

200 PARK AVENUE, WATERLOOVILLE

**FLOOD RISK ASSESSMENT
ON BEHALF OF R&R DESIGN STUDIO**

Prepared by

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1.0 INTRODUCTION

1.1 Odyssey has been commissioned by R&R Design Studio to provide a Flood Risk Assessment with respect to a development scheme comprising of 3 new dwellings on the 0.1-hectare site of 200 Park Avenue, Waterloooville.

1.2 This report comprises of the following elements:

- Summary of relevant planning policy;
- Review of existing site conditions, including the hydrology, geology and existing drainage regime of the site;
- Assessment of the existing flood risk to the site.



2.0 PLANNING POLICY

2.1 *Flood and Water Management Act (2010)*

2.1.1 The Flood and Water Management Act (FWMA) received royal assent on 8th April 2010. It was intended to implement Sir Michael Pitt's recommendations following the widespread summer 2007 floods. Guidance and information notes are published online by Defra to address a range of different aspects concerning the act.

2.2 *National Planning Policy Framework (2018)*

2.2.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and Wales, and how these policies should be applied. Planning practice guidance is available online and provides additional guidance to the NPPF, as well as links to relevant current detail documents. Please refer to section 2.3.

2.2.2 Paragraph 155 of the NPPF states that *'inappropriate development in areas at risk of flooding should be avoided by directing development away from areas of highest risk (whether existing or future). Where development is necessary, the development should be made safe for its lifetime without increasing flood risk elsewhere'*.

2.2.3 Paragraph 163 states that, when determining planning applications, Local Planning Authorities (LPAs) should only consider appropriate development in areas at risk of flooding where, following application of the Sequential Test (and if required, the Exception Test), it can be demonstrated that:

- Within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location;
- The development is appropriately flood resistant and resilient;
- It incorporates Sustainable Drainage Systems, unless there is clear evidence that this would be inappropriate;
- Any residual risk can be safely managed; and,
- Safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

2.2.4 All land in England and Wales is classified into three main Flood Zones which refer to the probability of river or sea flooding, ignoring the existence of defences. The PPG identifies and describes the Environment Agency flood zones as:



- Flood Zone 1: Low probability, land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%);
- Flood Zone 2: Medium probability, land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%)
- Flood Zone 31: High probability, land assessed as having a 1 in 100 or greater annual probability of river flooding ($\geq 1\%$), or a 1 in 200 or greater annual probability of sea flooding ($\geq 0.5\%$); and,
- Flood Zone 3b: The Functional Floodplain, land where water has to flow or be stored in times of flood (as identified by the LPAs in the Strategic Flood Risk Assessments).

2.2.5 In accordance with the NPPF, a site-specific Flood Risk Assessment (FRA) is required for:

- Proposals of 1 hectare or greater in Flood Zone 1;
- All proposals for development in Flood Zones 2 or 3;
- An area within Flood Zone 1 which has critical drainage problems
- Development or change of use to a more vulnerable class that may be subject to other sources of flooding.

2.3 Planning Practice Guidance (2012)

2.3.1 The Planning Practice Guidance (PPG) provides additional direction to the NPPF, and details each section to provide information on how to conform to the NPPF. Following on from the 2018 revision of the NPPF, the PPG shall also be updated, 'where necessary, in due course'.

2.4 Hampshire County Council Local Flood Risk Management Strategy (2013)

2.4.1 The Local Flood Risk Management Strategy (LFMRS) was produced in 2013 off the back of the FWMA designated Hampshire County Council (CC) as an LLFA. The strategy details the different types of flooding that affect Hampshire, and also maps out annual cost of flooding by area.

2.4.2 Figure 4.6 of the strategy shows that flooding costs the Havant Borough up to £25,000 annually.

2.4.3 Section 4.1.1.3 states that flooding from the sea is the predominant risk to low-lying coastlines in areas such as Havant, which affects this site.

2.4.4 Section 4.5.3 discuss urban development and its impact on flooding. In it, it is mentioned that Hampshire CC have established a SuDS working group which will, in partnership with other Risk Management Agencies, develop procedures and processes for the implementation of the SuDS



Approving Body. They will also provide guidance and design principles for developers to ensure that new development does not increase the risk of local flooding.

2.4.5 It is recommended to district and borough councils within the county by Hampshire CC that the LFRMS is treated as an *'important material consideration in the planning process.'*

2.5 **Havant Strategic Flood Risk Assessment Update (2016)**

2.5.1 The Havant Borough Council SFRA was first published in 2007, but has since been updated, to include the GIS deliverables and make sure the report reflects the most recent and accurate evidence base.

2.5.2 It is noted that tidal and surface water flooding pose the biggest threat to the region , although defences along the majority of its coastal frontages reduce the tidal risk.

2.5.3 Existing drainage systems in Havant are *'known to be at or below capacity in key areas'*, and the deep clay bedrock results in a lack of positive drainage. Therefore, it is essential that SuDS features are utilised where possible, such as to not put excessive pressure on a drainage system that is already running at its maximum levels.

2.6 **Havant Borough Core Strategy (2011)**

2.6.1 The Havant Core Strategy sets the planning framework for the borough until 2026, and is designed to address risks and allow for flexibility in order to ensure the vision and objectives set out by the council are met.

2.6.2 Policy CS15 addresses Flood and Coastal Erosion Risk. The policy discusses SuDS at length, stating *'all development will be required to ensure that there is no net increase in surface water run-off. Priority should be given to incorporating SuDS to manage surface water drainage, unless its proven that SuDS are not appropriate. Where SuDS are provided, arrangements must be put in place for their whole life management and maintenance.'*

2.6.3 Policy CS16 addresses High Quality Design and states that all development should *'mitigate negative environmental impact, particularly water.'*



3.0 EXISTING SITE CONDITIONS

3.1 *Location*

3.1.1 The 0.11-hectare site is located in WaterlooVille, approximately 13km north of Portsmouth, Hampshire. The Ordnance Survey grid reference for the centre of the site is 467629E, 107689N, and the postcode is P07 5EZ.

3.1.2 A site location plan can be found in **Appendix A**.

3.1.3 The site has had multiple historic planning applications to redevelop it into a series of dwellings. An application was accepted in August 1992 (ref 92/57702/000) to add an attached 3-bedroom house to the side of the existing property, but was not implemented. Another application (ref 08/57702/002) for a 3-bedroom house was refused in March 2008 on the grounds of design, bulk and orientation, amongst others. Finally, an application in March 2008 (ref 09/55702/003) for an attached 4-bedroom house to be constructed was not proceeded with.

3.1.4 An indicative masterplan can be found in **Appendix B**.

3.2 *Topography*

3.2.1 LiDAR data was sourced from the Environment Agency in November 2018 to display the topography of the site. The data shows that the site is predominantly flat (within a 1m contour), at a level of 39m. Overall levels range from 38m in the south-west of the site, to 42m in the north-east of the site. LiDAR mapping can be seen in **Appendix C**.

