



**200 Park Avenue
Waterlooville
PO7 5EZ**

FLOOD RISK ASSESSMENT REPORT

On Behalf of:

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1. Introduction

Instructions were received on March 4th 2019 to carry out a Flood Risk Assessment Report on this site, in accordance with our quotation. It is understood that a pre-application consultation is to be submitted on this site and this report supports the submission. The client has requested a Flood Risk Assessment report, in accordance with the current recommendations given by the National Planning Policy Framework (NPPF) to submit with the planning application. Our original FRA report has been amended for the revised planning application following refusal of the previous application.

Following a desk study and deliberations with the Environment Agency (EA) data, this report has been prepared to determine the risk of flooding on the site for the proposed development and recommendations are hereby given to protect the development and its residents from any potential flood risk. This report also aims to investigate the risk of flooding for the proposed development and to provide recommendations to protect the development and its users from any potential flood risk.

The previous guidance and advice from the planners is given below and this report goes on to respond to each point accordingly:

- provide site specific fluvial flood levels and proposed finished floor levels to show that the property will be safe for the lifetime of the development
- take the impacts of climate change into account
- consider how people will be kept safe from the identified flood hazards
- consider how a range of flooding events (including extreme events) will affect people and property
- consider the requirement for flood emergency planning including flood warning and evacuation of people for a range of flooding events up to and including the extreme event.
- Evidence to show that no flood storage will be lost through this development and if so, flood storage compensation must be provided in m³

2. The Existing Site

The site is located on the Eastern side of the Park Avenue, Waterlooville, Hampshire, at grid reference SU 67621 07689. Appendix A contains a location plan for the site. A topographical plan showing site existing ground levels is shown on Appendix B. The levels are provided to ordnance survey datum. The topographical survey plan shows the existing ground levels on the site are approximately between 38.10 and 39.60m AOD.

The existing site mainly consists of an existing dwelling and garage surrounded by grass surface and trees planting, within an urban environment. The geology of the grounds comprise of Head deposits (Clay, silt and gravel) overlying Wittering formation comprising sand, silt and clay. In due course a formal site investigation will need to be undertaken to prove the assumptions contained within this report.

The site, including existing dwelling has an extent of approximately 1100 square metres. A walk over of the site showed that there is a watercourse (Brook) running to the south of the site, along Alameda Road.

The front area of the site, in front of the existing house has a mix of grass/planted areas and compacted gravel / tarmac drive, which connects the property to the Park Road at the Northern

Boundary. Details of the existing site are shown on Appendix B along with some existing site photographs.

3. The Proposed Development

The proposed development on the site involves the extension of the existing dwelling and no new dwellings are now proposed as part of the revised planning application. Detailed information on the new proposals are provided in Appendix C. The new extension is approximately 40m² at ground floor level. Though it is also proposed to remove the existing annex to the existing house which has an area of approximately 20m².

4. Policy Background

The Government's sustainable development strategy (SDS) makes it a requirement to assess appropriate procedures for developments in areas at risk of flooding. This is to avoid any unnecessary increase in requirements for flood defences.

The NPPF requires that developers making planning applications on sites that are potentially at risk from flooding should consult with the EA, and where appropriate produce a flood risk assessment (FRA). The aim is to assess the potential risk for the development, demonstrating how flood risk will be managed onsite ensuring that flood risk is not increased elsewhere. The EA flood matrix was consulted and showed that a flood risk assessment is appropriate for this site.

5. Flood Risk Maps and Available Information

Appendix D and E contains a copy of the EA Flood Map for this area. This shows that the development site is not at risk from flooding from river and sea. Further investigation however showed that the site is partly within flood zone 3 and partly within flood zone 2 for risk of surface water, which is from the watercourse to the South of the site, evidence of the flood risk is depicted in Appendix D. Part of the site, to the Western end, is not within any flood risk zone.

As part of this flood risk assessment the EA and their online flood mapping and detailed flood model data (Product 4) was consulted. It was confirmed that part of the site, from approximately the front of the existing house to the Western boundary, is shown to be within Flood Zone 3 - an area with 1 in 100 annual likelihood of flooding (1% chance). The data indicates that part of the site is at risk from fluvial flooding from the water course to the Southern boundary of the site. The water course that runs along Alameda Road is only partially exposed and/or completely enclosed along its length, flowing under buildings and driveways. A more detailed EA flood map and model data can be found in Appendix E.

Appendix E also contains detailed flood mapping data obtained from the Environment Agency. Flood Levels are given within the data, with data compiled in 2016. The outputs from this modelling have been used to obtain the flood depths and extents shown on the map and its data. The map shows an amplified view of our site and show the line of the water courses in gradients of purple / pink and blue, representing Flood Zones 3 and 2 respectively. The map also shows various depth locations where data was recorded and the logs related to point marked on the map are detailed on the table enclosed.

The Eastern part of the development site is shown to be in flood zone 3. EA data predicts the maximum of 1 in 100 year flood level plus an allowance for climate change (35%). The data provided by the EA indicate that a maximum level of 39.410m AOD flood level is to be expected on our site for the area within flood zone 3 which represents the most likely risk to the site (Data points 1 to 12 on the EA data contained within Appendix F), which is higher than the existing ground levels

During a flood event the appropriate flood zone 3 EA data flood levels would indicate that up to 1.21m of flood water would be present on our site, using the lowest existing site levels of 38.20m and the flood level of 39.41m AOD. The topographical levels taken on the site indicate that the existing house finished floor level (FFL) of the existing building is **38.900m** AOD, indicating that there would be up to 0.51m of flood water within the dwelling for the predicted maximum flood event. Therefore the existing house is at risk from flooding during the 1/100 year flood event according to the EA data and this is shown by the existing property being inside of the predicted flood zone shown on the flood mapping.

The maximum flood level for the 1 in 100 year event + 35% climate change allowance is 39.410m AOD.

6. Risk Assessment

The standing advice from the government and Environment agency website for minor extension such as proposed on this development is that - *Make sure that floor levels are either no lower than existing floor levels or 300 millimetres (mm) above the estimated flood level. If your floor levels are not going to be 300mm above existing flood levels.*

Consultations have been held with the EA data. The information from the EA depicts that the proposed development site lies partially within Flood Zone 3 - an area where the chance of flooding from the sea has been assessed as less than 1.0% in any year (1 chance in 200 in any year).

From the levels taken on site the proposed extension would become flooded as a result of the predicted flood event. The ground floor would have approximately 0.51m of water depth. There would however be the possibility of evacuation from the site during a flood event towards Park Avenue to the West. There are no bedrooms proposed on within the ground floor of the new extension.

Due to the levels on site and the predicted flood levels it is not feasible to raise the new extension above the predicted flood levels. Therefore the standing advice for minor extension should be adhered to. The FFL for the new extension should be set no lower than 38.900m AOD.

The site is not identified as at risk from surface water flooding.

The existing and new first floor areas of the building could act as a 'safe haven' during a flood event if required.

