

3.3 Existing Drainage

- 3.3.1 The site currently has no positive surface water or foul water drainage infrastructure.
- 3.3.2 Rainfall on the site currently discharges in part to ground and in part overland as a greenfield runoff to the pond at the western site boundary and the ditch at the southwest east corner of the site.
- 3.3.3 The total existing greenfield runoff rate has been established using XP Solutions Microdrainage.
- 3.3.4 Q_{bar} has been established at 7.9l/s, the 1:30 year peak runoff 17.8l/s and the 1:100 year peak runoff 25l/s
- 3.3.5 The equivalent greenfield runoff rates are 3.6l/s/ha, 8l/s/ha and 11.4l/s/ha respectively.

ICPSUDS Input (FSR Method)

Return Period (Years): 100

Area (ha): 2.190

SAAR (mm): 732

Soil: 0.400

Growth Curve: (None)

Partly Urbanised Catchment (QBAR)

Urban: 0.000

Region: Region 7

Results

QBAR rural (l/s): 7.9

QBAR urban (l/s): 7.9

Return Period Flood

Region	QBAR (l/s)	Q (100yrs) (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	7.9	19.5	6.7	14.8	19.5
Region 2	7.9	20.6	6.8	14.9	20.6
Region 3	7.9	16.3	6.8	13.8	16.3
Region 4	7.9	20.2	6.5	15.4	20.2
Region 5	7.9	27.9	6.8	18.9	27.9
Region 6/Region 7	7.9	25.0	6.7	17.8	25.0
Region 8	7.9	19.0	6.1	15.0	19.0
Region 9	7.9	17.1	6.9	13.8	17.1
Region 10	7.9	16.3	6.8	13.3	16.3

Enter Return Period between 1 and 1000

- 3.3.6 There are public sewers located beneath St. George's Avenue at the western site boundary comprising a 225mm diameter surface water sewer and a 175mm diameter foul sewer and beneath Emsworth Road to the south of the site which comprise a 150mm diameter surface water sewer and a 225mm diameter foul sewer.
- 3.3.7 A copy of the sewer records is located in Appendix 3 at the rear of this report.

3.4 Geology and Groundwater

- 3.4.1 Enzygo Geo Environmental undertook a site investigation in January 2017
- 3.4.2 The investigation confirmed the ground conditions which comprise topsoil over gravelly clay over medium dense gravel and loose sand.
- 3.4.3 The gravel and sand layers are typically located 0.5-1.5m below ground level depending on location.
- 3.4.4 Groundwater was encountered at depths of between 1.25m and 3.0m below ground level during site investigation and during monitoring rose to 0.76m below ground level at its highest. The presence of a pond is noted adjacent to the western site boundary.
- 3.4.5 No contamination was identified.
- 3.4.6 Preliminary soakaway tests recorded soil infiltration rates of between 5×10^{-5} m/s and 1×10^{-4} m/s and represents the sand present at depth.
- 3.4.7 However the site investigation states that *'given the presence of more clayey gravel near surface, together with shallow groundwater it is likely that soakaway drainage may not be feasible.'*
- 3.4.8 The site investigation also notes that *'BGS records show that the site is at risk of groundwater flooding but this is not considered a risk unless basements are proposed.'*
- 3.4.9 British Geological Survey maps and borehole information confirm that the site is located within an area underlain by sands and gravels with bands of clay.
- 3.4.10 The online "Magic Map" available from Defra confirms that the site is located above a minor aquifer classified as having an intermediate vulnerability.
- 3.4.11 Extracts of the Enzygo Geo Environmental site investigation report and a copy of the geological borehole data are located in Appendix 4 at the rear of this report.

4 Flood Zone and Flood History

4.1 Flood Zone

- 4.1.1 The Environment Agency's online mapping confirms that the site is located in Flood Zone 1 and is not at risk of flooding from rivers or the sea from anything less extreme than a 1:1,000 year flood event.

4.2 Flood History

4.2.1 Environment Agency

- 4.2.1.1 The Environment Agency maps of historic flood incidents do not identify any historic incidents of flooding in the locality of the site.

4.2.2 Hampshire County Council

- 4.2.2.1 Neither the Local Flood Risk Management Strategy dated July 2013 nor the Preliminary Flood Risk Assessment dated April 2011 identify any specific flood incidents in the immediate vicinity of the site.

4.2.3 The Partnership for Urban South Hampshire

- 4.2.3.1 The Strategic Flood Risk dated December 2007 and its draft update dated February 2016 do not identify any specific flood incidents in the immediate vicinity of the site.

4.2.4 Havant Borough Council

- 4.2.4.1 Neither the Flood Risk Assessment dated November 2012 nor the Strategic Flood Risk Assessment Supplement dated October 2013 identify any specific flood incidents in the immediate vicinity of the site.
- 4.2.4.2 Copies of the available flood maps are located in Appendix 5 at the rear of this report.

5 Flooding Potential

5.1 Tidal Flooding

5.1.1 The site is located 1.2km from the coast and is not at risk of tidal flooding.

5.2 Fluvial Flooding

5.2.1 The area of the proposed site is within Flood Zone 1 and is not at risk of flooding from rivers or the sea from anything less extreme than a 1:1,000 year flood event.

5.3 Groundwater Flooding

5.3.1 Groundwater monitoring undertaken by Enzygo Geo Environmental confirmed groundwater rising to 0.76m below ground level at its highest.

5.3.2 The site investigation notes that *'BGS records show that the site is at risk of groundwater flooding but this is not considered a risk unless basements are proposed.'*

5.3.3 There are no records identified within Hampshire County Council's Local Flood Risk Management Strategy dated July 2013 or Preliminary Flood Risk Assessment dated April 2011 nor in Havant Borough Council's Flood Risk Assessment dated November 2012 or Strategic Flood Risk Assessment Supplement dated October 2013 of groundwater flooding affecting the site.

5.4 Overland Flow

5.4.1 The Environment Agency's maps identify parts of the site to be at low risk of flooding from overland surface water.

5.4.2 These are generated from LiDAR data and broadly generated from lower level areas relative to their surroundings.

5.4.3 In this case the mapping identifies the existing pond and an area of the southwest corner of the site and the underpass beneath the A27 at the southern site boundary.

5.4.4 The areas identified are all isolated low spots with no apparent flow route.

5.4.5 The flood mapping contained within the various flood documents produced by Hampshire County Council and Havant Borough Council does not identify any flood risk associated with overland flow routes.

5.5 Flood Routing

5.5.1 The natural route for flood waters to dissipate should any event occur on the site is southwards beneath the A27 to the ditch which flows southwards towards the coast.



5.5.2 There is no associated flood risk to the downstream catchment area.

6 Development Proposals

6.1 Description

- 6.1.1 The proposed development is for the construction of 69 residential dwellings with associated access road, private drives and parking spaces, private gardens and landscaping on land to the east of Castle Avenue, Havant
- 6.1.2 A copy of the proposed site layout plan is located in Appendix 6 at the rear of this report.

6.2 Drainage Strategy

- 6.2.1 The site investigation undertaken by Enzygo Geo Environmental confirms the presence of shallow groundwater and that it is likely that soakaway drainage may not be feasible. The site investigation also notes that the site is at risk of groundwater flooding but this is not considered a risk unless basements are proposed.
- 6.2.2 Given the above a preliminary surface water drainage strategy has been progressed based on a non infiltrating drainage system which will discharge surface water at a restricted rate in part to the existing public surface water sewer beneath St. George's Avenue to the west of the site and in part to the existing public surface water sewer beneath Emsworth Road to the south of the site.
- 6.2.3 The surface water system will be designed to comply with National Planning Policy Framework and its supporting guidance documents including the Non-Statutory Technical Standards for SuDS.
- 6.2.4 Normal practice is that runoff from the developed areas of the site are restricted to the equivalent greenfield runoff across all storm durations (ie 100 year greenfield runoff for the equivalent 1:100 +cc year storm, 30 year greenfield runoff for the equivalent 30 year storm, 1 year runoff for 1 year storm)
- 6.2.5 In this case it is proposed to provide storage within offline cellular crates with runoff discharged to the Southern Water public sewers.
- 6.2.6 In accordance with Southern Waters current Guidance to Developers the discharge from the developed areas of the site will be restricted to the greenfield Q_{30} rate.
- 6.2.7 Storage will be provided to accommodate 1:100 year storm event with an additional 40% to account for the predicted effects of increased rainfall intensity due to future climate change.

6.2.8 The approximate impermeable areas for various elements of the site split by their proposed discharge to the public surface water sewers beneath St. George's Avenue and Emsworth Road are as follows:

St. George's Avenue

- 595m² Residential Roofs
- 865m² Parking and Private Access
- 915m² Adoptable Highway

Emsworth Road

- 2,890m² Residential Roofs
- 3830m² Parking and Private Highways

6.2.9 The total impermeable areas of the site and equivalent Q₃₀ greenfield runoff rates at 8l/s/ha are as follows:

St. George's Avenue

Impermeable Area 2,375m²

Q₃₀ runoff 1.9 l/s

Emsworth Road

Impermeable Area 6,720m²

Q₃₀ runoff 8.4 l/s

6.2.10 Very low levels of restriction are impractical and in accordance with the Environment Agency guidance as noted in their Rainfall Runoff Management for Developments (Report – SC030219) a restriction of 5l/s is proposed for discharge to St. George's Avenue.

6.2.11 Preliminary calculations have been prepared in order to demonstrate that surface water drainage can be adequately accommodated within the site without any increased flood risk elsewhere.

6.2.12 For the northern part of the site discharging to the public surface water sewer beneath St. George's Avenue at a restricted discharge rate of 5l/s a total storage volume of approximately 116m³ will be required to store the 1:100 year +40% rainfall event. The depth of cover to the surface water sewer is 770mm and storage must therefore be kept as shallow as possible. The use of storage crates with a 95% void ratio is proposed. At a single crate depth of 400mm a total surface area of approximately 310m² of crate storage will be required.

6.2.13 For the remainder of the site discharging to the public surface water sewer beneath Emsworth Road at the Q₃₀ greenfield rate of 8.4l/s a total storage volume of approximately 375m³ will be required to store the 1:100 year +40% rainfall event. The use of storage crates with a 95% void ratio is proposed. At a double layer crate depth of 800mm a total surface area of approximately 495m² of crate storage will be required.

6.3 Foul Water

6.3.1 Foul water will be discharged to the existing public foul sewers beneath St. George's Avenue and Emsworth Road.

6.3.2 A copy of the preliminary drainage strategy plan together with copies of the preliminary storage calculations is located in Appendix 7 at the rear of this report.

6.4 Water Quality

6.4.1 The proposed development is for residential use. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for this type of development is between very low and low depending on the use/area of the site. Where surface water runoff is to be discharged to ground within a groundwater protection zone, the SuDS components are only required to control potential contaminants for the frequent low intensity rainfall events as the natural high volume of flows within the receiving water body during a high intensity rainfall event is likely to dilute any contaminants within the water body.

6.4.2 The surface water scheme will include mitigation to ensure water quality before the discharge point will be treated and any pollution risk will be mitigated prior to its discharge to ground.

6.4.3 Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types and uses and defines runoff from residential roofs to be at very low risk potential for pollution. Runoff from individual property driveways, residential car parks is considered to be at low risk potential for pollution.

Residential Areas	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.20	0.20	0.05
Individual property driveways, residential car park, low traffic roads	Low	0.50	0.40	0.40

Pollution Hazard Indices

6.4.4 Where multiple drainage components are used in series the individual mitigation index of secondary and tertiary components is lowered due to reduced performance associated with primary treatment.

