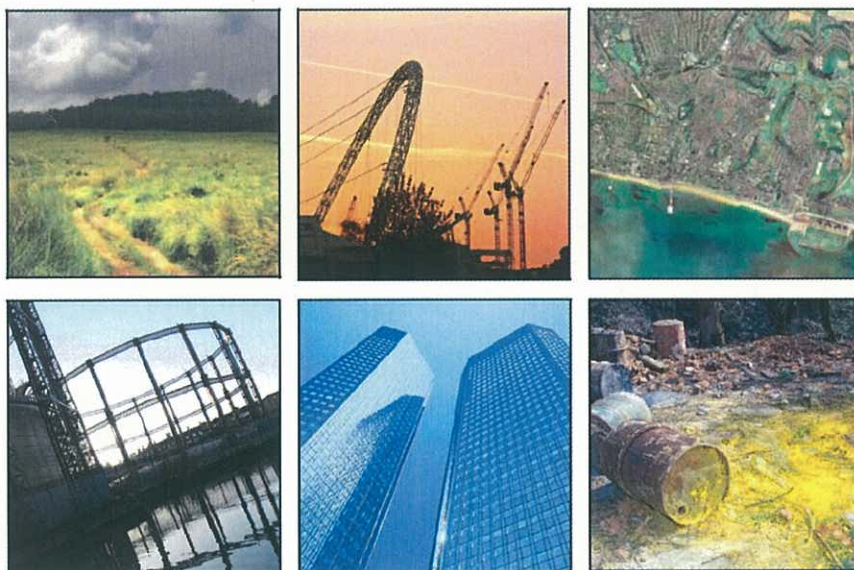


Winkworth Works, Swallowfield

Hydraulic Modelling Report

For

*Bellway Homes*



RPS Health, Safety & Environment  
Unit 12 Water Edge Business Park  
Modwen Road  
Salford Quays  
M5 3EZ

Tel: 0161 874 3737  
Fax: 0161 877 3959  
Web: [www.rpsgroup.com](http://www.rpsgroup.com)

Final version  
RCEF22261-003 R  
June 2013

## CONTENTS

- 1.0 INTRODUCTION
- 2.0 BACKGROUND TO THE MODELLING
- 3.0 TOPOGRAPHIC DATA
- 4.0 MODEL EXTENTS
- 5.0 MODEL BOUNDARIES AND HYDROLOGY
- 6.0 ROUGHNESS
- 7.0 MODEL LIMITATIONS
- 8.0 RESULTS
- 9.0 CONCLUSIONS

## APPENDICES

- A ENVIRONMENT AGENCY PRODUCT 4
- B ENVIRONMENT AGENCY CORRESPONDENCE

## FIGURES

- 1 SITE LOCATION PLAN
- 2 LIDAR-DERIVED DTM
- 3 MODEL SCHEMATIC
- 4 MODELLED FLOOD EXTENTS

## 1 Introduction

- 1.1 RPS was commissioned by Bellway Homes to undertake a hydraulic modelling exercise to support the planning application for a proposed residential development at the Winkworth Works site in Swallowfield.
- 1.2 This modelling report describes the modelling approach and presents the results obtained.
- 1.3 The modelling exercise has been undertaken through consultation with the Environment Agency, who have formally approved the modelling for use in a site specific study at the Winkworth Works.

## 2 Background to the modelling

- 2.1 The Environment Agency Flood Map indicates that the site appears to be located partially within fluvial Flood Zone 2 (moderate risk of fluvial flooding) and fluvial Flood Zone 3 (high risk of fluvial flooding). There is a potential flood risk to the site from two watercourses; the River Loddon to the west of the site and the River Blackwater to the east. These watercourses meet at a point to the north of the site. A site location plan is shown in Figure 1.
- 2.2 In order to clarify the nature of flood risk in the area, data has been obtained from the Environment Agency and a site-specific modelling exercise has been undertaken. Data provided by the Environment Agency for the purposes of this study are as follows:
- River Loddon 2009 model
  - River Blackwater 2007 model
  - Lower Loddon Flood Map Update report, January 2009, WSP
  - River Blackwater Model Update Final Report, May 2009, Capita Symonds
  - Product 4, including modelled flood levels and flood maps
- 2.3 Key information on the two models is presented in Table 1 below:

**Table 1: Key information on the models provided by the Environment Agency**

| Watercourse          | River Loddon                           | River Blackwater                      |
|----------------------|----------------------------------------|---------------------------------------|
| Name of model        | Loddon (Lower)<br>1d_loddon_280606.dat | Blackwater<br>BW_2d_no_spills_102.dat |
| Model referred to in | River Loddon 2009 model                | River Blackwater 2007 model           |

| this report      |                                                                                                            |                                                                                                                                                     |
|------------------|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Date</b>      | Built in 2007<br><br>Hydrology updated in 2009                                                             | Built in 2006<br><br>Updated in 2007 and 2008 (these updates did not involve any modification to the reach of the River Blackwater in Swallowfield) |
| <b>Type</b>      | ISIS-Tuflow 1D-2D                                                                                          | ISIS 1D                                                                                                                                             |
| <b>Hydrology</b> | Derived using the pooled statistical method. Described in the Lower Loddon Flood Map Update report, (2009) | Derived using the Flood Estimation Handbook Rainfall Runoff (FEH RR) flood estimation method. Described in the Interim Hydrology Report (2004)      |

- 2.4 Product 4 is included as Appendix A. The modelled flood level provided from the River Loddon 2009 model is at a location within the floodplain close to the site (shown on the map in Appendix A with 'A' and 'B' marked on). Comparing the modelled flood level with the site levels suggests that the site is not at risk of flooding from the River Loddon. Given that the River Loddon 2009 model is relatively recent and uses a modelling software and approach that is generally accepted as being best practice and robust, it is considered likely that the results are up-to-date and of a relatively high quality.
- 2.5 A modelled flood level from the River Blackwater 2007 model is not available within the floodplain as the model is 1D and therefore in-channel levels only have been provided. Comparing the nearest modelled in-channel flood level (located approximately 500 m to the east of the site) with the site levels shows site levels are lower than in-channel flood levels. Given that the River Blackwater 2007 model uses a less sophisticated modelling technique which does not account for complex floodplain flows, the accuracy of the results of this modelling within the vicinity of the site is likely to be limited.
- 2.5 In producing their flood map, the Environment Agency have 'merged' the results of the two models. The Environment Agency have confirmed that the River Loddon 2009 model does not explicitly include the downstream reaches of the River Blackwater and therefore there are currently no 2D modelling outputs for the River Blackwater. In order to refine the extents shown on the Environment Agency flood map and produce more accurate flood zones within the vicinity of the site, a more detailed site-specific model has been constructed. This model is a 1D-2D model built in InfoWorks. The basis of the model is the two existing models provided by the Environment Agency described in Table 1.

- 2.6 A site visit was undertaken on 28th June 2012. Consultation has been undertaken with the Environment Agency in order to inform the approach taken within the modelling exercise. The following sections of the report describe the model produced for the purposes of this study and the results of the site-specific modelling exercise.

### **3 Topographic data**

- 3.1 The in-bank 1D element of the model is taken from the 1D (i.e. ISIS) elements of the River Loddon 2009 and River Blackwater 2007 models. These are based on topographic channel cross section surveys. The topographic data source for the floodplain elements of the model (either represented in 1D as extended cross sections or in 2D as a mesh) is 1 m resolution LiDAR purchased in September 2012. The LiDAR-derived Digital Terrain Model (DTM) used in the modelling exercise is shown in Figure 2.

### **4 Model extents**

- 4.1 The extents of the model are shown in the model schematic included as Figure 3.

