

Environment Agency Review Response

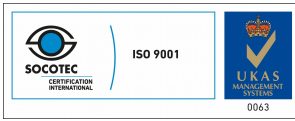
Henley Road, Caversham modelling

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Environment Agency



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1 Introduction

As part of modelling work to support an FRA for the Phase 1 adjacent site at 199 – 203 Henley Road (2017), it was agreed that Edenvale Young would procure and review the existing Jacobs (2011) flood model, make improvements local to the site and include the latest climate change guidance. This model would then be used to enable more accurate flood mapping at the site. These modelling updates were consequently approved by the Environment Agency (see appendix A).

For the current Phase 2, 205 - 211 Henley Road, Edenvale Young submitted the same model as described above, with the only addition being updated topographic survey for the site. Jacobs undertook an audit for the hydrology (Appendix B) and hydraulic modelling (Appendix C) and concluded that further action was required for the modelling to be signed off.

This document forms a response to Jacobs' audit comments and to fulfil the “further actions required”, so that the Environment Agency can lift their objection to the scheme.

2 Hydrology audit response

The full audit from Jacobs can be found in Appendix B.

The figure below shows the key findings and recommended actions from the report:

8 KEY FINDINGS AND RECOMMENDED ACTIONS		Action RED: Action required AMBER: Action recommended GREEN: satisfactory GOLD: Exemplary practice
The Edenvale Young model updated the hydrology of a model previously created by Jacobs. This hydrology was approved and reviewed at the time; see Appendix E- Intermediate Hydrology Review, and therefore it is likely that the approach undertaken was acceptable. Further details on recent flood history would be beneficial.		NO ACTION REQUIRED/ GENERAL COMMENTS
- Although it is noted that the 2011 model hydrographs were based on the 2003 and 2007 events, we are surprised no consideration has been given to the latest 2013- 2014 event. Given the large extent of the catchment, it would be good if the events were compared in terms of similarity in catchment response. - At current it is very hard to comment about these aspects owing to a report chain (i.e. each report saying the detail is in another report). It is assumed the 2011 schematization has been checked and approved by the Environment Agency at a catchment scale. Confirmation from Edenvale Young would be required in terms of whether the schematization is appropriate for the site-specific application. - What was the approximate return period/ severity of the 2003 flood event and does that match the flood modelling results in Caversham in terms of properties flooded? Comment to the Environment Agency: - We are currently aware of JBA building a model for the area in 2018. This was nearly completed at the beginning of the year. Was any of the available data shared? It would be good to compare the 2011 flood maps with the 2018 to highlight any discrepancy and reasons behind it; if this is possible.		ACTION SUGGESTED
- Since 2011, there was a significant flood event in the area (2013). As the hydrology is heavily based on the 2011 analysis, this has not been captured. Please either update or provide justification on why this is not required. - Has the site got a flood history/ did the site flood in the 2003 event in which the Jacobs (June, 2011) report stated 4 properties in Caversham flooded? - The 2011 approach is deemed appropriate; however, the 2013- 2014 flood could heavily affect the design flows. No checks undertaken in this respect. - Please expand on comparison between design flood maps and flood history at the site. - Appendix A shows the Berry Brook as an excluded main river from the model at the location of the site. The site appears to be close to the source of this Brook but the Brook flows next to the site/ bounds the site to the south. No commentary is supplied on this. Has any attempt to identify flood risk from the Berry Brook been undertaken? - The proposal is to build new dwellings. The Edenvale Young figures, for example Figure 5.5, suggest 9 dwellings and associated infrastructure such as parking space. This would increase the area of hard standing. Any changes to surface area risk should be investigated and appropriately mitigated against?		ACTION REQUIRED

Figure 2.1: Jacobs' model audit key findings and recommended actions

2.1 Actions required (red comments)

2.1.1 *Inclusion of 2013 flood event into hydrological analysis*

Edenvale Young were originally commissioned to undertake updated climate change modelling for the site, which was done successfully. The original (2011) hydrological calculations and data were also not supplied with the reporting and therefore could not be checked but are considered to be robust based on the associated limited reporting.