7. Effects on Existing Drainage Strategy

New developments must ensure that their drainage strategy does not increase flood risk onsite or elsewhere, and must account for flows from roads and overland as possible source for onsite flood, in order to manage, prevent and control runoff flow patterns. The NPPF guidance's advises that 'both the rates and volumes of runoff from new developments should be no greater than the rates prior to the proposed development'.

Currently, the proposed extension site is within the urban setting and the majority of the area proposed for the new extension is already hardlandscaped and contains a patio area. The removal of the existing annex will also offset any small increase in impermeable area on the site.

To limit the proposed development surface runoff water and to achieve flow rates similar to the ones prior to the development a sustainable urban drainage systems (SUDs) scheme will be required. Government policy and strategy strongly recommends the use of SUDs as approach to prevent the increase in flood risk. Systems should be implemented to reduce the amount of surface runoff in the event of a peak rainfall.

The new extension area will direct its roof drainage to a controlled discharge into soakaway, provided with then adequate storage capacity would minimise the effects of high surface runoff flow.

In due course and before any detailed design is carried out a site specific trial hole investigation would need to be carried out to determine soil properties and ground water levels. Similarly, before the carryout of the detailed design of drainage systems an infiltration/soakaway test should be carried out to determine the expected soil infiltration rate on site then a suitable soakaway / attenuation system can be designed to maintain green field run off levels from the new development on the site.

The new development will have a very small impact on the foul water flow due to the slightly larger dwelling however a large increase in the number of people using the site, this will be minor for the new dwelling and the additional foul water will be discharged into the local Foul water sewer within Park Avenue. Southern Water will need to be contacted in order to obtain permission for the additional discharge. The foul water discharge on the site will not affect flood risk as the flood risk on this site is from the nearby watercourse. We would however propose that any new inspection chambers placed within the flood zone are fitted with sealed lids to avoid flood water from entering the foul water system during a flood event.

8. Flood Water displacement

As the proposed new extension is partially within the predicted flood zone the proposed new extension could affect the volume of displaced water, should a flooding event occur unless measures are put in place to negate this.

The annex in zone G will be removed but the area in zone B will be infilled and contain the new extension.

Using the existing topographical levels on the site and the available EA flood data during the predicted flood zone 3 event (flood level of 39.410m AOD) approximately **593.23m³** of flood water will be stored on the site. These calculations have been made using the EA flood data, topographical site levels and the existing structures on the site that will currently impede flood water storage. Calculations have then been undertake to calculate the proposed flood water storage on the site when taking into account the removal of the existing annex and the building of the new extension. This exercise showed that a loss of **9.76m³** would result from the development if existing ground levels on site were retained.

In order to avoid this flood water from being displaced we would propose that existing ground levels are reduced in zone K on the sketches included within Appendix G. The existing ground level in Zone K will be reduced by 100mm. By undertaking these level reductions the flood water storage on the site during the 1in100 year + 35% climate change allowance will not be effected by the development.

9. Sequential and Exception Test

Sequential and exception tests are required to prove that developments provide wider sustainability benefits to the community that outweigh flood risk. The NPPF classifies 'areas at risk of flooding' as land within Flood Zones 2 and 3, or land within Flood Zone 1 which have critical drainage problems and which have been notified as so to the local planning authority by the EA.

The aim of the sequential test is to steer developments towards flood zone 1 and avoid areas at risk. The information obtained from the EA states that our development site is within a flood zone 3. The site is an extension to the existing dwelling already on the site. Foul and storm water drainage issues can be suitably detailed to avoid increasing or being effected by any flooding issues. The standing advice from the EA has been followed regarding proposed FFL. Therefore considering the previous points we believe that the site is suitable for development.

10. Conclusion and Recommendation

Investigation results have shown that according to the EA flood mapping and data part of the site of the proposed development is within a flood zone 1 with no risk of flooding, and part is within flood zone 2 and 3 with associated flood risk.

Using the predicted flood data supplied by the EA a maximum predicted flood level of 39.410m AOD can be expected during the 1 in 100 year +35% climate change allowance event. As in the previous paragraphs we would propose the EA standing advice for minor extension should be adhered to. The FFL for the new extension should be set no lower than 38.900m AOD.

Storm water drainage discharge from the site will be limited by using permeable construction for new driveway / parking areas on the site. Storm water will then be discharged into soakaways, early geotechnical information would suggest that a soakaway solution is feasible but in time a full site investigation including soil infiltration testing will need to be undertaken to confirm this.

Foul water from the site will be discharged into the local foul sewer within Park Road. The local sewer service provider will need to be contacted to obtain permission to revise the discharge into the system. The foul water discharge from the site will increase slightly but will not be significant and will not affect flood risk on the site. We would however propose that any new drainage inspection chambers within the predicted flood zone are installed with sealed covers to ensure that no flood water will enter the foul water system during a flood event.

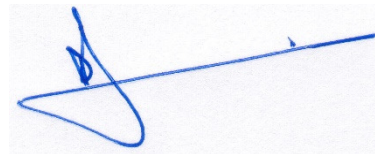
Flood water displacement on the site could potentially occur due to the area of new dwellings contained within the predicted flood zone. To ensure that no flood water is displaced off of the site we would propose that ground levels on the site are reduced as shown on the sketches in Appendix G. Instigating these ground level reductions in the proposed flood zone marked on the sketch is feasible and will ensure that additional flood water storage volume is created on the site to equal that lost due to the new dwelling.

We would also propose that a Flood Warning Plan is produced for the development at design / construction stage. This plan should be reviewed at least annually and would include the following information:

- Contact the Environment Agency Floodline Service on 0845 988 1188 and <https://flood-map-for-planning.service.gov.uk/> to check that the flood risk to the property has not changed, for example flood defences may be built in the future.
- Contact the Environment Agency Flood Warning Service on 0845 988 1188 to register to the Floodline Warnings Direct service. This offers free 24 hour flood alerts direct to your phone or email address. This information is also on the Environment Agency website and is currently available at www.environment-agency.gov.uk/subjects/flood/floodwarning. This is a free service which provides vital information in the event of a flood.
- Prepare and maintain a 'safe haven' flood kit to contain items which are essential for evacuation/refuge. The flood kit will also be useful for general emergency situations. This should be stored where you can easily get to it and on the first floor of the property, and should include:
 - A torch
 - Blankets or a sleeping bag, warm clothing and waterproofs
 - A first-aid kit, including a supply of any essential medication
 - A list of useful telephone numbers
 - A supply of bottled water
 - A stock of non-perishable food items
 - A portable radio and supply of batteries
 - Wellington boots or similar waterproof boots
- Contact the local emergency authorities to find out whether evacuation is considered necessary and where they are providing for evacuees. Or whether safe refuge should be sought on the designated ground and first floor 'safe haven' areas as noted within this report.

Consideration to water resistant construction techniques should also be considered for the new extension ground floor areas, which could experience some water ingress. These may include a secondary electricity ring main at high level to enable the ground floor to act as a 'safe haven' and continued electricity use should the ground floor become flooded. Ground floor walls should be plastered with water resistant plaster or tiled. Ground floors should have a drained sub floor void and be finished with tiles or another water resistant coating.