SuDS Type	Total suspended solids (TSS)	Metals	Hydro-carbons
Filter strip	0.4	0.4	0.5
Permeable paving	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5

Mitigation Indices

6.4.5 Suitable infrastructure will be provided within the detailed design to meet the target treatment level required for runoff with very low - low risk of pollution potential thus demonstrating that the surface water drainage system for the site can be designed to adequately mitigate against the risk of pollution.

6.4.6 An outline drainage maintenance schedule is located in Appendix 8 at the rear of this report.

7 Safe Development

7.1 Safe Access

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

7.2 Risk to Others

- 7.2.1 The proposed surface water drainage system will be designed to current standards incorporating SuDS elements providing treatment, attenuation and storage which will minimise runoff leaving the site during times of heavy rain.
- 7.2.2 Allowance has been made for 40% increase in rainfall intensities which accords with the latest figures published by the Environment Agency and in accordance with the requirements under the National Planning Policy Framework.
- 7.2.3 The proposed drainage system will incorporate sufficient treatment prior to final discharge destination thus mitigating the risk of pollution from the site.
- 7.2.4 The risk of surface water flooding to others due to the development proposals is negligible.
- 7.2.5 Given the obligation of sewerage undertakers to upgrade the existing networks if a connection to an equivalent sized public sewer is available there is therefore no risk of sewer flooding from this development in the foreseeable future.

8 Conclusions

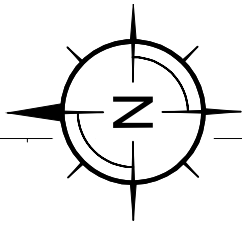
- 8.1 The site is located within Flood Zone 1 and is not at risk from any source of flooding.
- 8.2 There are no historic records of flooding from any source affecting the site or its immediate area.
- 8.3 The site investigation undertaken by Enzygo Geo Environmental confirms that the discharge of surface water by infiltration may not be feasible.
- 8.4 Surface water will be discharged at a restricted rate in part to the existing public surface water sewer beneath St. George's Avenue to the west of the site and in part to the existing public surface water sewer beneath Emsworth Road to the south of the site.
- 8.5 Preliminary calculations indicate that surface water runoff generated by the proposed development can be attenuated on site for all rainfall events up to the 1:100 year event including an allowance for climate change.
- 8.6 Water quality improvement will be provided to mitigate against any risk to any receiving waterbody.
- 8.7 Foul water will be discharged to the existing public foul sewers beneath St. George's Avenue and Emsworth Road.
- 8.8 In terms of flood risk planning the proposed development is safe, will not increase flood risk elsewhere and will provide improvement to immediately adjacent sites by managing surface water from all rainfall events up to the 100 year plus climate change event.
- 8.9 The development proposals are suitable at this location.

9 List of Appendices

Appendix 1	Site Location Plan
Appendix 2	Existing Site Layout Plan
Appendix 3	Sewer Records
Appendix 4	Site Investigation Extracts and BGS Geological Borehole Data
Appendix 5	Flood Maps
Appendix 6	Proposed Site Layout Plan
Appendix 7	Preliminary Drainage Strategy Plan and Calculations
Appendix 8	Drainage Maintenance Schedule

Appendix 1
Site Location Plan

Appendix 2
Existing Site Layout Plan



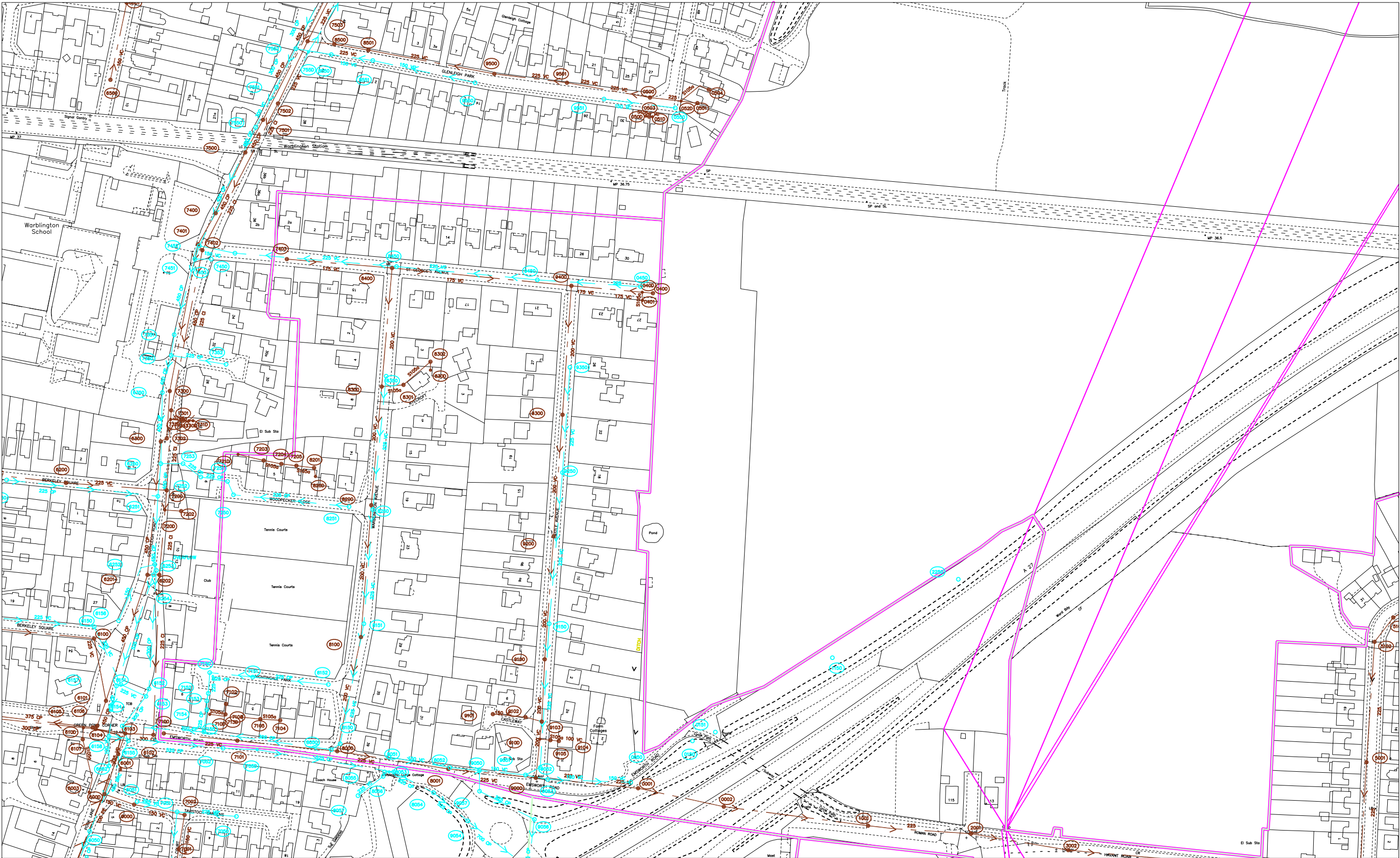
-10m 0 10m 20m 30m 40m
Scale 1:1000

TITLE Castle Avenue, Havant Existing Site Layout			
SCALE 1:1000@A3		PROJECT No. 23086	
REPORT TYPE FRA		DRG. No. 02	

Appendix 3
Sewer Records

SEWER RECORDS PAGE 1 OF 2

106602



106025

472591

O.S. REF.

SU7306SW

Title: 236171_Land at East of Castle

Drawn by: kumaria

Scale: 1:2500

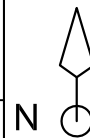
Date: 20/04/2017

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

Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved
Licence No. WU 298530.



