



Brandeston Water Control Boards

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1. Introduction and background

The Brandeston Flood boards form a weir behind Brandeston School, Brandeston TM 24860 60165.

Following discussions with landowners, this report has been produced to outline the issues and present possible solutions to address this failing structure. This report will be circulated to the land owners and affected parties with a view to interested parties meeting and discussing a way of moving forward with this project based on the options outlined in this report.

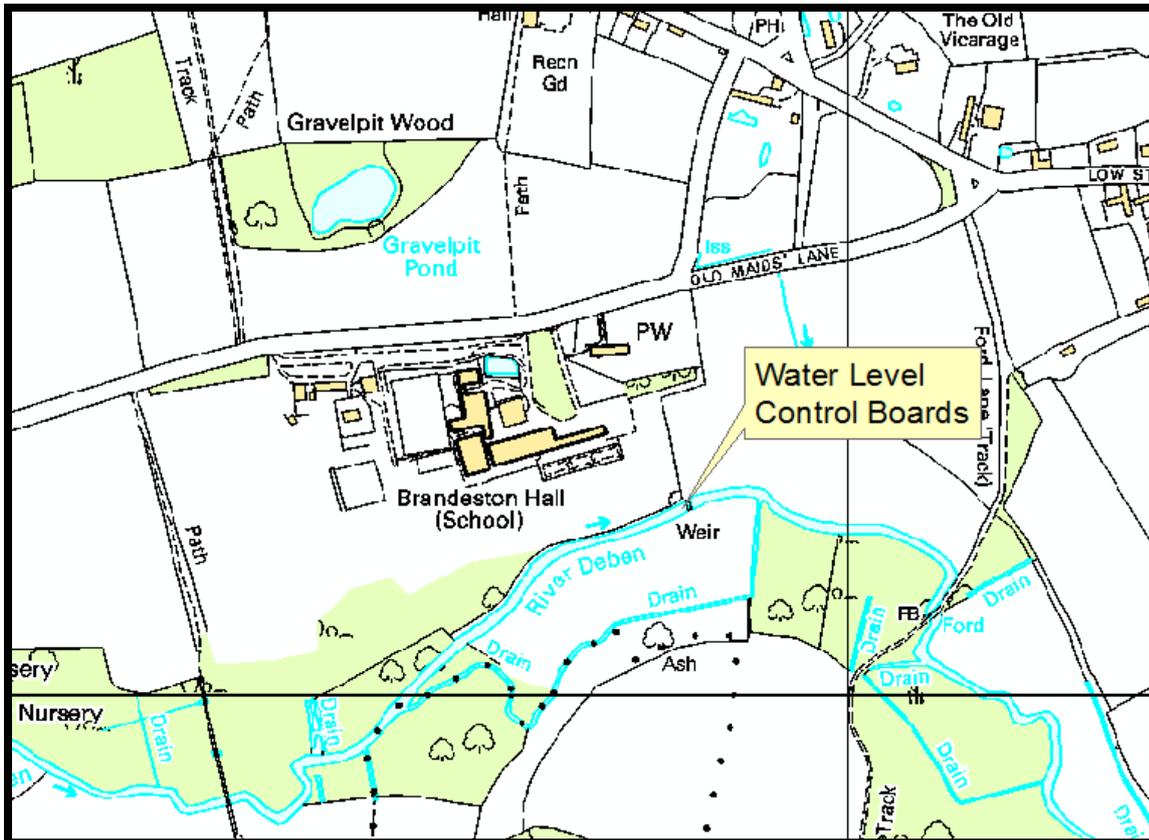
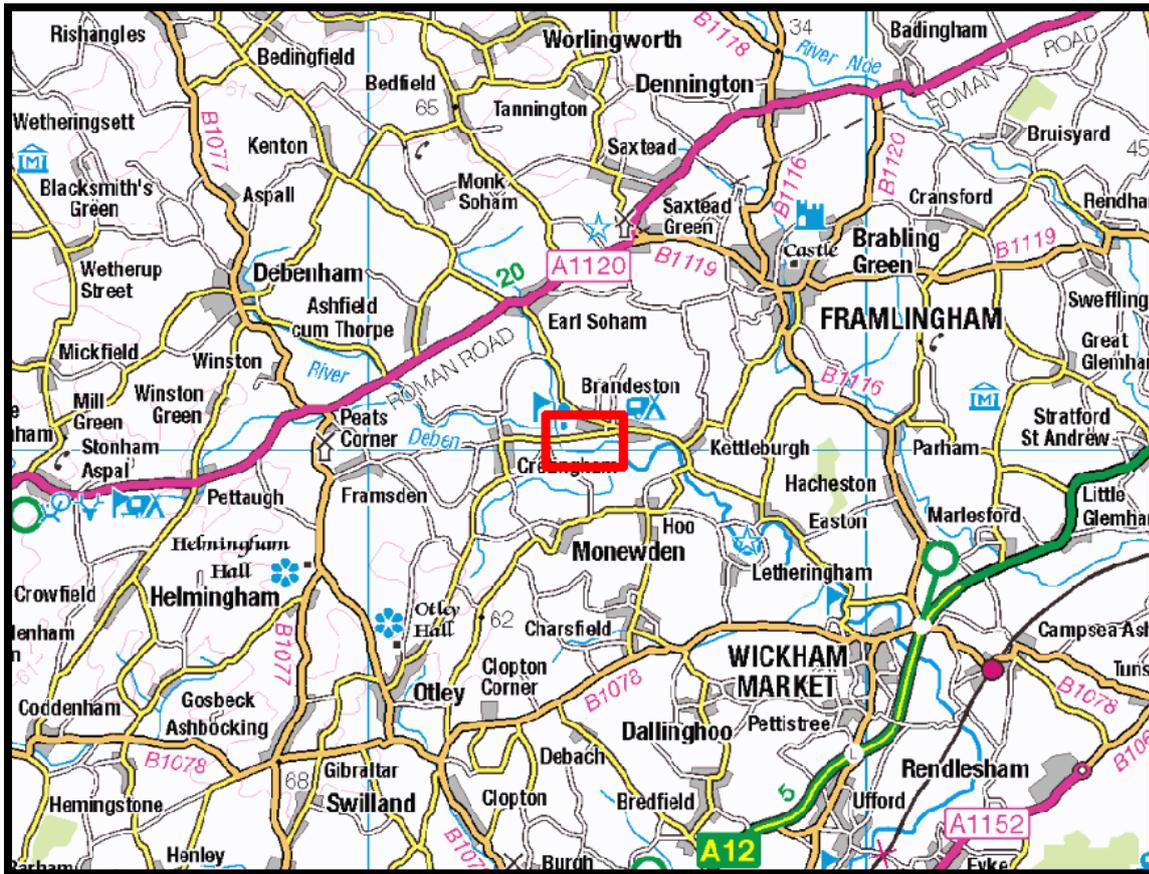
This part of the river Deben has been heavily engineered by many years of in channel works, over-deepening and widening of the channel. The structure maintains an artificial upstream river level; slowing the flow of water and allowing sediment build up and associated weed growth. The site is not within or close to a designated or protected area.

