GRAY ENVIRONMENTAL LTD

Flood Risk Assessment Report for Residential Development of Land to the Rear of 55 and 57 Hart Plain Avenue, Waterlooville, PO8 8RG

CY Developments Ltd

17th February 2015

Document Control

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1.0 INTRODUCTION

This document has been produced by Gray Environmental Ltd (Gray Environmental). The aim of the document is to prepare a site specific Flood Risk Assessment (FRA) for the land to the rear of 55 and 57 Hart Plain Avenue, Waterlooville, PO8 8RG showing either that there is a low risk of flooding from all sources or that the development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed. Please see Figure 1 for the Site Location Plan.

2.0 SUMMARY OF SITE CHARACTERISTICS AND SETTING

The site is located in Waterlooville, Hampshire. The site is approximately 70m long by 35m wide, the site area is circa 0.13ha and the National Ordnance Survey (OS) Grid Reference for the site is 468080, 110960. The Site Location Plan is included as Figure 1.

The site is bounded to the north by Hart Plain Church Car Park. The site is bounded to the east, south and west by similar residential development. The Existing Survey is included as Figure 2.

Figure 2 indicates the site has a gentle fall towards the west southwest.

The site is to be developed to become 3 no. two storey detached dwellings with access/drive/parking areas. Please see Figure 3 for details of the post development site.

The BGS Geoindex website provides information on the geology underlying the site:

- 'Polymict deposit' comprising of 'gravel, sand and clay depending on upslope source and distance from source'[1]; and,
- 'Vertically and laterally variable sequences mainly of clay, some silty or sandy, with some sands and gravels, minor limestones and lignites and occasional sandstone and conglomerate'[2].

The nearest available borehole log shown on the BGS Geoindex website is approximately 100m southeast of the site. SU61SE76[3] recorded around 0.30m Made Ground (MG) overlying CLAY to circa 1.80m bgl; SAND to approximately 2.40m bgl; and SILT to around 7.30m bgl. Groundwater was encountered at circa 3.00m bgl.

Developer correspondence in Appendix A indicates a 'trial hole' was excavated on the neighbouring down gradient site and 'there is no scope for soakaways'. 'Clay hogging' was encountered to 1.20m bgl and was underlain by 'thick clay'. Groundwater was not encountered.

[1] http://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=HEAD
[2] http://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=LMBE
[3] http://scans.bgs.ac.uk/sobi_scans/boreholes/421430/images/10755470.html

The hydrological characteristics of the area are:

Average annual rainfall (AAR) mm	792
Soil runoff coefficient (SPR)	0.47
M5-60 mm	20
Rainfall ratio (r)	0.3
Hydrological region (R)	7[4].

The groundwater beneath the site is associated with a source protection zone[5].

[4] http://www.uksuds.com/surfacewaterstorage_js.htm
[5] http://maps.environment-agency.gov.uk/wiyby/wiybyController?value=PO8+8RG&lang=_e&ep=map&topic=groundwater&layerGroups=default&scale=9&textonly=off&submit.x=20&submit.y=9

3.0 FLOOD RISK ASSESSMENT

3.1 Flooding from Rivers and Sea

The site is approximately 45m Above Ordnance Datum (AOD).

A review of the Environment Agency (EA) Flood Map for Planning (from Rivers and the Sea)[6] indicates the site lies within Flood Zone 2 i.e. land assessed as having between a 1 per cent (1 in 100) and 0.1 per cent (1 in 1,000) annual probability of river flooding.

For the purposes of the Flood Risk Regulations 2009 and the EU Directive 2007/60/EC on the assessment and management of flood risk, the EA's Risk of Flooding from Rivers and the Sea Map (Flood Hazard Map)[7] assesses that the chance of flooding from rivers at the site location is low.

The highest EA JFLOW derived Flood Zone 2 Water Surface Level presented in the Flood Risk Assessment (FRA) that accompanied Planning application APP/14/00715 was 42.96m AOD (Appendix B). This level corresponds to a Water Depth of 0.05m in the location of the up gradient site access (Point 1). The maximum Water Depth of 0.30m actually corresponds to Water Surface Level of 42.73m AOD on the neighbouring down gradient site (Point 5).