3.3 *Hydrology*

3.3.1 According to Environment Agency mapping (accessed November 2018), the River Wallington runs directly under the site, through a culvert that extends from its source in a marshy area at Sandy Brow, to its outfall at the junction of London Road and Purbrook Heath Road.

3.3.2 On this route, the river passes through a number of culverts. Information provided by the Environment Agency shows the conditions of these culverts, as available. Culvert 404697 (Alameda Way) carries the river 422.77m, and as of 01/05/2018 was described as having a 'poor' actual condition. Culverts 166321 and 166322 then channel the river to its outfall at the junction of London Road and Purbrook, for a total distance of ~600m, and each have a defined actual condition of 'fair.'

3.3.3 Environment Agency mapping can be found in **Appendix E**.



3.4 Geology and Hydrogeology

3.4.1 British Geological Survey mapping (accessed August 2018) indicates that the bedrock geology of the site consists of Wittering Formation – clay, sand and silt. It can also be seen that there are superficial deposits overlying the bedrock geology on the site, consisting of Head – clay, gravel, sand and silt. For British Geological Survey mapping please refer to **Appendix D**.

3.4.2 British Geological Survey hydrogeological mapping shows that the site lies within the Bracklesham Group and Barton Group aquifer. This is deemed as a moderately productive aquifer, with significant intergranular flow.

3.4.3 British Geological Survey boreholes are available to evidence the geology and groundwater levels. In this instance, only one borehole scan is available for the area surrounding the site, taken approximately 40m south-west of the site.

3.4.4 Borehole scan ref. SU60NE155 was taken on 17th May 1969, and reached a depth of 4.57m below ground level (bgl). The scan shows an initial layer of *'topsoil and fill'* extending down 0.30m bgl, before *'fill'* extends down a further 0.70m bgl. Following this, a layer of *'brown medium to coarse gravel with slight clay content'* is present for an additional 1.22m bgl, before a layer of *'brown sandy fine to medium gravel'* extends 1.10m bgl. Finally, *'soft mottled grey-brown silty clay with occasional gravel'* extends a further 0.30m to the bottom of the borehole.

3.4.5 It is noted that groundwater was encountered at a range of depths, ranging from 1.52m bgl to 3.81m bgl. British Geological Survey records can be found in **Appendix D**.

3.4.6 The site sits in *'Zone 1: Subsurface Activity'* of the Environment Agency's Groundwater Source Protection Zones. Zone 1 is defined by a 50-day travel time from any point below the water table to the source and, additionally, as a minimum 50m radius from the source. *Zone 1: Subsurface Activity* extends Zone 1 where the aquifer is confined and may be impacted by deep drilling activities.



4.0 SOURCES OF FLOOD RISK

4.1 *Fluvial Flooding*

4.1.1 The Environment Agency Flood Map for Planning shows that the majority of the site is located within Flood Zone 2 or 3. Refer to **Appendix E** for Environment Agency data.

4.1.2 According to Havant Borough Council SFRA data (accessed November 2018), there has been no recorded historic history at this site.

4.2 *Tidal Flooding*

4.2.1 As noted in section 2.02 of the Havant Borough Council Strategic Flood Risk Assessment Supplement (2013) and section 4.1.1.3 of the LFRMS (2013), tidal flooding is a major source of flood risk to the Havant Borough. Havant Borough has 56km of coastal frontage and 32km of main river, and as a result, 22% of the Borough is at risk of coastal and/or fluvial flooding, and is designated within Flood Zones 2 or 3 by the Environment Agency.

4.2.2 There was recorded tidal flooding in the Havant Borough in 2014, although there is no mention of the site being affected.

4.3 *Surface Water Flooding*

4.3.1 The Environment Agency Risk of Flooding from Surface Water mapping shows that a large portion of the site to the south lies within a 'high' risk area. The rest of the site, except for a small area in the north is deemed at 'medium' or 'low' risk.

4.3.2 There are no historic records of surface water flooding affecting the site, however, in the 2013 LFRMS, Purbrook is listed as the 22nd most at-risk ward from surface water flooding in Hampshire, out of a total 248. For Hampshire County Council extracts, please refer to **Appendix F**.

4.4 *Groundwater Flooding*

4.4.1 Groundwater flooding is acknowledged as a 'significant cause of flooding in Hampshire' in section 4.3.2.1 of the LFRMS. However, the most at risk areas in the country are those within the Hampshire Chalk groups. As discussed in section 3.4.2, this site falls into the Bracklesham and Barton group, which are not at such a high level of risk.



4.4.2 It is acknowledged in the Havant Borough SFRA Supplement (2013) that Havant has been susceptible to groundwater flooding in the past. However, there is no specific mention of the site being affected by groundwater flooding previously.

4.5 Sewer Flooding

4.5.1 This site falls under the jurisdiction of Southern Water for sewerage provision. As per section 4.4.5.6 of the LFRMS, Southern Water provided the DG5 risk register details to Hampshire CC. However, because another sewer provider in the county did not do so to a level detailed enough to be used in ward level risk assessment, the LFRMS was not able to quantify the impact of sewer flooding.

4.5.2 The Havant SFRA Supplement notes that sewer flooding has occurred at locations including The Florins, Petersfield Road, Park Lane and Hulbert Road, although it is noted that the closest of these to the site in question is The Florins, which is approximately 700m south-east of the site. Therefore, sewer flooding is not be considered a major risk to the site.



5.0 FLOOD MITIGATION MEASURES

5.1 According to Environment Agency mapping, the site sits in Flood Zones 2 and 3 for fluvial flood risk, and predominantly Flood Zones 2 and 3 for pluvial flood risk. Therefore, it will be required that flood mitigation measures are put in place to ensure the proposed redevelopment is not at risk of flooding.

5.2 Having assessed the levels identified in the JFLOW model received from the Environment Agency, it is proposed that Finished Floor Levels (FFLs) for the dwelling at the lowest part of the site shall be raised by 900mm to provide protection from flood waters. It is anticipated that the levels provided in JFLOW are conservative, therefore it is adjudged that raising the levels by 900mm shall provide suitable protection.

5.3 For Environment Agency records, please refer to **Appendix E**.



6.0 SUMMARY AND CONCLUSIONS

6.1 Odyssey has been commissioned by R&R Design Studio to provide a Flood Risk Assessment for a development scheme comprising of 3 new dwellings on the current site of 200 Park Avenue, Waterlooville.

6.2 Based on Environment Agency floodplain mapping, the majority of the site is situated in Flood Zones 2 or 3 for fluvial and pluvial flooding.

6.3 This FRA has demonstrated that the redevelopment is fully compliant with requirements of the NPPF. Issues relating to flood risk and drainage do not represent an obstruction to the proposals, and therefore should not hinder an approval for planning permission of the proposed redevelopment.