We believe that if the above measures are installed then the new development will not result in any increase in flood risk to the site users or nearby areas.



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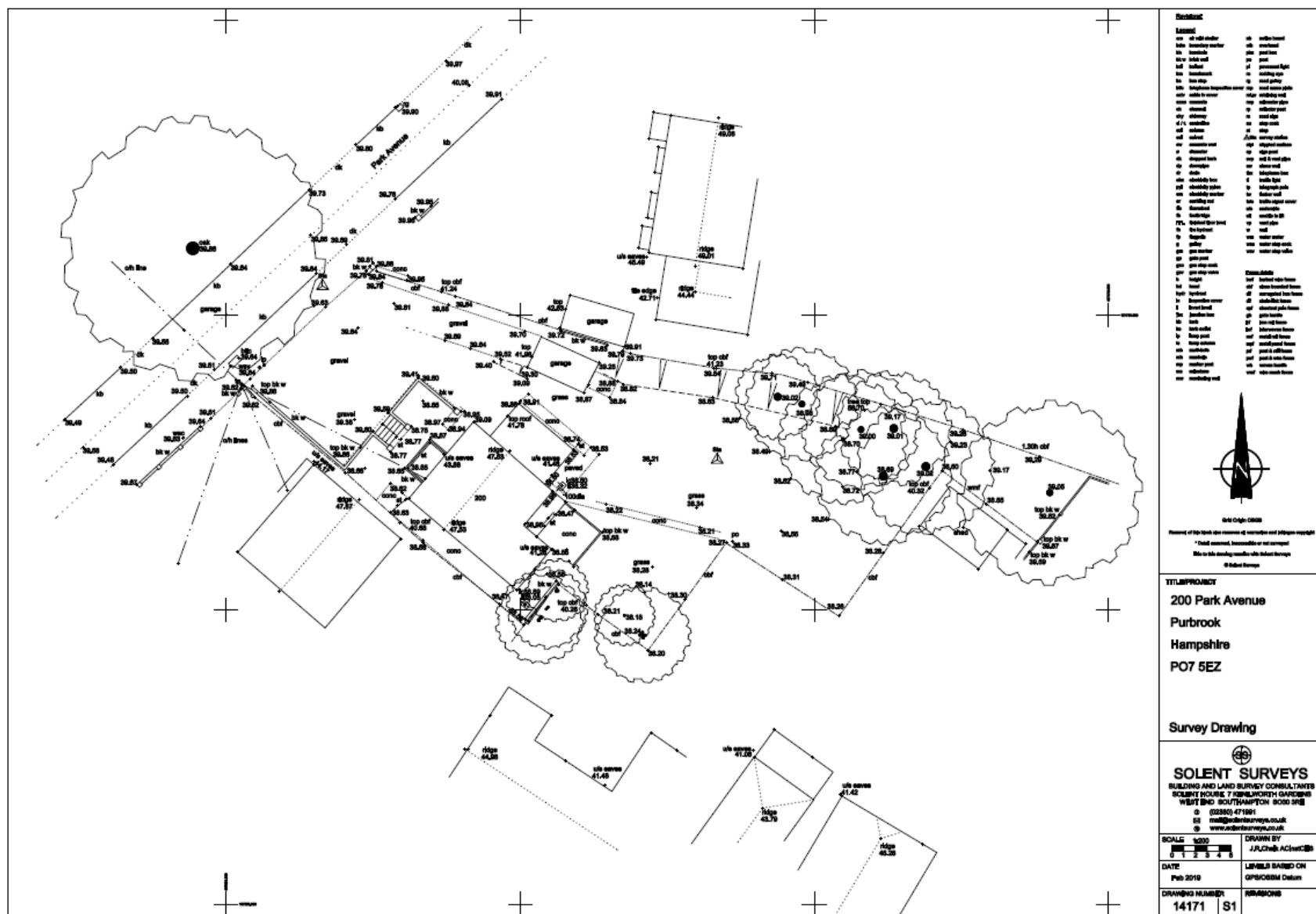
APPENDIX