The point that appears most applicable to current pre development site levels in Appendix B is Point 1 with a Water Surface Level of 42.96m AOD.

3.2 Flooding from Land

Information collection indicates the site is located in a predominantly residential setting; the site has a gentle fall towards the west southwest; and the site is underlain by low permeability soil.

A review of the EA's risk of flooding from surface water map indicates a high risk -

[6] http://maps.environment-agency.gov.uk/wiyby/wiybyController?value=PO8+8RG&lang=_e&ep=map&topic=floodmap&layerGroups=default&scale=9&textonly=off&submit.x=24&submit.y=6#x=468034&y=111077&lg=1,&scale=11

[7] http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?layerGroups=default&lang=_e&topic=floodmap&scale=9&ep=map&y=111077&x=468034#x=468031&y=111077&scale=11

greater than 1 in 30 (3.3%) chance of flooding each year - in the site location[8].

The estimated surface water depth where there is a high chance of flooding occurring in the site location is below 300mm[9]; the estimated direction of water is not shown; and the estimated surface water velocity is over 0.25 m/s[10].

The PUSH EA Surface Water Flood Map indicates the site has a medium susceptibility to surface water flooding. The PUSH SFRA indicates the site is located in an area that is a very high potential source of overland flow but where land use change will have a low impact on surface water runoff[11].

3.3 Flooding from Groundwater

The PUSH EA Groundwater Flood Map indicates the site is located in an area that is susceptible to superficial deposits groundwater flooding and the PUSH SFRA indicates moderate bedrock permeability[12].

Developer correspondence in Appendix A indicates groundwater was not encountered on the neighbouring down gradient site to a maximum proven depth of 1.20m bgl.

3.4 Flooding from Sewers

The PUSH SFRA EA Surface Water Sewer Flood Map indicates the nearest location where Southern Water has previously observed surface water sewer flooding is approximately 450m northeast of the site[13].

3.5 Flooding from Reservoirs, Canals and Other Artificial Sources

The site is not located in an area that could be flooded if a large reservoir were to fail

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[8] http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?lang=_e&topic=ufmfsw&layer=default&x=468034&y=111077&scale=11#x=468034&y=111077&scale=11
[9] http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?lang=_e&topic=ufmfsw&layer=3&x=468034&y=111077&scale=11#x=468034&y=111077&scale=11
[10] http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?lang=_e&topic=ufmfsw&layer=3&x=468034&y=111077&scale=11#x=468034&y=111077&scale=11
[11] http://maps.hants.gov.uk/push/Map.aspx
[12] http://maps.hants.gov.uk/push/Map.aspx
[13] http://maps.hants.gov.uk/push/Map.aspx

and release the water it holds[14].

3.6 Conclusion

To ensure the development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed:

1. The development is situated in Flood Zone 2 - i.e. land assessed as having between a 1 per cent (1 in 100) and 0.1 per cent (1 in 1,000) annual probability of river flooding, as defined in Planning Policy Guidance (PPG) Flood Risk and Coastal Change[15].

   The Appendix B Point 1 Water Surface Level of 42.96m AOD with a 30% allowance for climate change (0.02m) indicates the proposed dwellings ground floor levels should be set at a minimum of 42.98m AOD - subject to obtaining site wide Product 4 Flood Data from the EA.

2. A review of the EA's risk of flooding from surface water map indicates a high risk - greater than 1 in 30 (3.3%) chance of flooding each year - in the site location with an estimated depth below 300mm and an estimated surface water velocity of over 0.25 m/s.

   Please see proposed dwelling ground floor levels above.

   A formal application for connection to the public surface water sewerage system that runs west southwest - east northeast across the site will be submitted to Southern Water for the proposed development. This application will detail proposals ensuring all surface water runoff from the post development impermeable areas will be treated, attenuated - for the 100 year critical event with 30% uplift for extreme rainfall intensities - and discharged to the public surface water sewerage system via a hydraulic flow control.