APPENDIX A

Site Location Plan



APPENDIX B

Indicative Masterplan

APPENDIX C

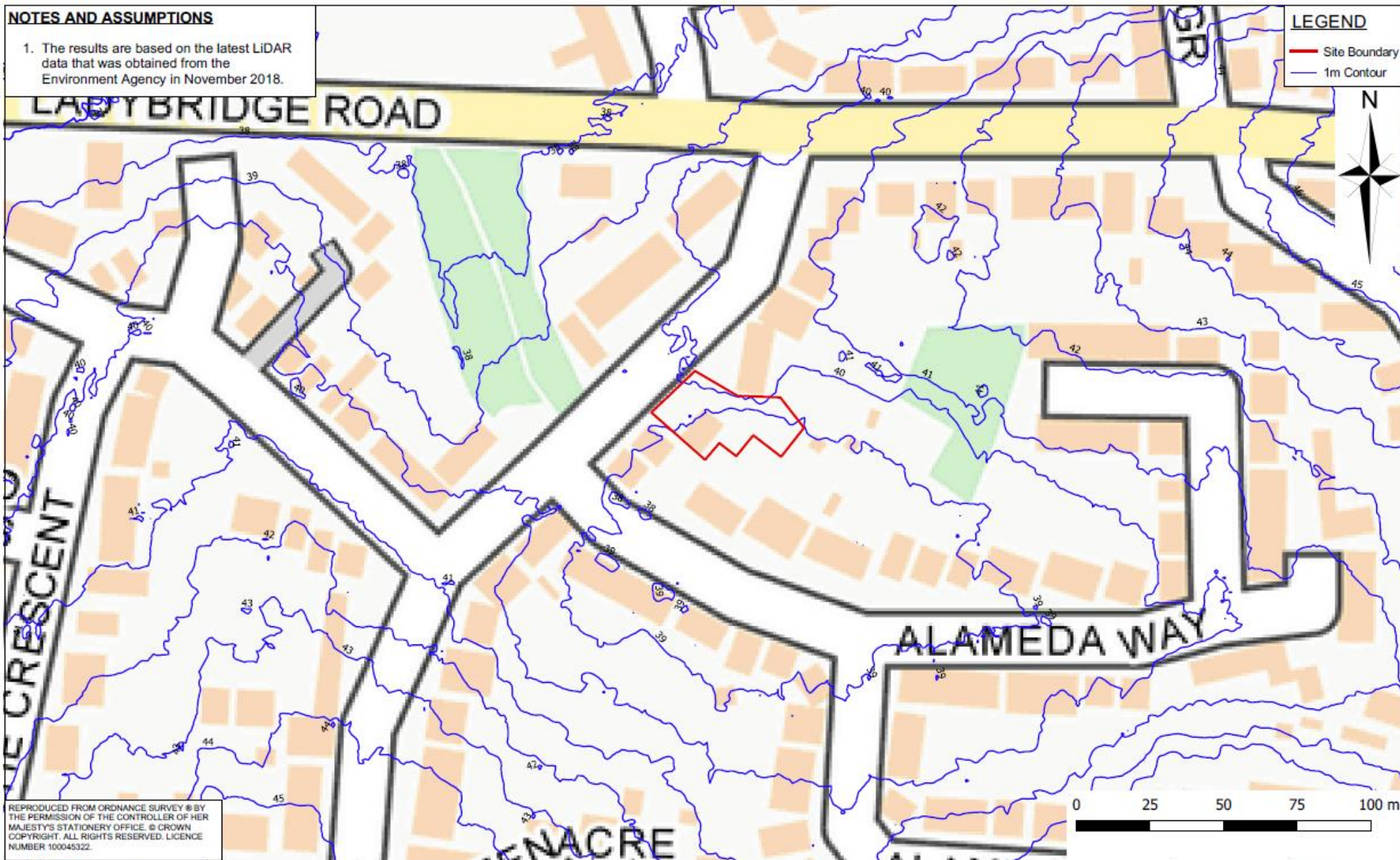
Topographical Data (LiDAR)

NOTES AND ASSUMPTIONS

1. The results are based on the latest LiDAR data that was obtained from the Environment Agency in November 2018.

LEGEND

- Site Boundary
- 1m Contour



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Job Title	200 PARK AVENUE, WATERLOOVILLE
Figure Title	TOPOGRAPHICAL DATA (LIDAR)

Client	R&R DESIGN STUDIO LTD
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Scale	1:1250 @ A3	Date	NOV 18	Designed	NM
Drawn	NM	Checked	GG	Approved	GG
Job No	18-193	Figure No	FIGURE 2	Rev	

