

## **Review of Flood Defence Trial in Clementhorpe.**

### **Summary**

- 1 This report advises Members on the progress made with the trial use of the Aquabarrier flood defence system and seeks guidance on the future response to flooding from the River Ouse in the Clementhorpe area.

### **Background**

- 2 On 9 November 2004 the Executive received a report entitled "Temporary Flood Defences". It considered the outcome of a study into options for temporary flooding defences in those areas of the City which flooded in November 2000 and sought guidance on progressing those options. Paragraph 13 of the report identified possible temporary flood defences that could be used at various locations in the City that flooded in 2000.
- 3 Having considered the advice of the Shadow Executive, Members recommended that :
  - (vi) Officers enter into negotiations with Aquabarrier to take up their offer of a pilot for their demountable system in the Clementhorpe area at nil direct cost to the authority providing that:
    - a) Suitable agreements can be reached with the landowners of the walls at either side of the reach of the proposed barrier;
    - b) All works identified by City of York Council officers to ensure the stability of the system in flood are achieved;
    - c) An agreement on operation and costs of deployment is reached;
    - d) An exit strategy is agreed to ensure that the authority is not left with a liability if the scheme is cancelled;
    - e) Public consultation is undertaken with residents directly affected by the proposed schemes.

The reason for this was to improve flood protection in York.

- 4 Following those negotiations a further report on the “Clementhorpe Flood Barrier – Aquabarrier Pilot Scheme” was taken on 8 June 2006 to the meeting of the Executive Member for Neighbourhood Services and Advisory Panel. That report advised Members of the proposed offer by Aquabarrier-Systems Ltd, to provide a demountable flood defence system in Clementhorpe, at minimal cost to the Council, and sought Members approval to accept the offer. Officers confirmed that the defence level could not be raised to the 1 in 100 year protection as requested by the Micklegate Ward Committee meeting, at that stage as a taller defence unit was still under development and would be 2 – 3 years before it could be trialed.
- 5 It was resolved that the Executive Member would accept the advice of the Advisory Panel that a demountable flood defence to give protection against a river level of 10.200m Above Ordnance Datum (AOD) i.e. 1 in 50/60 year protection, which could be augmented with sandbagging when protection was required against a 1 in 100 year event. This option was proposed by Aquabarrier at minimal cost to the Council.
- 6 The reason for this decision was to give flood protection to the Clementhorpe area of York, within the funding arrangements currently available to the Council.

#### **Civil Contingency Act.**

- 7 As a Category 1 responder under the Civil Contingencies Act 2004, the Council has a statutory duty to risk assess, plan for and respond to emergencies affecting both itself and the communities it serves. An emergency is defined by the act as an event or situation which presents a serious threat to the welfare of the population of the UK or a part of it, the environment or the political, economic or administrative stability of it or its security.
- 8 A ‘**threat**’ is further defined as:
  - the loss of human life,
  - human illness or injury,
  - homelessness, damage to property, disruption to the supply of food, water, energy, fuel or other essential commodity,
  - disruption to communications, transport or medical, educational or other essential services.
- 9 To respond to this duty the Council has a River Flooding Emergency Plan which details all the actions needed to be carried out in a river flood event and temporary defences is one of those actions.

#### **The Barrier in Operation**

- 10 The Aquabarrier was deployed during a river flood event between 6 – 11 September 2008. During this event the peak river level was 9.400m AOD and the barrier unit held back a depth of water approximately 650mm high. Some

minor leaks were evident between the barrier units themselves, and between them and their foundation slab. This seepage drained away through the highway gullies. However, of concern was the seepage under the foundation slab of the barrier to the supposedly “dry” side of the barrier. The tarmac road surface lifted and was floating on a layer of water, luckily this upward pressure was relieved through some cracks in the road surface and joints where the tarmac abutted the kerbstones.

- 11 The barrier is designed to hold back up to 1.5m, in height, of water and at this level the belief is that there is a significant risk of road failure on the property side of the barrier which could be sudden and catastrophic, also potentially affecting the stability of public utility pipes and cables. Clearly such a failure and the subsequent upward flow of water could be dangerous to any persons in the vicinity and will as a minimum mean that the barrier is thereafter ineffective.
- 12 The problem of seepage was discussed with Aquabarrier throughout the development of the project and they believe they had allowed for this in their design. However, the quantity of seepage was greater than they expected and overwhelmed their seepage collection system.
- 13 A meeting took place between Aquabarrier and the Council to review the problem and see if any remedial actions could be taken. As this was a pilot project and because of the poor ground conditions, and an unknown extent of remedial works, Aquabarrier believe that this falls outside the scope of their commitment to the project.
- 14 Both the Council's officers and Aquabarrier now have serious reservations about future deployment of the barrier because of the Health and Safety risks which have been identified. A diagram showing the seepage problem is at Annex B.
- 15 The water level in Clementhorpe during the peak of the November 2000 event was 10.300m AOD. The coping level of the temporary barrier is 10.200m AOD. As part of the development of the trial the property thresholds in the Clementhorpe area have been surveyed. There are 28 properties with thresholds below this level. The threshold of the lowest property is 10.020m AOD, so it can be seen that it is only the top 180mm of the barrier which offer protection against internal property flooding. At flood levels below that the barrier will only offer assistance to people in gaining access to their properties at times of flooding.

## **Consultation**

- 16 Correspondence has been received and/or discussions have taken place with, Hugh Bayley MP, a number of individual residents, Ward Members and the Directors of Waterfront House.
- 17 These comments were generally in connection with the following:
  - People believed the barrier worked.