### **5 Model Boundaries and Hydrology**

- 5.1 The downstream boundary of the 1D element of the model is a normal depth boundary located 400 m downstream of the confluence of the River Loddon and River Blackwater. The confluence is located approximately 700 m downstream of the site. The downstream extent of the model is sufficiently downstream of the site such that any backing-up effects do not impact the site.
- 5.2 The upstream boundaries on the River Loddon and River Blackwater are time-flow hydrographs. The hydrographs are the relevant inflows used in the River Loddon 2009 model; the 'Sheepbridge' inflow hydrograph is the upstream boundary for the River Loddon and the 'Swallowfield' inflow hydrograph is the upstream boundary for the River Blackwater. This hydrology is deemed to be the most appropriate as it is derived from the latest hydrological study on the catchments in the area, as explained in the following sections:
- 5.3 The hydrology used in the River Blackwater 2007 model was derived using the Flood Estimation Handbook Rainfall Runoff (FEH RR) flood estimation method, as described in the Interim Hydrology Report (2004). A review of this 2004 hydrology was undertaken by WSP and JBA. It was confirmed that the FEH RR method had overestimated the peak flows and it was reported that the pooled statistical method provides a more realistic assessment of peak values. JBA and WSP revised the flow estimations and these were agreed with the Environment Agency to be more reliable than the original FEH RR flows.
- 5.4 The River Loddon 2009 model (and the model produced for this study) use the revised flow estimations. The hydrology used as the inflow for the upstream boundary of the River Blackwater in the model produced for this study, therefore, is not the same as that used in

the River Blackwater 2007 model; rather it is the 'Swallowfield' inflow used in the River Loddon 2009 model.

## **6 Roughness**

- 6.1 The Mannings 'n' values assigned within the model are those used in the River Blackwater 2007 model and the River Loddon 2009 model.

## **7 Model Limitations**

- 7.1 The model has been developed for the specific purpose of identifying flood risk to the Winkworth Works site. The model is considered to be fit for this purpose. The model has not been developed to establish flood extents elsewhere on the catchment and therefore should not be used for this purpose. The model has not been reviewed or signed off by the Environment Agency.

## **8 Results**

- 8.1 The model has been run for the following events:
- 1 in 100 year plus climate change
  - 1 in 1000 year
- 8.2 The outputs of the modelling are discussed in the context of flood risk posed to the proposed development site. The results of the modelling are presented in Figure 4. The results of the modelling show that the site is not affected by a 1 in 100 year plus climate change or 1 in 1000 year modelled flood event.
- 8.3 The modelled floodplain extent covers a smaller area than that shown on the Environment Agency flood map. The Environment Agency flood map is made up of the outputs from the River Loddon 2009 model and the River Blackwater 2007 model. A comparison of the floodplain extents produced by the modelling undertaken for this study has been made with those produced by the River Blackwater 2007 model and the River Loddon 2009 model. The comparison is shown in Figure 4.
- 8.4 Within the vicinity of the River Loddon watercourse and the confluence of the River Loddon and River Blackwater, the modelling outputs from this study show similarity with those from the River Loddon 2009 model. This is to be expected as the same geometry and hydrology is used for the River Loddon watercourse in both models.
- 8.5 Within the vicinity of the River Blackwater, the modelling outputs from this study show a smaller floodplain extent than that produced by the River Blackwater 2007 model. The main reasons for the difference in floodplain extent obtained from the two models are considered to be:

i) Hydrology

The River Blackwater 2007 model used hydrology derived in 2004 using the Flood Estimation Handbook Rainfall Runoff (FEH RR) flood estimation method. As described in the preceding sections, a review of the 2004 hydrology confirmed that the FEH RR method overestimated peak flows. The model produced for this study uses more recent hydrology, as derived using the pooled statistical method and employed (in agreement with the Environment Agency) in the River Loddon 2009 model.

ii) 2D modelling approach

The River Blackwater 2007 model is a 1D ISIS model through Swallowfield. The model produced for this study uses a 2D domain to represent the floodplain in Swallowfield. The 1D modelling approach used in the River Blackwater 2007 model is a less sophisticated modelling technique than the 2D approach used in this study. 1D modelling does not account for complex floodplain flows and therefore the accuracy of the results within the vicinity of the site are likely to be limited.

- 8.6 The results of the modelling undertaken for this study are considered to be more reliable and accurate as they have been derived using a more sophisticated (2D) modelling approach and more accurate and reliable hydrology.

## 9 Environment Agency Review

- 9.1 The draft version of this modelling report and model files were sent to the Environment Agency for review. The model has been reviewed for the Environment Agency by third party consultants (JBA consulting). The Environment Agency confirmed that they approve the modelling for the site specific study at the Winkworth Works. Environment Agency correspondence is included as Appendix B.

## 10 Conclusions

- 10.1 An InfoWorks 1D-2D model has been constructed for the purpose of identifying flood risk to the Winkworth Works, Swallowfield site.
- 10.2 The results of the modelling show that the site is not affected by a 1 in 100 year plus climate change or 1 in 1000 year modelled flood event. The modelled floodplain extent covers a smaller area than that shown on the Environment Agency flood map. The results of the modelling undertaken for this study are considered to be more reliable and accurate as they have been derived using a more sophisticated (2D) modelling approach and more accurate and reliable hydrology.
- 10.3 The model and results have been reviewed and approved by the Environment Agency.

## APPENDIX A

### ENVIRONMENT AGENCY PRODUCT 4

RPS

Miss R Abbott  
RPS  
Unit 12  
Waters Edge Business Park  
Modwen Road  
Salford Quays  
M5 3EZ

Our ref: WT/005532

Your ref:

Date: 20 July 2012

Dear Miss Abbott

**Provision of Product 4 for Site at Swallowfield, near RG7 1QX**

Thank you for your request regarding the above site. The information is attached.

If you have requested this information to help inform a development proposal, then you should note the detail in the attached advisory text on the use of Environment Agency Information for Flood Risk Assessments / Flood Consequence Assessments.

**Supporting Information**

The Product 4 supplied contains information from the two following models:

- Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 (Node levels available - extents cover site)
- Loddon (Lower) 2009 (Floodplain levels available - extents cover edge of site)

This location is not currently protected by any formal raised defences, we are not planning any works in the area in the near future to provide flood alleviation. However we continue to maintain the watercourses in the vicinity, the schedule of these works can be found on our internet pages.

This information is provided subject to the attached notice, which you should read.

If you have any queries or would like to discuss the content of this letter further please contact me.

Yours sincerely



Tanya Jorgji  
**External Relations Officer**

Direct dial 01276 454333

Direct email: [wt enquiries@environment-agency.gov.uk](mailto:wt enquiries@environment-agency.gov.uk)

## Product 4 (Detailed Flood Risk) fo Site at Swallowfield, RG7 1QX Our Ref: WT/005532

Product 4 is designed for developers where Flood Risk Standing Advice FRA (Flood Risk Assessment) Guidance Note 3 Applies. This  
i) "all applications in Flood Zone 3, other than non-domestic extensions less than 250 sq meters; and all domestic extensions",  
ii) "all applications with a site area greater than 1 ha" in Flood Zone 2.

### Product 4 includes the following information:

Ordnance Survey 1:25k colour raster base mapping;  
Flood Zone 2 and Flood Zone 3;  
Relevant model node locations and unique identifiers (for cross referencing to the water levels, depths and flows table);  
Model extents showing *defended* scenarios;  
FRA site boundary (where a suitable GIS layer is supplied);  
Flood defence locations (where available/relevant) and unique identifiers; (supplied separately)  
Flood Map areas benefiting from defences (where available/relevant);  
Flood Map flood storage areas (where available/relevant);  
Historic flood events outlines (where available/relevant, not the Historic Flood Map) and unique identifiers;  
Statutory (Sealed) Main River (where available within map extents);

### A table showing:

- i) Model node X/Y coordinate locations, unique identifiers, and levels and flows for *defended* scenarios.
- ii) Flood defence locations unique identifiers and attributes; (supplied separately)
- iii) Historic flood events outlines unique identifiers and attributes; and
- iv) Local flood history data (where available/relevant).