APPENDIX D

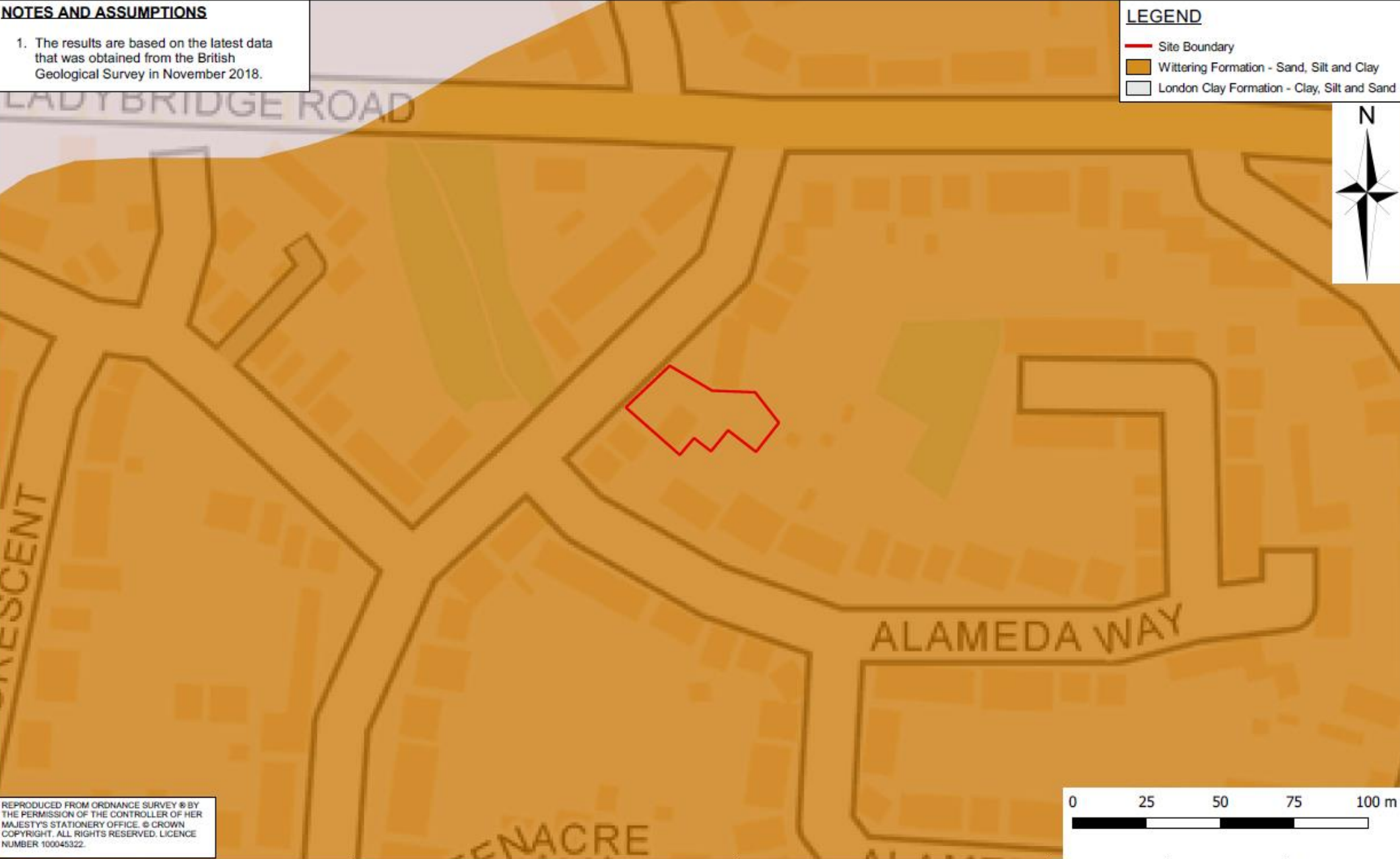
British Geological Survey Data

NOTES AND ASSUMPTIONS

- 1. The results are based on the latest data that was obtained from the British Geological Survey in November 2018.

LEGEND

- Site Boundary
- Wittering Formation - Sand, Silt and Clay
- London Clay Formation - Clay, Silt and Sand



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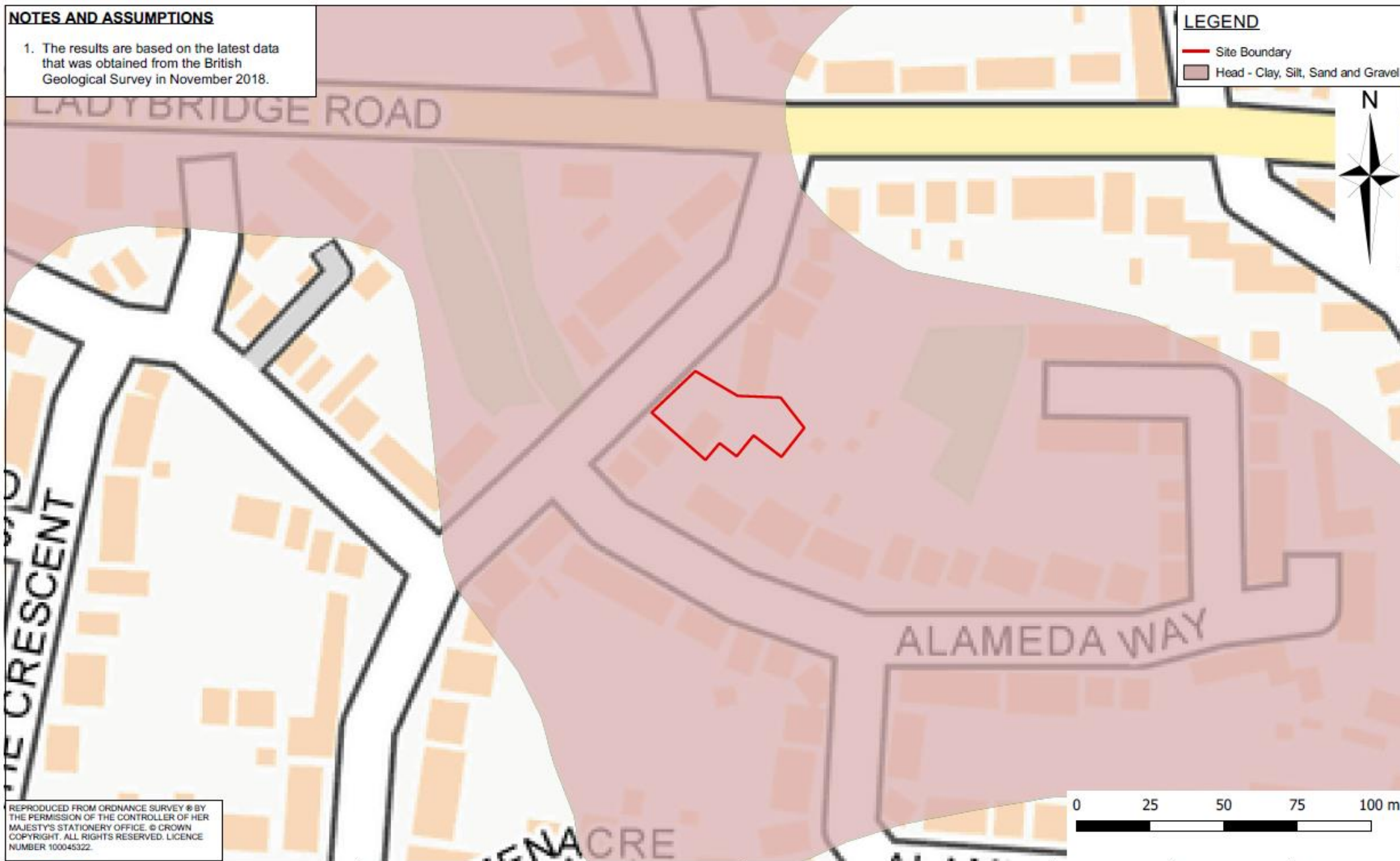
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Figure Title	BRITISH GEOLOGICAL SURVEY BEDROCK			Drawn	NM	Checked	GG	Approved	GG
		R&R DESIGN STUDIO LTD		Job No	18-193	Figure No	FIGURE 3		Rev

