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Subject Initial Review of Modelling Results Following November 2020 Flood Event		By N Starkey
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Introduction

The purpose of this technical note is present the initial findings of the model review following the flooding in November 2019 and a site visit in February 2020. The report will identify updates carried out to the model and recommendations for future studies.

Previous Modelling Results

Pell Frischmann were instructed in 2012 to undertake a study assessing flood risk in Redbourne and review potential mitigation measures flowing two significant flood events in 2007 and 2008.

In order to understand the flood risk to the village from the beck a 1D steady flow model was constructed in HEC-RAS to analyse the extent of flooding in the area as part of the 2012 studies. The model was based on a topographical channel survey undertaken by Clugston during September 2011. The unnamed beck was modelled from the upstream extent at Honeysuckle Cottage on Beck Lane downstream to the pumping station to the east of Park Lane.

During the 2007 flood event flooding occurred to properties in two key areas: Beck Lane and School Lane. A total of nine properties were recorded to have flooded internally.

The model outputs were unable to replicate the extents of flooding experienced in 2007, with no property flooding shown along Beck Lane. The onset of flooding was calculated to be 0.7% (1 in 140 year) Annual Exceedance Probability (AEP) event.

Due to this low probability of flooding the Redbourne scheme was deferred to concentrate on settlements with a greater flood risk.

2020 Model Update

Following the November 2019 flood event North Lincolnshire Council have prioritised a review of the flood risk in Redbourne.

A site visit was carried on 11 February 2020 and discussions were held with residents. The flooding experienced was similar to the extents witnessed in the 2007 floods with five properties recorded as internally flooding.

In liaison with the residents the trash screen on the culvert running beneath the B1206 was identified as being blocked during the 2019 event and causing the beck to back up and overtop its banks. Anecdotal evidence suggests that when the screen was cleared during the flood event the water levels dropped but the screen quickly became blocked again.

The original HEC-RAS model was transferred to an ICM 2D model, with LiDAR data used to represent the flood plain. The 2D model better maps the overland flows, therefore will better represent the flooding experienced in Redbourne.

The model was tested by running the 1% (AEP) fluvial flow model and the results were similar to those produced in the HEC-RAS model, with flooding only occurring on Park Lane. Taking into account the anecdotal evidence from the 2019 flood the model was tested simulating a blocked screen at the B1206 culvert. This model run identified the flooding on Beck Lane similar to that experienced during the 2007 flood events, see Figures 1, ~~and 2~~ and 3 below.

Figure 1 – 1% AEP flood extents (no blockage)

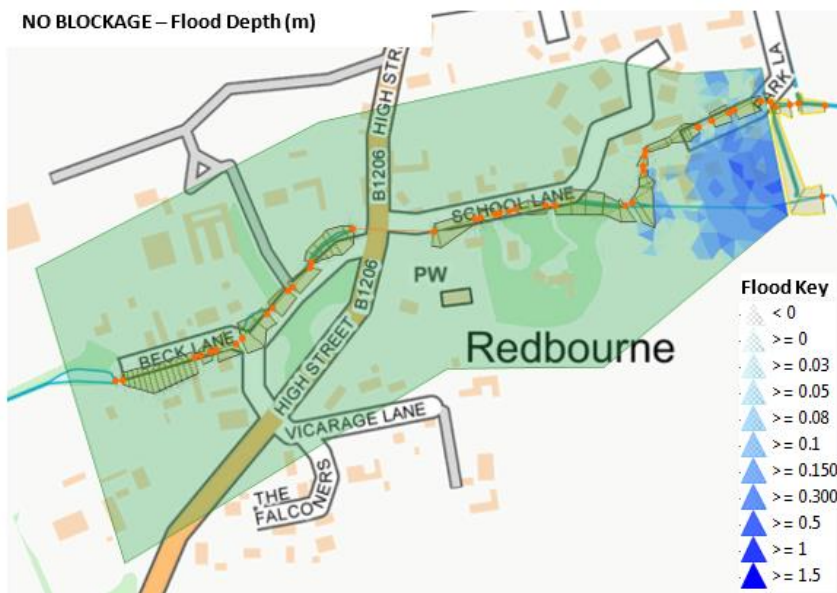


Figure 2 – 1% AEP flood extents (100% blockage)



Figure 3 – Revised catchment area (3.5 hectares where water will enter the beck)



Recommendations

The latest modelling review has been able to more accurately represent the flood extents experience in Redbourne in 2007, 2008 and 2019.

The below options will mitigate flooding on all previous flooding incidents in Redbourne. A hybrid solution of the options will be carried out as opposed to one option in its entirety, as stated below.

-Therefore, it is recommended that the following long list of options are investigated further including a potential blockage at the B1206 culvert:

- Option 1 - Flow restriction upstream of the village, including storage;
- Option 2 - Lowering of overflow weir at Emmerson House;
- Option 3 – New diversion channel around property at School Lane and Park Lane;
- Option 4 – Improvements to trash screen to reduce blockages and improve ease of maintenance;
- Option 5 – Combination of Options 1, 2 and 4; and
- Option 6 – Combination of Options 1, 3 and 4.