3. The PUSH EA Groundwater Flood Map indicates the site is located in an area that is susceptible to superficial deposits groundwater flooding.

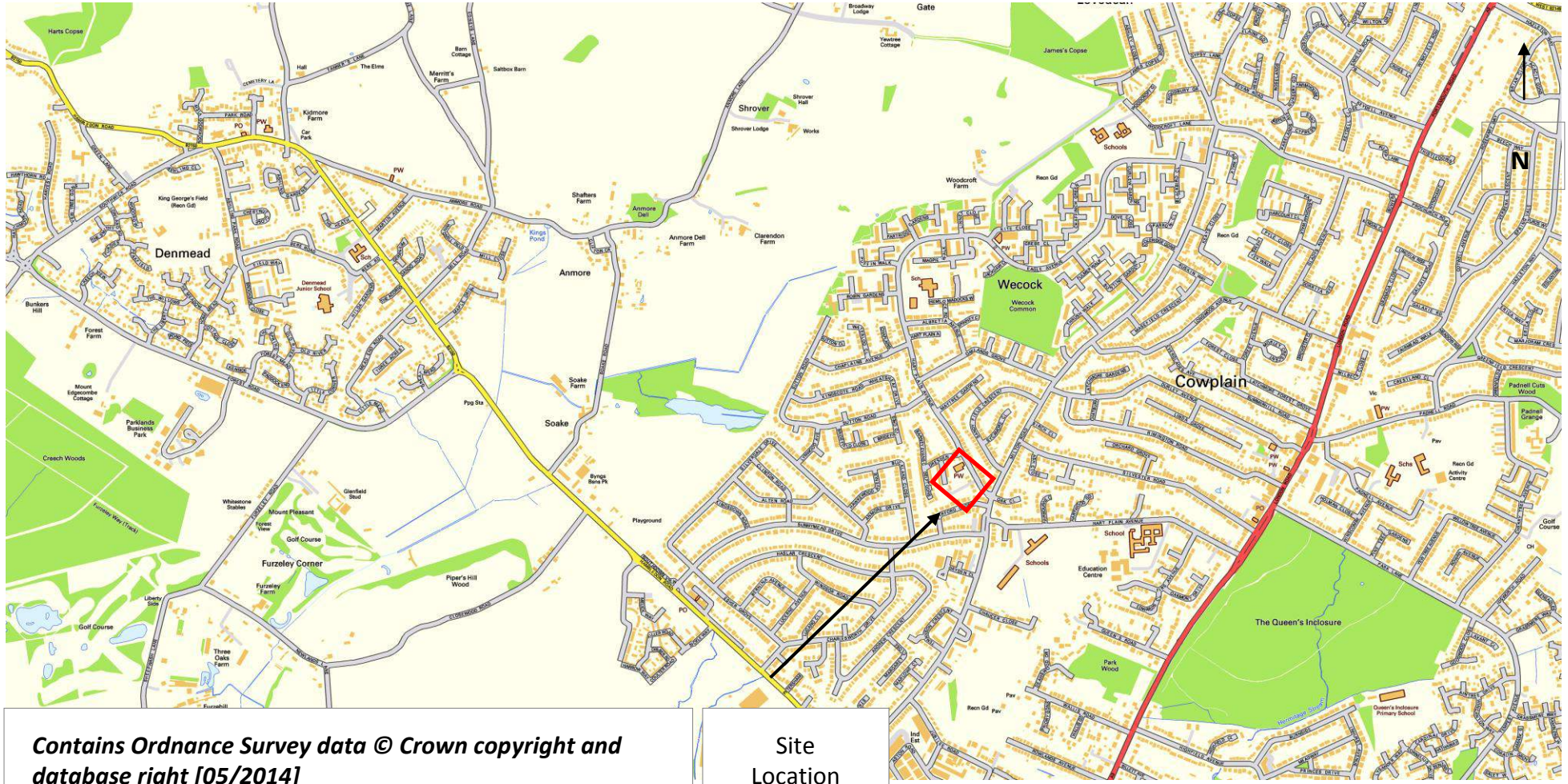
[14] http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?lang=_e&topic=reservoir&layer=default&scale=10&x=468034&y=111077#x=468031&y=111077&scale=8
[15] http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/

Developer correspondence in Appendix A indicates groundwater was not encountered on the neighbouring down gradient site to a maximum proven depth of 1.20m bgl.