NOTES AND ASSUMPTIONS

1. The results are based on the latest data that was obtained from the British Geological Survey in November 2018.

LEGEND

- Site Boundary
- Head - Clay, Silt, Sand and Gravel



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Job Title

200 PARK AVENUE,
WATERLOOVILLE

Figure Title

BRITISH GEOLOGICAL SURVEY
SUPERFICIAL DEPOSITS

Client

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Scale

1:1250 @ A3

Date

NOV 18

Designed

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Drawn

NM

Checked

GG

Approved

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Job No

18-193

Figure No

FIGURE 4

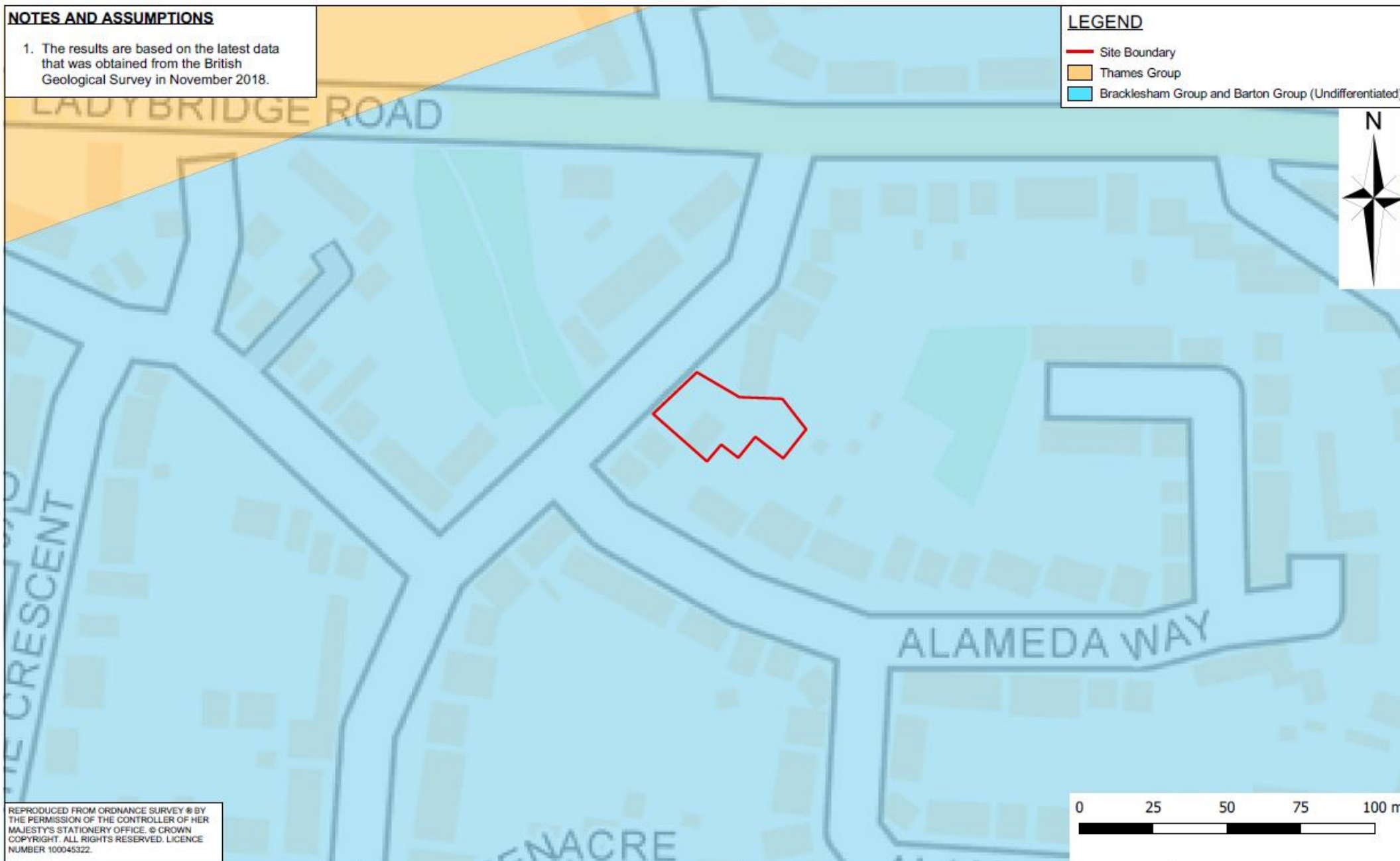
Rev

NOTES AND ASSUMPTIONS

1. The results are based on the latest data that was obtained from the British Geological Survey in November 2018.

LEGEND

- Site Boundary
- Thames Group
- Bracklesham Group and Barton Group (Undifferentiated)



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Job Title

200 PARK AVENUE,
WATERLOOVILLE

Figure Title

BRITISH GEOLOGICAL SURVEY
HYDROGEOLOGY

Client

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1:1250 @ A3

Date

NOV 18

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Checked

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Job No

18-193

Figure No

FIGURE 5

Rev

RECORD OF BOREHOLE 12

50 60 NE/155
NGR 6759 0766

British Geological Survey
Ground level: Dia. of boring: 6in to 15ft 6in
Method of boring: Shell and Auger Lining tubes: 8in to 15ft 6in

Daily Progress	Samples		Change of Strata			Description of Strata
	Depth	Type	Legend	Depth	O.D. Level	
HEAD				1'0"		TOPSOIL and FILL
	3'0"	BD				FILL (sand, gravel, ash etc)
	3'0"	D		4'6"		
	5'0"	D				Soft brown clayey PEAT
	8'0"	BD		7'0"		
	8'0"	D				Brown medium to coarse GRAVEL with slight clay content
? BRACKLESHAM BEDS	12'0"	BD		11'0"		
	12'0"	D				Brown sandy fine to medium GRAVEL
17.5.69	15'0"	D		14'6"		
LONDON CLAY				15'6"		Soft mottled grey-brown silty CLAY with occasional gravel

Key to type of sample:

- U (4) — 4 in (0.10 m) dia. undisturbed sample
- D — disturbed sample
- BD — bulk disturbed sample
- V — vane test
- S { } — standard penetration test
- C { } — dynamic cone penetration test

Figure in brackets is No. of blows for penetration given in depth column (see Notes, page 1).

Remarks: (Observations on ground-water, etc.)

The following ground-water levels were recorded during boring:-

Date	Depth below ground level	
17.5.69	7'0" (1)	12'6"
19.5.69	6'6" (2)	5'0" (3)

(1) Ground-water was first encountered. Water added to facilitate boring from 11ft. (2) Water level after withdrawal of lining tubes. (3) Water level before backfilling borehole.

