

The Inland Waterways Association Consultation response

Transport and Works Act 1992- Application by the Environment Agency for an Order under Sections 3(1) (b) and 5 dated 23 August 2016- The Boston Barrier Order

Introduction

The Inland Waterways Association (IWA) has been consulted under the Transport and Works (Applications and Objections Procedure) (England and Wales) Rules 2006 Schedule 5 categories 3&4, on The Boston Barrier Order. In particular, IWA is concerned over the impact of the Order, if granted, on navigation issues.

The Inland Waterways Association is a registered charity, founded in 1946, which advocates the conservation, use, maintenance, restoration and development of the inland waterways for public benefit.

IWA members' interests include boating, towpath walking, industrial archaeology, nature conservation and many other activities associated with the inland waterways.

IWA works closely with navigation authorities, other waterway bodies, and a wide range of national and local authorities, voluntary, private and public sector organisations.

Objection to the granting of the Order

IWA objects to the granting of the Order in its current form.

Whilst the need for a Tidal Surge Barrier at Boston is clear, the impact of the Environment Agency's (EA) project on navigation is inaccurately set out and inadequately mitigated. Notwithstanding comments from IWA on the draft Environmental Statement including a section on navigational risk, and comments on the form of the draft of the Order itself, the Order is unclear on what EA is intending to do directly or through others to mitigate substantial navigational risk.

The section on navigational risk within the accompanying Environmental Statement remains inaccurate and inconsistent with other parts of the Environmental Statement, and has not delivered against requirements and comments made by local experienced mariners, the Port of Boston, and the Marine Management Organisation. Where significant impacts are identified, neither the order or the Navigational Risk Assessment details what steps are actually going to be put in place to mitigate these impacts, and it is apparent EA does not regard them as a priority.

IWA considers that in the absence of firm and detailed proposals to address and mitigate navigational risk, and given the concerns of local individuals, organisations and regulatory bodies there is insufficient evidence to allow the Order to proceed without further

investigation. The Inland Waterways Association requests that the Secretary of State holds either a hearing, or a Public Enquiry, into the Order to address its current shortcomings in these areas amongst others before deciding whether it should be approved.

IWA hopes that its considered comments will result in a better and more complete outcome of the TWAO application and statement of case. Any further enquiry needs to be conducted on the complete facts and merits of the safety case for navigation, rather than conjecture and EA assertion.

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Detailed comments on the Order, the Navigational Risk Assessment and other relevant parts of the Environmental Statement

IWA has studied the documentation from EA in detail. Comments to support the recommendation for a hearing or public enquiry are set out below, as follows;

1. A general introduction to the project and its recent history (pages 4-5)
2. Comments on the proposed Section A2 Draft TWA Boston Barrier Order (pages 6-7)
3. Comments on the Navigational Risk Assessment- listed by EA within the Environmental Statement, Volume 2D Technical Report: Navigational Impact Assessment (pages 8- 19)
4. Comments on other relevant parts of the Environmental Statement (20-26)

A General introduction to the Boston Barrier project and its recent history

The present proposal for a tidal surge barrier by the EA has been under discussion for many years, and many completion dates have already passed. This was originally set out by the Boston Combined Strategy (BCS) of a steering group including EA, Lincolnshire County Council and Boston Borough Council as early as 2008. This group proposed a plan to address flooding at the same time as economic development within the town of Boston. More recently the steering group procured a report outlining the potential benefits of various options of these plans from consultants (Richard Glen Associates 2015 Multifunctional Barrier – Water Level Management Economic Benefit Analysis). This set out the options and major benefits from raising the water level in the Haven as a holistic proposal to benefit Boston, and this confirmed the benefits from undertaking the tidal surge barrier construction as a key part of water level management (WLM) above the tidal barrier. Early in 2015, this holistic project was halted as EA intended to complete the tidal barrier by 2019, if necessary without the other benefits of WLM to Boston.

Regrettably by not providing a tidal lock and operating the barrier to maintain a half tide level to the Grand Sluice as was originally included, EA has prevented the opportunity for the commercial development of Boston's water front, and improving the Fenland Waterways Link connection through the Black Sluice Lock.