473533

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
0001X	9.97		UNK	UNK	CIRC		7002X	11	9.05	150	VC	CIRC		8100X	11.54	8.41	200	VC	CIRC							
0002X	10.076	7.226	UNK	UNK	CIRC		7050X	11.3	9.5	225	VC	CIRC		8150X	10.95	9.77	225	VC	CIRC							
0050Y			UNK	UNK	CIRC	*	7051X	10.92	9.11	300	CP	CIRC		8151X	11.52	10.46	225	VC	CIRC							
0050X			300	UNK	CIRC	*	7052X	10.72	8.02	525	CP	CIRC		8152X	11.48	10.87	225	CP	CIRC							
0150X			UNK	UNK	CIRC		705DX	10.86	7.82	525	CP	CIRC		8200X	11.7	8.93	200	VC	CIRC							
0151X			UNK	UNK	CIRC		7100X	10.54		225	VC	CIRC		8201X			UNK	UNK	CIRC							
0400X	11.67	10.29	175	VC	CIRC		7101X			225	VC	CIRC		820DX			UNK	UNK	CIRC							
0401X			UNK	UNK	CIRC		7102X			UNK	UNK	CIRC		8250X	11.69	10.68	225	VC	CIRC							
040DX			175	VC	CIRC		7103X			UNK	UNK	CIRC		8251X	11.59	10.79	225	CP	CIRC							
0450X	11.59	10.82	225	UNK	CIRC		7104X			UNK	UNK	CIRC		8300X	11.83	9.46	200	VC	CIRC							
0500X	13.09	11.99	225	VC	CIRC		7105X			UNK	UNK	CIRC		8301X			UNK	UNK	CIRC							
0501X			225	UNK	CIRC		7150X	11.1	10.4	225	CP	CIRC		8302X			UNK	UNK	CIRC							
0504X			UNK	UNK	CIRC		7151X	11.38	10.62	225	CP	CIRC		830DX			UNK	UNK	CIRC							
050DX			UNK	VC	CIRC		7152X	11.18	10.3	225	CP	CIRC		8350X	11.85	11.03	225	VC	CIRC							
051DX			UNK	VC	CIRC		7153X	11.2	10.26	225	CP	CIRC	*	8400X	11.98	9.84	200	VC	CIRC	*						
052DX			225	UNK	CIRC		7153Y	11.2		UNK	UNK	CIRC	*	8400Y	11.98	9.84	175	VC	CIRC	*						
1001X	10.284	7.032	225	UNK	CIRC		7154X	11.19	10.24	225	CP	CIRC		8450X	12.03	10.28	225	VC	CIRC							
1150X			UNK	UNK	CIRC		7155X	10.85	9.99	300	CP	CIRC		8500X	12.25	10	225	VC	CIRC							
2001X	10.339	6.824	UNK	UNK	CIRC		7200X	10.98	8.65	225	CI	CIRC		8501X	12.45	10.1	225	VC	CIRC							
2250X			UNK	UNK	CIRC		7202X			UNK	UNK	CIRC		8550X	12.06	11.44	150	VC	CIRC							
3002X	10.482	6.767	UNK	UNK	CIRC		7203X			UNK	UNK	CIRC		8551X	12.32	11.66	150	VC	CIRC							
5001X			225	UNK	CIRC		7204X			UNK	UNK	CIRC		9000X	10.41		225	VC	CIRC							
5101X	10.324	8.559	UNK	UNK	CIRC		7205X			UNK	UNK	CIRC		9050X	10.75	10.11	225	CP	CIRC							
5102X	10.363	8.47	225	UNK	CIRC		7250X	11.22	10.46	225	CP	CIRC		9051X	10.66	9.89	150	VC	CIRC							
5250X	11.54	10.85	225	CP	CIRC		7251X	11.32	10.46	225	CP	CIRC		9052X	10.47	8.61	225	VC	CIRC							
6000X	10.45	8.97	150	VC	CIRC		7252X	11.31	10.42	225	CP	CIRC		9053X	10.51	9.7	150	VC	CIRC							
6003X	10.15	8.71	225	VC	CIRC		7253X	11.29	10.36	225	CP	CIRC		9054X	9.07	5.62	700	CP	CIRC							
600DX			UNK	UNK	CIRC		7300X	11.29	8.77	450	CP	CIRC		9056X	8.55	6	375	CP	CIRC							
6050X	10.12	9.25	300	CP	CIRC		7301X	11.19	8.75	225	CI	CIRC		9057X	9.94	8.04	225	CP	CIRC							
6051X	10.58	9.49	225	VC	CIRC		7302X	11.29	8.6	450	CP	CIRC		9100X	10.69		200	VC	CIRC							
6052X	10.21	8.88	100	VC	CIRC		7303X			UNK	UNK	CIRC		9101X	11.31	10.16	150	VC	CIRC							
6100X	11.29	9.28	225	VC	CIRC		730DX			UNK	UNK	CIRC		9102X	10.86		150	VC	CIRC							
6101X	10.67	8.17	450	CP	CIRC		731DX			UNK	UNK	CIRC		9103X	10.55		200	VC	CIRC							
6102X	10.52	8.1	300	CP	CIRC		732DX			225	CI	CIRC		9104X			100	VC	CIRC							
6103X	10.55	8.09	300	CP	CIRC		7350X	11.4	10.53	450	CP	CIRC		9105X			100	VC	CIRC							
6104X	10.57	8.02	300	CP	CIRC		7351X	11.54	10.57	450	CP	CIRC		910DX			200	VC	CIRC							
6105X	10.58	9.37	375	CP	CIRC		7352X	11.37	10.67	225	CP	CIRC		9150X	10.87	9.87	225	VC	CIRC							
6106Y	10.56	8.05	450	CP	CIRC	*	7400X	11.77	9.03	450	CP	CIRC		9200X	10.98	8.45	200	VC	CIRC							
6106X	10.56	8.04	375	CP	CIRC	*	7401X	11.67	8.67	450	CP	CIRC		9250X	11.23	10.33	225	VC	CIRC							
6107X			UNK	UNK	CIRC		7402X	11.68	9.21	225	CI	CIRC	*	9300X	11.33	8.83	200	VC	CIRC							
610DX			300	CP	CIRC		7402Y	11.68	9.21	225	CI	CIRC	*	9350X	11.54	10.63	225	VC	CIRC							
6150X	11.26	10.13	225	VC	CIRC		7403X	11.88	10.41	175	VC	CIRC		9400X	11.91	9.26	200	VC	CIRC							
6151X	10.93	9.95	225	VC	CIRC		7450X	11.78	10.94	150	VC	CIRC		9450X	11.96	10.51	225	VC	CIRC							
6152X	10.27	9.75	300	CP	CIRC		7451X	11.66	10.71	450	CP	CIRC		9500X	13.02	11.01	225	VC	CIRC							
6153X	10.2	9.75	300	CP	CIRC		7452X	11.79		300	CP	CIRC	*	9501X	13.06	11.42	225	VC	CIRC							
6154X	10.46	9.64	525	CP	CIRC		7452Y	11.79		300	CP	CIRC	*	9550X	12.71	12.07	150	VC	CIRC							
6155X	10.52	9.53	450	BRC	CIRC		7453X	11.76	11.01	150	VC	CIRC		9551X	12.87	12.16	150	VC	CIRC							
6156X			150	UNK	CIRC		7500X	11.97	9.16	450	CP	CIRC														
6157X	10.82	8.97	525	CP	CIRC		7501X	12.08	9.17	450	CP	CIRC														
6158X	10.48	8.6	525	CP	CIRC		7502X	12.07	9.61	225	CI	CIRC														
6200X	11.3	9.4	225	VC	CIRC		7503X	12.03	9.76	225	VC	CIRC														
6201X	11.24	8.22	450	CP	CIRC		7550X	12.16	10.93	450	CP	CIRC														
6202Y	10.9	8.47	375	CP	CIRC	*	7551X	12.07	10.94	300	VC	CIRC														
6202X	10.9	8.47	225	CI	CIRC	*	7552X	11.95	11	300	CP	CIRC														
6250X	11.25	10.32	450	CP	CIRC		755DX			UNK	UNK	CIRC														
6251X	11.23	10.12	450	CP	CIRC		8000X	10.84	8.02	225	VC	CIRC														
6252Y	11.25	9.93	450	CP	CIRC	*	8001X	11.19	7.97	225	VC	CIRC														
6252X	11.25	9.92	525	CP	CIRC	*	8050X	10.86	10.24	300	CP	CIRC														
6253X	11.21	10.01	300	CP	CIRC		8051X	11.32	10.81	150	VC	CIRC														
6254X	11.28	9.82	525	CP	CIRC		8052X	11.36	10.26	150	VC	CIRC														
6300X	11.2	8.54	450	CP	CIRC		8053X	10.99	6.59	525	CP	CIRC														
6350X	11.36	10.44	450	CP	CIRC		8054X	10.52	6.32	525	CP	CIRC														
6500X	12.27	11.51	150	VC	CIRC		8055X	11.01	9.15	300	CI	CIRC														
6601X	12.53	10.98	175	VC	CIRC		8056X	10.92	9.26	225	VC	CIRC														
7001X	10.76	9.16	150	VC	CIRC		8057X	11.08	9.98	225	VC	CIRC														

LINE STYLES / COLOURS	
Brown	Foul
Dark Blue	Foul Syphon Sewer
Purple	Foul Vacuum Main
Red	Foul Rising Main
Orange	Combined
Dark Blue	Combined Syphon Sewer
Purple	Combined Rising Main
Light Blue	Lateral Drain
Yellow	Building Over Agreement Area
Green	Treated Effluent
Dark Blue	Sludge
Purple	Sewer Catchment
Light Blue	Section 104 Area
Yellow	Surface Water
Green	Surface Water Rising Main
Dark Blue	Private
Green	Access Shaft
Dark Blue	Decommissioned

MATERIALS	
AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAR	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Verified Clay
XXX	Other
ZZZ	Unknown

Manhole (SW)
Manhole (F&C)

Appendix 4

Site Investigation Extracts and BGS Geological Borehole Data



Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY				WS1
Job No CRM.1033.025	Dates Start 15-12-16 Finish 15-12-16	Ground Level (m)	Co-Ordinates	
Client Persimmon Homes				Sheet 1 of 1

Well	Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
		Depth (m)	No/Type	Results					
					0.30			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
		0.50	ES					(Soft to firm) Reddish brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
		1.00 1.00 - 1.45	D SPT	C 9				1.00 - 1.45 Firm, low to medium strength.	1
					1.50			Reddish grey brown slightly silty fine SAND.	
		2.00 2.00 - 2.45	D SPT	C 4				2.00 - 2.45 Loose. 2.00 - 3.00 Becoming dark grey.	2
		3.00 3.00 - 3.45	D SPT	C 18	3.00			2.90 Sub-horizontal reddish brown closely spaced bands.	3
					3.45			Medium dense dark grey slightly silty fine SAND.	
					{4.00}			Borehole completed at 3.45m.	4

General Remarks

EQUIPMENT: Premier 110 Compact Window Sampling Tracked Rig.
METHOD: Hand dug inspection pit 0.00m-1.00m. Dynamic sampled 1.00m-3.00mbgl.
CASING: Not used.
GROUNDWATER: Groundwater not encountered.
BACKFILL: On completion, a slotted pipe (50mm) was installed to 3.00m, granular response zone (3.00m-0.50m), bentonite seal 0.50m-0.20m, concrete and stopcock cover 0.20m-0.00m.

Groundwater	Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
All dimensions in metres Scale 1:25				Logged By MV

1.0 ENZYGO BH LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3.1 ENZYGO.GPJ 12/1/17

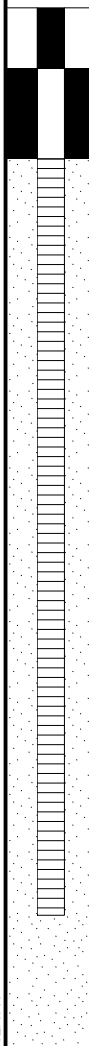
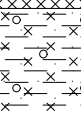
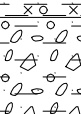
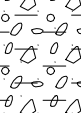
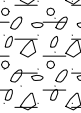
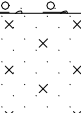
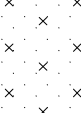


Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY							WS2		
Job No CRM.1033.025		Dates Start 15-12-16 Finish 15-12-16		Ground Level (m)		Co-Ordinates			
Client Persimmon Homes							Sheet 1 of 1		
Well	Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
		Depth (m)	No/Type	Results					
		0.25						(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
		0.50	ES		0.55			(Firm) Reddish brown gravelly sandy silty CLAY with fine rootlets. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
		1.00 1.00 - 1.45	D SPT	C 50	1.50			Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
		2.00 2.00 - 2.45	D SPT	C 3				Reddish brown slightly silty fine SAND.	2
		3.00 3.00 - 3.45	D SPT	C 11	3.00			Medium dense reddish brown slightly silty fine SAND.	3
					3.45			Borehole completed at 3.45m.	
				{4.00}					4
General Remarks EQUIPMENT: Premier 110 Compact Window Sampling Tracked Rig. METHOD: Hand dug inspection pit 0.00m-1.00m. Dynamic sampled 1.00m-3.00mbgl. CASING: Not used. GROUNDWATER: Groundwater not encountered. BACKFILL: On completion, the borehole was backfilled with arisings.									
Groundwater									
Date		Strike Depth (m)		Casing Depth (m)		Depth After Observation (m)			
All dimensions in metres Scale 1:25								Logged By MV	

1.0 ENZYGO BH LOG CRM.1033.025 HAVANT GPJ GINT STD AGS 3 1 ENZYGO GPJ 12/1/17

Site Land East of Castle Street, Havant PO9 2RY				WS3
Job No CRM.1033.025	Dates Start 15-12-16 Finish 15-12-16	Ground Level (m)	Co-Ordinates	
Client Persimmon Homes				Sheet 1 of 1

Well	Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
		Depth (m)	No/Type	Results					
		0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
					0.70			(Firm) Reddish brown orange slightly gravelly sandy silty CLAY with fine rootlets. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
		1.00 1.00 - 1.45	D SPT	C 49				Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
		1.50	D					1.00 - 1.45 Dense.	
		2.00 2.00 - 2.45	D SPT	C 6	1.80			Reddish brown slightly silty fine SAND.	2
		3.00 3.00 - 3.45	D SPT	C 5	3.00			2.00 - 2.45 Loose.	
					3.45			Loose reddish brown slightly silty fine SAND.	3
								3.00 - 3.45 Loose.	
								Borehole completed at 3.45m.	
					{4.00}				4

General Remarks

EQUIPMENT: Premier 110 Compact Window Sampling Tracked Rig.
METHOD: Hand dug inspection pit 0.00m-1.00m. Dynamic sampled 1.00m-3.00mbgl.
CASING: Not used.
GROUNDWATER: Groundwater not encountered.
BACKFILL: On completion, a slotted pipe (50mm) was installed to 3.00m, granular response zone (3.00m-0.50m), bentonite seal 0.50m-0.20m, concrete and stopcock cover 0.20m-0.00m.