Site specific information on ground conditions will be obtained to confirm this assessment, informing foundation and attenuation storage design.

FIGURES

Figure 1: Site Location Plan
Figure 2: Existing Survey
Figure 3: Block Plan



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Site Location

GRAY ENVIRONMENTAL LTD	Client:	CY Developments Ltd	Job No:	244
	Project:	Land to the Rear of 55 and 57 Hart Plain Avenue, Waterlooville	Scale:	N.T.S.
	Title:	Site Location Plan	Drawing No:	FIGURE 1

P STUBBINGTON LAND SURVEYS LTD

THE MEAD
DURLEY BROOK ROAD
DURLEY
SOUTHAMPTON
HAMPSHIRE
SO32 2AR

TEL: - 023 8060 1876

MOBILE: - 07973 348165

EMAIL: - PAUL.STUBBINGTON@BTINTERNET.COM

CLIENT: -	PEAK QUALITY HOMES
CONTRACT: -	53 HARTPLAIN AVENUE COWPLAIN
TITLE: -	EXISTING SURVEY
SCALE: -	1:200 @A1
DRAWING NO.	1569/01
DATE: -	APRIL 2012
SURVEYOR: -	PS

NOTES:
LEVELS RELATE TO O.S. DATUM
TREE SPECIES SHOULD BE VERIFIED WHERE OF CRITICAL IMPORTANCE
THE ARCHITECT SHOULD SATISFY HIMSELF THAT ALL TREES LIKELY TO AFFECT HIS DESIGN HAVE BEEN SHOWN
INTER CONNECTION OF MANHOLES SHOULD BE VERIFIED WHERE OF CRITICAL IMPORTANCE USING CCTV
PIPE SIZES & INVERTS DETERMINED WITHOUT ENTRY INTO MANHOLE

HAVANT BOROUGH COUNCIL
13 JUN 2013
RECEIVED

KEY:

bt	British Telecom
cb	Control Box
cl	Cover Level
ctv	Cable Television
dk	Drop Kerb
el	Electric
ep	Electricity Pole
fh	Fire Hydrant
gv	Gully
gsv	Gas Stop Valve
ht	Height
ic	Inspection Cover
il	Invert Level
lp	Lamp Post
mkr	Marker
o/h	Overhead
pb	Post Box
ped	Pedestrian Crossing
np	Name Plate
rs	Road Sign
sv	Stop Valve
tb	Telephone Box
tl	Traffic Light
tt	Top of Tree
th	Threshold
tw	Top of Wall
ufl	Unable to Lift
vp	Vent pipe
wm	Water Meter
wsv	Water Stop Valve

1:500 Block Plan

0 10 20 30 40 50 Metres

Scale 1: 500 @ A3

Scale 1: 500

1:1250 Location Plan

0 50 100 Metres

Scale 1: 1250 @ A3

Scale 1: 1250

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scheme	drwg. no.	revision
Cowplain, LTR 55-57 Hart Plain Avenue	14132 - P01	.
title	scale	date
Block / Location Plan	1:500/1250 @A3	Feb 2015

Nye saunders
chartered architects
3 Church Street, Godalming, Surrey GU7 1EQ
Tel: 01483 418600 Fax: 01483 418655 e-mail: info@nyesaunders.co.uk

APPENDICES

Appendix A Correspondence

Chris Gray

From: matt young [matt@cydevelopments.com]
Sent: 29 September 2014 11:02
To: Chris Gray
Subject: Re: Management of Surface Water Runoff - Residential Redevelopment of 53 Hart Plain Avenue, Waterlooville, PO8 8RG

Bone dry. Strip foundation

On 29/09/2014 10:57, "Chris Gray" <chris.gray@grayenvironmental.co.uk> wrote:

Hi Matt,

Did you encounter groundwater in the trial pit?

