TRANSPORT AND WORKS ACT 1992
TRANSPORT AND WORKS (INQUIRIES PROCEDURE) RULES 2004
TOWN AND COUNTRY PLANNING ACT 1990
BOSTON BARRIER ORDER

DOCUMENT EA/2/1

PROOF OF EVIDENCE

OF

SUN YAN EVANS

FLOOD RISK

FOR

ENVIRONMENT AGENCY

MARCH 2017

SUMMARY PROOF OF EVIDENCE

1 Introduction

1.1 My name is Sun Yan Evans. I am a Technical Director for Storm and Flood Risk Management with Mott MacDonald, an international multidisciplinary consultancy. I specialise in hydrodynamic modelling of rivers, estuaries and coasts; flood risk assessments and flood risk mapping. I have been working in the flood risk management field for the last 30 years.

2 Scope Of Evidence

2.1 My evidence provides my opinion on flood risk and modelling related to the pre and post construction of the Boston Barrier Scheme.

2.2 My evidence covers the following aspects:

a) History and effects of flooding in Boston;

b) The benefits of the scheme;

c) The robustness of flood risk assessment and modelling;

d) Impact on flood risk downstream of the Barrier along the Haven;

e) Impact on flood risk upstream;

f) Effect of the Barrier on the velocity of water in the channel; and

g) The location of the Barrier.

2.3 In my evidence, I respond to objections raised related to the scope of my evidence.

2.4 Of the matters about which the Secretary of State particularly wishes to be informed, my evidence also address the following:

2.4.1 Matters 1, 2, 3, 5(b), 7, 12i, 12iii and 14(a).

3 Need and Support for Boston Barrier Scheme

3.1 Boston has a history of tidal flooding from the tidal river known as ‘the Haven’. The major flood risk in the town of Boston is from the tidal surges propagating up the tidal river from the Wash.

3.2 In 1953, Boston was badly flooded by a big tidal surge event. In December 2013, an even greater tidal surge event hit east coast, sea water propagated up the Haven, overtopped the river banks, inundated the streets, flooded people’s houses, shops, schools and business premises, also caused significant damages to critical infrastructure, such as road and substations. The floods significantly affected Boston and led to significant disruptions and economical losses.

3.3 With the predicted sea level rise due to climate change, the potential flood risk to the Boston is increasing.

3.4 The Environment Agency proposes to build a tidal Barrier and improve the downstream embankments on the Haven to reduce flood risk and mitigate the effects of climate change.

4 History and Impacts of Flooding in Boston

4.1 The town of Boston is entirely located within the floodplain and it has a history of tidal flooding. Just within over 200 years' span, Boston experienced nine instances of flooding, namely in 1779, 1807, 1810, 1949, 1953, 1961, 1976, 1978, and 2013. With climate change and predicted sea level rise in the future, the threat of tidal flooding to the public's health and safety, and to the high grade agricultural land, which is so important to this country's food security and sustainability, is on the increase.

5 Benefits of the Barrier

5.1 The current level of flood protection for Boston is 'low', with a likelihood of 2% in any one year. However, the frequency of flooding will increase over time with climate change.

5.2 The Scheme would offer protection against an 'extreme' tidal flood event – considered to be an event with a 1 in 300 (0.33%) chance of happening in any one year over a 100 year time period including allowance for climate change.

5.3 The benefits of the Scheme therefore include:

a) a reduction in flood risk from 'significant' to 'low' to 17,269 residential properties;

b) a reduction in flood risk to nearly 582 commercial properties; and

c) present value benefits of £1,116m (October 2015 cost base).

5.4 The Barrier and improvements to the Haven embankments downstream of the Barrier will provide security and peace of mind to the people of this borough, investors, visitors and business.