It would require considerable effort to recreate the entire Thames catchment upstream of Reading and would entail a disproportionate amount of work considering the size of the site. The recently run climate change sensitivity simulations should provide confidence in any uncertainty of outputs.

An alternative approach might be to use the new model developed to support the proposed Caversham flood defence scheme. The Environment Agency revealed the existence of this new baseline model at a very recent public meeting (21st May 2019) with residents of Heron Island, attended by Dr. Chris Whitlow of Edenvale Young.

2.1.2 *Site flood history*

The nearest flow gauges to the site are on the Thames at Kingston 30km downstream of Reading, with records from 1883 to 2012, and Days Weir, some 30km upstream, with records from 1939 to 2012. The records at both gauges are considered by the Environment Agency to be of good quality and are therefore suitable for flow estimation using standard hydrological methods.

Figure 2.2 shows the largest floods during the period of record at the nearest gauging stations.

Kingston		Day's Weir	
Date	Flow (cms)	Date	Flow (cms)
18/11/94	806	17/03/47	349.2
20/03/47	714.2	09/02/40	260.1
17/09/68	600.1	29/01/39	255.3
05/01/15	585.1	24/01/59	248.5
23/11/74	559	04/01/03	237.5

Figure 2.2: Highest flow events at two EA gauging stations during the period of record

The map shown in Figure 2.3 shows that flooding may have occurred on the site in the March 1947 flood event.

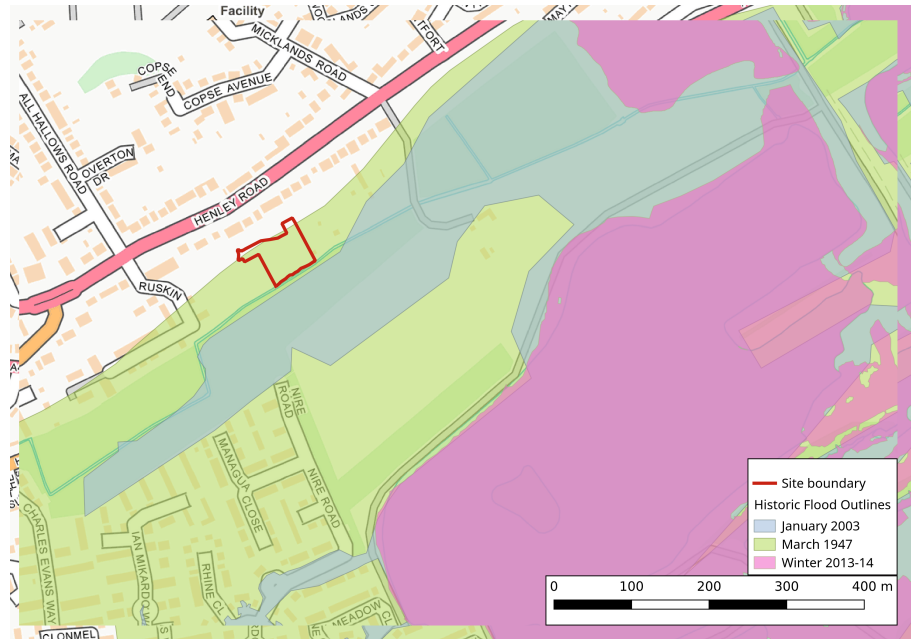


Figure 2.3: Historical flood extent map showing the approximate outlines of the 1947, 2003 and 2014 flood events.

According to the Environment Agency recorded flood extents, other major flood events such as those in 2003 and 2013/4, did not impact the site, despite flooding being experienced in other parts of Reading and Caversham.

From the available information, it appears that the March 1947 flood event may have been the only event to have flooded the lower lying area of the site although the accuracy of the EA historical flood outlines are not always consistent or reliable.