Also as a result of this late change, new impacts on navigational risk have appeared. Placing the barrier in a location allegedly beneficial to future water level management creates flow velocities which, in conjunction with fluvial flows, will make navigation more hazardous when operated only as a tidal barrier, particularly at certain times and conditions. Despite a joint statement from EA, Lincolnshire County Council and Boston Borough Council confirming their intention to continue to develop water level management in future, EA clearly states in its proposed Order and Environmental Statement that the barrier may only be used for flood protection. As a result it seems likely that there will be no synergistic benefit to Boston or its economy and quality of life from further exploitation of the river front and associated navigational use and tourism.

Moreover the lateness of the change means there remains considerable uncertainty and controversy in the area on what this project is providing. Consultations made before early 2015 included development of the waterfront, showing representations of potential developments, as well as highlighting the primary benefit of tidal surge protection. Uncertainty remains amongst commercial & recreational navigators over the arrangements for handling problems created by the construction of the barrier, and there is little known about what will be provided to mitigate risk once barrier operation is in place.

The details that are of major concern to the IWA and other users are lack of information in the EA's Navigational Risk Assessment and Environmental Statement with particular reference to the following items;

- Lack of detail and inconsistencies on flow velocities around the barrier both during and following construction and their effects on navigation

- The proposed minimum 18 metres width of the coffer dam by-pass channel, which according to some documentation in the TWAO Application could be further reduced by protection and collision defences.
- Lack of information on what is actually to be put in place by the project to manage transit by water during the construction period, or for the operational barrier. This includes whether there will be one or two-way operation, and what will be put in place to provide 'safe havens' up and downstream of the construction area and operational barrier.
- Risk of collision due to excessive flows and short sight-lines with the barrier location on a bend in the Haven.
- Proposal to close the navigation on occasions during construction, to the detriment of the commercial fishing fleet and leisure users.

The TWAO Application A4 Concise Statement of Aims states:

'Furthermore, the Proposal has been designed in a manner which would not preclude achievement of the navigation objective identified by the BCS, through the future delivery of water level management proposals.'

IWA considers that the content of the TWAO application and supporting documentation makes it impossible to deliver this aim.

Comments on the proposed Section A2 Draft TWA Boston Barrier Order

Section 5: Power to Deviate

The Order proposes unlimited deviation laterally or vertically on all details of work within the limits of deviation of the Order. Whilst changes and in particular improvements to the project are always welcome, being able to change everything to any extent is not reasonable. EA has had plenty of time to finalise its plans and the Order should be qualified to permit a smaller and more specific measure of reasonable deviation than this unlimited suggestion. Changes in vertical and lateral points within this scope can produce significantly different outcomes and effects which will make it impossible to determine what EA is intending to erect and operate, apart from the fact that the barrier gap will be exactly 25m.

Section 7: Works in the River

This section sets out powers the Order provides EA to allow it to carry out the works in the river. In particular ‘...and despite any interference with public or private rights..’ EA can ‘remove or relocate any mooring’, ‘...direct the owner or master of any vessel....moored or left (whether lawfully or not) to remove or relocate it’ and then recover the costs from the owner or master. This seems an unnecessarily draconian power for a boat owner or master who has lawfully occupied a mooring, and should be removed for lawful occupation. In that case, it is reasonable for either EA to have to find the owner/ master, or move the vessel at EA’s expense.

Section 17: Temporary closing of river in connection with works

It is not reasonable for EA to have no liability whatsoever for closure of the river, unless the 17(2) condition on minimising interference to navigation has been met.

Section 45: Power to operate scheduled works

S45 only covers operation of the scheduled works to safeguard against flooding. S45(2) states that ‘...the power conferred in paragraph (1) is to be exercised to safeguard against flooding’. S45 (4) confirms that ‘Except when required to be closed for the purposes mentioned...the barrier and the flood gates are to remain open’. This precludes any use of the barrier for water level management at a later date, somewhat at odds with the joint statement from EA, Lincolnshire County Council and Boston Borough Council to continue to develop water level management for Boston.