Based on the ground conditions, what foundation design are you going for?

Thanks

Chris
07980 988861

From: matt young [mailto:matt@cydevelopments.com]
Sent: 26 September 2014 09:29
To: Chris Gray; Naomi Sadler; Ken Watkinson
Subject: Re: Management of Surface Water Runoff - Residential Redevelopment of 53 Hart Plain Avenue, Waterlooville, PO8 8RG

Chris

Please see attached consent from southern water, I have done a trial hole on site and there is no scope for soakaways. The 1st 1200mm is clay hogging and below that is thick clay.

At the moment I don't have a surface water plan but have attached a site plan that shows the existing storm water drain

Matt

On 26/09/2014 09:11, "Chris Gray" <chris.gray@grayenvironmental.co.uk> wrote:
Hi Matt,

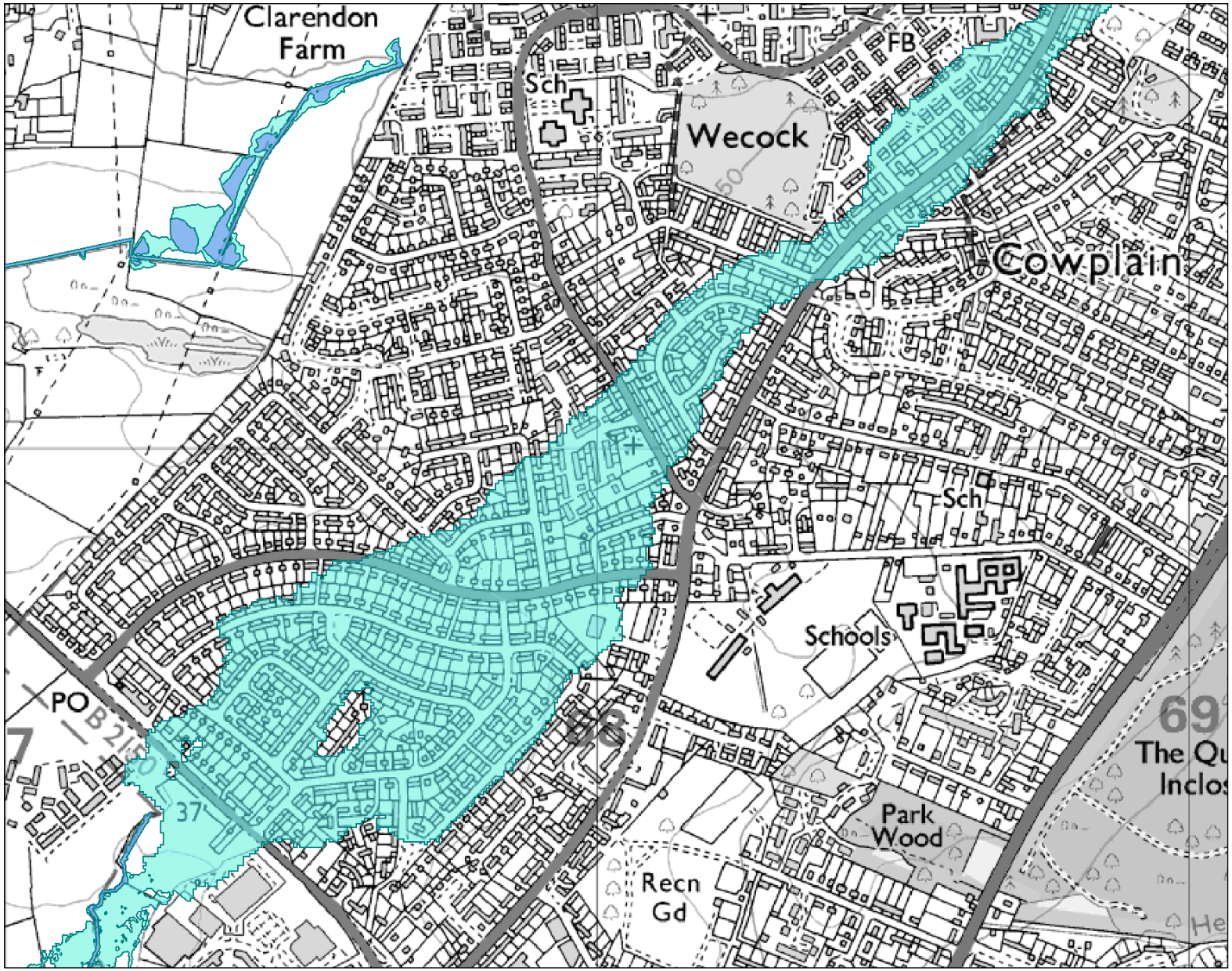
Can you please send me the letter from Southern Water confirming acceptance of proposed developments connection to the surface water sewer and forward a surface water drainage plan for the development if available?

