
**Meeting of the Executive Member for
Neighbourhood Services and Advisory Panel**

8 June 2006

Report of the Director of City Strategy

**CLEMENTHORPE FLOOD BARRIER – AQUABARRIER PILOT
SCHEME**

Summary

1. This report is to advise Members of the proposed offer by AquaBarrier-Systems Ltd, to provide a demountable flood defence system at Clementhorpe, at minimal cost to the Council, and seeks Members approval to accept the offer.

Background

2. The 2000 floods cost City of York Council £1.32m. Individual costs to householders ran into many thousands of pounds, with an estimated damage figure of around £30,000 - £40,000 per house (based on Government figures).
3. Records show that forty properties in the River Street / Clementhorpe area suffered internal property flooding during the 2000 flood, and access was cut off to at least another fifty, as shown on Annex 1. Lower-level floods also restrict access to many properties.
4. The highway surface in Clementhorpe begins to flood at 8.50m Above Ordnance Datum (AOD), which is 3.5m above normal River Ouse summer level, and property flooding starts at 10.03m AOD. The 2000 flood reached a level of 10.30m AOD at this location. The effects of the flood were worsened by a back-flow of foul sewage from the drains, due to the failure of Yorkshire Water Services' (YWS) Fulford Pumping Station.
5. In subsequent flood events, the Council has built a temporary sandbag bund across Clementhorpe near its junction with Terry Avenue, to allow access to residents during floods. However, this bund is not high enough to prevent internal property flooding.
6. To tackle this flooding problem, a "free trial" of a removable flood barrier has been offered to the Council by AquaBarrier-Systems Ltd. This prototype barrier has been tested in a dry dock and in a Hydraulics Research

establishment, but AquaBarrier are now keen to test their product in a real situation. The system, as shown on Annex 2, has the following features: -

- A raised table across the end of Clementhorpe (similar to a speed table, but with gentler ramps), onto which temporary interlocking barriers will be fixed in times of flood. The barrier has built-in rubber seals to prevent leakage around the structure.
 - Stand-by temporary pumping to deal with ground water, which builds up behind the barrier.
7. Following the Executive meeting of 9th November 2004, Members resolved to enter into negotiations with AquaBarrier-Systems Ltd, to take up their offer of a pilot for their demountable flood defence system at Clementhorpe.
 8. The Environment Agency is interested in testing this product and is therefore offering grant-aid to AquaBarrier to undertake the trial.

Consultation

9. The proposed scheme has been consulted upon, both internally with council officers and Members, and externally with over 250 local residents and businesses. The scheme was also presented to the public during the Micklegate Ward Committee meeting held on the 8 May 2006. The results of the consultation process are produced below: -

Internal Consultation:

- The Council's Engineering Consultancy carried out a Stage 2 Safety Audit. A number of recommendations were made to modify the proposed road signs for the scheme, which have now been accommodated into the works.
- The proposal to carry out the construction under a temporary road closure was objected to by Network Management. The contractor has subsequently confirmed that the scheme can be constructed with temporary traffic lights to keep the road open.
- Local ward councilors are supportive of the scheme

External Consultation:

- Fifty-four survey forms were returned (25% of those canvassed).
- Of those returned, 63% strongly agreed that the scheme will be effective at reducing flood risk in the area.
- A further 24% slightly agreed that the scheme would be effective.
- Overall, 15% of people commented that a higher defence level (100-year) should be provided.

- 9% of returns indicated that the scheme would have little or no effect against flooding.
 - A vote, by show of hands, was held at the end of the ward committee meeting, asking who was in favour of the scheme. Those present were overwhelmingly in favour. The floor was also asked if the Council should pursue an option to raise the protection level of the barrier to 100-year, instead of the proposed 50/60-year protection, which was also greatly supported.
 - Consultations with statutory undertakers (gas, electric, Emergency Services etc.) have lead to requirements for numerous diversions of services and the provision of spare ducts through the barrier for future use. These costs are being borne by AquaBarrier-Systems Ltd. No comments have been received from the Emergency Services.
- 10 AquaBarrier-Systems Ltd were consulted following this meeting for their views on raising the protection level of the barrier. They ruled out raising the base level by 200mm as this would extend the raised table by a considerable distance into Terry Avenue and further up Clementhorpe and create drainage problems in the road. They suggested that on the few occasions when such levels were predicted the barrier could be augmented by a sandbag wall behind built to a higher level to increase the crest level of the barrier.

Options

- 11 There are two options:

Option 1: Demountable flood defence to give protection against a river level of 10.20m AOD (100mm below the 2000 flood, i.e. 1 in 50/60-year protection), which can be augmented with sandbagging when protection is required against a 1 in 100 year event. This option is the scheme proposed by AquaBarrier at minimal cost to the Council.