### Please note:

If you will be carrying out computer modelling as part of your Flood Risk Assessment, please read the enclosed guidance which sets out our requirements and best practice for computer river modelling.

This information is based on that currently available as of the date of this letter. You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

This information is provided subject to the enclosed notice which you should read.

This letter is not a Flood Risk Assessment. The information supplied can be used to form part of your Flood Risk Assessment. Further advice and guidance regarding Flood Risk Assessments can be found on our website at

<http://www.environment-agency.gov.uk/research/planning/82584.aspx>

If you would like advice from us regarding your development proposals you can complete our pre application enquiry form which can be found at

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

## Modelled in-channel flood flows and levels

WT/005532

The modelled flood levels and flows for the closest most appropriate model node points for your site that are within the river channel are provided below:

| Node label         | Model                                                                  | Easting | Northing | Flood Levels (mAOD) |        |        |                                                            |          |
|--------------------|------------------------------------------------------------------------|---------|----------|---------------------|--------|--------|------------------------------------------------------------|----------|
|                    |                                                                        |         |          | 20% AEP             | 5% AEP | 1% AEP | 1% AEP with climate change allowance (+20% on river flows) | 0.1% AEP |
| 06324_MN_BL1_1.005 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472683  | 165348   | 43.20               | 43.41  | 43.70  | 43.86                                                      | 0.00     |
| 06324_MN_BL1_1.006 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472782  | 165312   | 43.21               | 43.42  | 43.71  | 43.86                                                      | 0.00     |
| 06324_MN_BL1_1.007 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472822  | 165229   | 43.23               | 43.44  | 43.72  | 43.87                                                      | 0.00     |
| 06324_MN_BL1_1.008 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472867  | 165137   | 43.27               | 43.46  | 43.74  | 43.89                                                      | 0.00     |
| 06324_MN_BL1_1.009 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472917  | 165043   | 43.38               | 43.61  | 43.96  | 44.19                                                      | 0.00     |
|                    |                                                                        |         |          |                     |        |        |                                                            |          |
|                    |                                                                        |         |          |                     |        |        |                                                            |          |
|                    |                                                                        |         |          |                     |        |        |                                                            |          |
|                    |                                                                        |         |          |                     |        |        |                                                            |          |
|                    |                                                                        |         |          |                     |        |        |                                                            |          |
|                    |                                                                        |         |          |                     |        |        |                                                            |          |
|                    |                                                                        |         |          |                     |        |        |                                                            |          |

| Node label         | Model                                                                  | Easting | Northing | Flood Flows (m3/s) |        |        |                                                            |          |
|--------------------|------------------------------------------------------------------------|---------|----------|--------------------|--------|--------|------------------------------------------------------------|----------|
|                    |                                                                        |         |          | 20% AEP            | 5% AEP | 1% AEP | 1% AEP with climate change allowance (+20% on river flows) | 0.1% AEP |
| 06324_MN_BL1_1.005 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472683  | 165348   | 33.190             | 41.290 | 54.850 | 64.540                                                     | 0.000    |
| 06324_MN_BL1_1.006 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472782  | 165312   | 33.160             | 41.220 | 54.620 | 64.280                                                     | 0.000    |
| 06324_MN_BL1_1.007 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472822  | 165229   | 33.170             | 41.200 | 54.460 | 64.100                                                     | 0.000    |
| 06324_MN_BL1_1.008 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472867  | 165137   | 33.180             | 41.200 | 54.380 | 63.990                                                     | 0.000    |
| 06324_MN_BL1_1.009 | Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007 | 472917  | 165043   | 33.180             | 41.200 | 54.320 | 63.900                                                     | 0.000    |
|                    |                                                                        |         |          |                    |        |        |                                                            |          |
|                    |                                                                        |         |          |                    |        |        |                                                            |          |
|                    |                                                                        |         |          |                    |        |        |                                                            |          |
|                    |                                                                        |         |          |                    |        |        |                                                            |          |
|                    |                                                                        |         |          |                    |        |        |                                                            |          |
|                    |                                                                        |         |          |                    |        |        |                                                            |          |

The modelled flood levels for the closest most appropriate model grid cells for your site are provided below:

[illegible]

## Model information

WT/005532

**Model:**

Blackwater (Aldershot to Sandhurst and Bramshill to Swallowfield) 2007

**Description:**

The data provided is taken from the River Blackwater 1D Detailed Flood Risk Mapping Study which was completed in September 2007. The model includes Blackwater, Marrow Brook, Pystock Stream and Vigo Stream.

**Model design runs:**

1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 50 / 2% AEP; 1 in 100 / 1% AEP; and 1 in 100+20% / 1% AEP with climate change

**Mapped outputs:**

1 in 5 / 20% AEP; 1 in 20 / 5% AEP; 1 in 100 / 1% AEP; and 1 in 100+20% / 1% AEP with climate change

**Model accuracy:**

Levels  $\pm$  300mm

## Historic flood data

WT/005532

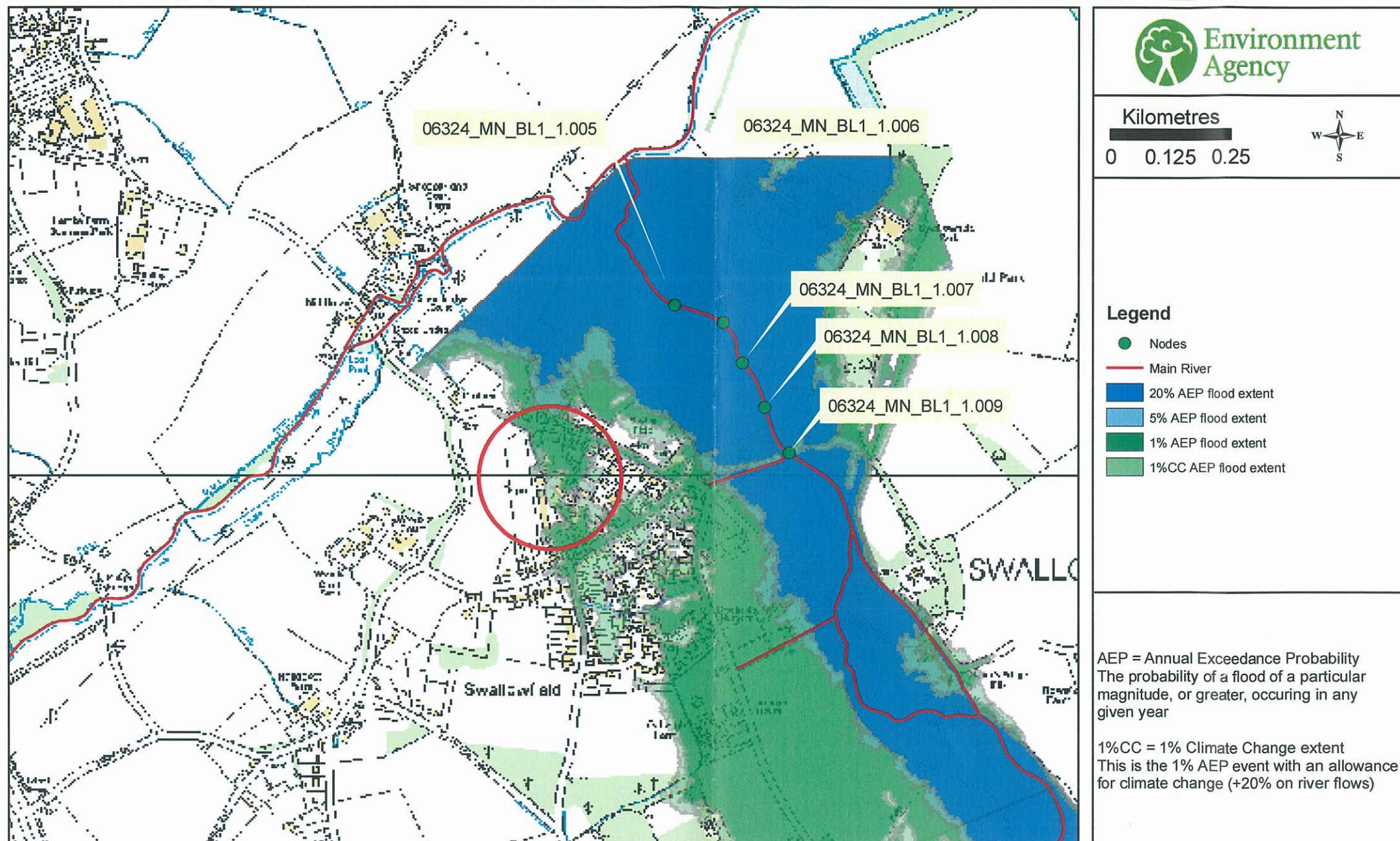
Our records show that the area of your site has been affected by flooding.  
Information on the floods that have affected your site is provided in the table below:

| Flood Event Code | Flood Event Name         | Start Date | End Date   | Source of Flooding | Cause of Flooding                              |
|------------------|--------------------------|------------|------------|--------------------|------------------------------------------------|
| EA062007030148   | Thames SE area July 2007 | 20/07/2007 | 21/07/2007 | drainage           | local drainage/surface water                   |
| EA0619910200011  | 06FebruaryWinter1991     | 01/01/1991 | 12/12/1991 | main river         | channel capacity exceeded (no raised defences) |
| EA0619900200261  | 06FebruaryWinter1990     | 01/01/1990 | 12/12/1990 | main river         | channel capacity exceeded (no raised defences) |
|                  |                          |            |            |                    |                                                |
|                  |                          |            |            |                    |                                                |
|                  |                          |            |            |                    |                                                |
|                  |                          |            |            |                    |                                                |
|                  |                          |            |            |                    |                                                |
|                  |                          |            |            |                    |                                                |
|                  |                          |            |            |                    |                                                |

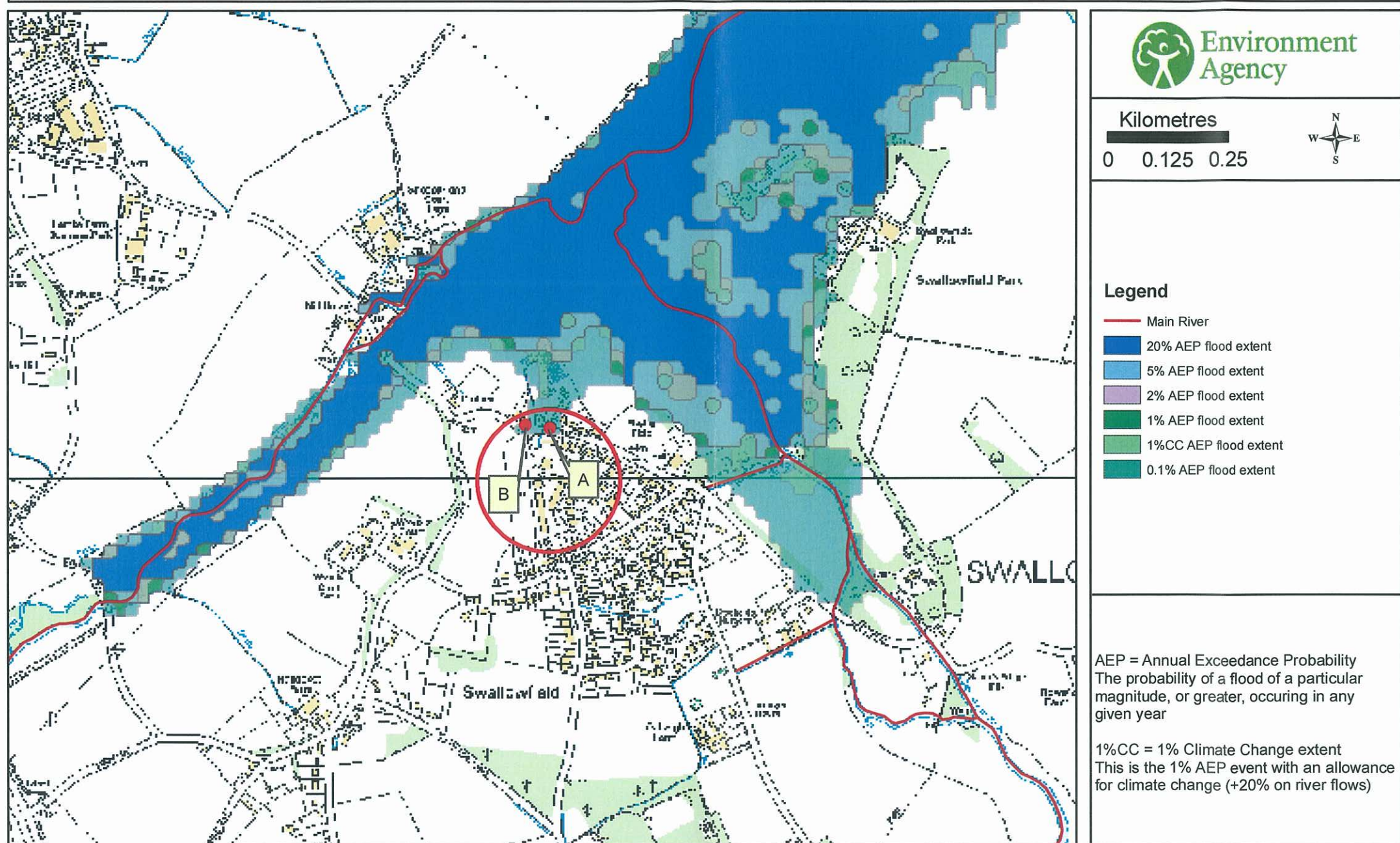
Please note the Environment Agency maps flooding to land not individual properties. Floodplain extents are an indication of the geographical extent of a historic flood. They do not provide information regarding levels of individual properties, nor do they imply that a property has flooded internally.

Start and End Dates shown above may represent a wider range where the exact dates are not available.