Lab. Ref. No.
SJ 7246

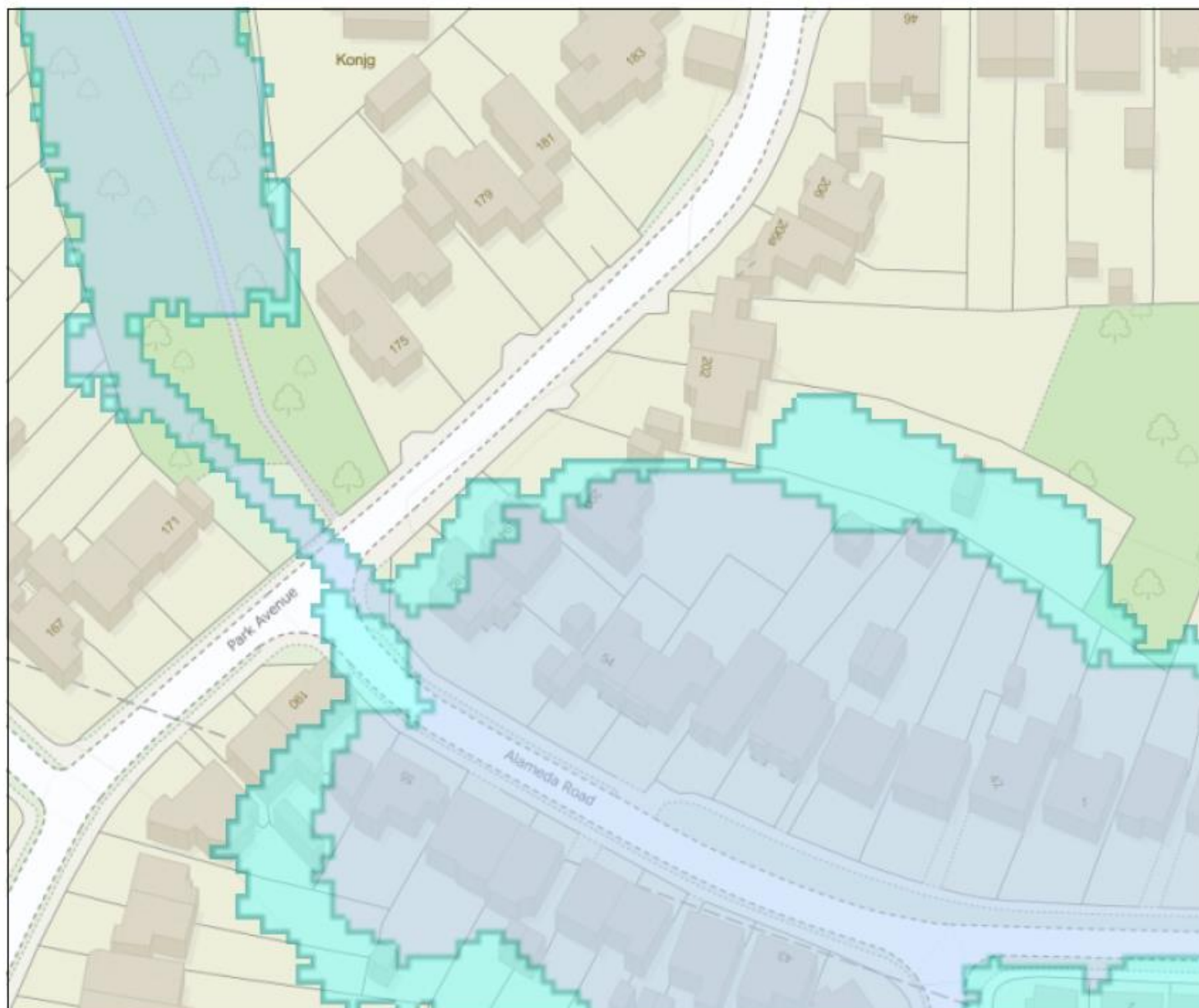
PURBROOK - FOUL WATER SEWER

FIG. 12

APPENDIX E

Environment Agency Data

Flood Map for Planning (Rivers and Sea) Centred on Park Avenue - Created 9 August 2018



Scale 1: 1,016



Flood Map for Planning (Rivers & Sea)

- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

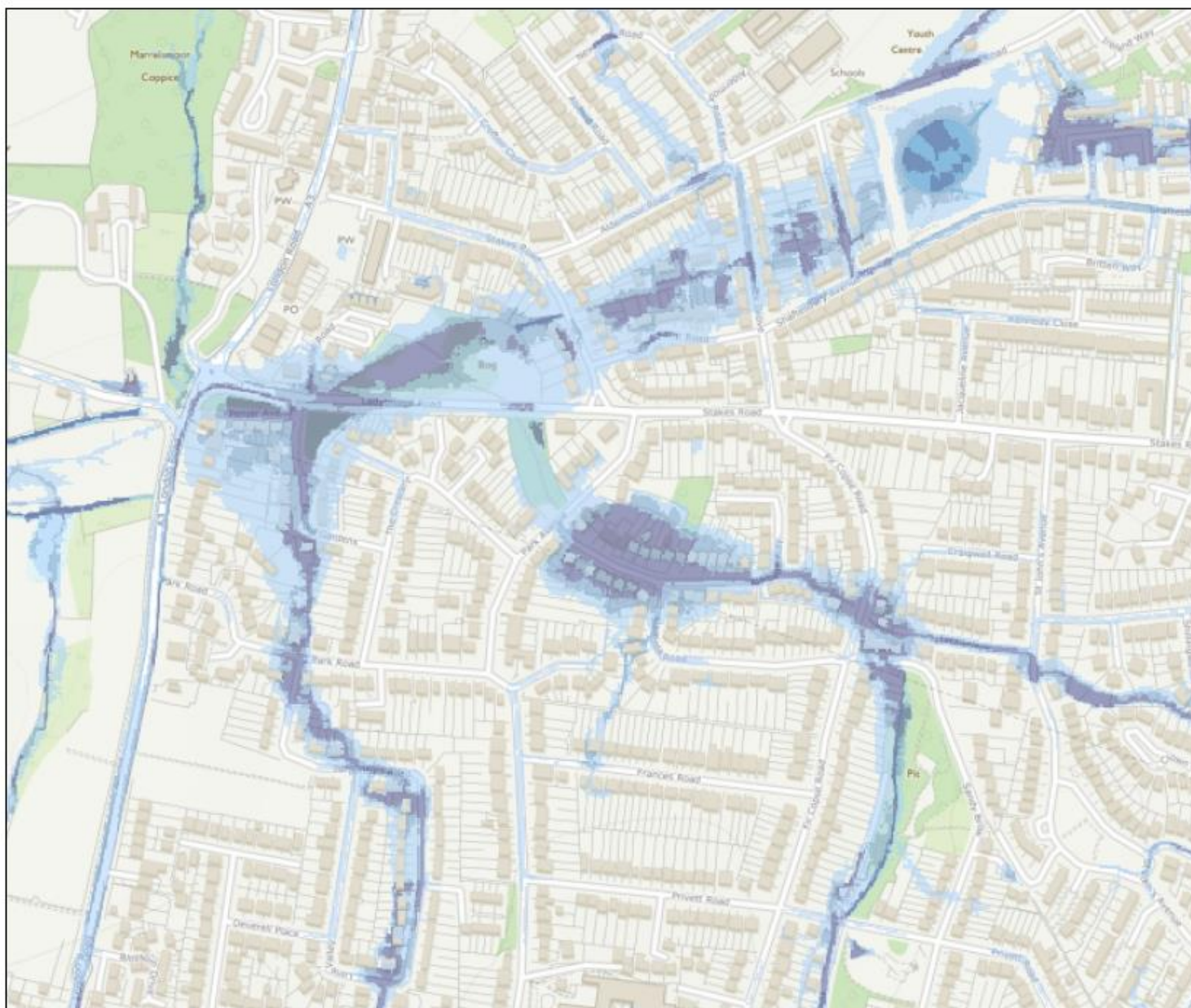
Flood Map Areas (assuming no defences)

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

Risk of flooding from Surface Water Centred on Park Avenue - Created 9 August 2018



Scale 1:6,250



Likelihood of flooding from Surface Water

- High ($\geq 3.3\%$)
- Medium (3.3% - 1%)
- Low (1% - 0.1%)
- Very Low

Likelihood of flooding from Surface Water

- High:** Greater than or equal to 3.3% (1 in 30) chance in any given year
- Medium:** Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
- Low:** Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
- Very Low:** Less than 0.1% (1 in 1,000) chance in any given year

This information is shown on the Risk of Flooding from Surface Water map on our website.