Option 2: Not proceed with the demountable flood defence scheme and continue sandbagging as at present when floods occur.

Analysis

- 12 Option 1

Advantages

- It would provide protection against 170mm depth of internal flooding, to at least 14 low-level properties.
- Access will be maintained to a large number of properties, which would otherwise be cut off by floodwater.

- Fear and anxiety would be reduced for local residents.
- The trial will be at minimal costs to the Council and York's residents.
- The modified "raised table" will have minimal visual impact or effect on traffic travelling over it.
- Releases resources to deal with flooding problems elsewhere in the City.

13. Disadvantages

- The barrier set with its crest at 10.20m AOD will give 1 in 50-year flood protection. However, protection against the more extreme flood events can be provided by sandbagging .
- The deployment of this system will have to take place more frequently than the current sandbag arrangement. This is because the barrier units have to be fixed to the floor, prior to the floodwater covering the raised table.
- The Council will need to provide indemnity against damage for the two adjacent householders to which the AquaBarrier will be attached, without which the householders will refuse to consent to the scheme.
- The barrier's operation during floods is wholly dependant upon the uninterrupted operation of YWS's pumping station at Fulford, to prevent sewage backing-up behind the defences
- Floodwater could still rise up behind the barrier as a result of backflow through the sewers.
- Provision of the temporary barrier may lessen the probability of the Environment Agency providing a permanent flood defence.
- The Council will need to find a suitable storage location for the barriers when not in use, or pay an additional £500 per deployment to AquaBarrier.
- If the barrier fails to operate successfully and the Council terminates the agreement, then the "raised table" will have to remain in place, as no arrangements are in place for the permanent infrastructure to be removed. Such removal has been estimated to cost over £20k.

14 Option 2

Advantages

- Access to Terry Avenue can remain open longer as the defences do not need to be constructed so soon.

Disadvantages

- Lower level protection, no flood protection inside properties.
- Loss of access to many properties.

Corporate Objectives

- 15 This scheme falls under the Council's Corporate Strategy, Building on Success: 3.1 York's City Vision (York – A City Making History). York will be the first place in the country to test this innovative type of barrier, and will be seen to be continuing its support for residents during times of flood.

Implications

- 16 The implications of the proposals are as follows: -

- **Financial –**

- The civil engineering works to enable the use of the system would be provided free of charge to the Council. The first 3 deployments of the barrier (including the initial test) would be free of charge. Additional deployments within 3 years of installation would cost £1k each (up to a maximum total of 6 deployments, i.e. £6k). The current average cost of deploying sandbags in this area is £1k per annum.
- After the three-year trial, negotiations will be required between the Council and AquaBarrier-Systems Ltd as to the continued use of the system. The latest quote from AquaBarrier's Director reads "*... It would be difficult at this stage to tie City of York Council, the E.A. or ourselves into any pricing structure at this point in time*". It is likely that, as a minimum, the Council will need to purchase the set of barriers at a cost of £12k.

- **Human Resources (HR) - There** are no Human Resources implications.

- **Equalities - There** are no Equality implications.

- **Legal - The Council** will need to provide indemnity for the two adjacent householders who will abut the barrier, without which they will refuse to consent to the scheme. Currently, the sandbag is deployed without any legal agreement, but to a much lower level than the proposals in this report. The table would be constructed under powers in the Highways Act 1980, in line with Highways (Road Hump) Regulations 1996. Signing would be in accordance with Traffic Signs Regulations and General Directions 2002.

- **Crime and Disorder - There** are no Crime and Disorder implications.

- **Information Technology (IT) - There** are no IT implications.

- **Other – The Council** will take over maintenance of the permanent infrastructure, once it has been constructed.

Risk Management

- 17 The successful deployment of either option during floods is wholly dependant upon the uninterrupted operation of YWS's pumping station at Fulford. Failure of the pumping station during extreme event floods will result in sewage back-flow through the sewers and drains, causing flooding behind the barrier. The risk has been reduced since YWS rebuilt their pumping station. However, in extreme flood events, the sewerage system may still become over-loaded by the infiltration from the river. This could result in sewage backing-up in Lower Darnborough Street, causing flooding behind the defences.
- 18 The Council will need to provide indemnity for the two adjacent householders who will abut the barrier, against any damage to their property as a result of deployment of either of the options, without which they will refuse to consent to the scheme. No significant additional loading will be placed on the adjoining walls as a result of this proposal. Leakage around the barrier could cause erosion to the foundation of the wall. However, the risk of this occurring is minimal due to the proposed pressure grouting behind the walls as part of the works.