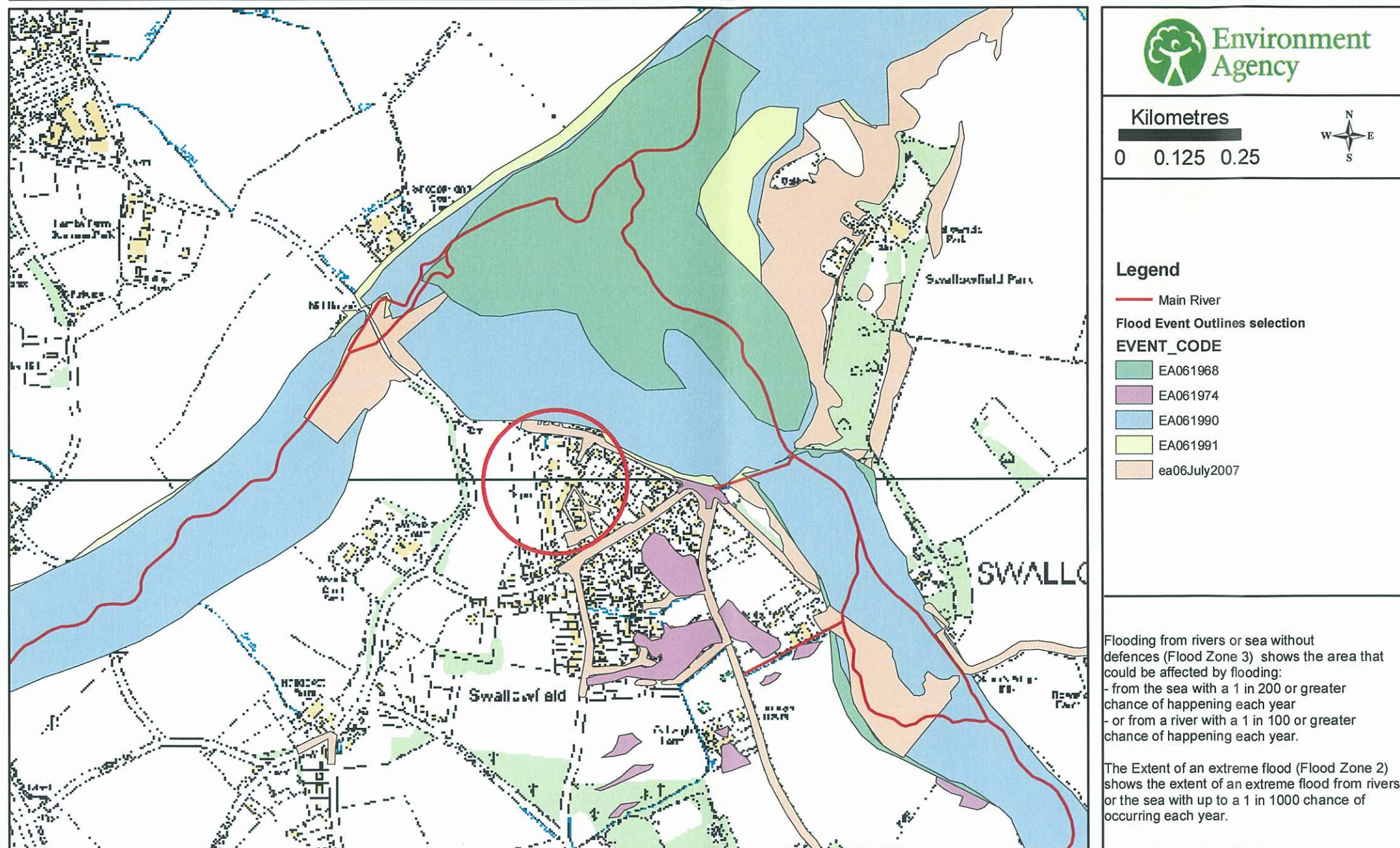
**Basic/FRA Map centred on Site at Swallowfield, RG7 1QX**  
**Created 18/07/2012 - REF: WT/005532**



**Basic/FRA Map centred on Site at Swallowfield, RG7 1QX**  
**Created 18/07/2012 - REF: WT/005532**



# Historic Flood Map centred on Site at Swallowfield, RG7 1QX Created 18/07/2012 - REF: WT/005532





## Standard notice [not for use with Special Data, Personal Data or unlicensed 3<sup>rd</sup> party rights]

### Information warning

We (The Environment Agency) do not promise that the Information supplied to You will always be accurate, free from viruses and other malicious or damaging code (if electronic), complete or up to date or that the Information will provide any particular facilities or functions or be suitable for any particular purpose. You must ensure that the Information meets your needs and are entirely responsible for the consequences of using the Information. Please also note any specific information warning or guidance supplied to you.

### Permitted use

- The Information is protected by intellectual property rights and whilst you have certain statutory rights which include the right to read the Information, you are granted no additional use rights whatsoever unless you agree to the licence set out below.
- Commercial use of anything except EA OpenData is subject to payment of a £50 licence fee (+VAT) for each person seeking the benefit of the licence, except for use as an Environment Agency contractor or for approved media use.
- To activate this licence you do not need to contact us (unless you need to pay us a Commercial licence fee) but if you make any use in excess of your statutory rights you are deemed to accept the terms below.

### Licence

We grant you a worldwide, royalty-free (apart from the £50 licence fee for commercial use), perpetual, non-exclusive licence to use the Information subject to the conditions below.

### You are free to:

-  copy, publish, distribute and transmit the Information
-  adapt the Information
-  exploit the Information commercially, for example, by combining it with other Information, or by including it in your own product or application

### You must (where you do any of the above):

-  acknowledge the source of the Information by including the following attribution statement:  
"Contains Environment Agency information © Environment Agency and database right"
-  ensure that you do not use the Information in a way that suggests any official status or that We endorse you or your use of the Information
-  ensure that you do not mislead others or misrepresent the Information or its source or use the Information in a way that is detrimental to the environment, including the risk of reduced future enhancement
-  ensure that your use of the Information does not breach the Data Protection Act 1998 or the Privacy and Electronic Communications (EC Directive) Regulations 2003

These are important conditions and if you fail to comply with them the rights granted to you under this licence, or any similar licence granted by us will end automatically.

### No warranty

The Information is licensed 'as is' and We exclude all representations, warranties, obligations and liabilities in relation to the Information to the maximum extent permitted by law. We are not liable for any errors or omissions in the Information and shall not be liable for any loss, injury or damage of any kind caused by its use. We do not guarantee the continued supply of the Information.

### Governing Law

This licence is governed by the laws of England and Wales.

### Definitions

"Information" means the information that is protected by copyright or by database right (for example, literary and artistic works, content, data and source code) offered for use under the terms of this licence.

"Commercial" means:

- offering a product or service containing the Information, or any adaptation of it, for a charge, or
- internal use for any purpose, or offering a product or service based on the Information for indirect commercial advantage, by an organisation that is primarily engaged in trade, commerce or a profession.

## APPENDIX B

### ENVIRONMENT AGENCY CORRESPONDENCE



Ruth Abbott

---

**From:** Piotrowski, Michael [michael.piotrowski@environment-agency.gov.uk]

**Sent:** 25 June 2013 15:41

**To:** Ruth Abbott

**Subject:** RE: Modelling the River Loddon and Blackwater at Swallowfield

Hi Ruth,

As per our conversation yesterday, your comments (Doc: RCEF22261-005) were reviewed, are satisfactory and the modelling has now been approved. As such the modelling has been approved for the site specific study at the Winkworth Works.

If you have any questions, please do not hesitate to ask.

Kind Regards,

Mike

Michael Piotrowski

FCRM Officer

Partnership and Strategic Overview Berkshire and Buckinghamshire Team,

South East Region

01189 535854

[michael.piotrowski@environment-agency.gov.uk](mailto:michael.piotrowski@environment-agency.gov.uk)

Kings Meadow House, Kings Meadow Road, Reading, RG1 8DQ

**Flooding. Are you or your family at risk?**



Whether you live on the coast or inland you could be at risk from flooding.

It only takes a few minutes for you, your family or your friends to find out more and how to be prepared.

Share this information with your family and friends. Act now!