A. Site Location Plan





B. Site Topographic Survey





Front driveway to existing house

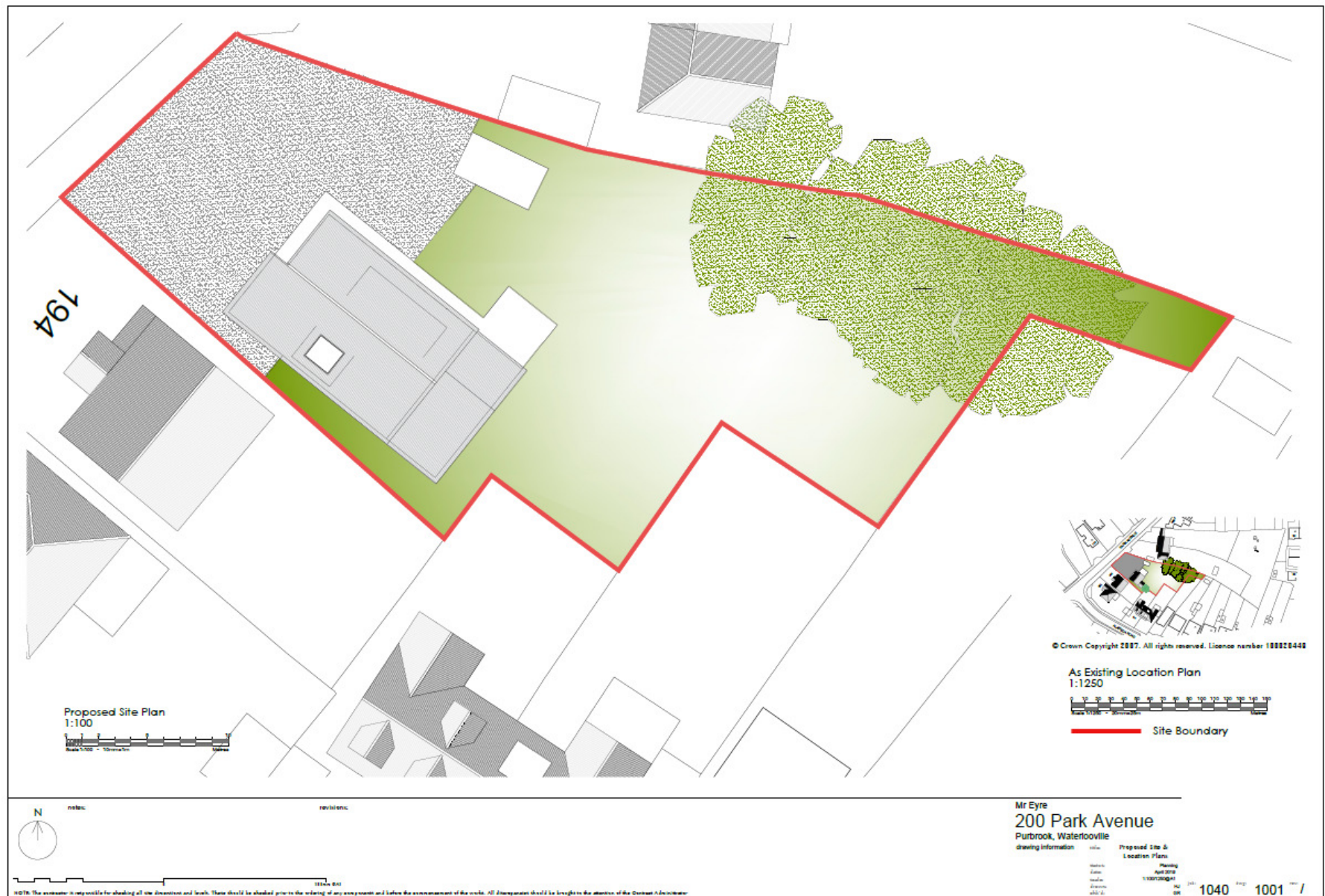


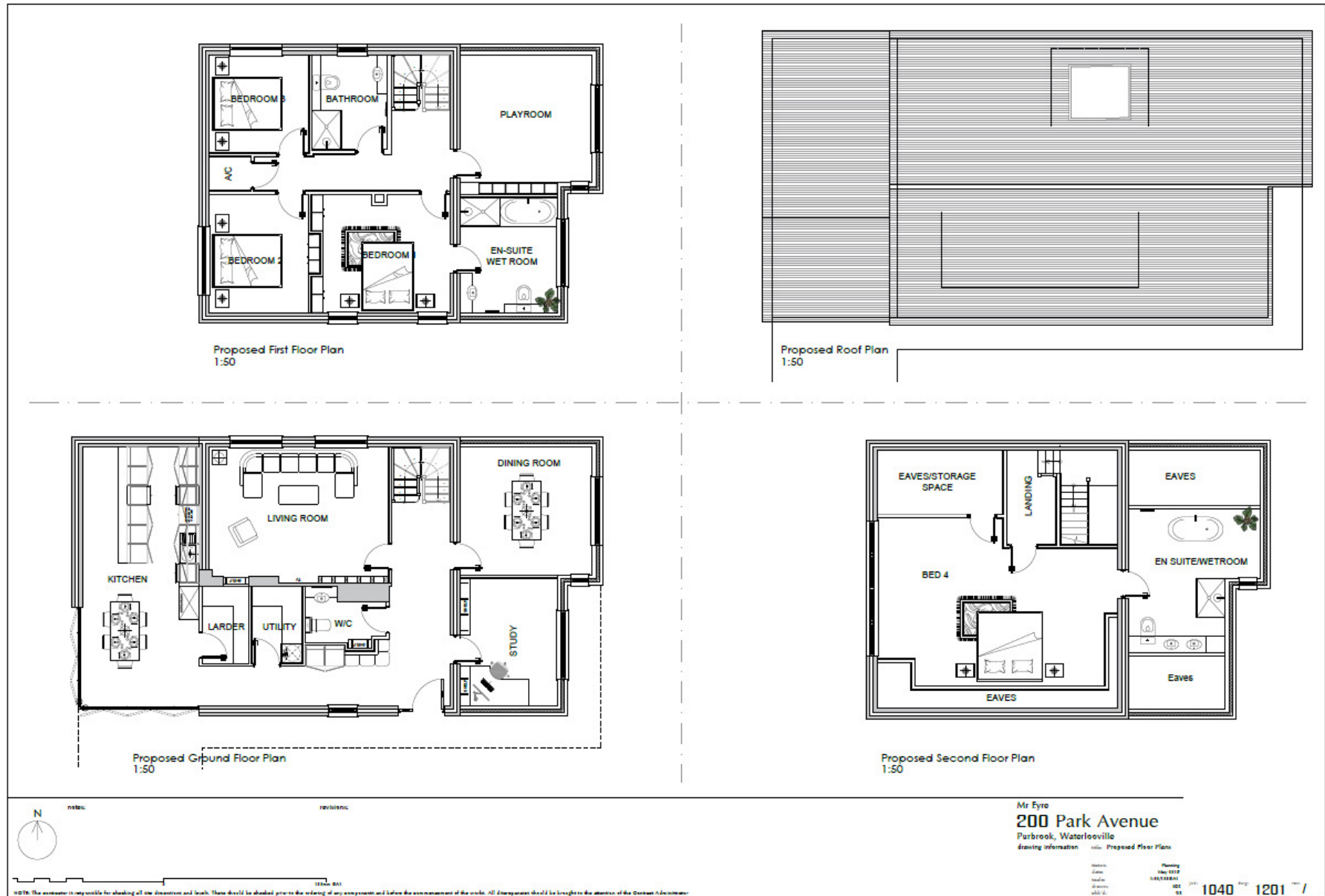
Rear patio of existing house



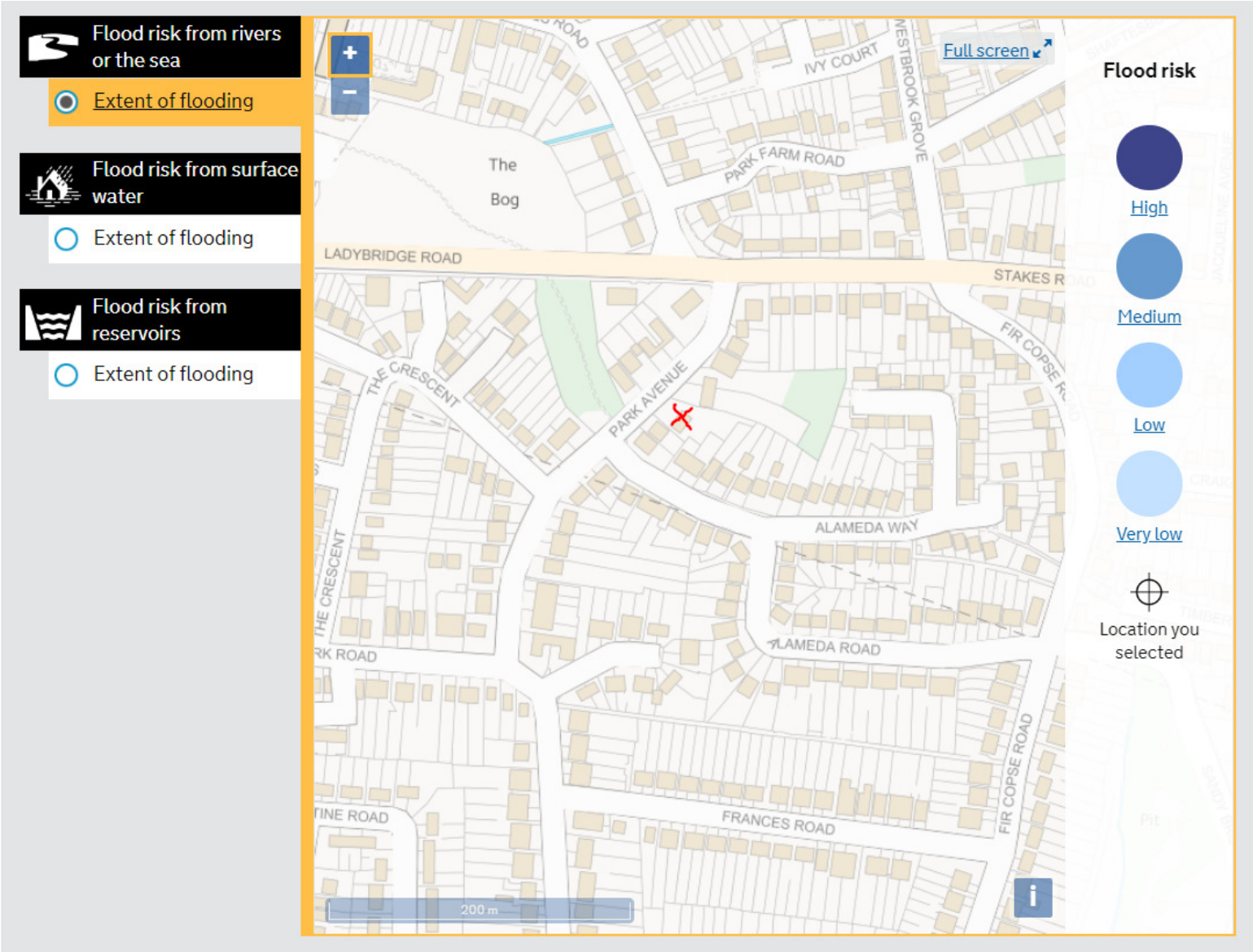