Groundwater	Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
All dimensions in metres Scale 1:25				
				Logged By MV



Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY				WS4
Job No CRM.1033.025	Dates Start 15-12-16 Finish 15-12-16	Ground Level (m)	Co-Ordinates	

Client Persimmon Homes	Sheet 1 of 1
---------------------------	-----------------

Well	Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
		Depth (m)	No/Type	Results					
		0.50	ES		0.25			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
					0.70			(Firm) Dark reddish orange brown slightly gravelly sandy silty CLAY with fine rootlets. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
		1.00 1.00 - 1.45	D SPT	C 43				Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
								1.00 - 1.45 Dense.	
		2.00 2.00 - 2.45	D SPT	C 8				2.00 - 2.45 Loose.	2
					2.50			Reddish brown slightly silty fine SAND.	
		3.00 3.00 - 3.45	D SPT	C 9	3.00			Loose reddish brown slightly silty fine SAND.	3
					3.45			Borehole completed at 3.45m.	
					{4.00}				4

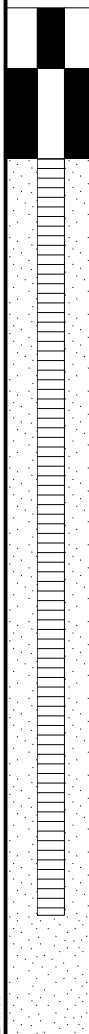
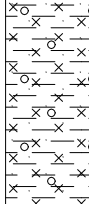
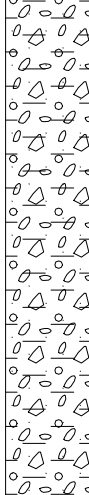
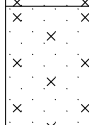
General Remarks

EQUIPMENT: Premier 110 Compact Window Sampling Tracked Rig.
METHOD: Hand dug inspection pit 0.00m-1.00m. Dynamic sampled 1.00m-3.00mbgl.
CASING: Not used.
GROUNDWATER: Groundwater not encountered.
BACKFILL: On completion, the borehole was backfilled with arisings.

Groundwater	Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
All dimensions in metres Scale 1:25				
				Logged By MV

1.0 ENZYGO BH LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3.1 ENZYGO.GPJ 12/1/17

Site Land East of Castle Street, Havant PO9 2RY				WS5
Job No CRM.1033.025	Dates Start 15-12-16 Finish 15-12-16	Ground Level (m)	Co-Ordinates	
Client Persimmon Homes				Sheet 1 of 1

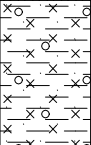
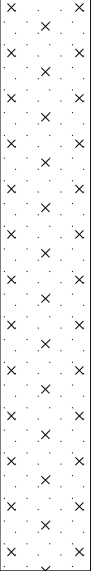
Well	Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
		Depth (m)	No/Type	Results					
					0.23			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
		0.50	ES					(Firm) Reddish brown slightly sandy slightly gravelly silty CLAY with fine rootlets. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
		1.00 1.00 - 1.45	D SPT	C 40	1.10				1
		1.90 2.00 - 2.45	D SPT	C 27				Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine. 1.90 - 2.80 Damp. 2.00 - 2.45 Medium dense.	2
		3.00 3.00 - 3.45	D SPT	C 3	3.00			Reddish brown slightly silty fine SAND.	3
					3.45			Very loose reddish brown slightly silty fine SAND.	
					{4.00}			Borehole completed at 3.45m.	4

General Remarks

EQUIPMENT: Premier 110 Compact Window Sampling Tracked Rig.
METHOD: Hand dug inspection pit 0.00m-1.00m. Dynamic sampled 1.00m-3.00mbgl.
CASING: Not used.
GROUNDWATER: Groundwater not encountered.
BACKFILL: On completion, a slotted pipe (50mm) was installed to 3.00m, granular response zone (3.00m-0.50m), bentonite seal 0.50m-0.20m, concrete and stopcock cover 0.20m-0.00m.

Groundwater	Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
All dimensions in metres Scale 1:25				
				Logged By MV

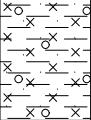
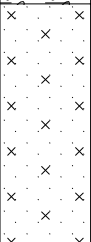
Site Land East of Castle Street, Havant PO9 2RY						TP1
Job No CRM.1033.025	Dates Start 13-12-16 Finish 13-12-16	Ground Level (m)	Co-Ordinates			
Client Persimmon Homes						Sheet 1 of 1

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over (soft) light greyish brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
					0.80		(Soft) Reddish brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine to coarse.	
	1.40	D		1.40			Reddish brown clay-bound sandy cobbly GRAVEL. Gravel is subangular and subrounded, fine to coarse flint, and cobbles of flint. Sand is fine.	1
							Reddish grey brown mottled green slightly silty fine glauconitic SAND.	2
	3.30	D		3.30				3
				{4.00}			Trial Pit completed at 3.30m.	

General Remarks
 Dimensions: 2.80x0.70x3.30
 Trial pit excavated by JCB 3CX.
 Trial pit sides collapsing from 1.40-3.30mbgl.
 Groundwater not encountered.
 On completion, the trial pit was backfilled with materials arisings.

All dimensions in metres Scale 1:25		Logged By MV
--	--	-----------------

Site Land East of Castle Street, Havant PO9 2RY				TP2
Job No CRM.1033.025	Dates Start 14-12-16 Finish 14-12-16	Ground Level (m)	Co-Ordinates	
Client Persimmon Homes				Sheet 1 of 1

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
				0.20			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
	0.50	ES		0.60			(Soft) Reddish brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
	1.00	D		1.70			Dark reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
	2.50	D		2.50			Light greyish green and light brown slightly silty fine glauconitic SAND.	2
				{4.00}			Trial Pit completed at 2.50m.	3
								4

General Remarks

Dimensions: 2.90x0.70x2.50
Trial pit excavated by JCB 3CX.
Trial pit sides collapsing from 1.70-2.50mbgl.
Groundwater not encountered.
On completion, the trial pit was backfilled with materials arisings.

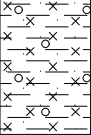
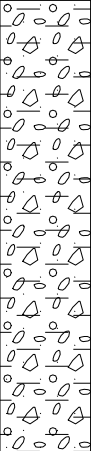


Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP3			
Job No CRM.1033.025		Dates Start 14-12-16 Finish 14-12-16		Ground Level (m)				Co-Ordinates	
Client Persimmon Homes						Sheet 1 of 1			
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description		
	Depth (m)	No/Type	Results						
	0.20			0.20			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0	
	0.50	ES		0.50			(MADE GROUND) (Soft to firm) Dark reddish brown sandy gravelly silty clay. Gravel is subangular and subrounded, fine to coarse flint, and occasional brick fragments. Sand is fine.		
	1.00	D					Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1	
	1.70								
	2.40	D			2.40			Dark reddish brown slightly silty fine glauconitic SAND.	2
							Trial Pit completed at 2.40m.	3	
				{4.00}				4	
General Remarks Dimensions: 2.90x0.70x2.40 Trial pit excavated by JCB 3CX. Trial pit sides collapsing from 1.70-2.40mbgl. Groundwater seepage encountered at 1.70mbgl. On completion, the trial pit was backfilled with materials arisings.									
All dimensions in metres Scale 1:25						Logged By MV			

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17

Site Land East of Castle Street, Havant PO9 2RY				TP4
Job No CRM.1033.025	Dates Start 13-12-16 Finish 13-12-16	Ground Level (m)	Co-Ordinates	
Client Persimmon Homes				Sheet 1 of 1

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
				0.25			(MADE GROUND) Topsoil: Grass over (soft) dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
	0.50	ES		0.70			(Soft) Reddish brown mottled grey sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine to coarse.	
	1.00	D					Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine. 1.00 - 2.20 Hard to excavate.	1
	2.20	D		2.20				2
							Trial Pit completed at 2.20m.	3
				{4.00}				4

General Remarks

Dimensions: 2.60x0.70x2.20
Trial pit excavated by JCB 3CX.
Trial pit sides remained vertical and stable.
Groundwater seepage encountered at 2.20mbgl.
On completion, the trial pit was backfilled with materials arisings.

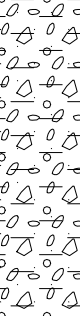
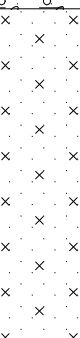
Site Land East of Castle Street, Havant PO9 2RY						TP5	
Job No CRM.1033.025	Dates Start 14-12-16 Finish 14-12-16	Ground Level (m)	Co-Ordinates			Sheet 1 of 1	
Client Persimmon Homes							

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over dark greyish brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
				0.60			(Soft to firm) Light greyish brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
	1.00	D		1.40			Greyish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine. 0.75 - 1.40 Becoming reddish brown with pockets of light greyish green slightly glauconitic fine SAND.	1
				2.50			Light and dark yellow brown fine SAND.	2
				{4.00}			Trial Pit completed at 2.50m.	3
								4

General Remarks
 Dimensions: 2.60x0.70x2.50
 Trial pit excavated by JCB 3CX.
 Trial pit sides collapsing from 1.40-2.00mbgl.
 Groundwater slight seepage encountered at 1.40mbgl.
 On completion, the trial pit was backfilled with materials arisings.

All dimensions in metres Scale 1:25		Logged By MV
--	--	-----------------

Site Land East of Castle Street, Havant PO9 2RY						TP6	
Job No CRM.1033.025	Dates Start 14-12-16 Finish 14-12-16	Ground Level (m)	Co-Ordinates				
Client Persimmon Homes						Sheet 1 of 1	

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
				0.50			(Soft to firm) Dark brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
	1.50	D		1.60			Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
							Dark reddish brown mottled green slightly silty fine glauconitic SAND.	2
2.70	D		2.70			Trial Pit completed at 2.70m.	3	
			{4.00}					4

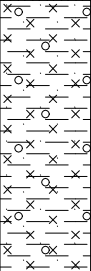
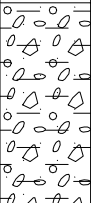
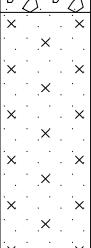
General Remarks

Dimensions: 2.80x0.70x2.70
 Trial pit excavated by JCB 3CX.
 Trial pit sides collapsing from 1.60-2.70mbgl.
 Groundwater seepage encountered at 1.60mbgl, accumulating rapidly.
 On completion, the trial pit was backfilled with materials arisings.

All dimensions in metres Scale 1:25		Logged By MV
--	--	-----------------

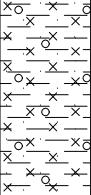
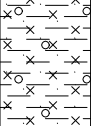


Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP7		
Job No CRM.1033.025		Dates Start 14-12-16 Finish 14-12-16		Ground Level (m)				Co-Ordinates
Client Persimmon Homes						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
				1.20			(Soft) Light greyish brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
	1.50	D		1.90			Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
				2.70			Reddish brown mottled green slightly silty fine glauconitic SAND.	2
	2.40	D					Trial Pit completed at 2.70m.	3
				{4.00}				
General Remarks Dimensions: 2.60x0.70x2.70 Trial pit excavated by JCB 3CX. Trial pit sides collapsing from 1.90-2.70mbgl. Groundwater not encountered. On completion, the trial pit was backfilled with materials arisings.								
All dimensions in metres Scale 1:25						Logged By MV		

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17

Site Land East of Castle Street, Havant PO9 2RY						TP8	
Job No CRM.1033.025	Dates Start 13-12-16 Finish 13-12-16	Ground Level (m)	Co-Ordinates				
Client Persimmon Homes						Sheet 1 of 1	

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
				0.25			(MADE GROUND) Topsoil: Grass over (soft) dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
	0.50	ES					(Soft) Grey mottled reddish brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
	1.00	D						1
				1.35				
	2.00	D					Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	2
	3.00	D		3.00				3
							Trial Pit completed at 3.00m.	
				{4.00}				4

General Remarks

Dimensions: 2.70x0.70x3.00
 Trial pit excavated by JCB 3CX.
 Trial pit sides collapsing at 3.00mbgl.
 Groundwater seepage encountered at 3.00mbgl, moderate ingress.
 On completion, the trial pit was backfilled with materials arisings.