There is currently no significant flood risk in the area and for this reason it is misleading to refer to the structure as flood boards. It would be more meaningful to refer to them as water level control boards.

There is no documented reason why the structure was put in, or by whom. It is assumed that they were put in place to maintain the summer water level of the Deben to enable water abstraction by land owners and for recreational purposes.

At some point, the Environment Agency took on the responsibility of the maintenance and operation of the structure. We however, have no claim of ownership.

2. Site Plans



3. Current situation

The water level control boards are in a poor state of repair and are deemed to be in a failing condition. They have temporarily been repaired with plastic sheeting, but it is expected that the wooden boards may fail within the next 2-3 years.

Without the boards in position, the level of the river will drop resulting in the river being approximately 0.2m deep in summer months. This drop in water level will change the local ecology and if allowed to happen in an uncontrolled manner, would damage water vole habitat.

Due to the design and construction of the structure it has been 'red carded' meaning that it has been deemed unsafe for our staff to operate and maintain. The current operation of the boards requires our field teams to enter the water course and manually lift the boards in and out of position.

We must make sure that we use every pound of tax payers' money to reduce the risk of flooding to most people, homes and businesses. This means that where a flood defence, or in this case water level control board, provides little or no flood risk benefit we return the maintenance responsibility for the structure to the riparian landowner.

The Water Framework Directive (WFD) is a European directive which aims to protect and improve the water environment. This directive along with other pieces of environmental legislation places certain legal requirements on us that we must fulfil whilst we are undertaking our work.

There are hundreds of barriers (for example, weirs, sluices, gauging stations) on our rivers in England and these barriers prevent the free movement of fish and eels and limit the diversity of river habitats. We are required to make these barriers passable to fish and eels as part of wider measures to deliver WFD objectives for our rivers. Where it is possible to do so the removal of structures is the best way to improve river habitats and enable fish and eel passage. Removing structures and replacing with a carefully designed habitat enhancement scheme also reduces or removes ongoing maintenance costs and liabilities relating to a structure.

Shallow wells provide the sole supply for a number of properties in the Friday street hamlet just upstream of the Brandeston structure. Historically the Environment Agency has undertaken work to secure the supply to a number of these local wells. This work was undertaken as a precautionary measure to mitigate for the potential draw down caused by our river support operations. We also had concerns regarding the sensitivity of these supplies to changes in river stage levels.

The Friday Street supplies are located within 100 metres of the river along a reach where the water control board tail water effect is greater than 0.6 metres. During the

summer of 2013 and the following winter we monitored the well and river levels to understanding the hydraulic continuity between these features.

No definite signal could be observed during the removal of the boards and there has been no lowering of levels in the spring of 2014 as a result of permanent removal of the upper boards. We would not interpret this direct observation to conclude there is no potential affect such as may result from long term storage loss in dry years. This data is however indicative of poor continuity between the two features.