Defences Centred on Park Avenue - Created 9 August 2018



Legend

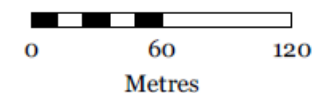
ASSET_ID

- 166321
- 166322
- 364916
- 404697
- 413253

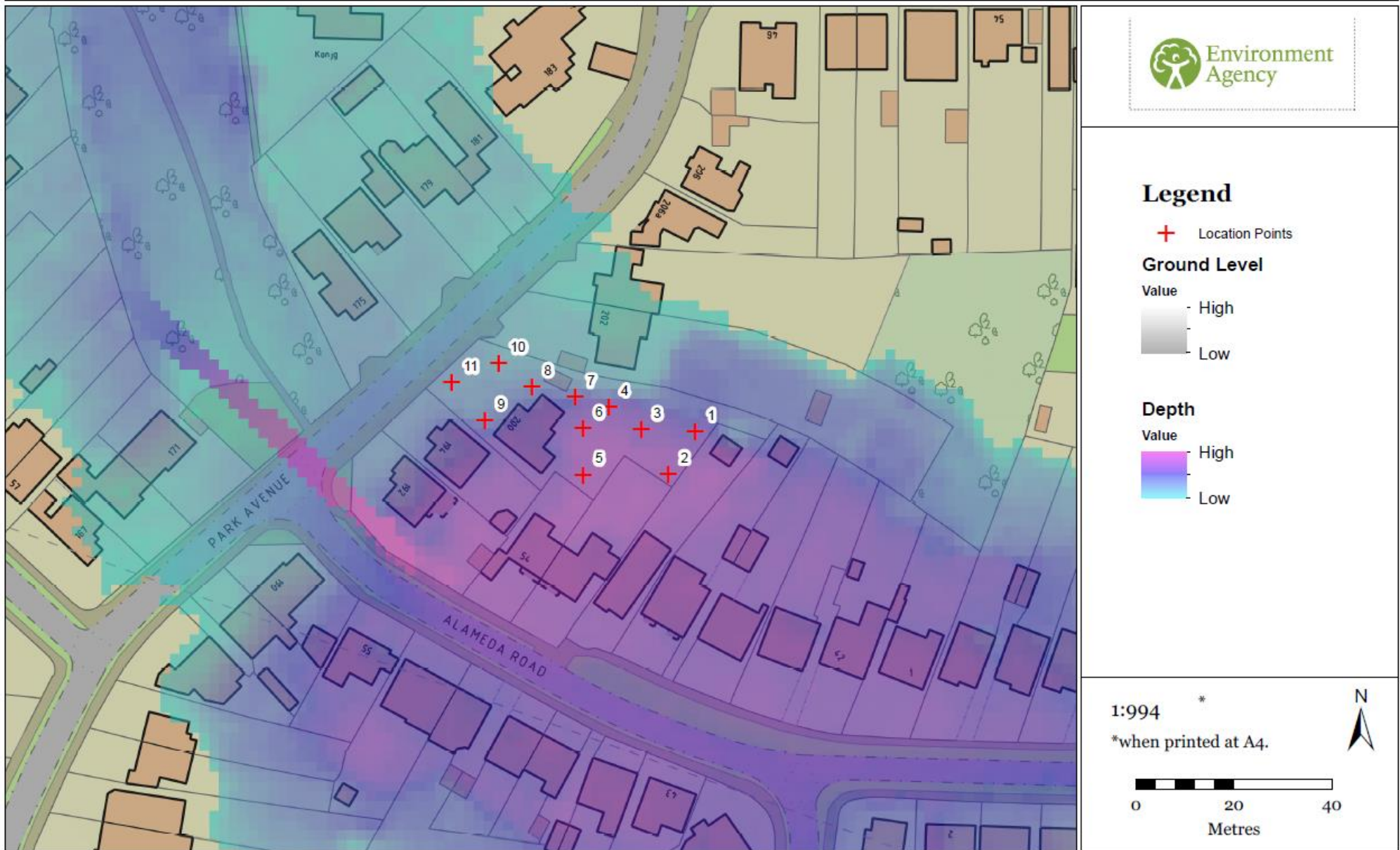
Asset Id	Asset Sub-type	Length (m)	Asset Maintainer	Actual Condition	Estimated Standard of Protection	Last Inspection Date
166321	simple culvert	393.53	unknown	Fair	1:2	19/09/2017
166322	simple culvert	238.18	private	Fair	1:2	19/09/2017
364916	open channel	50.75	unknown			
413253	open channel	18	unknown			
404697	simple culvert	422.77	unknown	Poor		01/05/2018

1:3,185 *

*when printed at A4.



2016 JFLOW Levels Centred on Park Avenue - Created 9 August 2018



**Water Depths & Levels for 200 Park Avenue, Waterloooville, PO7 5EZ -
2016 JFLOW**

Point	Water Depth (Metres)					Water Surface Level (mAOD*)					Ground Level
	1% Annual Probability/1 in 100 Year (Flood Zone 3)	1% Annual Probability/1 in 100 Year + Climate Change 35%	1% Annual Probability/1 in 100 Year + Climate Change 45%	1% Annual Probability/1 in 100 Year + Climate Change 105%	0.1% Annual Probability/1 in 1000 Year (Flood Zone 2)	1% Annual Probability/1 in 100 Year (Flood Zone 3)	1% Annual Probability/1 in 100 Year + Climate Change 35%	1% Annual Probability/1 in 100 Year + Climate Change 45%	1% Annual Probability/1 in 100 Year + Climate Change 105%	0.1% Annual Probability/1 in 1000 Year (Flood Zone 2)	
1	0.35	0.64	1.47	1.65	0.86	39.11	39.40	40.23	40.41	39.62	38.76
2	0.58	0.87	1.78	1.96	1.09	39.00	39.29	40.20	40.38	39.51	38.42
3	0.47	0.77	1.67	1.85	0.98	39.03	39.33	40.23	40.41	39.54	38.56
4	0.35	0.65	1.34	1.51	0.86	39.04	39.34	40.03	40.20	39.55	38.69
5	0.76	1.05	1.99	2.16	1.27	39.07	39.36	40.30	40.47	39.58	38.31
6	0.78	1.07	1.90	2.07	1.29	39.06	39.35	40.18	40.35	39.57	38.28
7	0.23	0.52	0.93	1.10	0.74	39.18	39.47	39.88	40.05	39.69	38.95
8	No Data	0.02	0.58	0.75	0.24	No Data	39.33	39.89	40.06	39.55	39.31
9	No Data	0.09	0.76	0.92	0.30	No Data	39.41	40.08	40.24	39.62	39.32
10	No Data	No Data	0.33	0.48	No Data	No Data	No Data	40.16	40.31	No Data	39.83
12	No Data	No Data	0.52	0.67	No Data	No Data	No Data	40.25	40.40	No Data	39.73