All dimensions in metres Scale 1:25		Logged By MV
--	--	-----------------

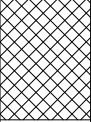
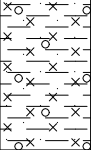
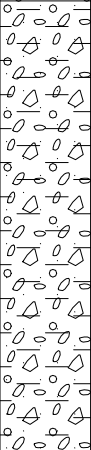
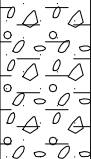
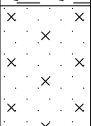


Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP9		
Job No CRM.1033.025		Dates Start 13-12-16 Finish 13-12-16		Ground Level (m)				Co-Ordinates
Client Persimmon Homes						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over (soft) dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
				0.70			(Soft) Yellow brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
	1.00	D					Reddish brown clay-bound sandy cobbly GRAVEL. Gravel is subangular and subrounded, fine to coarse flint, and cobbles of flint. Sand is fine.	1
				1.80			1.40 - 1.80 Hard to excavate.	
	1.80	D		1.80			Yellow brown slightly silty fine SAND.	2
				2.70				
				{4.00}			Trial Pit completed at 2.70m.	3
								4
General Remarks Dimensions: 2.70x0.70x2.70 Trial pit excavated by JCB 3CX. Trial pit sides remained vertical and stable. Groundwater not encountered. On completion, the trial pit was backfilled with materials arisings.								
All dimensions in metres Scale 1:25						Logged By MV		

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17

Site Land East of Castle Street, Havant PO9 2RY				TP10
Job No CRM.1033.025	Dates Start 13-12-16 Finish 13-12-16	Ground Level (m)	Co-Ordinates	
Client Persimmon Homes				Sheet 1 of 1

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
▽	0.50	ES		0.40			(MADE GROUND) Topsoil: Grass over (soft) greyish brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
							(Soft) Light greyish brown slightly gravelly sandy silty CLAY. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	
	1.00	D		0.90			Yellow brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
	2.00	D						2
				2.40			Reddish brown slightly silty fine SAND.	
	2.80	D		2.80			Trial Pit completed at 2.80m.	3
				{4.00}				4

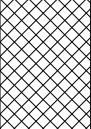
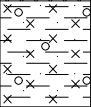
General Remarks

Dimensions: 2.90x0.70x2.80
Trial pit excavated by JCB 3CX.
Trial pit sides collapsing from 1.80-2.80mbgl.
Groundwater seepage encountered at 2.40mbgl, moderate ingress.
On completion, the trial pit was backfilled with materials arisings.

All dimensions in metres Scale 1:25	Logged By MV
--	-----------------



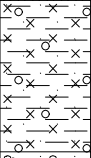
Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP11		
Job No CRM.1033.025		Dates Start 13-12-16 Finish 13-12-16		Ground Level (m)				Co-Ordinates
Client Persimmon Homes						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.45			(MADE GROUND) Topsoil: Grass over (soft) greyish brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
				0.80			(Soft to firm) Reddish yellow brown slightly gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
	1.00	D					Yellow brown clay-bound sandy cobbly GRAVEL. Gravel is subangular and subrounded, fine to coarse flint, and cobbles of flint. Sand is fine.	1
	2.00	D						2
	2.60	D		2.60			Becoming brown slightly silty SAND at 2.60mbgl. Trial Pit completed at 2.60m.	3
				{4.00}				4
General Remarks Dimensions: 2.90x0.70x2.60 Trial pit excavated by JCB 3CX. Trial pit sides collapsing from 2.70-2.60mbgl. Groundwater not encountered. On completion, the trial pit was backfilled with materials arisings.								
All dimensions in metres Scale 1:25						Logged By MV		

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17



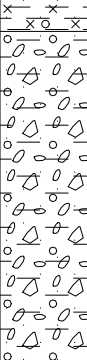
Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP12		
Job No CRM.1033.025		Dates Start 13-12-16 Finish 13-12-16		Ground Level (m)				Co-Ordinates
Client Persimmon Homes						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over (soft) dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
					0.80			(Soft) Reddish brown mottled yellow brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.
		2.00	D		3.00			Reddish brown occasionally cobbly sandy silty GRAVEL with occasional detached bands of light greyish green glauconitic fine SAND. Gravel is subangular and subrounded, fine to coarse flint, and cobbles of flint. Sand is fine.
								3
								4
				{4.00}				
General Remarks Dimensions: 2.60x0.70x3.00 Trial pit excavated by JCB 3CX. Trial pit sides remained vertical and stable. Groundwater not encountered. On completion, the trial pit was backfilled with materials arisings.								
All dimensions in metres Scale 1:25						Logged By MV		

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17



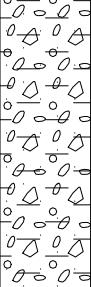
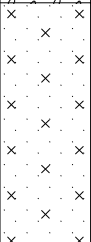
Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP13		
Job No CRM.1033.025		Dates Start 13-12-16 Finish 13-12-16		Ground Level (m)				Co-Ordinates
Client Persimmon Homes						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over (soft) dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
					0.70			(Soft) Reddish brown mottled orange sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.
		1.00	D					Reddish brown clay-bound sandy cobbly GRAVEL. Gravel is subangular and subrounded, fine to coarse flint, and cobbles of flint. Sand is fine.
	1.80	D		1.80			Trial Pit completed at 1.80m.	2
				{4.00}				4
General Remarks Dimensions: 2.70x0.70x1.80 Trial pit excavated by JCB 3CX. Trial pit sides remained vertical and stable. Groundwater not encountered. On completion, the trial pit was backfilled with materials arisings.								
All dimensions in metres Scale 1:25						Logged By MV		

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17



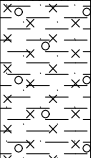
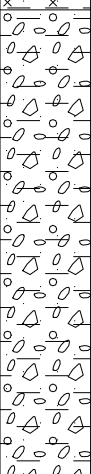
Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP14		
Job No CRM.1033.025		Dates Start 14-12-16 Finish 14-12-16		Ground Level (m)				Co-Ordinates
Client Persimmon Homes						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.35			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
					0.60			(Soft) Dark brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.
	1.00	D					Reddish brown clay-bound sandy GRAVEL. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
					1.60			
	2.40	D					Light greenish grey and light brown slightly silty fine SAND.	2
					2.40			
							Trial Pit completed at 2.40m.	3
								4
				{4.00}				
General Remarks Dimensions: 2.90x0.70x2.40 Trial pit excavated by JCB 3CX. Trial pit sides remained vertical and stable. Groundwater not encountered. On completion, the trial pit was backfilled with materials arising.								
All dimensions in metres Scale 1:25						Logged By MV		

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17



Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP15		
Job No CRM.1033.025		Dates Start 14-12-16 Finish 14-12-16		Ground Level (m)				Co-Ordinates
Client Persimmon Homes						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.30			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
					0.85			(Soft) Light greyish brown sandy gravelly silty CLAY. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.
	1.50	D					Reddish brown clay-bound sandy slightly cobbly GRAVEL. Gravel is subangular and subrounded, fine to coarse flint, and occasional cobbles of flint. Sand is fine.	1
								1.70 - 2.40 Becoming reddish brown mottled green.
	2.40	D		2.40			Trial Pit completed at 2.40m.	
				{4.00}				3
								4
General Remarks Dimensions: 2.80x0.70x2.40 Trial pit excavated by JCB 3CX. Trial pit sides remained vertical and stable. Groundwater seepage encountered at 0.00mbgl, moderate ingress. On completion, the trial pit was backfilled with materials arisings.								
All dimensions in metres Scale 1:25		Logged By MV						

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17



Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Land East of Castle Street, Havant PO9 2RY						TP16		
Job No CRM.1033.025		Dates Start 14-12-16 Finish 14-12-16		Ground Level (m) Co-Ordinates				
Client Persimmon Homes						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.50	ES		0.25			(MADE GROUND) Topsoil: Grass over dark brown slightly gravelly sandy silt with rootlets. Gravel is subangular to subrounded, fine to coarse flint. Sand is fine.	0
				0.70			(Soft) Dark greyish brown gravelly sandy silty CLAY with fine rootlets. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	
	1.00	D		0.95			(Firm) Dark reddish brown mottled bluish grey gravelly sandy silty CLAY with fine rootlets. Gravel is subangular and subrounded, fine to coarse flint. Sand is fine.	1
							Reddish brown clay-bound sandy cobbly GRAVEL. Gravel is subangular and subrounded, fine to coarse flint, and cobbles of flint. Sand is fine.	
	2.00	D		2.00			1.25 - 2.00 With detached pockets and bands of light greyish green glauconitic SAND.	
							Trial Pit completed at 2.00m.	2
								3
								4
				{4.00}				
General Remarks Dimensions: 2.60x0.70x2.00 Trial pit excavated by JCB 3CX. Trial pit sides collapsing from 1.25-2.00mbgl. Groundwater seepage encountered at 1.25mbgl, accumulating rapidly. On completion, the trial pit was backfilled with materials arisings.								
All dimensions in metres Scale 1:25						Logged By MV		

1.1 ENZYGO TP LOG CRM.1033.025 HAVANT.GPJ GINT STD AGS 3_1 ENZYGO.GPJ 12/1/17



British
Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Geology of Britain viewer

[Try the Beta version of our 3D Geology of Britain viewer](#)



[More BGS map viewers](#)



Surface
Geology



3D
Models



Borehole
Scans



Earthquake
Timeline

Borehole Scans

Click on a borehole to view scan.

Borehole depth

- 0 - 10m
- 10 - 30m
- 30m+
- Unknown
- Confidential or Restricted

[More on boreholes](#)

Go to Location

Switch Basemap

100% 0%

Geology Transparency

Grid Ref: 473292, 106652





British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 425580 : BGS Reference: SU70NW198

British National Grid (27700) : 473100,106460

[Report an issue with this borehole](#)

<<

< Prev

Page 1 of 1 ▾

Next >

>>

OAKLEY SOILS AND CONCRETE ENGINEERING LIMITED

BOREHOLE SECTION SHEET

BOREHOLE No.3.....