Subsection 5 identifies that EA ‘must have regard to’ ‘the safety of vessels on the river, and the requirements of vessels in the river (including the need to have freedom of access to moorings and berths in the river upstream of the barrier)’.

As EA has not provided a way around the closed barrier, such as a lock, it does not appear to have the ability to meet this requirement. This section appears to be compromised by the change in purpose of the barrier in early 2015. IWA objects to EA being able to compromise the rights of navigators in this way. EA has chosen to reduce the scope of its project, and thereby eliminated navigators’ ability to pass the barrier at certain times for either routine maintenance or purposeful operation to defend against a tidal surge. The rights of navigators need to be protected in the provision of this barrier, and EA should be required to provide a way of navigating around it to maintain navigators’ right to navigate.

Section 53 Byelaws

The scope of byelaws EA is seeking here gives them the freedom, once granted, to significantly limit the right of navigation in the vicinity of the works, without limit. This power is unreasonable, and is opposed by IWA. Some test of reasonableness is required, and IWA proposes that EA should only be able to 'make byelaws in relation to the navigation and use of the river area...' when necessary to fulfil the function of safe operation of the tidal surge barrier. IWA looks to the Secretary of State to ensure the public right of navigation overrides EA's byelaw applications. This power should be limited at the TWAO Application stage, rather than allowing EA to propose byelaws and expecting people to check each one as it is proposed, and act to prevent unreasonable seeking of powers one by one.

EA has chosen to limit the works in the TWAO to avoid providing a means to bypass the barrier such as a lock. If EA considers operation of its barrier will require powers to limit navigation, it should be required to provide suitable alternatives, notably a lock for all sizes of vessel normally requiring passage.

Schedule 8 Protection of the Port of Boston

This Schedule states in Section 3 that EA must submit plans to the Harbour Authority (HA) of the Port of Boston for any works, and that the HA may not unreasonably withhold approval. Section 3(3) (b) states that the HA approval may be given subject to 'such reasonable requirements as the Harbour Authority may make for the protection of...navigation in, or the flow regime of, the river;...'. IWA is pleased to see this requirement and oversight, and looks to the HA to exercise this power to protect navigation and navigators.

IWA is also pleased to note, in Sections 5, 7, 8 and 9 the powers confirmed for the Harbour Authority to protect navigation, maintain adequate depth by dredging, and require the EA to pay for reasonable equipment for protection of navigators. IWA comments on the inconsistency of provision for mitigation of navigation set out by EA in its Navigation Risk Assessment and Environmental Statement below.

Comments on the Navigational Risk Assessment (NRA) (listed by EA within the Environmental Statement, Volume 2D Technical Report: Navigational Impact Assessment)

Introduction

The introduction sets out the project outline. Interestingly it states that (1.2.1) the project will not affect existing standards of fluvial flood protection, whereas in A17/2b - Volume 2b: Technical Report: Surface Water and Flood Risk Section 2.8.3 there is a small adverse effect on tidal lock periods and on levels of fluvial flood protection. When 90 percentile Climate Change increases are applied, these modelled effects are likely to be more serious than EA claims. There is more detail on this issue in IWA's comments on A17.2B - Volume 2b: Estuarine and Geomorphology Processes Technical Report in 'Comments on other relevant parts of the Environmental Statement'

Section 1.2.3 refers to 'annual probability of flooding' in the context of bankside defences, however it is not clear that the probability referred to is tidal surge flooding only. No improvement is going to result in fluvial flooding as a result of this project, and there may be a deterioration.

Section 2 Assessment Methodology

Introduction

This section mentions the Marine Management Organisation (MMO) letter of 22.5.15. MMO makes a series of comments on the scope and what they expect to see in the final Navigation Risk Assessment. In IWA's view, despite MMO's letter EA has failed to address manoeuvrability during construction, or included and assessed mitigation adequately within the NRA.

S2.2.1 sets out the sources of information- it is disappointing to see that EA has not obtained any independent verification of the models produced by their consultants, although IWA suggested this was both useful and necessary.