* Levels in metres above Ordnance Datum Newlyn

APPENDIX F

Hampshire County Council Extracts

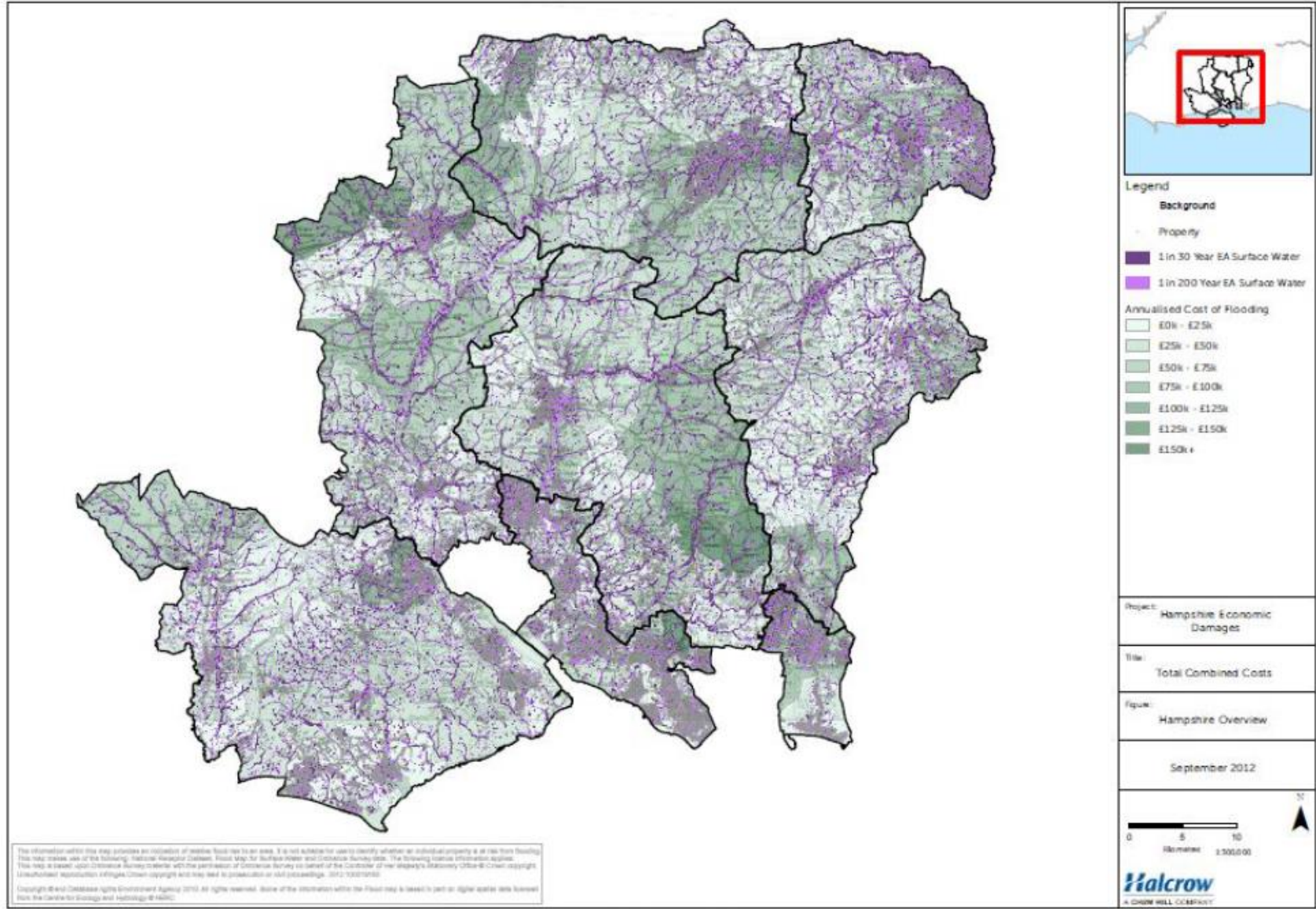


Figure 4.6: Risk of flooding calculated as an economic cost by combining all three data sources

Ward	Rank					Overall ranking	Measures
	Total	Groundwater	HCC dataset	Environment Agency Flood Map for Surface Water	EA communities at risk rank		
Aldershot Park	18	56	62	9		High	See specific action plan
Waterloo	19	56	62	10		High	See specific action plan
Buckskin	20	56	26	14		High	See specific action plan
Broughton and Stockbridge	21	15	62	27	Stockbridge 63	Moderate	Being assessed in GW SWMP
Tadley North	22	56	1	140	Tadley 46	Moderate	See specific action plan
Fleet Pondtail	23	56	34	12	Fleet 3	Moderate	N - HCC measures delivered
Fleet West	24	56	34	13	Fleet 3	Moderate	N - HCC measures delivered
Oakley and North Waltham	25	45	18	20		Moderate	Being assessed in Basingstoke SWMP
Cherrywood	26	56	62	15		Moderate	Being assessed in Rushmoor SWMP
South Ham	27	56	34	17		Moderate	Being assessed in Basingstoke SWMP
Fleet North	28	56	62	16		Moderate	Being assessed in Rushmoor SWMP
Upton Grey and The Candovers	29	13	34	53		Moderate	Being assessed in GW SWMP
St Barnabas	30	56	62	18		Moderate	Monitor and communicate risk - moderate risk status indicated primarily from modelling
Rowlands Castle	31	7	62	123		Moderate	Being assessed in GW SWMP
Purbrook	32	56	27	22		Moderate	Monitor: third party responsibility
Bourne Valley	33	18	62	46		Moderate	Being assessed in GW SWMP
Bishops Waltham	34	21	62	39		Moderate	Monitor and communicate risk
Fernhill NE	35	56	62	19		Moderate	Being assessed in Rushmoor SWMP
Bramshott and Liphook	36	56	62	21		Moderate	Monitor and communicate risk
Wickham	37	11	34	146		Moderate	Being assessed in GW SWMP
Knellwood	38	56	62	23		Moderate	Being assessed in Rushmoor SWMP
Fareham North	39	56	62	24		Moderate	Monitor and communicate risk - moderate risk status indicated primarily from modelling