Analysis of the available LiDAR data in this area shows that the 1947 flood level does not appear consistent with the topography, as the outline follows a line with a ground level that varies from approximately 36.00mAOD to 37.80mAOD in the vicinity of the site. Additionally, in most areas around Caversham the EA Flood Zone 2 (area susceptible to a 1 in 1000 year flood) outline appears to be based on the 1947 flood event outline. This is particularly prevalent at the site (see Figure 2.4).

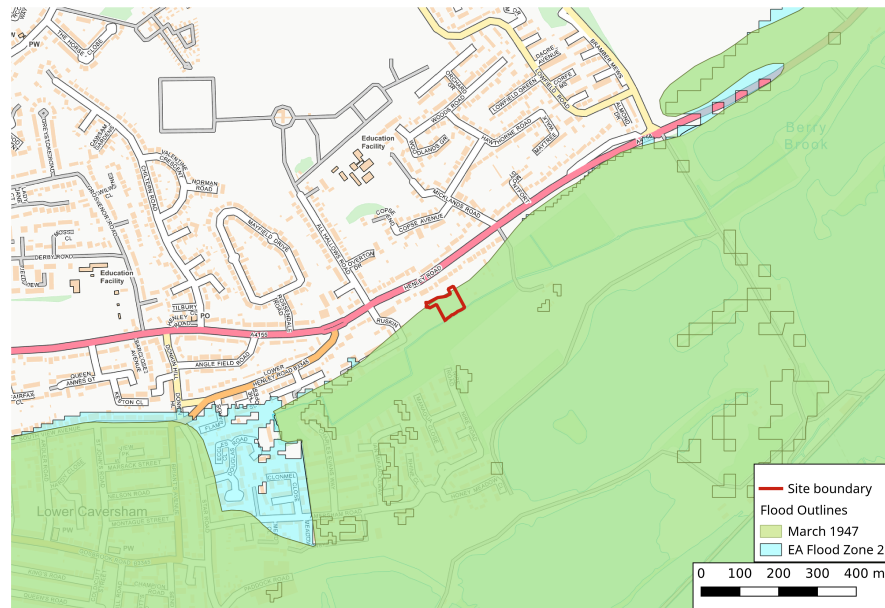


Figure 2.4: 1947 flood event vs EA flood zone 2

As a result of this analysis, it is considered that the March 1947 flood outline may be unreliable in this area and should therefore not be used to inform detailed flood risk to the site.

2.1.3

Will the 2013-14 flood affect the design flows?

While including the 2013-14 flood event would be preferable, without the previous 2011 hydrology methodology and complete dataset we cannot update this hydrological analysis. Additionally, as discussed in section 2.1.1 this is considered to be too much work for a single small site.

As the 2011 calculations have not been viewed, it is not clear how the 2013-14 data (AMAX value) would be applied and how it would affect the resulting design peak estimates.

The 2011 hydrology has made use of over 100 years of data, including 11 flood events larger than 2013-14 which, from a general perspective, comprises more recorded flood events than most river flow gauges in the UK are likely to have experienced. The 2011 hydrology is therefore considered robust even without the inclusion of the 2013-14 event flow data.

As stated above, an alternative approach would be to use the new baseline model developed very recently by Jacobs to support the development of a flood defence scheme for Caversham.

2.1.4

Comparison of design flood maps and flood history at the site

The highest frequency modelled event was the 1 in 100 year event. The outline from this event is a good match to the January 2003 event at the site (Figure 2.5). The modelled 1 in 100 year event could be considered a slightly larger event than January 2003 as “Lower Caversham” is shown to flood in the modelling but not the 2003 recorded extents. The site did not flood in either the modelled 1 in 100 year or was shown to be flooded in the recorded 2003 extent. The January 2003 flood event is the 13th largest AMAX event out of 134, for the Thames at Kingston.

