Needham Market hydraulic modelling non-technical summary

Project update winter 2015

Background

Following the May 2012 flooding in Needham Market, the Suffolk Flood Risk Management Partnership has carried out computer modelling to understand what happened and to start investigating possible ways of reducing the flood risk. A new model was built to show the combined risk from the River Gipping, Lion Barn Drain and Orchard Gate Watercourse plus surface water flooding (direct rainfall). This new model has been verified against the May 2012 event using recorded flood levels on buildings and gauged river levels.

Modelling results

In July 2014 we met with the Needham Market flooding working group. This group mainly consists of local residents. Following our discussions we commissioned 12 different modelling scenarios for the 1 in 5 year (20% chance of occurring in any year), 1 in 20 year (5% chance of occurring in any year) and 1 in 100 year (1% chance of occurring in any year) return period flood events. A summary of some main areas that were discussed with the group are provided below.

1 in 100 year return period event. Change in water level (cm) from baseline.

Scenario	Upstream of St Mary's Bridge (GIPP_18625)	Upstream of Bosmere Mill (GIPP_17800)
1. Vegetation clearance entire model	-16	-5
2. Gates closed & blockages	-2	0
3. Vegetation clearance downstream of Hawks Mill only	-9	-5
4. Vegetation clearance in certain areas	-9	-13
5. Silt bar removal	-6	+1
6. Lowering of Bosmere bypass weir	0	0
7. Desktop study Lion Barn drain	0	0
8. Desktop study upstream flood storage	-2	-1
9. Desktop study Crown Street pumping	N/A	N/A
10. Combination of best options (scenario 3 & 5)	-11	-5
11. Future design of St Mary's bridge	-1	0
12. Complete removal of Bosmere bypass weir	0	-6

What has the modelling shown for the possible options?

The results show that across all the scenarios modelled, the changes in water levels are not large. The greatest reduction relates to the removal of Bosmere Mill bypass weir, however this only reduced in-channel water levels immediately upstream in the area near Needham Lake, and not the town itself.

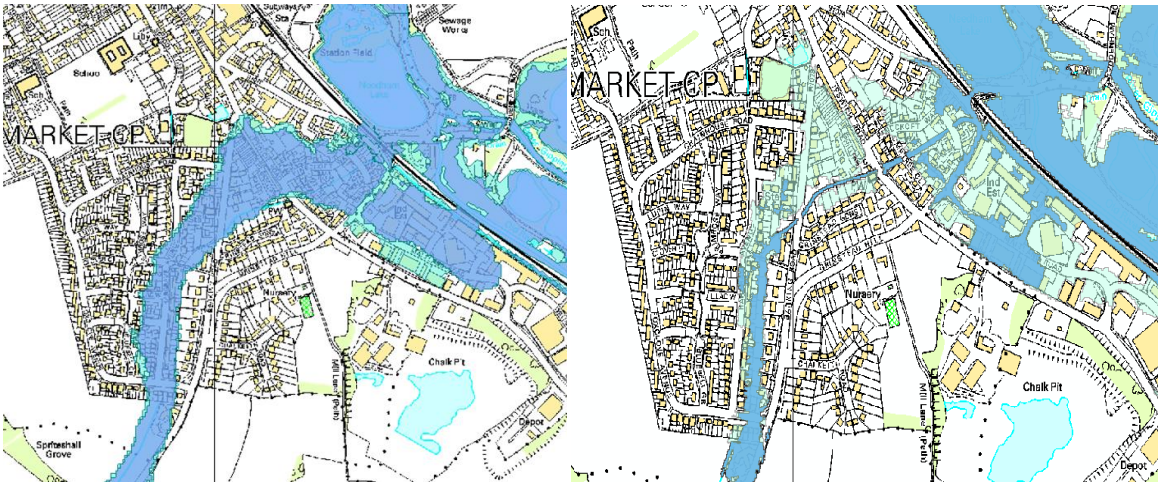
Vegetation clearance is shown to reduce water levels, but doing excessive clearance upstream of Hawks Mill lock can increase flood risk here and further downstream. Our proposed maintenance plan (scenario 4 in the table) is shown to reduce water levels by up to 13cm in certain locations and generally reduced water levels across the study area. This provides useful evidence to support our continued routine channel maintenance works. Further details on our routine maintenance are provided towards the end of this update.