SU70NW/198

7310 0646

CLIENT: Borough of Havant

DATE STARTED: 2.11.77

LOCATION: Denvilles Sewerage

DATE FINISHED: 3.11.77

BH. DIAMETER: 6"

PLANT: Pilcon 1 ton

LEVEL A.O.D.: 11.90m

CASING SIZE: 6 3/8"

Leg- end	Depth below G. L.	Elev. A.O.D.	Thick- ness	Description of Strata	Samples			Water Levels	Casing Level:
					No.	Type	Depth		
	0.34		0.34	Topsoil.					
				Soft brown silty clay.					BE
	1.30		0.96	Medium dense dark orange brown claybound flint gravel.	1	U4	1.0-1.5 (no rec)		
	3.20		1.90	Loose yellow brown very clayey silty fine sand with a little flint gravel.	2	B	2.3-2.5	3.20 ▽	Ch
	4.80		1.60	Firm yellow brown with patches of blue grey clayey sandy silt.	3	B	3.5-3.7		W
	5.50		0.70		4	B	4.8-5.0	LC(W)	5.00
					5	W			LC(W)
S.P.T. RESULTS									
Depth (m) 'N' Value 2.0-2.5 23 3.0-3.5 8 5.0-5.5 21									
NOTE									
Piezometer installed to 5.0m									
R.J.W. 2.10.83									



British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 425591 : BGS Reference: SU70NW209

British National Grid (27700) : 473100,106140

[Report an issue with this borehole](#)

<<

< Prev

Page 1 of 1 ▾

Next >

>>

Institute of Geological Sciences RECORD OF SHAFT OR BOREHOLE		6-in or 1:10 000 Map Registration No. SU 70 NW/209																													
Name and Number of Shaft or Borehole: Dennville Sewage B.H. 6		National Grid Reference 7310 0614																													
For whom made Havant B.C.		1-in or 1:50 000 New Series Map No. 316																													
Town or Village Ensworth County Hants.		Enter 'C' if Confidential																													
Exact site (reference to a fixed point on 1-in or 1:50 000 Map)																															
Purpose for which made trial																															
Ground level at shaft bore relative to O.D. ca +10 m. If not ground level give O.D. of beginning of shaft bore _____ m.																															
Made by _____		Date of sinking 1983																													
Information from Havant B.C.		Examined by _____																													
Specimen Numbers and Additional Notes																															
<table border="1"> <thead> <tr> <th>Geological Classification</th> <th>Description of Strata</th> <th>Thickness metres</th> <th>Depth metres</th> </tr> </thead> <tbody> <tr> <td>Brickworth</td> <td>Compact brown clayey soil with some gravel</td> <td>0.9</td> <td>0.9</td> </tr> <tr> <td>Head Gravel</td> <td>Compact brown clayey gravel</td> <td>1.1</td> <td>2.0</td> </tr> <tr> <td>? Raised Beach</td> <td>Loose brown clayey sand with occasional gravel</td> <td>2.5</td> <td>4.5</td> </tr> <tr> <td>London Clay</td> <td>Stiff dark grey silty sandy clay</td> <td>1.5</td> <td>6.0</td> </tr> <tr> <td>R.S.W.</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4.11.83</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Geological Classification	Description of Strata	Thickness metres	Depth metres	Brickworth	Compact brown clayey soil with some gravel	0.9	0.9	Head Gravel	Compact brown clayey gravel	1.1	2.0	? Raised Beach	Loose brown clayey sand with occasional gravel	2.5	4.5	London Clay	Stiff dark grey silty sandy clay	1.5	6.0	R.S.W.				4.11.83			
Geological Classification	Description of Strata	Thickness metres	Depth metres																												
Brickworth	Compact brown clayey soil with some gravel	0.9	0.9																												
Head Gravel	Compact brown clayey gravel	1.1	2.0																												
? Raised Beach	Loose brown clayey sand with occasional gravel	2.5	4.5																												
London Clay	Stiff dark grey silty sandy clay	1.5	6.0																												
R.S.W.																															
4.11.83																															

British Geological Survey

British Geological Survey

Appendix 5

Flood Maps

Flood map for planning

Your reference
23086

Location (easting/northing)
473062/106275

Created
4 Sep 2018 11:49

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

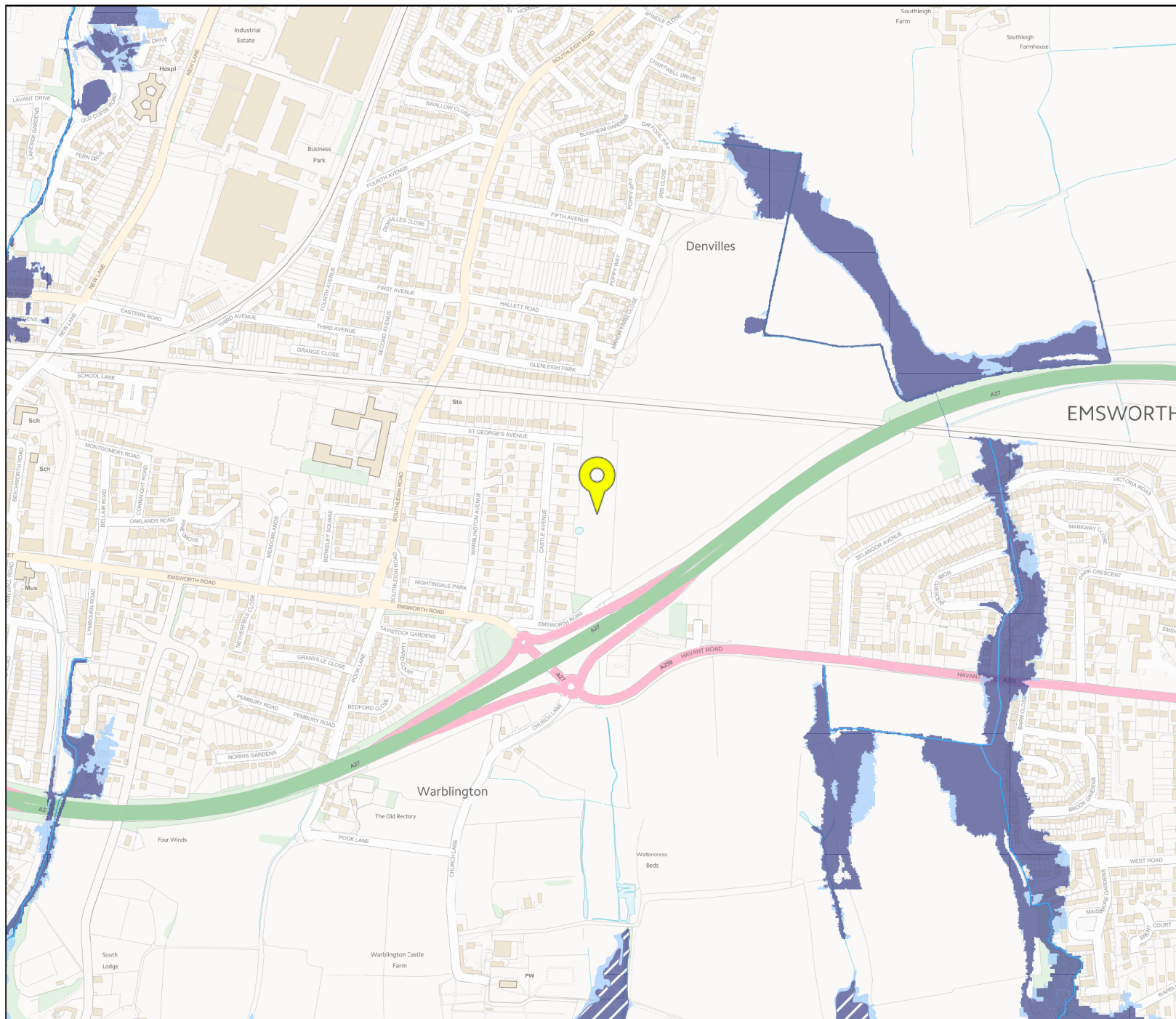
- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

The Open Government Licence sets out the terms and conditions for using government data.
<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>



Flood map for planning

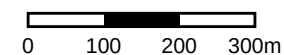
Your reference
23086

Location (easting/northing)
473062/106275

Scale
1:10000

Created
4 Sep 2018 11:49

-  Selected point
-  Flood zone 3
-  Flood zone 3: areas benefitting from flood defences
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Flood storage area