Recommendations

- 19 That the Advisory Panel advises the Executive Member that approval be given to Option 1, detailed in paragraph 1 of the report, to proceed with construction of the AquaBarrier-Systems Ltd scheme.

Reason: To give flood protection to the Clementhorpe area of York, within the funding arrangements currently available the Council.

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Report Approved Date

Chief Officer's name
Title

Report Approved Date

SPECIALIST IMPLICATIONS OFFCIERS(S)

Implication – legal
Brian Gray
Principal Property Lawyer
Tel No. 01904 551042

Wards Affected: Micklegate

For further information please contact the author of the report

Background Papers:

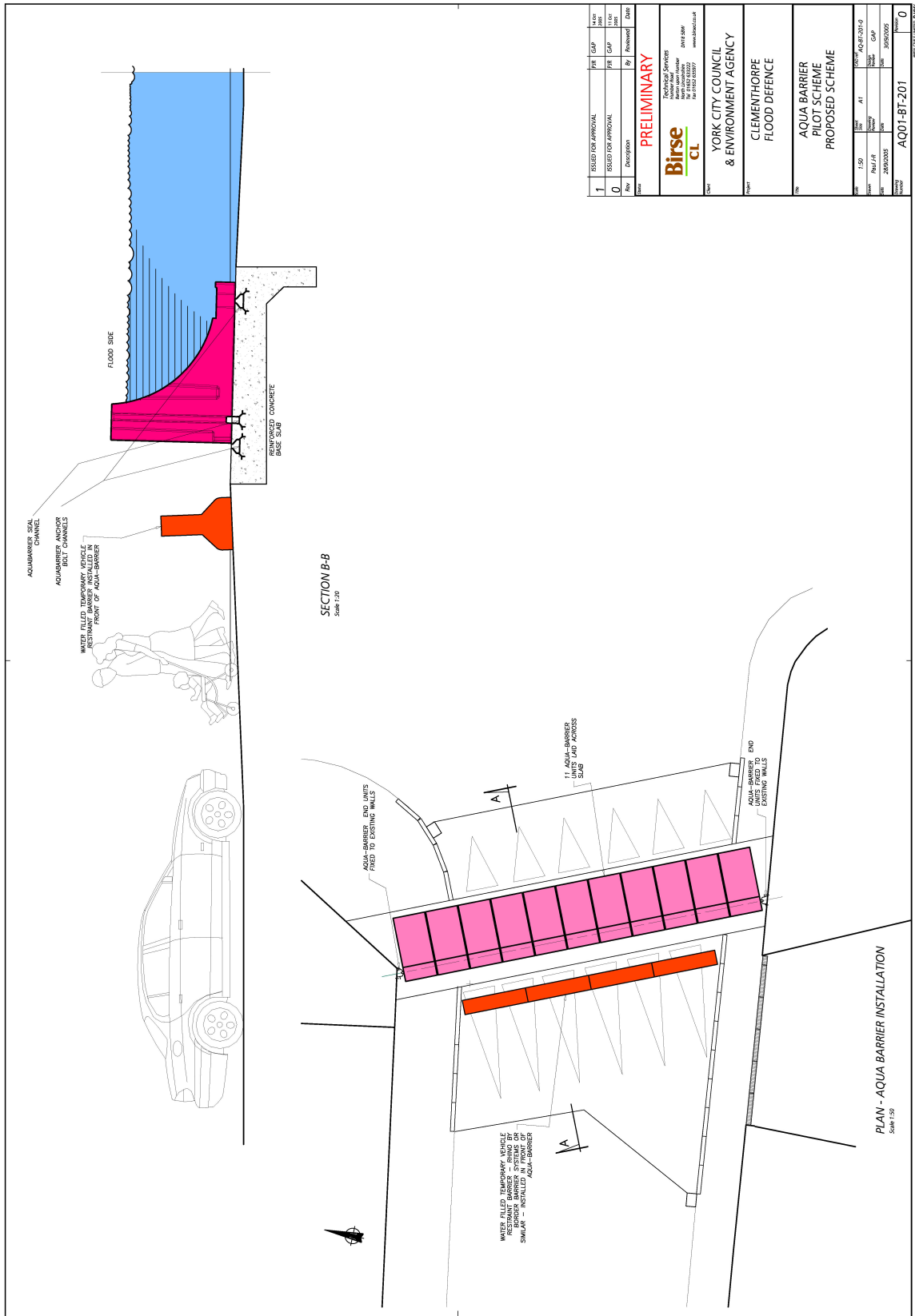
None.

Annexes

Annex 1: Plan showing 2000 Flood Extent.

Annex 2: Proposed AquaBarrier Scheme.

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Client	YORK CITY COUNCIL & ENVIRONMENT AGENCY			
Project	CLEMETHORPE FLOOD DEFENCE			
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