- Why did the barrier not go in during the flood event of 30 November – 16 December 2009.
- Why were residents not informed that the barrier was not to be installed in the above event.
- What are the proposals for the future to defend the area against flooding.

At the various meetings explanations were given consistent with the contents of the letter sent out to residents on 21 January 2010, as seen at Annex A.

## Options

18 There are three possible options for Members to consider:

### **Option 1 - Continue with the trial of the Barrier.**

19 This would see the continuance in the trial of the Aquabarrier system at the bottom of Clementhorpe in times of flooding, when it would be called off to be put in use in accordance with the guidance in the River Flooding Emergency Plan.

### **Option 2 - Provide underground seepage cut-off.**

20 This would require the installation of a vertical impermeable cut-off to prevent flood water from the river seeping through the ground, under the barrier foundation slab, to rise on the property “dry” side of the flood barrier. This would need to be constructed adjacent to and attached to the foundation slab.

### **Option 3 - Terminate the trial of the Aquabarrier System and provide a sand bag bund across Clementhorpe adjacent to River Street and wait for the Environment Agency scheme to provide a permanent flood alleviation scheme.**

21 This would involve the termination of trial of the Aquabarrier system and at times when the river is predicted to rise greater than 4.0m above its normal summer level (9.000m AOD), a sandbag bund could be erected across the carriageway of Clementhorpe from the corner of 2, River Street to the lower side of 30, Clementhorpe.

## Analysis

### **Option 1 - Continue with the trial of the Barrier.**

22 As outlined in paragraphs 10 to 15 , because of the Health and Safety implications this option is not recommended.

### **Option 2 - Provide underground seepage cut-off.**

23 The installation of an effective seepage cut-off arrangement would be very expensive and difficult to install given the number of utility services in the area and preventing the flow of seepage water from under adjacent properties. The

contractor believes this to be outside the contract with the Council and would not be willing to install it. Therefore any cost would have to be borne by the Council. This option is not recommended.

**Option 3 - Terminate the trial of the AquabARRIER System and provide a sand bag bund across Clementhorpe adjacent to River Street and wait for the Environment Agency scheme to provide a permanent flood alleviation scheme.**

- 24 Some assistance could be given to mitigate the effects of flooding suffered by residents in River Street and those higher up the hill by providing a sandbag bund across Clementhorpe from the corner of 2, River Street to the lower side of 30, Clementhorpe. This would assist in residents accessing River Street in most flood events, but will not prevent property flooding in extreme events. The residents of Riverside Cottage, Waterfront House and Dukes Wharf would have restrictions to their access, but should be able in most flood events to gain rear access via Lower Darnborough Street.
- 25 As was advised in the 8 June 2006 EMAP report the foundation slab for the barrier will become redundant and will be left in place as per the contract with AquabARRIER. The actual AquabARRIER units themselves will need to be collected by the supplier.
- 26 The Environment Agency have on their forward plan a project to study the feasibility of a permanent flood alleviation scheme for the Clementhorpe area, starting in the 2012/13 financial year. For the above reasons this is the recommended option.

### **Corporate Priorities**

27. The continued support to temporary defences in the Clementhorpe area will help with the corporate priority to provide a Healthy City, by helping residents to lead an independent life in their own home. Also it continues the commitment to provide a Safer City by offering what assistance is available in times of an emergency.

### **Implications**

- 28 This report has the following implications:
  - **Financial** – If the recommended option is chosen there would be a return to the process of installing a sandbag bund across Clementhorpe during significant flood events and this could cost in the order of £500 per event.
  - **Human Resources (HR)** - No impact
  - **Equalities** - No impact
  - **Legal** - The Council will need to revoke the agreements with adjacent property owners.
  - **Crime and Disorder** - No impact

- **Information Technology (IT)** - No impact
- **Property** - No impact
- **Other** - As was advised in the 8 June 2006 EMAP report the foundation slab for the barrier will become redundant and will be left in place as per the contract with Aquabarrier.

## Risk Management

- 29 There are two risks to consider. The first is the Health and Safety implications if the seepage pressure became too great and caused a catastrophic failure of the road and public utilities. It is felt that this is too great for the current deployment of the barrier to continue. The second is reputational risk, where the Council may be criticised for terminating the trial, but the provision of the sand bag bund would give some measure of assistance to the residents of River street and those who live further up the hill. It is felt that this risk is preferable to the reputational risk that would ensue if the system did fail.

## Recommendations

- 30 Following the problems with ground conditions at the location of the trial flood defence system in Clementhorpe, it is proposed that Members approve the termination of the trial of the Aquabarrier system and agree to the revised action plan of introducing a sandbag bund across Clementhorpe to offer residents some assistance in times of flooding from the River Ouse in the Clementhorpe area.

Reason: To overcome the potential health and safety risks associated with the seepage flow through the ground causing road failure and flooding behind the line of defence and offer some measure of assistance to residents in the Clementhorpe area.

## Contact Details

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Report Approved

Date 4 March 2010

## Specialist Implications Officer(s)

Wards Affected: *Micklelegate*

**For further information please contact the author of the report**

**Background Papers:**

Executive - 9 November 2004 - Temporary Flood Defences.

EMAP Neighbourhood Services - 8 June 2006 - Clementhorpe Flood Barrier –  
Aquabarrier Pilot Scheme.

**Annexes**

Annex A – Letter to Clementhorpe residents dated 21 January 2010

Annex B – Diagram of seepage path

Annex C – Clementhorpe Proposed Temporary Defences

Annex D – Clementhorpe Typical Permanent Defences