Basic view ☐ Detailed view

Location



Flood risk from rivers or the sea

☐ Extent of flooding



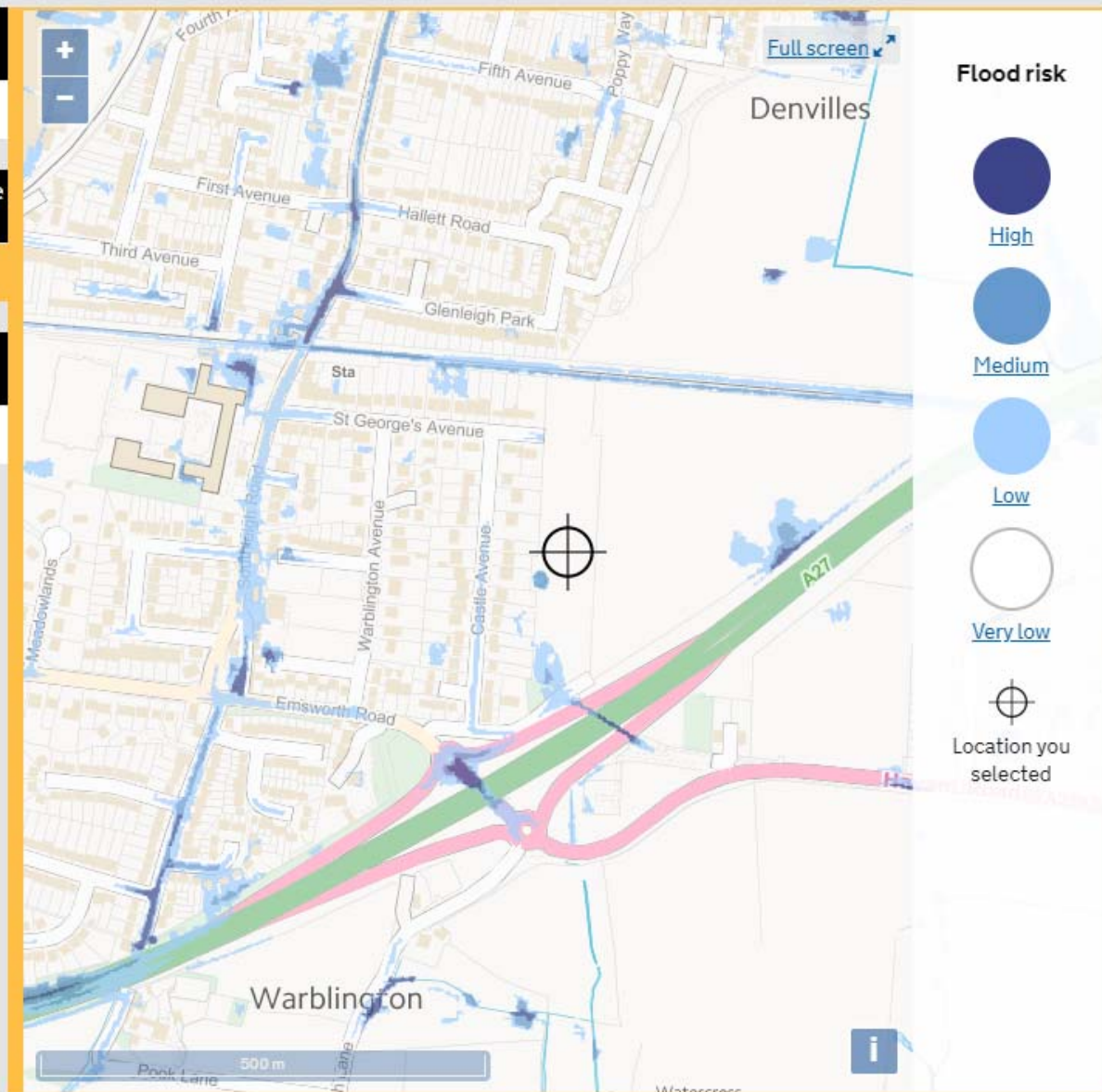
Flood risk from surface water

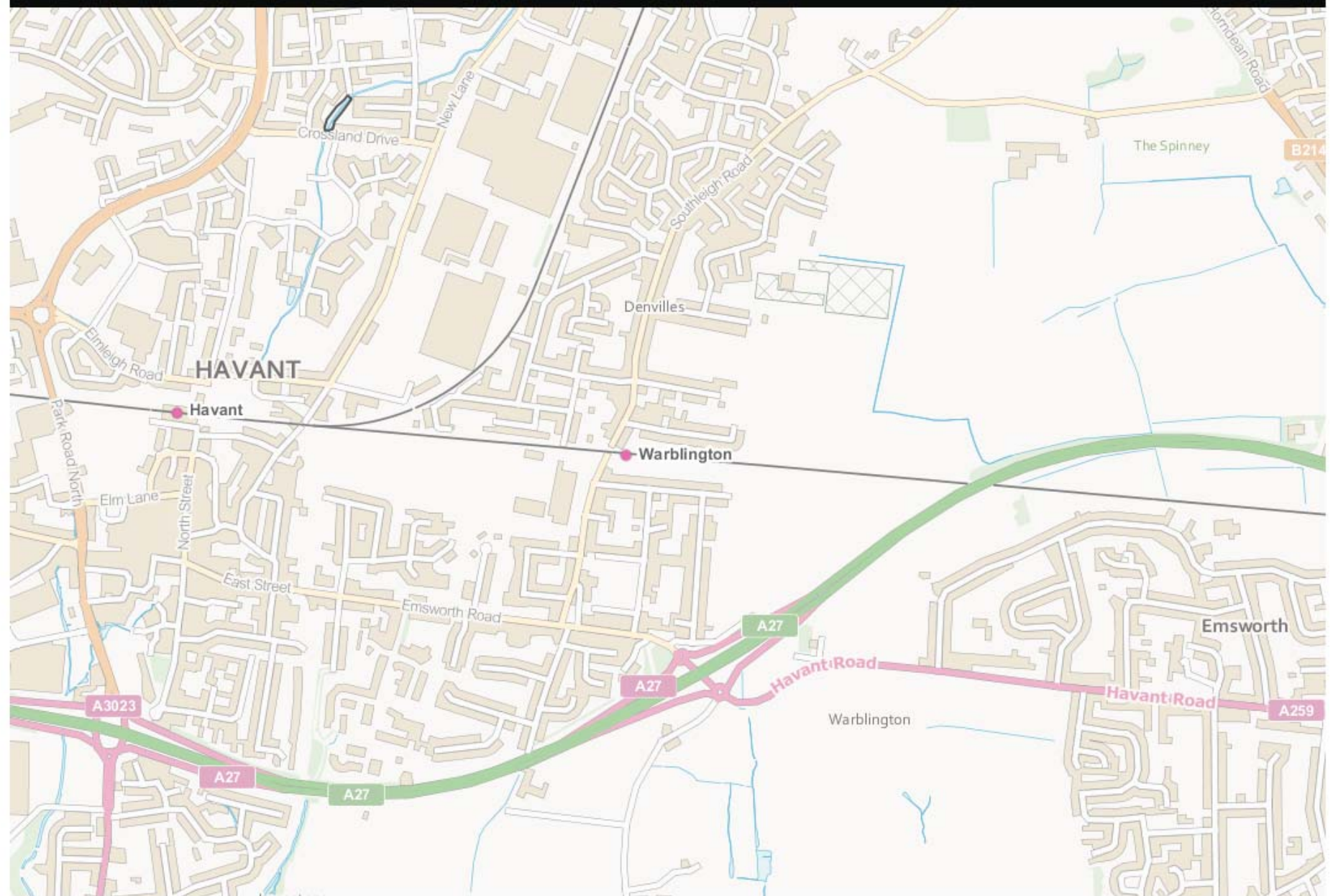
☒ Extent of flooding



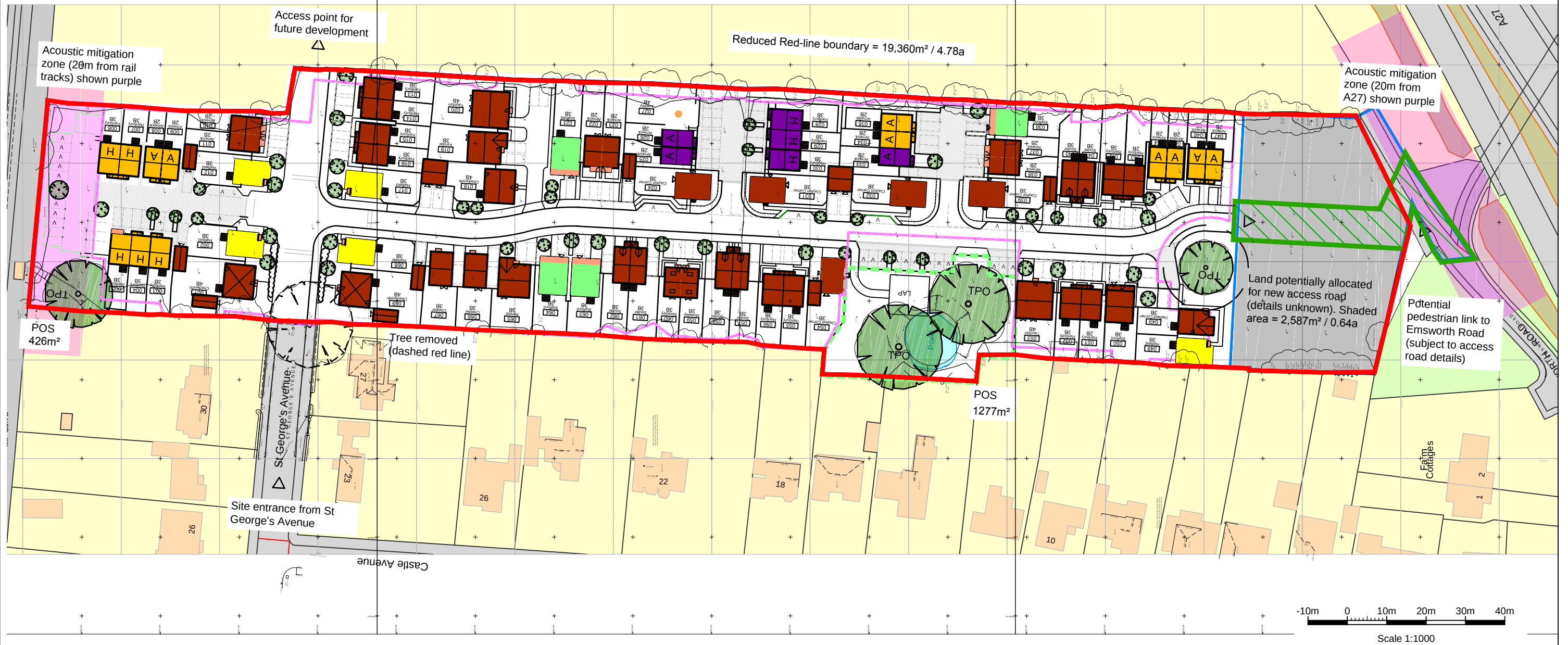
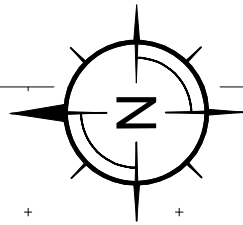
Flood risk from reservoirs

☐ Extent of flooding





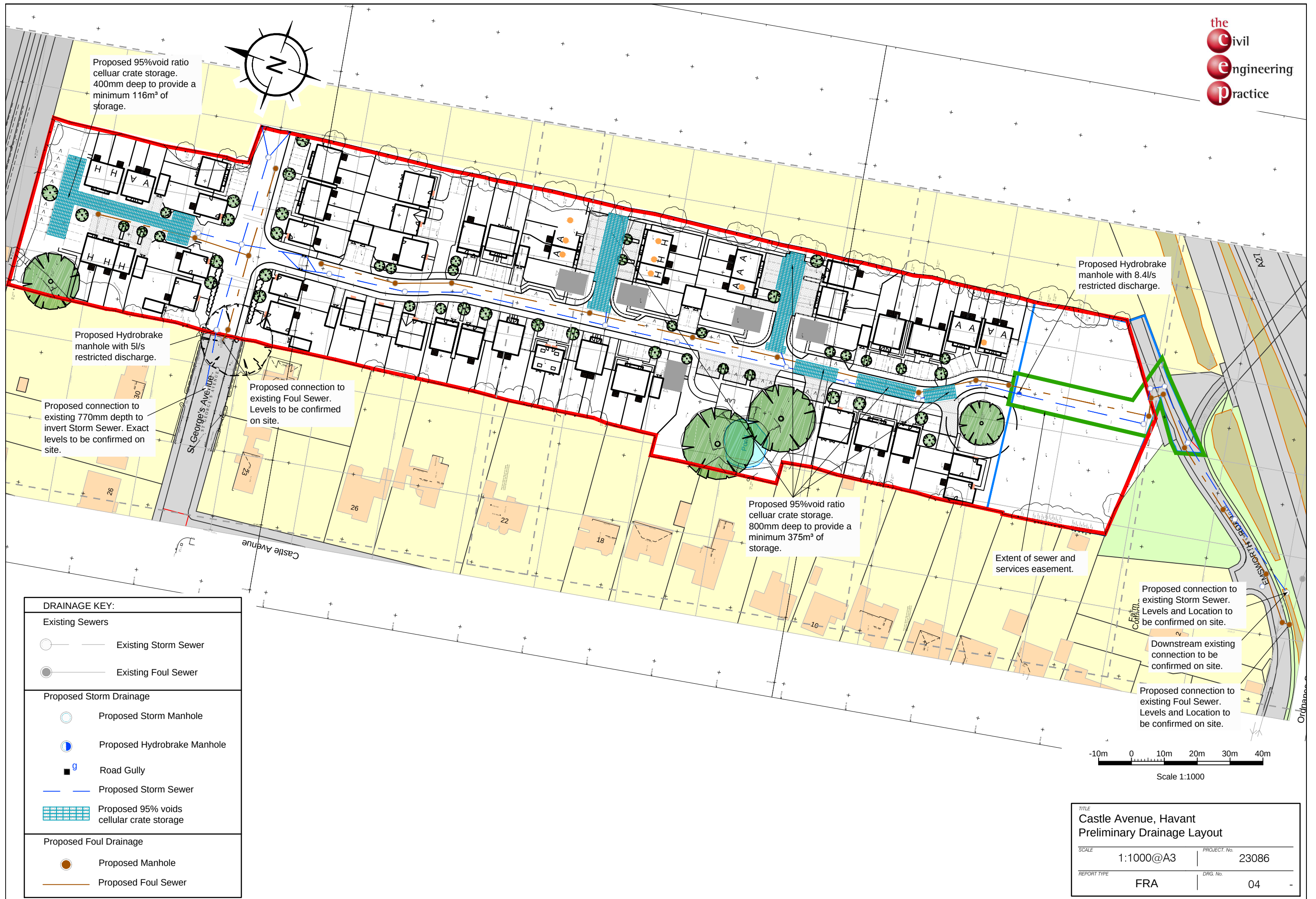
Appendix 6
Proposed Site Layout Plan



TITLE Castle Avenue, Havant Proposed Site Layout			
SCALE 1:1000@A3		PROJECT No. 23086	
REPORT TYPE FRA		DRG. No. 03	

Appendix 7

Preliminary Drainage Strategy Plan and Calculations



DRAINAGE KEY:	
Existing Sewers	
	Existing Storm Sewer
	Existing Foul Sewer
Proposed Storm Drainage	
	Proposed Storm Manhole
	Proposed Hydrobrake Manhole
	Road Gully
	Proposed Storm Sewer
	Proposed 95% voids cellular crate storage
Proposed Foul Drainage	
	Proposed Manhole
	Proposed Foul Sewer

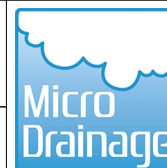
TITLE	
Castle Avenue, Havant Preliminary Drainage Layout	
SCALE	1:1000@A3
PROJECT No.	23086
REPORT TYPE	FRA
DRG. No.	04

Half Drain Time : 194 minutes.