Rear garden to existing house

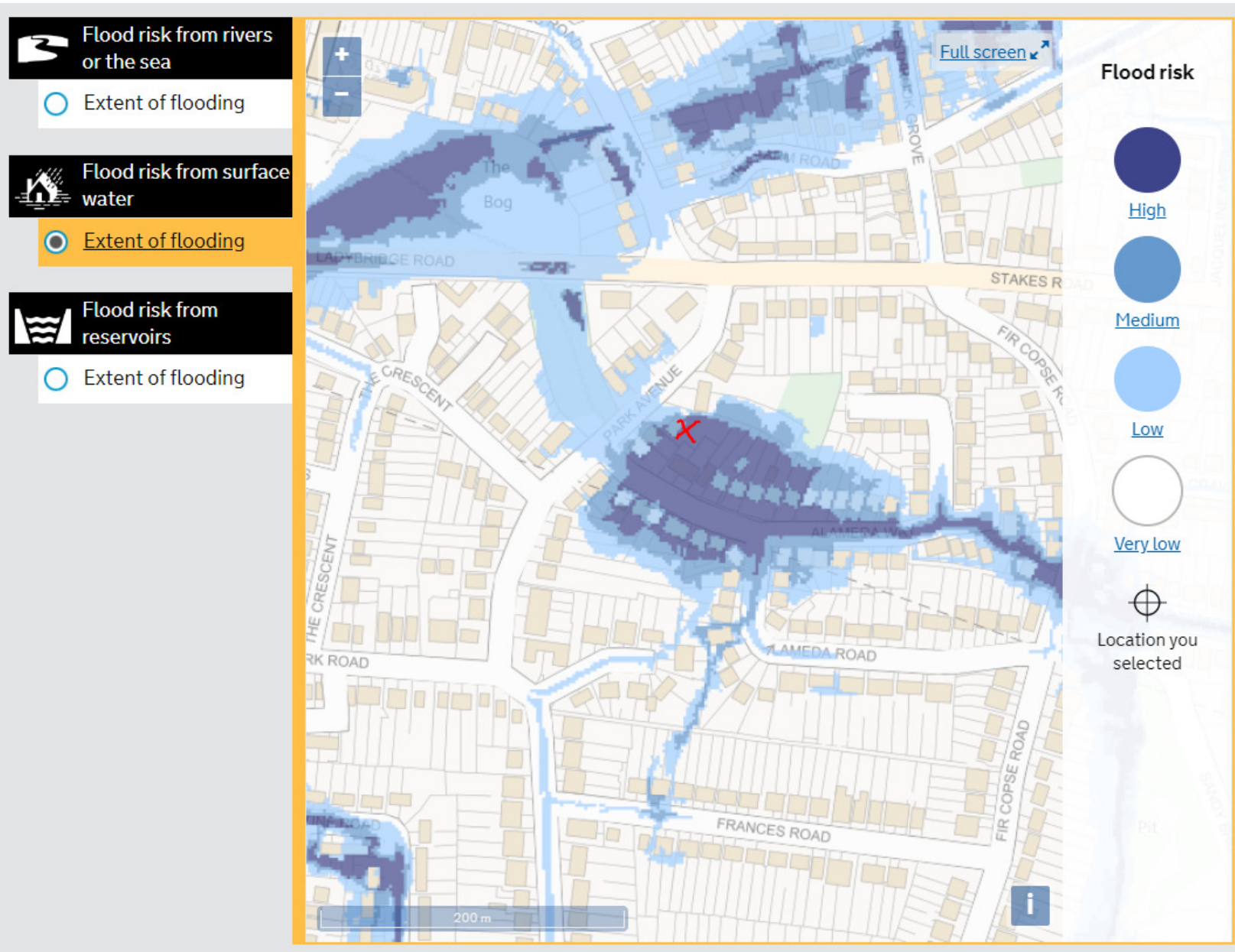
C. Proposed Development Plans



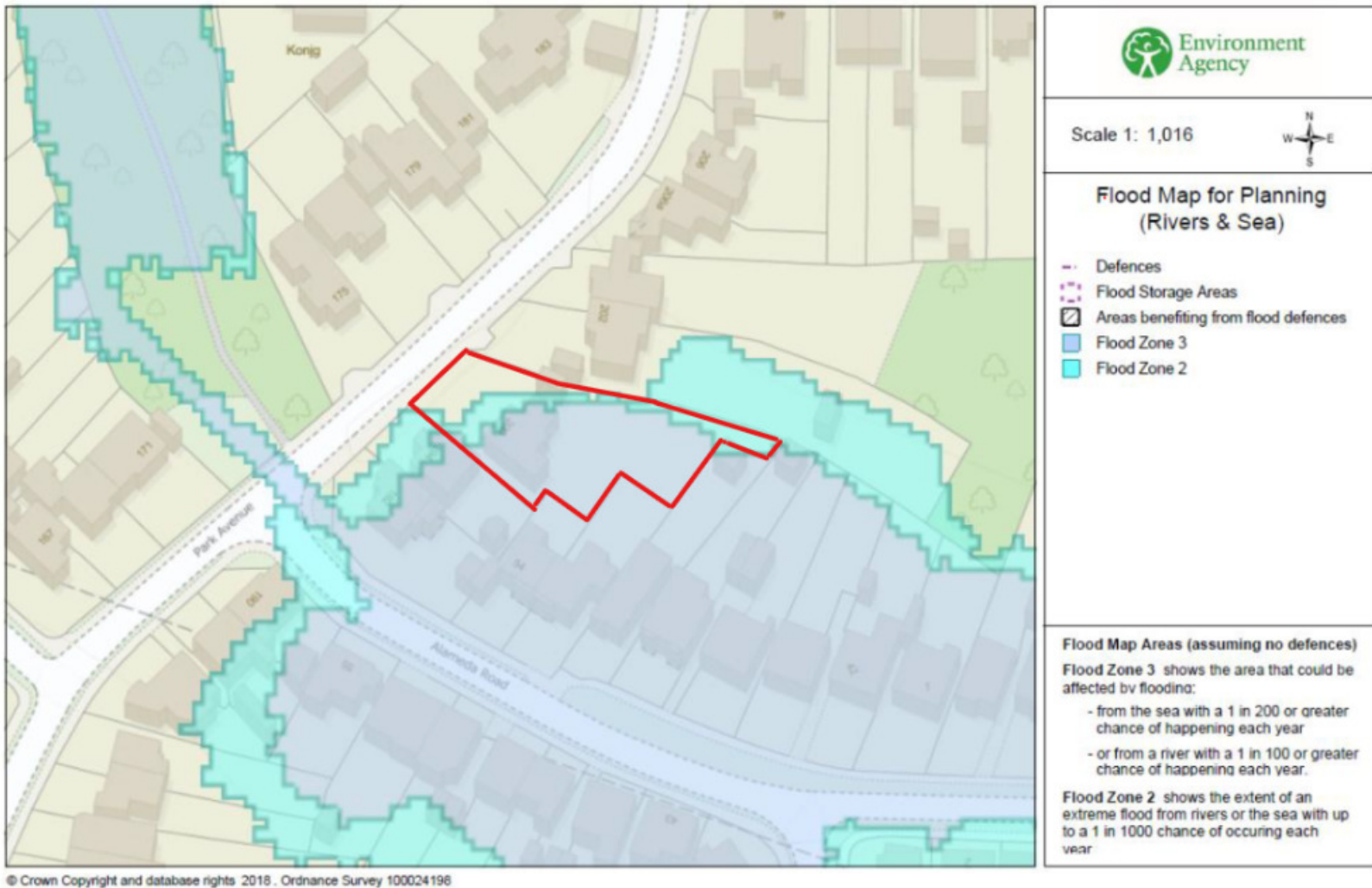


D. Risk of Flooding

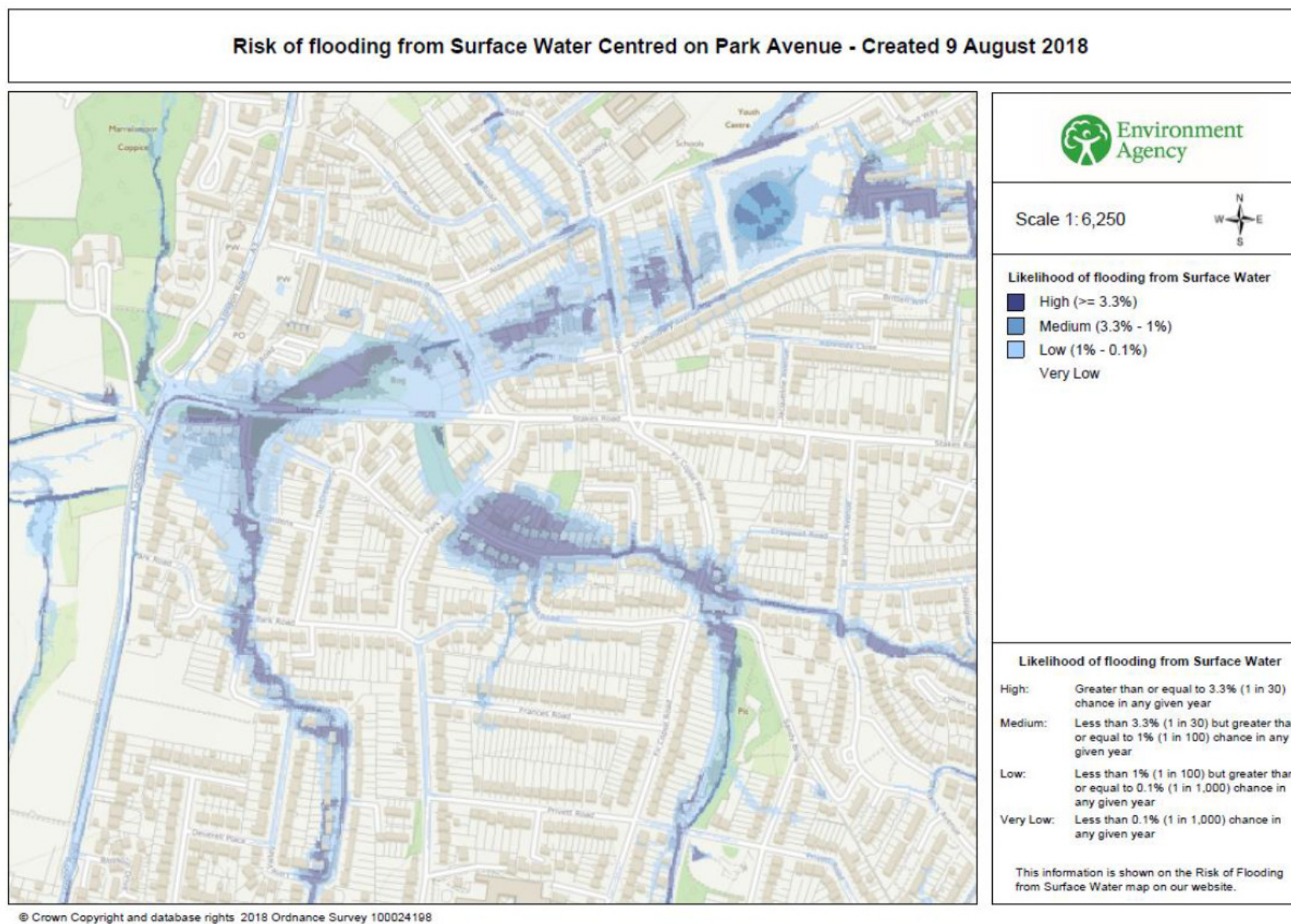