The short period (15 minute) data collected from the data loggers gave us a good understanding of the hydraulic continuity in this area and showed that the response of the well and the river levels is distinctly different. At locations where the valley material is permeable, we would expect to observe a more regular well response to increasing river level with the potential for a reversal in the hydraulic gradient in winter and the development of almost planar summer water table condition in the valley discharge zone.

At Friday Street the wells recover in a slow stepped fashion with response to individual rainfall events preceding the river level rise. There is also a significant seasonal increase in hydraulic gradient towards the river.

At no point is the gradient negative or below 1%. Recession rates are predominantly linear and constant from which we are able to infer that a positive gradient to the river will always be maintained even under stress conditions. The relative response of the river and well all indicate local conditions of poor hydraulic continuity between the river and the shallow aquifer.

We were unable to extend this monitoring into a period of very low flows and levels and we must stress that there is a potential for river water level management practices to impact on well water levels under drought conditions. We can now however conclude that the risk is low.

4. Consequences of doing nothing

If we stopped operation and maintenance here, the residual life expectancy of the structure is 2-3 years. Failure of the structure will lower upstream water levels, affecting river and riparian habitat and possibly impacting groundwater levels.

5. Possible Scenarios

5.1 Removal of the structure

Removal of the structure will have an effect on river habitats and will possibly affect groundwater levels. With a managed staged removal of the boards over a few years, water vole habitat will not be damaged and existing water voles will be able to adapt to the change in river level. Removal of the structure will allow free movement of fish and eels and increase the diversity of the river habitats. This option presents the least challenges with regards to funding and would eliminate the need for any future maintenance and operations costs to the maintainer.

Estimated cost – £5k

5.2 Refurbishment with operation and maintenance by the Environment Agency

This would require us to repair the structure and continue with the current operation and maintenance regime to maintain existing water levels in the Deben. With no properties benefiting from a reduction in flood risk, we would not obtain the full amount of funding required.

Estimated cost - £15k to £20k

5.3 Refurbishment with landowner operation and maintenance

This would require us to undertake a refurbishment project to repair the structure and then handover the operation and maintenance to a third party. As with the previous scenario, we would not obtain the full amount of funding required for this scenario.

Estimated cost - £5k to £10k

5.4 Removal of the structure and replace with riffles and pools

This system would maintain the water levels in the river by creating a natural weir using imported stone and gravels. This would improve dissolved oxygen levels and produce more varied river habitats and would allow fish passage up and downstream without the need for a specially designed and constructed fish and eel pass.

Replacing the structure and undertaking a river restoration scheme here will help meet the objectives of the WFD with regard to improving river habitat diversity, enabling fish and eel passage as well as maintaining existing water levels up and downstream.

Estimated cost - £25k to £30k

5.5 Removal of the structure and full river restoration

In this option a number of river restoration techniques including the installation of a riffle and pool sequences would be undertaken. Creating a two-stage channel so that lower flows are contained within a narrower and shallower river channel would increase the range of river habitats present, address fish and eel passage issues, and reduce maintenance costs while maintaining the existing wider and deeper channel to contain higher river flows.

Estimated cost - £30 to £40k

6. Environment Agency's preferred suggestions

Observations for a sustainable solution

Having considered all scenarios, in our view there are three options that deliver a sustainable solution on the river Deben at Brandeston in terms of reducing maintenance costs and liability as well as enhancing river habitats.

6.1 Removal of the structure

This option presents the least challenges with regards to funding and would eliminate the need for any future maintenance and operations costs to the maintainer. Whilst there would be a capital cost to remove the structure, there would be no further maintenance or operational cost at this site in the future to us or landowners.

6.2 Refurbishment with landowner operation and maintenance

This option would require us to replace the timber boards and then handover the operation and maintenance to a third party. Any changes to the structure would be subject to Flood Defence Consent.

6.3 Removal of the structure and replacing with riffles and pools

This option will have all the benefits of the removal of the structure but with the added benefits of maintaining existing up and downstream water levels and additional habitat creation.

This will enhanced the river habitats, remove the barrier to fish and eel movement reconnecting habitats and fish communities and maintain recreational use.

Whilst there would be a capital cost to remove the structure and undertake the habitat enhancement works, there would be no further maintenance or operational cost at this site in the future, which means that the burden on riparian landowners for

potential on-going maintenance is removed and the environment it creates is attractive.

Challenges:

This type of river restoration does raise a number of challenging funding issues. While we will be able to fund elements of the project, such as the removal of the structure, third party partnership funding from other sources such as local authorities, local community and landowners.

In recent months we have been investigating new funding possibilities and this option is looking more promising as we may be able to secure a percentage of the funds required from other areas of the business and possibly other interested parties; this however, is yet to be confirmed and we would still require further third party funding contribution.

We have undertaken similar projects elsewhere to remove redundant or failing structures, including the removal of Homersfield sluice on the Waveney in 2013. A report on the Homersfield project is included in appendix A.