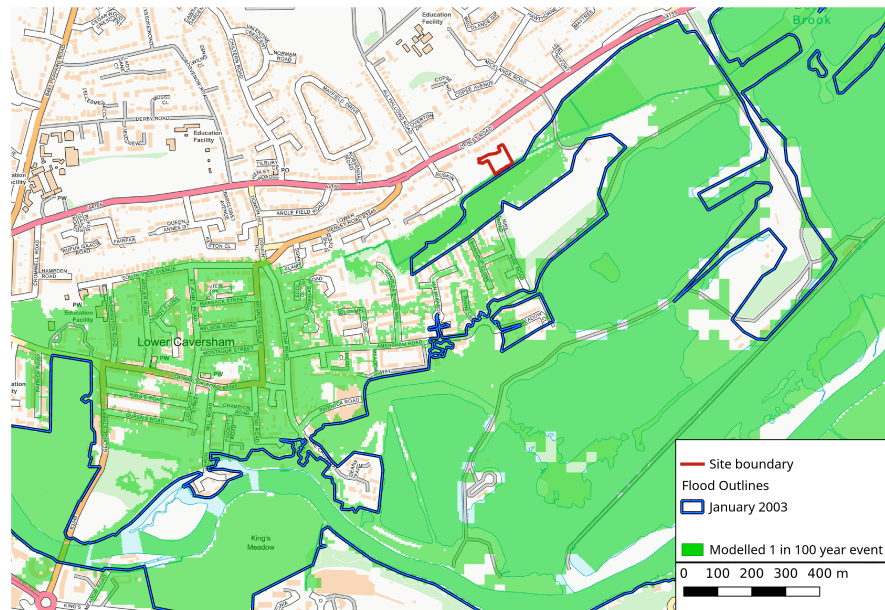


Figure 2.5: Comparison of 2003 flood event with the modelled 1 in 100 year event

2.1.5

Berry Brook representation

The reach of Berry Brook bounding the site was not explicitly modelled in the incoming model. However the flows from the Berry Brook are considered negligible compared to the design events of the Thames.

Based on inspection of the LiDAR data, the site (left bank of the Berry Brook) sits approximately 1m higher than the right bank of the Berry Brook and most of the flood plain. The January 2003 recorded extents show right bank flooding of the Berry Brook whilst the site remains dry (Figure 2.3).

2.1.6

Surface water and drainage

The Environment Agency do not require these issues to be resolved in order to overcome their objection, as they consider fluvial flood risk only. The Local Authority must be consulted in order to determine a surface water drainage strategy.

3 Hydraulic model audit

The full audit from Jacobs can be found in Appendix C.

The figure below shows the key findings and recommended actions from the report:

12. KEY FINDINGS AND RECOMMENDED ACTIONS	
	Action RED: Action required AMBER: Action recommended GREEN: satisfactory GOLD: Exemplary practice
The model approach used (1D-2D model) is considered appropriate for the purpose of the study (FRA). A few changes are still required for the model itself.	NO ACTION REQUIRED
The following actions are suggested: • Please provide a list of structures. • Please provide survey drawings. • Please include flood history of the area.	ACTION SUGGESTED: Please see requirements in the adjacent cell.
The following actions are required: • None	ACTION REQUIRED: Please see requirements in the adjacent cell.

Figure 3.1: Jacob's hydrology audit key findings and recommended actions

3.1 Actions suggested

3.1.1 List of structures

Edenvale Young did not construct the original model and no structure list was supplied when requesting the model. Either Jacobs or the Environment Agency should contact the original Jacobs team who built the 2011 model and they should be able to supply the structures list.

3.1.2 Survey drawings

As described above, Edenvale Young were not supplied with this information and the original Jacobs modelling team should be contacted.

The site topographic survey was included as an appendix to the flood risk assessment.

3.1.3 Flood history of the site

This has been discussed in detail throughout the hydrology audit section.

3.1.4 *New Jacobs baseline model*

This has been discussed earlier in this document. It may prove to comprise an improved representation of flood risk to the site and it is believed that it could be made available externally in the very near future.

Appendix A

Environment Agency modelling approval for phase 1.

Appendix B

Jacobs Hydrology Audit

Appendix C

Jacobs Hydraulic model Audit

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