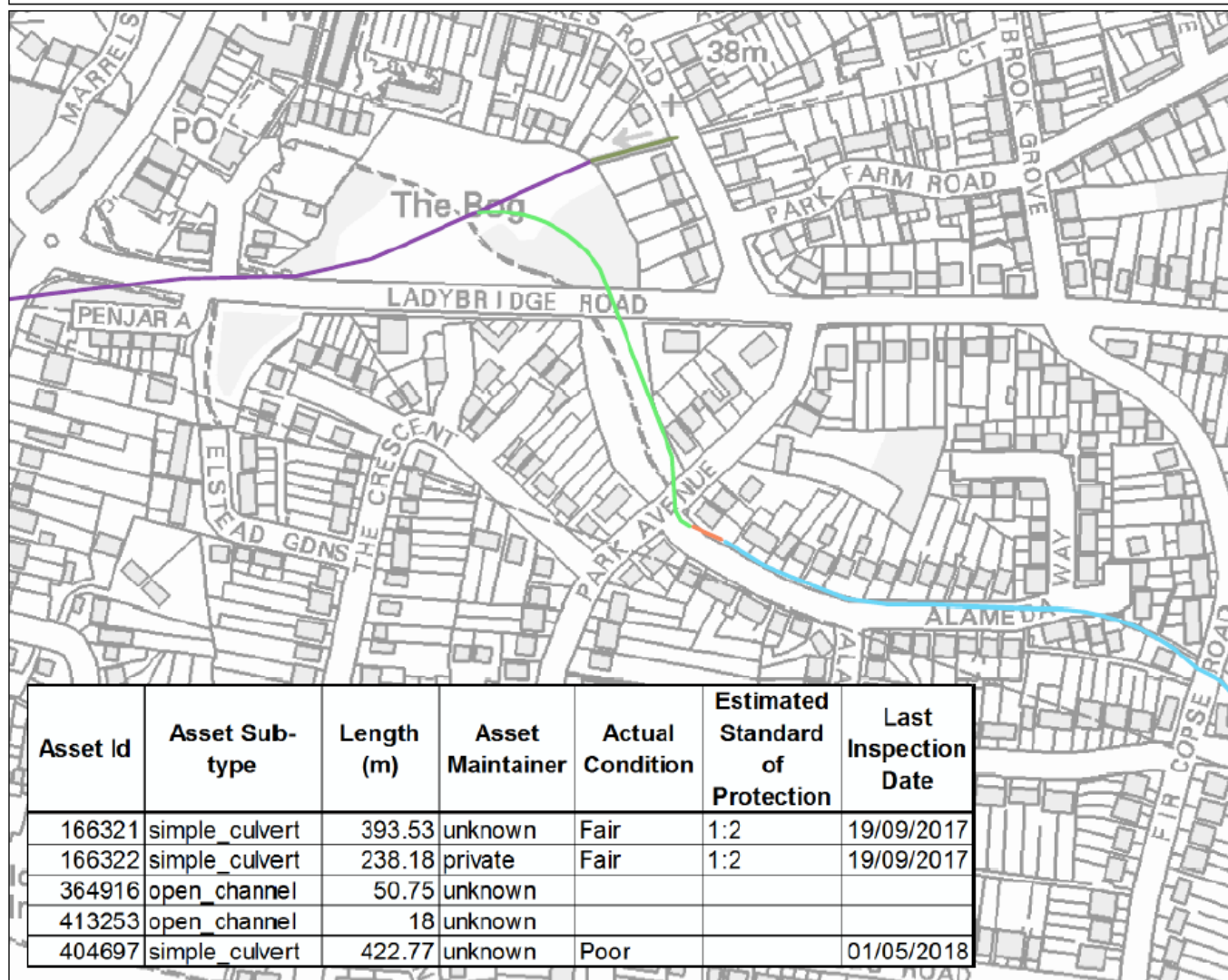
Flood Map for Planning (Rivers and Sea) Centred on Park Avenue - Created 9 August 2018



E. Extract from Valley Road Flood Risk Mapping Study (supplied by the EA)



Defences Centred on Park Avenue - Created 9 August 2018