If the Southern Water letter confirms that a maximum flow rate has not been set, I can size the oversized sewer (attenuation storage) proposed in the FRA (attached) based on a 5 l/s flow control.

I've attached a plan from another project that hopefully illustrates what is required (Figure 3 Drainage Plan Rev D 23092014).

Appendix B Environment Agency Product 4 Data

Flood Map (Rivers & Sea) Centered on Hart Plain Avenue - Created 7 August 2014



Environment Agency

Scale 1:10,001

N W E S

Flood Map for Planning (Rivers and Sea)

- Flood Map - Defences
- Areas Benefiting from Flood Defences
- Flood Map - Flood Storage Areas
- Flood Map - Flood Zone 3
- Flood Map - Flood Zone 2

Flood Map for Planning (Rivers and Sea)

(assuming no defences)

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.

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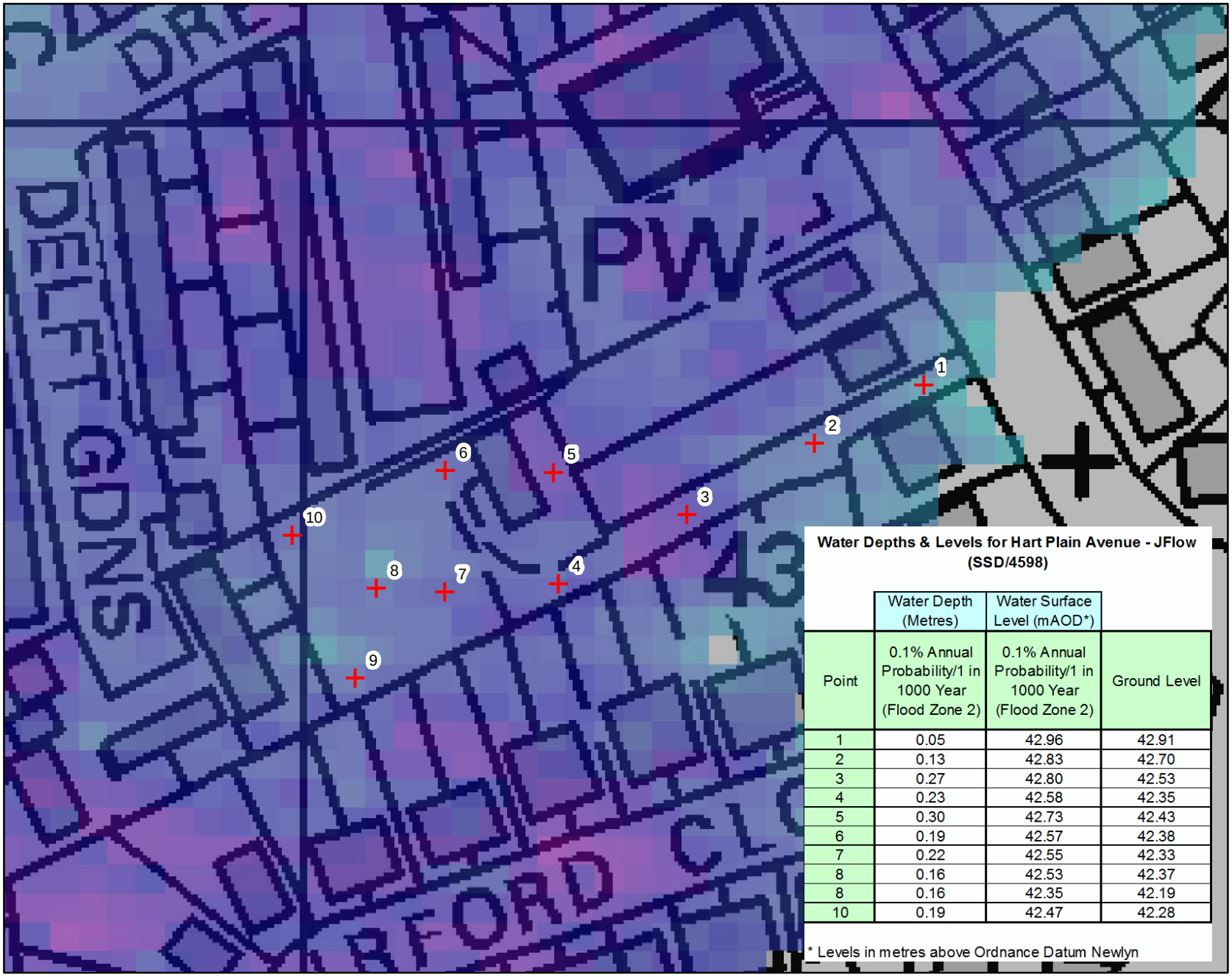
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