6 Flood Risk and Modelling

6.1 Some concerns have been raised by third parties regarding the flood risk impacts of the proposed Scheme. Those concerns are categorised into the following aspects:

6.1.1 robustness of the flood risk assessment and modelling, including climate change;

6.1.2 impact of flood risk downstream of the Barrier along the Haven;

6.1.3 impact of food risk upstream of the Grand Sluice;

6.1.4 the location of the Barrier; and

6.1.5 effect of the Barrier on the velocity of water in the channel.

6.2 The Robustness of the Flood Risk Assessment and Modelling

6.2.1 Following my review, I consider that the FRA (**FRA**) (**A/17/2C**) has been carried out in accordance with all relevant guidance and best practice. The models were properly calibrated against previous known events, including the worst fluvial and worst tidal events recorded. All the modelling and testing that can reasonably be done has been done. The modelling is compatible with future climate change scenarios. It is my considered opinion that the FRA and modelling is robust and complete.

6.3 Impacts on Flood Risk Downstream Along the Haven

6.3.1 Specific concerns have been raised by some third parties that the implementation and operation of the proposed Barrier will cause increased flood risk to the downstream reach of the Haven. This concern is ill-founded and is based on a misunderstanding of the position.

6.4 Impact on Flood Risk Upstream

6.4.1 Concerns have been raised by some objectors that that the implementation and operation of the proposed Barrier will cause increased flood risk upstream.

6.4.2 The implementation and the operation of the Barrier will not increase the flood risk upstream of Grand Sluice and upstream of Black Sluice for tidally dominant events when the Barrier is raised during high tide.

6.4.3 The modelling results have shown that the operation of the Boston Barrier will not significantly change the water levels in the River Witham upstream of Grand Sluice during fluvial floods.

6.4.4 The analysis has also demonstrated minor increases (0.01m to 0.05m) in upstream levels in the South Forty Foot Drain, when water is not pumped into the Haven during tidal lock conditions, and when the Barrier is raised, though properties would not be flooded.

6.5 Effect of the Barrier on the Velocity of Water in the Channel

6.5.1 Comments made by third parties suggest that the velocity through the Barrier could be as high as 2.5 times the velocity in the current situation due to the narrowing of the channel section at the Barrier. This concern is misplaced.

6.6 The Location of the Barrier

6.6.1 It was perceived by some objectors that a Barrier located at the end of the Haven with a lock would provide protection for a larger area.

6.6.2 It was concluded in the 1994 Sea Lock PFS report that building a sea lock and a barrage at the mouth of the Haven was less preferable than at a location further upstream. This assessment is supported even more so today.

6.6.3 A Barrier at the mouth of the Haven or other alternative locations would provide no greater level of protection from flood risk and would protect no greater an area than the proposals comprised within the Scheme.

6.6.4 The current proposed Barrier location will not only serve its purpose to reduce the risk from tidal flooding but will also provide the most practical, social, economic and environmental benefits overall.

7 Issues Raised in Objections

7.1 I have responded to the concerns raised by objectors that relate to my proof of evidence.

8 Response to Statement of Matters

8.1 I have responded to the issues raised in the Statement of Matters that related to my proof of evidence.

9 Conclusions

9.1 Not building a Barrier (and improvements to the embankments downstream of the Haven) would have major negative impacts upon the people in Boston due to the potential flood damage and risk to life along with the stress and health related impacts of living at risk of flooding, as well as the economic impacts.

9.2 The provision of a tidal defence Barrier will help to reduce flooding risk to over 17,000 homes and businesses in Boston. It will help to provide the opportunity for greater regeneration and economic development in Boston.

9.3 Regarding the Barrier location, the proposed Barrier at Location B will not only reduce the tidal flood flooding risk to Boston, but will also help to provide the most practical, social, economic and environmental benefits compared to other shortlisted locations A, C, D, E and locations at or towards the mouth of the Haven.

9.4 Considering the flood risk faced by Boston town now and the increasing flood risk in the future, considering the wider benefits could be brought by the proposed Barrier, in my opinion, permission should be granted to implement the Boston Barrier scheme.