[Find out if you're at risk from flooding](#)

28/06/2013

FIGURE 1

SITE LOCATION PLAN





LEGEND:



RPS

Unit 12, Watersedge Business Park,  
Modwen Road, Salford Quays M6 3EZ  
T 0161 874 3737 F 0161 877 3959

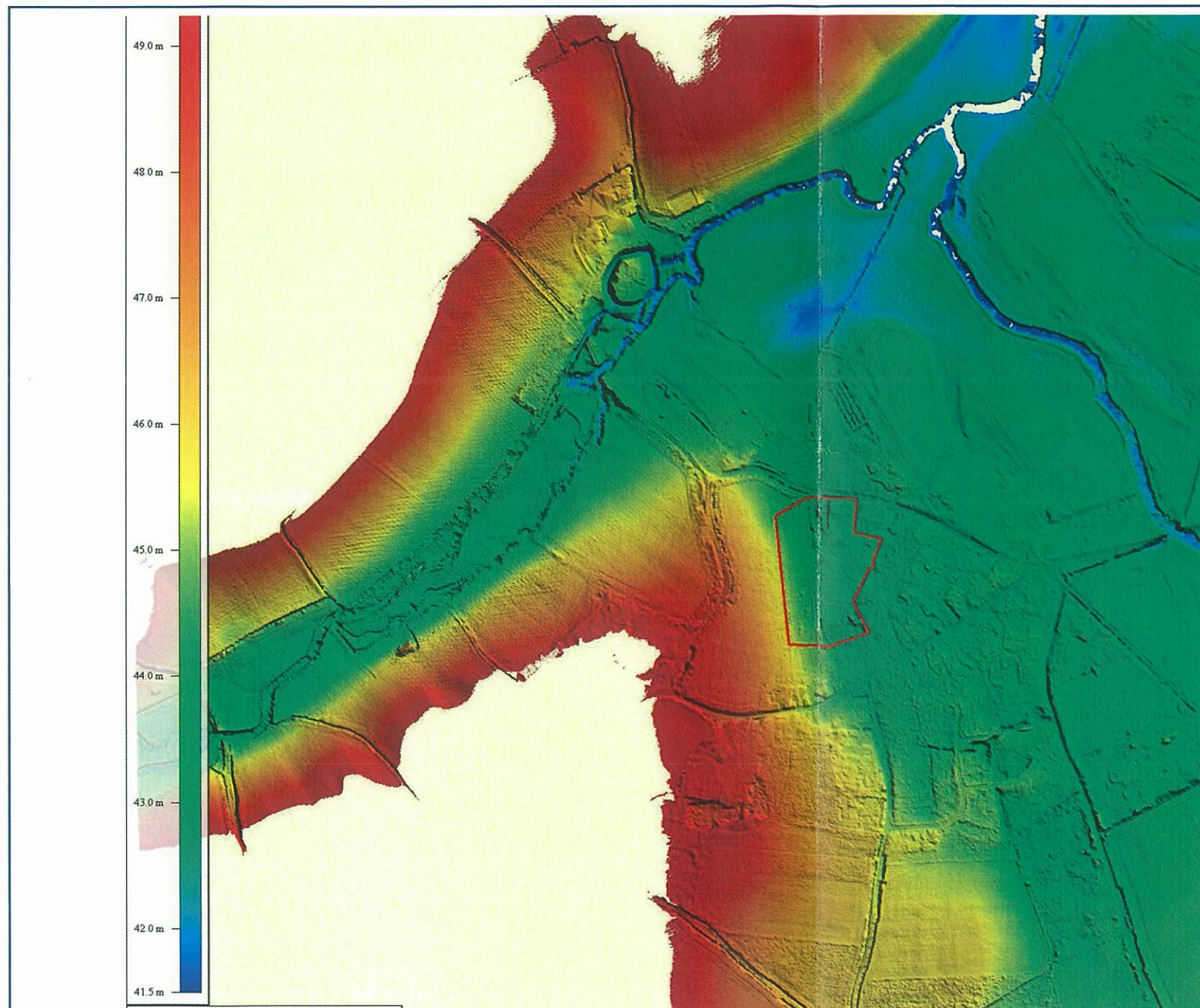
Client:  
**Bellway Homes**  
Project:  
**Winkworth Works,  
Swallowfield  
Modelling Report**  
Title:  
**Site Location Plan**

|           |            |        |
|-----------|------------|--------|
| Job No:   | Figure No: | Rev:   |
| RCEF22261 | 1          | A      |
| Drawn:    | Date:      | Scale: |
| RA        | 19/09/2012 | NTS    |

FIGURE 2

LIDAR\_DERIVED DTM





LEGEND:



**RPS** Unit 12, Watersedge Business Park,  
Modwen Road, Salford Quays M5 3EZ  
T 0161 874 3737 F 0161 877 3959

Client:

**Bellway Homes**

Project:

**Winkworth Works,  
Swallowfield  
Modelling Report**

Title:

**LIDAR-derived DTM**

Job No:

**RCEF22261**

Drawn:

**RA**

Figure No:

**2**

Date:

**19/09/2012**

Rev:

**A**

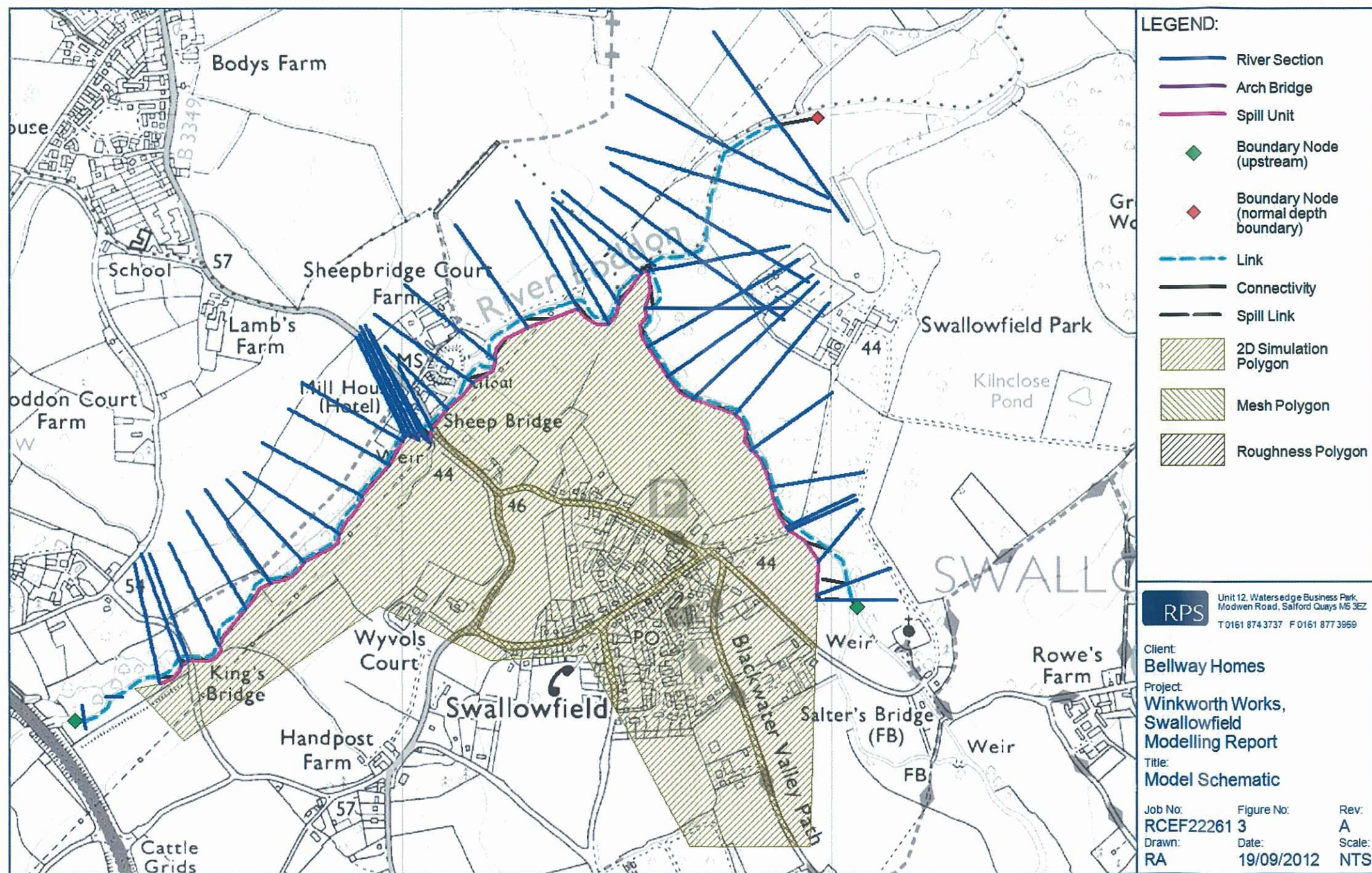
Scale:

**NTS**

FIGURE 3

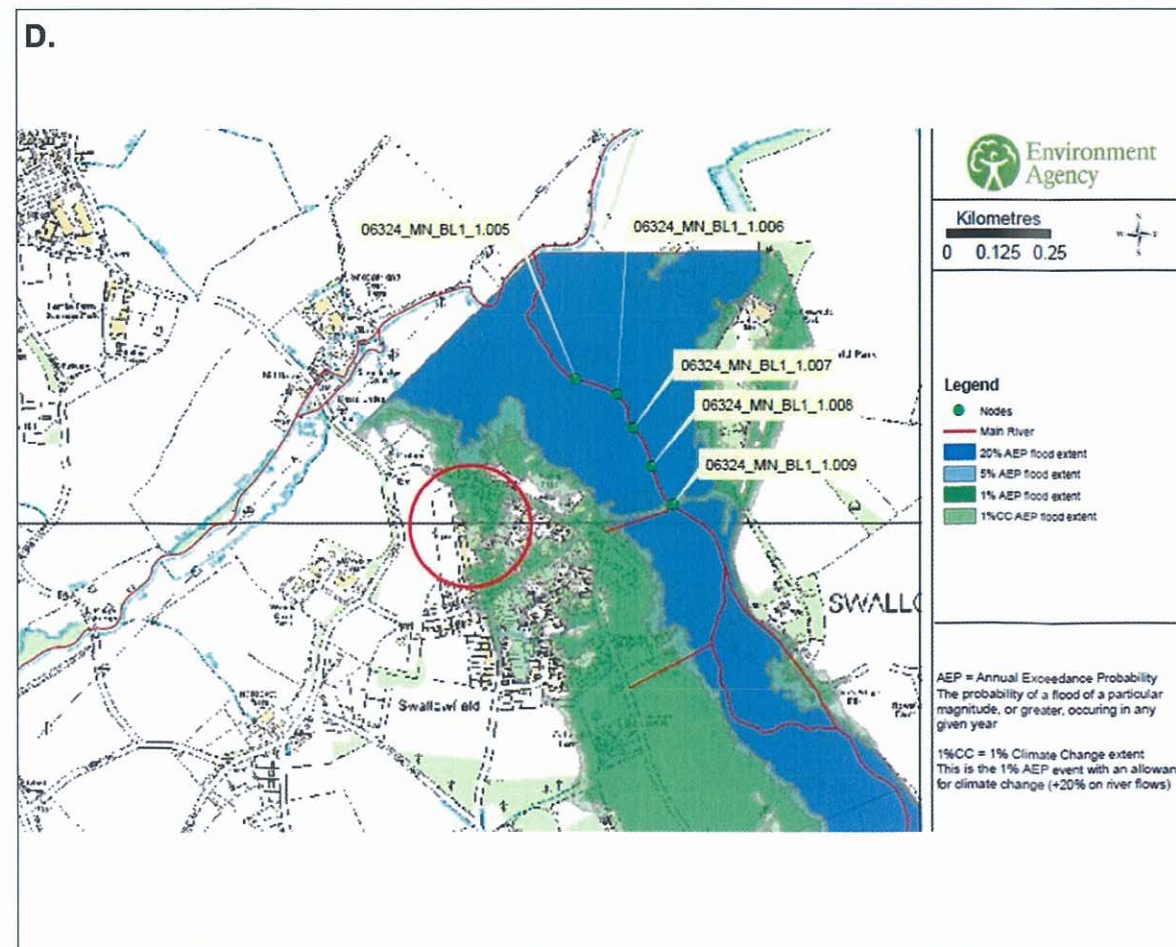
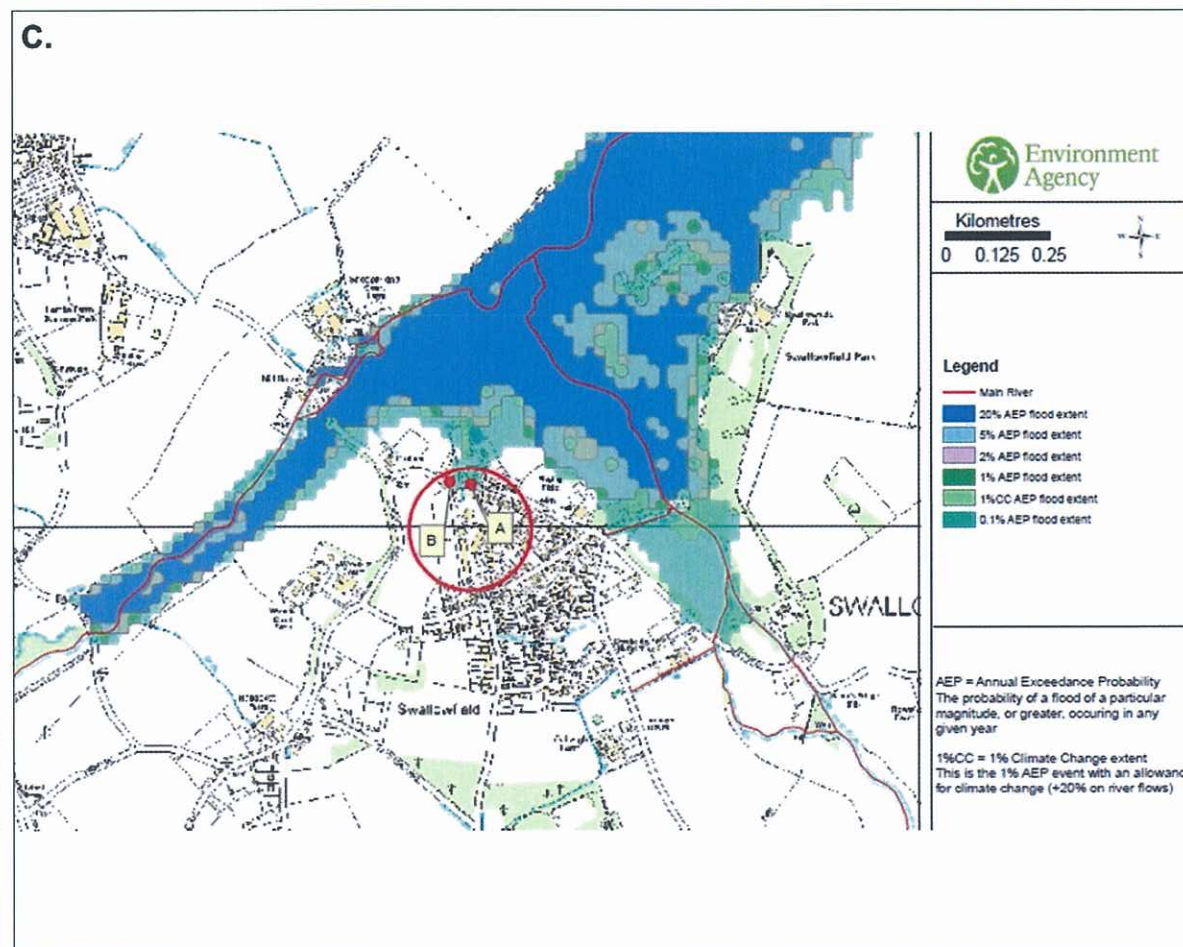
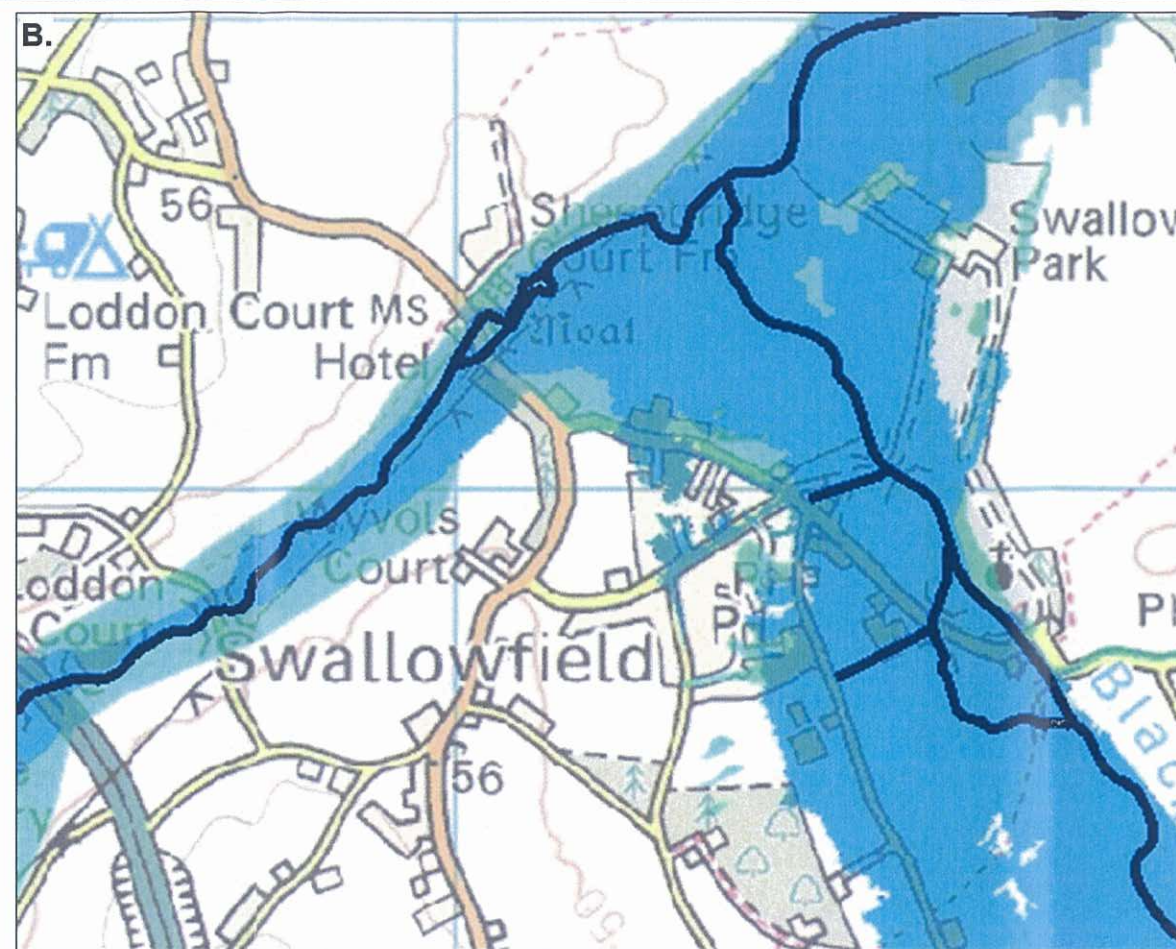
MODEL SCHEMATIC