Section 2.4 Consultation

EA has worked hard to consult widely. However in this section, it omits to mention that the consultations prior to early 2015 were about, in effect, a different scheme which contained significant benefits and mitigations for navigators and residents of Boston which are now excluded from the project.

IWA both received and responded to EA's letter of consultation.

Section 2.5 Approach

EA sets out its standardised Environmental Statement methodology. This is not a requirement of an NRA, nor particularly useful. The NRA stands alone in the TWAO

application process, with its particular focus on the impact of a project on navigation as an aid to deciding whether a TWAO Application should be approved or not.

Section 2.6 Evaluation of Impacts

As is stated later, there is a degree of subjectivity involved in the standardised process, and without any references detailing the evidence for EA's input from 'lessons learned from previous barrier schemes and experience', or 'professional industry experience in marine structures and navigation' it is not possible to know whether they are of any relevance.

'Types of impact' notably misses out one of significant relevance to recreational users. Why is there not an impact on the receptor's recreation? This should be an additional equivalent, given that for most people their recreation time is at least as important and as valuable as their business time. Whether voyaging on a commercial passenger trip, or navigating their own boat, recreational users of waterways expect their time should be considered and acknowledged as valuable by others.

Table 2.1 should include 'recreational impact' to each definition of sensitivity.

Section 2.6.9 refers again to 'professional industry experience in marine structures and navigation'. How and why is this relevant? Local experience and knowledge has been little used by EA, but usually brushed off and not used in practice resulting in a lack of trust locally in its work. How much reliance has been placed on this professional industry experience, and what industry is it in?

Table 2.2 sets out magnitude criteria. 'Geographic area' seems a poor criterion to suggest. What does it refer to- the length of the navigation a navigator is undertaking? The project is confined to a very small area, and a boat can for example only get sunk or badly damaged once on a journey and that event would be catastrophic. There seems to be a suggestion that a navigation from for example Boston to Holland might be more significant than one from Boston out and back- which is not borne out in the analysis. Otherwise longer journeys would always be 'major negative'.

The standard EA assessment of 'significance' in Table 2.3 seems a convenient way of reducing issues that need addressing. This is further commented on below.

Section 3 Legislation and Planning Policy

The navigation authority for the river Witham is the Canal and River Trust.

Section 5 Baseline Conditions

5.2.3 mentions an upstream swing bridge as a potential restriction on navigation, with a width of 32m. As can be seen in the picture below:



the locomotive shown here is 9m long, and apparently occupies less than 25% of the swing bridge which suggests a river width greater than 32m. Below the bridge, the water has largely unopposed ability to move underneath, with reasonable sight lines for boats approaching from either direction. The width as water level reduces is controlled by the dredging regime, and there are no eddys or cross currents.

Section 5.2.6 identifies PoB's dredging licence as 33,000 wet tonnes whereas elsewhere (A17/2B - Volume 2b: Estuarine and Geomorphology Processes Technical Report 4.6.2) in the Environmental Statement it states 66,000 tonnes, of which around 28,000 tonnes is used annually. The larger number appears correct, so presumably this is a mistake.

Section 5.2.12 refers to EA's consultants' modelling of ebb and flood tide events with a 1:2 year frequency. This is a fairly routine event, rather than a more extreme test. It is also the case that the impact on flow velocities is normally as a result of high flood run-offs from Grand Sluice and Black Sluice, which can be combined with MHWS ebbs. As Plate 5.2 shows, baseline conditions are relatively benign.

Section 5.3.2 refers to 2 way working for small boats and 1 way for large boats such as fishing vessels and the dredger, as a routine adopted in the existing Haven. It must be noted that this is in conditions of good visibility and consistent current flows up and down the Haven, which will change markedly when either the coffer dam or barrier installation is in place. It is also in practice an informal arrangement rather than one which is observed, with local navigators being aware of routine movements from for example the fishing fleet or the Boston Belle, and keeping over to one side in anticipation.