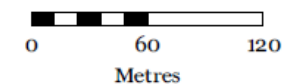


Legend

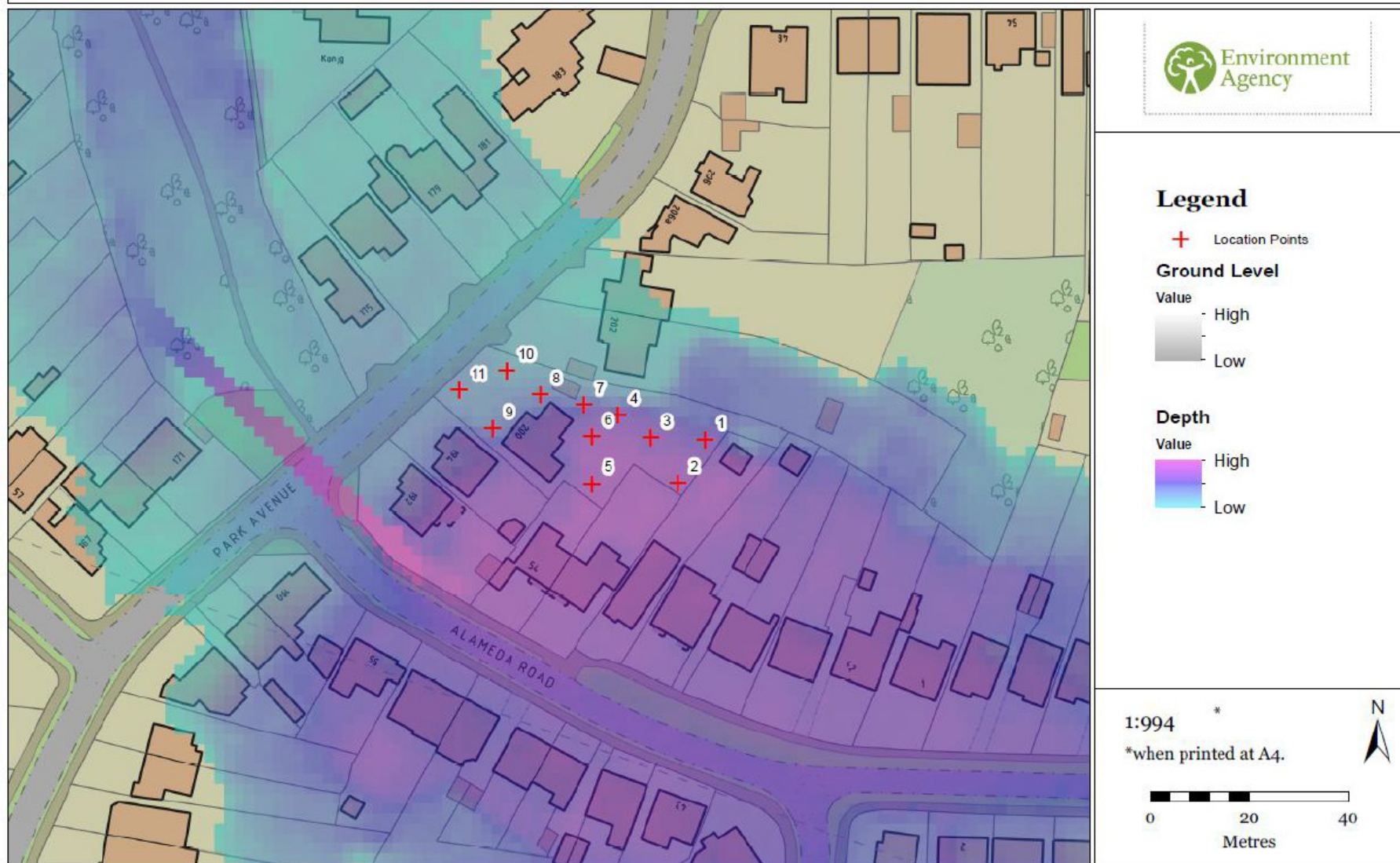
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2016 JFLOW Levels Centred on Park Avenue - Created 9 August 2018