	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
	15 min Summer	127.517	0.0	55.2	21
	30 min Summer	85.701	0.0	74.7	35
	60 min Summer	54.957	0.0	97.2	64
	120 min Summer	34.010	0.0	120.5	122
	180 min Summer	25.295	0.0	134.5	166
	240 min Summer	20.351	0.0	144.3	194
	360 min Summer	14.971	0.0	159.3	260
	480 min Summer	12.028	0.0	170.7	328
	600 min Summer	10.141	0.0	179.9	398
	720 min Summer	8.817	0.0	187.7	464
	960 min Summer	7.063	0.0	200.5	594
	1440 min Summer	5.157	0.0	219.5	842
	2160 min Summer	3.757	0.0	240.8	1192
	2880 min Summer	2.997	0.0	256.0	1508
	4320 min Summer	2.176	0.0	278.3	2212
	5760 min Summer	1.731	0.0	296.3	2944
	7200 min Summer	1.449	0.0	309.9	3672
	8640 min Summer	1.255	0.0	321.8	4408
	10080 min Summer	1.111	0.0	331.9	5136
	15 min Winter	127.517	0.0	62.0	21
	30 min Winter	85.701	0.0	83.8	35
	60 min Winter	54.957	0.0	109.0	64
	120 min Winter	34.010	0.0	135.0	120
	180 min Winter	25.295	0.0	150.7	174
	240 min Winter	20.351	0.0	161.8	220
	360 min Winter	14.971	0.0	178.6	278
	480 min Winter	12.028	0.0	191.3	356
	600 min Winter	10.141	0.0	201.6	432
	720 min Winter	8.817	0.0	210.4	506
	960 min Winter	7.063	0.0	224.7	642

23086 Castle Avenue, Havant
North Part of Site
Preliminary Storm Drainage

Designed by SRD
Checked by



Source Control 2017.1.2

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
1440 min Winter	11.022	0.192	0.0	5.0	5.0	56.5	O K
2160 min Winter	10.952	0.122	0.0	4.9	4.9	36.0	O K
2880 min Winter	10.932	0.102	0.0	4.0	4.0	30.0	O K
4320 min Winter	10.912	0.082	0.0	3.0	3.0	24.0	O K
5760 min Winter	10.901	0.071	0.0	2.4	2.4	20.8	O K
7200 min Winter	10.894	0.064	0.0	2.0	2.0	18.7	O K
8640 min Winter	10.889	0.059	0.0	1.8	1.8	17.2	O K
10080 min Winter	10.885	0.055	0.0	1.6	1.6	16.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
1440 min Winter	5.157	0.0	246.0	882
2160 min Winter	3.757	0.0	269.8	1172
2880 min Winter	2.997	0.0	286.9	1528
4320 min Winter	2.176	0.0	311.9	2252
5760 min Winter	1.731	0.0	331.9	2944
7200 min Winter	1.449	0.0	347.2	3672
8640 min Winter	1.255	0.0	360.6	4400
10080 min Winter	1.111	0.0	371.9	5136

The Civil Engineering Practice		Page 3
11 Tungsten Building George Street Fishersgate BN41 1RA	23086 Castle Avenue, Havant North Part of Site Preliminary Storm Drainage	
Date 21/09/2018 File NORTH PART OF SITE PREL...	Designed by SRD Checked by	
XP Solutions	Source Control 2017.1.2	

Rainfall Details

Rainfall Model	FSR	Ratio R	0.350	Cv (Winter)	0.840
Return Period (years)	100	Summer Storms	Yes	Shortest Storm (mins)	15
Region	England and Wales	Winter Storms	Yes	Longest Storm (mins)	10080
M5-60 (mm)	19.400	Cv (Summer)	0.750	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.238

Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)
0	4 0.119	4	8 0.119

The Civil Engineering Practice		Page 4
11 Tungsten Building George Street Fishersgate BN41 1RA	23086 Castle Avenue, Havant North Part of Site Preliminary Storm Drainage	
Date 21/09/2018 File NORTH PART OF SITE PREL...	Designed by SRD Checked by	
XP Solutions	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 11.360

Cellular Storage Structure

Invert Level (m) 10.830 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	310.0	0.0	0.900	0.0	0.0	1.800	0.0	0.0
0.100	310.0	0.0	1.000	0.0	0.0	1.900	0.0	0.0
0.200	310.0	0.0	1.100	0.0	0.0	2.000	0.0	0.0
0.300	310.0	0.0	1.200	0.0	0.0	2.100	0.0	0.0
0.400	310.0	0.0	1.300	0.0	0.0	2.200	0.0	0.0
0.401	0.0	0.0	1.400	0.0	0.0	2.300	0.0	0.0
0.600	0.0	0.0	1.500	0.0	0.0	2.400	0.0	0.0
0.700	0.0	0.0	1.600	0.0	0.0	2.500	0.0	0.0
0.800	0.0	0.0	1.700	0.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0114-5000-0400-5000 Sump Available Yes
Design Head (m) 0.400 Diameter (mm) 114
Design Flow (l/s) 5.0 Invert Level (m) 10.830
Flush-Flo™ Calculated Minimum Outlet Pipe Diameter (mm) 150
Objective Minimise upstream storage Suggested Manhole Diameter (mm) 1200
Application Surface

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	5.0	Kick-Flo®	0.312	4.5
Flush-Flo™	0.169	5.0	Mean Flow over Head Range	-	4.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.0	0.800	6.9	2.000	10.6	4.000	14.8	7.000	19.5
0.200	5.0	1.000	7.7	2.200	11.1	4.500	15.6	7.500	20.2
0.300	4.6	1.200	8.3	2.400	11.6	5.000	16.4	8.000	20.9
0.400	5.0	1.400	9.0	2.600	12.0	5.500	17.3	8.500	21.5
0.500	5.5	1.600	9.6	3.000	12.9	6.000	18.0	9.000	22.1
0.600	6.0	1.800	10.1	3.500	13.9	6.500	18.8	9.500	22.7

23086 Castle Avenue, Havant
South Part of Site
Preliminary Storm Drainage

Designed by SRD
Checked by



Source Control 2017.1.2

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
1440 min Winter	9.412	0.612	0.0	8.4	8.4	287.8	O K
2160 min Winter	9.240	0.440	0.0	8.4	8.4	206.9	O K
2880 min Winter	9.105	0.305	0.0	8.4	8.4	143.3	O K
4320 min Winter	8.958	0.158	0.0	8.1	8.1	74.5	O K
5760 min Winter	8.926	0.126	0.0	6.7	6.7	59.5	O K
7200 min Winter	8.910	0.110	0.0	5.7	5.7	51.8	O K
8640 min Winter	8.900	0.100	0.0	4.9	4.9	47.0	O K
10080 min Winter	8.892	0.092	0.0	4.4	4.4	43.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
1440 min Winter	5.157	0.0	694.1	1012
2160 min Winter	3.757	0.0	762.1	1408
2880 min Winter	2.997	0.0	810.3	1756
4320 min Winter	2.176	0.0	881.1	2336
5760 min Winter	1.731	0.0	937.2	3000
7200 min Winter	1.449	0.0	980.6	3680
8640 min Winter	1.255	0.0	1018.4	4416
10080 min Winter	1.111	0.0	1050.7	5144

The Civil Engineering Practice		Page 3
11 Tungsten Building George Street Fishersgate BN41 1RA	23086 Castle Avenue, Havant South Part of Site Preliminary Storm Drainage	
Date 21/09/2018 File SOUTH PART OF SITE PREL...	Designed by SRD Checked by	
XP Solutions	Source Control 2017.1.2	

Rainfall Details

Rainfall Model	FSR	Ratio R	0.350	Cv (Winter)	0.840
Return Period (years)	100	Summer Storms	Yes	Shortest Storm (mins)	15
Region	England and Wales	Winter Storms	Yes	Longest Storm (mins)	10080
M5-60 (mm)	19.400	Cv (Summer)	0.750	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.672

Time (mins)	Area	Time (mins)	Area
From: To: (ha)		From: To: (ha)	
0 4 0.336		4 8 0.336	

The Civil Engineering Practice		Page 4
11 Tungsten Building George Street Fishersgate BN41 1RA	23086 Castle Avenue, Havant South Part of Site Preliminary Storm Drainage	
Date 21/09/2018 File SOUTH PART OF SITE PREL...	Designed by SRD Checked by	
XP Solutions	Source Control 2017.1.2	

Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 8.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	495.0	0.0	0.801	0.0	0.0	1.800	0.0	0.0
0.100	495.0	0.0	1.000	0.0	0.0	1.900	0.0	0.0
0.200	495.0	0.0	1.100	0.0	0.0	2.000	0.0	0.0
0.300	495.0	0.0	1.200	0.0	0.0	2.100	0.0	0.0
0.400	495.0	0.0	1.300	0.0	0.0	2.200	0.0	0.0
0.500	495.0	0.0	1.400	0.0	0.0	2.300	0.0	0.0
0.600	495.0	0.0	1.500	0.0	0.0	2.400	0.0	0.0
0.700	495.0	0.0	1.600	0.0	0.0	2.500	0.0	0.0
0.800	495.0	0.0	1.700	0.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0137-8400-0800-8400 Sump Available Yes
Design Head (m) 0.800 Diameter (mm) 137
Design Flow (l/s) 8.4 Invert Level (m) 8.800
Flush-Flo™ Calculated Minimum Outlet Pipe Diameter (mm) 150
Objective Minimise upstream storage Suggested Manhole Diameter (mm) 1200
Application Surface

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	8.4	Kick-Flo®	0.559	7.1
Flush-Flo™	0.252	8.4	Mean Flow over Head Range	-	7.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0	0.800	8.4	2.000	12.9	4.000	18.0	7.000	23.6
0.200	8.3	1.000	9.3	2.200	13.5	4.500	19.0	7.500	24.3
0.300	8.3	1.200	10.2	2.400	14.1	5.000	20.0	8.000	25.1
0.400	8.1	1.400	10.9	2.600	14.7	5.500	21.0	8.500	25.8
0.500	7.7	1.600	11.6	3.000	15.7	6.000	21.9	9.000	26.5
0.600	7.3	1.800	12.3	3.500	16.9	6.500	22.7	9.500	27.3

Appendix 8
Drainage Maintenance Schedule

Drainage Maintenance Schedule



Project	Castle Avenue, Havant
Project Number	23086

By Steve Doughty

Date September 2018

The Civil Engineering Practice

11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA

T. 01273 424 424
E. design@civil.co.uk
www.civil.co.uk

1 Indicative Schedule of Maintenance

- 1.1 Once appointed the Contractor will prepare a site specific method statement for the control of silt and other pollutants during construction. CIRIA Report C532, Control of water pollution from construction sites, provides further guidance on this.
- 1.2 The Contractor will maintain the proposed drainage system during construction and until the handing over of the site. Upon completion the maintenance will be passed on to the property owner.
- 1.3 The following maintenance schedule details the typical tasks to be undertaken at different intervals.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Remove sediment and debris from silt trap chambers, channel drains and inlet chambers	6 monthly
	Litter and debris removal – catch pits and Infiltration Basin	Monthly or as required
	Surface and Foul water pipe work – jetting / rodding	Every 2 years or as required
	Manage other vegetation and remove nuisance plants – aesthetics	As required
	Visual Inspection of permeable paving for defects and settlement	Annually
	Sweeping / brushing of permeable paving	Twice Annually
Corrective Maintenance	Remove debris / blockages to silt traps / channel drains	As required
	Repairs to access chambers / manhole covers	As required
	Replace any broken permeable blocks / surface, remedial works to any depressions or rutting	As required
	Inspect inlet, outlet from downpipe and gullies for blockages, standing water and clear	As required

Indicative Schedule of Maintenance for the Proposed Drainage System



Inspection / Action Required	Gullies, Channels and Gutters	Catchpits	Permeable Surface	Surface and Foul Water Pipework
After leaf fall in Autumn	✓	✓		
6 Months	✓	✓	✓	
1 Year			✓	
2 Years				✓

Drainage System Maintenance Summary