JFLow Levels for Hart Plain Avenue - Created 7 August 2014



Water Depths & Levels for Hart Plain Avenue - JFlow (SSD/4598)

	Water Depth (Metres)	Water Surface Level (mAOD*)	
Point	0.1% Annual Probability/1 in 1000 Year (Flood Zone 2)	0.1% Annual Probability/1 in 1000 Year (Flood Zone 2)	Ground Level
1	0.05	42.96	42.91
2	0.13	42.83	42.70
3	0.27	42.80	42.53
4	0.23	42.58	42.35
5	0.30	42.73	42.43
6	0.19	42.57	42.38
7	0.22	42.55	42.33
8	0.16	42.53	42.37
8	0.16	42.35	42.19
10	0.19	42.47	42.28

* Levels in metres above Ordnance Datum Newlyn

Environment Agency

Legend

Location Points

Ground Level

Value

High : 233.2

Low : 16.5628

Depth

Value

High : 2.0349

Low : 0

1:972 *

*when printed at A4.

N

0 10 20

Metres

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Use of Environment Agency Information for Flood Risk / Flood Consequence Assessments

Important
If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:-

http://www.environment-agency.gov.uk/research/planning/33580.aspx

Depending on the enquiry, we may also provide advice on other issues related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In **England**, you should refer to the Environment Agency's Flood Risk Standing Advice, the technical guidance to the National Planning Policy Framework and the existing PPS25 Practice Guide for information about what flood risk assessment is needed for new development in the different Flood Zones. These documents can be accessed via:

http://www.environment-agency.gov.uk/research/planning/82587.aspx

http://www.communities.gov.uk/publications/planningandbuilding/nppftechnicalguidance

http://www.communities.gov.uk/publications/planningandbuilding/pps25guideupdate

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

In **Wales,** you should refer to TAN15 for information about what flood consequence assessment is needed for new development in the different flood zones
http://new.wales.gov.uk/splash;jsessionid=8yIGTfGZthmB0t2vhp6hS1GcB1LXvZzB3Ylczf20Xn7LK3zK0nMk!981825250?orig=/topics/planning/policy/tans/tan15/

You should also consult the Strategic Flood Consequence Assessment if one has been produced by your local planning authority.

