Summary of the 2012 modelling report

Wainford Mill

In 2012 a report was commissioned to model the influence of removing several structures along the River Waveney. This was done to help develop our understanding of how these structures impact flood risk.

The structures were modelled as removed because at the time, this was seen as the scenario that could have the greatest impact on flood risk to people and property.

The structures at Wainford Mill

The three main structures at Wainford Mill are:

- The main sluice located around 75m upstream of the mill buildings at TM3497890094 and shown in Photograph 2 on the Citizen Space web page.
- A fixed crest weir located around 35m upstream of the mill buildings at TM3502190094.
- The mill sluice located at TM3507690085 and shown in Photograph 1 on the Citizen Space web page. This is the structure that we are proposing to withdraw our maintenance responsibility for and transfer ownership to a third-party riparian owner. This mill sluice is not operated even in flood conditions and therefore the structure was not included in the modelling runs in 2012. Further information on this can be found in the Concluding Comments section on page 3.

Structure removal

To remove the main sluice and fixed crest weir for the modelling runs, the following changes were applied:

- The main sluice was removed and replaced with a spill weir, with the same width as the sluice gate, but an invert level equivalent to the upstream bed level.
- The bed levels either side of the fixed crest weir are similar and so this structure was simply removed.

Summary of results

a) Water Levels

Table 1 on page 2 shows the modelled upstream and downstream water levels with the main sluice and fixed crest weir removed. Further guidance to help interpret this data can be found in Appendix 1 on page 4.

Table 1: Upstream and downstream water levels at Wainford Mill with the main sluice and fixed crest weir removed

	U/S water levels (mAOD)*		D/S water levels (mAOD)*	
RP	Current	Structure Removed	Current	Structure Removed
Q5	3.56	3.52	3.35	3.35
Q25	3.65	3.62	3.46	3.46
Q50	3.69	3.66	3.50	3.50
Q100	3.70	3.68	3.52	3.52
Q200	3.75	3.73	3.57	3.57

*Upstream water levels were recorded at the point where the flow splits upstream of the mill and downstream water levels were recorded at the confluence downstream of the mill.

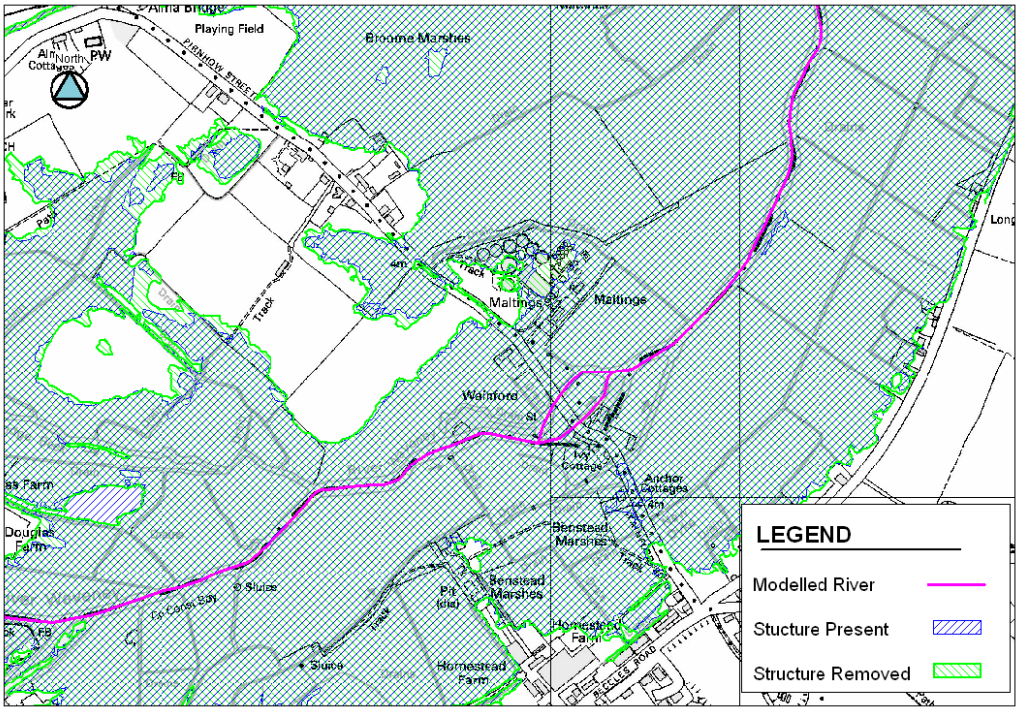
Removing the main sluice and fixed crest weir made little difference to the modelled water levels. Upstream of the flow split the modelled water levels decrease by between 0.02m and 0.04m, with no change downstream of the mill.

b) Flood Extent

Map 1 shows the flood outline for a 1 in 100-year flood event (1% AEP).

With the structures removed, there is a small increase in flood extent in the vicinity of the Maltings and in some areas to the north of the River Waveney and south-west of Pirnhow Street. This does not increase the number of dwellings at risk of flooding at the 1% AEP.

Map 1: *Flood extent for a 1 in 100-year flood event (1% AEP)*



Concluding comments

If the water levels and flood extents do not change significantly when a structure is modelled as removed, this shows that the structure does not provide additional protection to people and property when compared to the natural river channel and is therefore not a key asset in managing flood risk to people and property. This is the case for the main sluice and fixed weir at Wainford Mill.

The small changes in water level seemed reasonable as neither of the larger structures at Wainford Mill (i.e. the main sluice and fixed weir) provide a huge constriction to flow and there is significant by-passing around the mill complex as the main sluice is known to drown out during flood events.

Whilst the mill sluice that we are proposing to withdraw our maintenance responsibility for and transfer ownership to a third party riparian owner was not included in this modelling, if the removal of the larger structures at Wainford makes little difference to modelled water levels and flood extent, it is highly unlikely that a much smaller structure is going to affect water levels and flood extent to the point where it is a key asset in managing flood risk. In addition, most of the flow is re-routed through the larger structures during times of normal flow, or across the floodplain when the structures are drowned out during flood events.

We have recently updated our hydraulic modelling for the River Waveney catchment to include flood extents and water levels for a variety of flooding scenarios, as well as structure removal. We are looking to share this modelling via the Citizen Space web page once the final report is available.

The outputs from this most up-to-date modelling will be used to re-assess the viability of our proposal and ensure that clear guidance is provided to any owner owner/operator if the process goes ahead.

Appendix 1 - notes to accompany Table 1

U/S	Upstream
D/S	Downstream
mAOD	metres above Ordnance Datum (the height above average sea level)
RP	Return Period, also known as the annual recurrence interval.
Q5	A 1 in 5-year flood event, or a flood event with a 20% chance of occurring each year. This is also known as a 20% Annual Exceedance Probability (AEP) flood event.
Q25	A 1 in 25-year flood event, or a flood event with a 4% chance of occurring each year. This is also known as a 4 % Annual Exceedance Probability (AEP) flood event.
Q50	A 1 in 50-year flood event, or a flood event with a 2% chance of occurring each year. This is also known as a 2% Annual Exceedance Probability (AEP) flood event.
Q100	A 1 in 100-year flood event, or a flood event with a 1% chance of occurring each year. This is also known as a 1% Annual Exceedance Probability (AEP) flood event.
Q200	A 1 in 200-year flood event, or a flood event with a 0.5% chance of occurring each year. This is also known as a 0.5% Annual Exceedance Probability (AEP) flood event.