## FIGURE 4

### MODELLED FLOOD EXTENTS



**NOTES:**

- A.**  
1 in 100 year + CC and 1 in 1000 year flood extents derived from the site-specific modelling exercise undertaken for this study. The 2D outputs only are shown on the figure (i.e. within the area to the west of the River Blackwater and the east of the River Loddon - see Appendix B for model schematic).
- B.**  
Environment Agency Indicative Flood Map
- C.**  
Modelled outputs from the River Loddon 2009 Model. A larger version of this figure is included in Appendix A.
- D.**  
Modelled outputs from the River Blackwater 2007 Model. A larger version of this figure is included in Appendix A.

**RPS** Unit 12, Watersedge Business Park,  
Modwen Road, Salford Quays M5 3EZ  
T 0161 874 3737 F 0161 877 3959

Client:  
**Bellway Homes**

Project:  
**Winkworth Works, Swallowfield  
Modelling Report**

Title:  
**Modelled Flood Extents**

|           |            |        |
|-----------|------------|--------|
| Job No:   | Figure No: | Rev:   |
| RCEF18444 | 4          | A      |
| Drawn:    | Date:      | Scale: |
| RA        | 19/09/2012 | NTS    |

|                     |                                            |                                                                                    |          |
|---------------------|--------------------------------------------|------------------------------------------------------------------------------------|----------|
| Report Type:        | Hydraulic Modelling Report                 |                                                                                    |          |
| Report Status:      | FINAL                                      |                                                                                    |          |
| Project Reference:  | RCEF22261                                  |                                                                                    |          |
|                     | Consultant                                 | Signature                                                                          | Date     |
| Report Author:      | Ruth Abbott<br>Environmental<br>Consultant |  | 28/06/13 |
| Technical Reviewer: | Andrew Sloan<br>Project Engineer           |  | 28/06/13 |
| Report Reviewer:    | Neil Bagley<br>Technical Director          |  | 28/06/13 |

*This report has been prepared within the RPS Group Quality Management System to British Standard EN ISO 9001:2008*

*RPS Health, Safety & Environment is part of the RPS Group Plc with 4,500 staff based at over 80 UK-wide offices (and additional offices worldwide). RPS offers an unparalleled range of services related to acquisition / divestment, development and investigation / remediation of land and existing property (including pre-planning feasibility assessments, EIAs, ecological surveys, flood risk assessments, archaeological reports, liability reviews, due-diligence / compliance audits) and provides commercially-focussed site-specific environmental solutions.*

## RPS HEALTH, SAFETY & ENVIRONMENT

### General Notes

1. The following notes should be read in conjunction with the report:
2. This report contains only that available factual data for the site, which was obtained from the sources, described in the text. These data were related to the site on the basis of the location information made available to RPS by the client.
3. The assessment of the site is based on information supplied by the client. Relevant information was also obtained from other sources.
4. The report reflects both the information provided to RPS in documents made available for review and the results of observations and consultations by RPS staff.
5. Where data have been supplied by the client or other sources, including that from previous site audits or investigations, it has been assumed that the information is correct but no warranty is given to that effect. While reasonable care and skill has been applied in review of this data no responsibility can be accepted by RPS for inaccuracies in the data supplied.
6. This report is prepared and written in the context of the proposals stated in the introduction to this report and its contents should not be used out of context. Furthermore new information, changed practices and changes in legislation may necessitate revised interpretation of the report after its original submission.
7. The copyright in the written materials shall remain the property of the RPS Company but with a royalty-free perpetual licence to the client deemed to be granted on payment in full to the RPS Company by the client of the outstanding amounts.