In both **England and Wales** you should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk / Consequence Assessment (FRA / FCA) where one is required, but does not constitute such an assessment on its own.

2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or overland runoff. The information produced by the local planning authority referred to above may assist here.

3. Where a planning application requires a FRA / FCA and this is not submitted or deficient, the Environment Agency may well raise an objection.

4. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your local planning authority.

JFLOW - Appendix

- Our work to produce Flood Zones followed a 10 year programme which delivered more detailed mapping for 821 locations. However, in order to complete Flood Zones we needed national coverage, hence a generalised approach was used to provide this national coverage within the time available, to fill the gaps between the 821 locations where we had more detailed information. The Flood Zones are therefore not as accurate as we would normally specify for river modelling, but they do provide an adequate indication of the extent of flood risk such that developers can consider flooding as part of their proposals to ensure they are not unknowingly putting additional lives at risk. This is the purpose for which the Flood Zones were produced.

- Neither water depths nor water levels were outputs that were specified when we commissioned this generalised modelling for Flood Zones. Whilst the modelling process does provide some information on depth of water, it would have been possible to produce the flood extents without storing the water depth values, since water depth is only a 'by-product' of the calculation process. As the JFLOW modelling method was developed, tested and reviewed for production of the Flood Zone extents only, we currently have no information on the accuracy of the water depth data.

- The models were run using a Digital Terrain Model (DTM) with a 5m x 5m grid. However the DTM grids were generalised to between 5m and 100m (depending on the type of model and location, for reasons such as processing speed). Fluvial modelling produced depth data which can be processed using the DTM to provide water level data. However the differing grid sizes means that there is a significant potential for inaccuracy in producing level data, because of the DTM generalisation.

- Therefore because of the nature of the model and the DTM, in many cases it will not be possible to confidently assess whether or not a site is above the resulting water level. This is because there are further inherent uncertainties in the depth calculation and within the DTM itself

- Depth or level outputs from the National Generalised Modelling (JFLOW) are only suitable to be used for decision making at a broad catchment or Shoreline Management Plan coastal cell scale (or larger).

- **They are not suitable for use in site specific Flood Risk Assessments or Strategic Flood Risk Assessments and must not normally be used for these studies. However, where in exceptional circumstances Nationalised Generalised Modelling outputs are requested to be used for anything other than at a broad catchment or Shoreline Management Plan coastal cell scale further verification must be undertaken. As part of this verification the outputs must be proven to be suitable and appropriate bearing in mind the conclusions the user wishes to draw from them and this use must be agreed in writing by the local Environment Agency staff.**

- If any agreement is given by the Environment Agency in pursuance of the above, the User accepts and agrees that such agreement by the Environment Agency that that National Generalised Modelling outputs are suitable for a particular use does not imply agreement that the proposals are appropriate or that the Environment Agency has no further comment on flood risk, rather that following verification the User has proven that the outputs are suitable to help assess the flood risk in the particular circumstances.

- Any assessment of Flood Risk undertaken must be appropriate for the decisions that need to be based upon it, consider the risks and also take into account any limitations of the data used

- Please read the enclosed Notice and be aware that the Environment Agency does not guarantee that this data is suitable for your purposes.

- **The consultants employed to deliver JFLOW Flood Zones to the Environment Agency were Jeremy Benn Associates (JBA). I should make you aware that JBA will not release information that either is owned by the Environment Agency or based upon Environment Agency information as they are not licensed to do so. You will need to request any information you require from the Environment Agency.**

- Information provided relates solely to flood risk issues and is based on the best available information to date in the Environment Agency. If further information becomes available to the Environment Agency (on flood risk issues or on other environmental issues which affect a FRA) or policy changes, we reserve the right to comment further or to supply further information or to amend information sent.

- If this information is supplied in connection with a flood risk assessment of development proposals and any material amendments made thereto at any stage prior to the submission of a planning application, the User should be aware of the need to consult the Environment Agency further

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