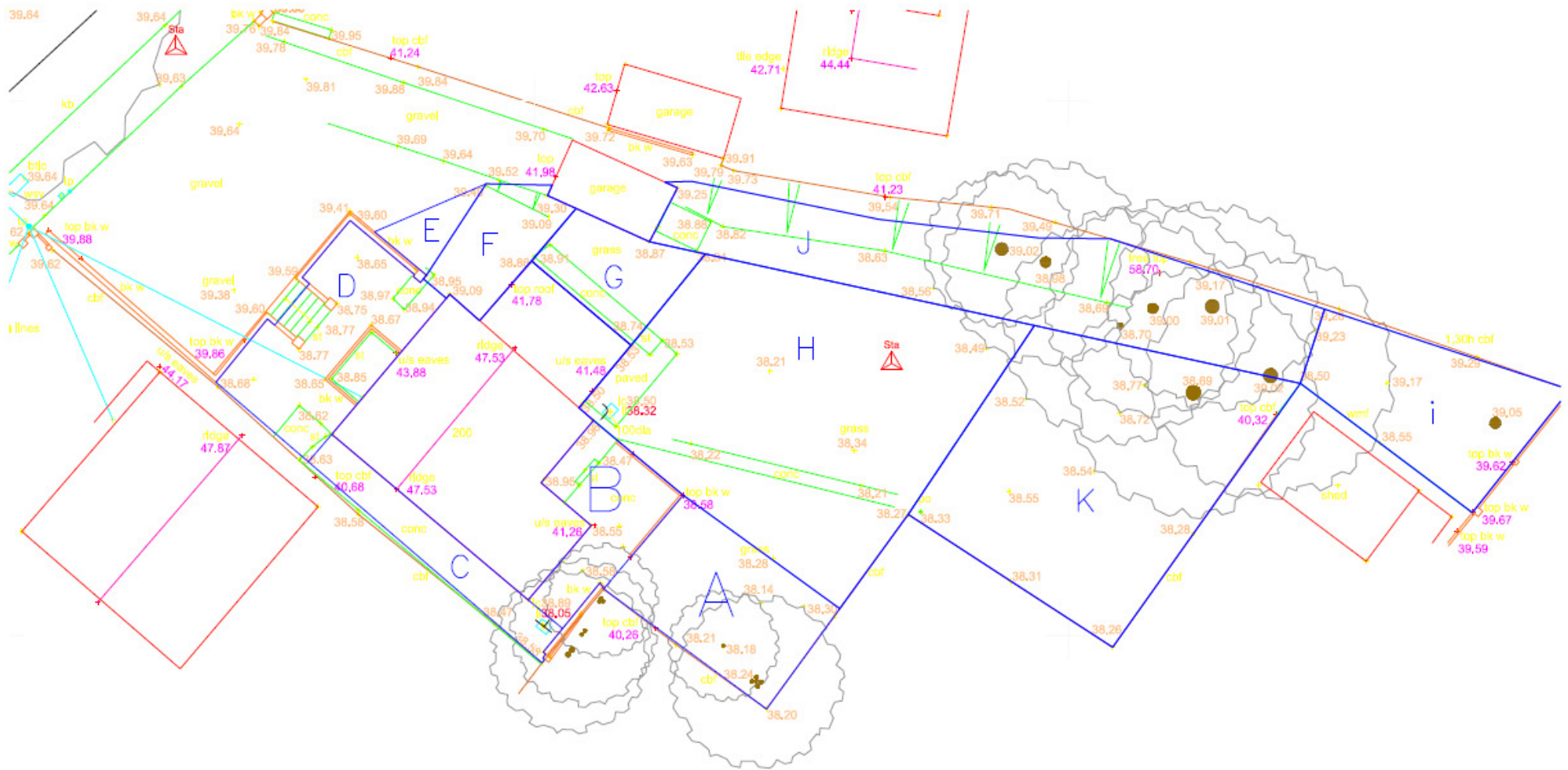


**Water Depths & Levels for 200 Park Avenue, Waterloooville, PO7 5EZ -
2016 JFLOW**

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

F. Proposed onsite floor water storage calculations and sketch



Flood water storage zones on existing site plan

Existing site 1% 1in100 year + 35% climate change

Flood level		39.41			
Zone	Ave existing GL	Flood level 1in100+35%	Depth flood	Area zone (m2)	Flood volume stored
A	38.24	39.41	1.17	53.485	62.58
B	38.6	39.41	0.81	30.87	25.0047
C	38.58	39.41	0.83	25.13	20.8579
D	38.7	39.41	0.71	55.84	39.6464
E	39	39.41	0.41	8.05	3.3005
F	39	39.41	0.41	23.51	9.6391
G	38.7	39.41	0.71	25.39	18.0269
H	38.3	39.41	1.11	192.22	213.3642
I	39	39.41	0.41	59	24.19
J	39	39.41	0.41	117.15	48.0315
K	38.55	39.41	0.86	149.53	128.5958
Sum				593.23	m3

Proposed 1% 1in100 year + 35% climate change

Flood level		39.41			
Zone	Ave existing GL	Flood level 1in100+35%	Depth flood	Revised Area zone (m2)	Flood volume stored
A	38.24	39.41	1.17	53.485	62.58
B	39.33	39.41	0.08	30.87	2.4696
C	38.58	39.41	0.83	25.13	20.8579
D	38.7	39.41	0.71	55.84	39.6464
E	39	39.41	0.41	8.05	3.3005
F	39	39.41	0.41	23.51	9.6391
G	38.7	39.41	0.71	43.39	30.8069
H	38.3	39.41	1.11	192.22	213.3642
I	39	39.41	0.41	59	24.19
J	39	39.41	0.41	117.15	48.0315
K	38.55	39.41	0.86	149.53	128.5958
Sum				583.48	m3

Therefore reduction in flood storage

9.76 m3

Remdial 1% 1in100 year + 35% climate change

Flood level		39.41			
Zone	Ave existing GL	Flood level 1in100+35%	Depth flood	Revised Area zone (m2)	Flood volume stored
A	38.24	39.41	1.17	53.485	62.58
B	39.33	39.41	0.08	30.87	2.4696
C	38.58	39.41	0.83	25.13	20.8579
D	38.7	39.41	0.71	55.84	39.6464
E	39	39.41	0.41	8.05	3.3005
F	39	39.41	0.41	23.51	9.6391
G	38.7	39.41	0.71	43.39	30.8069
H	38.3	39.41	1.11	192.22	213.3642
I	39	39.41	0.41	59	24.19
J	39	39.41	0.41	117.15	48.0315
K	38.45	39.41	0.96	149.53	143.5488
Sum				598.43	m3

Therefore reduction in flood storage

-5.20 m3

i.e additional storage provided