We also modelled the combination of vegetation clearance and removal of the silt bars in the river channel which was shown to reduce water levels by up to 14cm in certain places, but has been shown to increase flood risk to property downstream.

Upstream flood storage on the Lion Barn Drain was investigated but this was deemed unfeasible due to the amount of land take against the flood reduction benefits. Upstream flood storage along the River Gipping was also considered but because the entire floodplain is flooded for all events, there is limited extra space for large excavations to store floodwaters, and the scale of the works are likely to outweigh potential benefits.

Flood map update

The updated modelling reduces the flood extents in the Lion Barn area of the town (see below) therefore removing a significant number of properties from the area shown at high risk of flooding. This will replace the current outlines on the GOV.UK website early next year.



Existing flood map *Updated mapping*

Dark blue: 1% annual probability. Light blue: 0.1% annual probability

Economic testing of the possible options

Following the hydraulic modelling we obtained floor levels for properties across the town that were potentially at risk from surface water and river flooding. A local resident kindly helped us obtain the levels of the properties near the River Gipping. This allowed us to understand the risk of flooding to specific properties in a given scenario across the town (see table below).

2yr	5yr	10yr	20yr	30yr	50yr	75yr	100yr	200yr	1000yr
4	6	12	17	20	26	31	35	83	197

Number of properties at risk of flooding from surface water and river flooding in each return period

The two scenarios which provided the greatest reduction in flood levels to the town based on the hydraulic modelling results have been investigated further to work out their benefit/cost compared to the existing situation. These were:

Option 4 - Continue the current 'River Gipping routine maintenance' works.
Option 10 - Combination of the two optimum options: options 3 and 5 (downstream vegetation clearance and silt bar removal)

In addition we investigated the use of Property Level protection (PLP) – implementing measures to reduce the impact of flooding at home or business level.

Example of a flood barrier being tested (source Defra report FD2668)

We were able to estimate the potential damages caused by flooding across the town using the flood depths and property threshold levels in these scenarios. Damages were calculated for residential and commercial property, vehicles, and include the costs for the emergency services responding to a flood incident.

This analysis suggests that the use of property level protection (PLP) offers the most favourable economic return on the money invested, however it is recognised that due to uncertainties in local weather forecasts it is not always possible to accurately warn

of impending surface water flooding, thus these measures may not be suitable for certain households.

The study also recognises there is benefit in our current maintenance activities which helps provide evidence for our continuing maintenance activities in the town (see update below).

Earlier this year we installed two flap valves on the outfalls on Crown Street to ensure that water from the River Gipping can't enter Crown Street through the highway drains when river levels are high. We are also investigating the use of pumps on Crown Street to remove surface water when the drainage outfalls are submerged, providing a secondary defence against surface water ponding.

Newly installed flap valves in Crown Street

Routine channel maintenance

This year we have undertaken channel maintenance to remove vegetation using the weed boat in 2km of the River Gipping upstream of Hawks Mill and adjacent to Needham Lake. We also sprayed the reeds in an 800m section between Hawks Mill and Crown Street Bridge to kill them and reduce channel growth next year, as this area was too shallow for the boat to safely operate in. The reeds in the middle third of the channel were sprayed and we should see the results next year.

We plan to carry out channel clearance on Lion Barn Drain, Orchard Gate Watercourse and Earl Stonham watercourse in the near future.

Next steps

The hydraulic modelling and wider work carried out as part of this study will be used to help us understand what measures, if any, may be appropriate to consider for further assessment and potential inclusion in building a business case.

Once we have investigated potential measures further, we will be keen to

have input from residents and the wider community, particularly regarding PLP.

To progress with any proposal that reduces the flood risk in the town, funding will be required from other sources to supplement government funding. The more contributions obtained, the greater the chances of government funding.

Examples of funding from local sources include the Regional Flood & Coastal Committee (as local levy), contributions from local authorities and private contributions from individuals, organisations and businesses.

If you would like further information on the hydraulic modelling we can provide you with the full report.

How do I get further information?

For more information or to discuss the project, please contact:

Will Todd, Environment Agency william.todd@environment-agency.gov.uk

Simon Curl, Suffolk County Council simon.curl@suffolk.gov.uk

Or view www.greensuffolk.org/SFRMP