Section 5.12.1 refers to two types of recreational users; local Boston boats often moving out into the Wash to motor or sail, and transient inland waterway users moving from the Haven via Black Sluice Lock into the South Forty Foot Drain (Black Sluice Navigation). There is also a third group, moving from inland waterways into coastal and international waters and vice versa. These boats may visit Boston irregularly as part of a trip around the East Coast, or across the Wash to other local ports as well as travelling across to continental ports. These need to be accommodated in the baseline consideration. These boats can often reduce their air draft to facilitate moving further inland.

Table 5.4 claims to summarise user fleets. However, whilst the sailing boats from Witham Sailing Club (WSC) might well have a very predictable routine which needs to be mitigated,

inland waterways users are much less predictable as are motor boats travelling out of Boston or coming in from coastal waters, which they will expect to do at any suitable state of tide and weather. These boats will vary significantly from the 'typical vessel' quoted on the table- for example these dimensions are not sufficient for inland boats traveling across The Wash, which can be 21m long and 2.1 -6m wide. The wider of these are also the maximum sizes potentially traveling along the Haven into Black Sluice at the present time.

Section 6 Constructional Impact Assessment

Section 6.2.2 describes traffic suitable for barges which is instead probably coming in by road. This is very disappointing given the reduced green footprint of such water borne traffic, and the proximity of handling facilities.

Section 6.3 sets out the phased programme for dredging. This includes in Phase 1 dredging for the WSC facilities provided downstream of the barrier site, to avoid the small training boats movement through the construction works. It is good to see these facilities, which comprise clubhouse and welfare facilities, slipway, vehicle parking and access to onshore facilities. The pontoons provide 21.3m of capacity which represents 3-4 sailing or narrowboats, or 5-7 motor boats (drawings A18 Order Plans ref IMAN001472-PLG-025 to 028 refer). However there is ambivalence within the various documents on whether these facilities will be provided, and whether they will be maintained once construction has competed. IWA considers that these facilities are essential for both construction and operation of the barrier, for the use of all recreational navigators and should be a required facility to be permanently installed and maintained thereafter by EA. Likewise, similar or larger facilities are required above the barrier, and in some documentation has been suggested to be sited in the vicinity of Black Sluice Pumping Station. Details are required of these installations, including what exists and what extra will be installed prior to construction of the coffer dam for permanent provision, including any need to design to account for Black Sluice's pumping operation. At the current time, the Black Sluice pontoons are around 3m above water level at one stage of the tide cycle and Phase 1 dredging will have to include dredging to ensure they are at all times in water.

The TWAO approval process needs to include a direction to the applicant to provide detailed design of facilities at both above and below the barrier, to be in place before the coffer dam is erected and to be maintained permanently as floating 'safe havens' for boats unable to move beyond the barrier for whatever reason.

Section 6.5 discusses the coffer dam bypass, and the need to maintain a width of 18m. However elsewhere documentation refers to fitting of fendering which will reduce this. Whilst fendering might reduce impact, a smaller width will inevitably increase the likelihood of collisions so maintaining the maximum width is essential.

The TWAO approval process needs to ensure the coffer dam bypass width of 18m is a requirement of approval, otherwise the further reduced passage will increase navigational risk unnecessarily.

Section 6.5.5 refers to the possibility of one-way working down through the coffer dam bypass. Again this ambivalence to safety-critical requirements is very unsatisfactory. The coffer dam bypass will be the narrowest part of the project working navigational area, and inevitably will experience some strong currents and velocities. In the absence of any details of what exactly the EA is proposing, IWA has to assume a worst case scenario. Based on PIANC criteria, the channel is clearly not suitable for two way working for fishing boats or commercial passenger boats, nor the dredging barges and other construction traffic. There needs to be a robust and safe way to keep boats apart, which is ready and available for the construction of the coffer dam. This seems most likely to involve a 1- way working system, operated by the Harbour Authority and based on a VHF radio control arrangement backed up by traffic lights- however this appears neither agreed or certain.

IWA believes the TWAO approval process needs to ensure this specific provision is a requirement of approval, and that it should remain in place whilst the coffer dam exists.

Section 6.5.6-11 refers to modelling of the coffer dam bypass channel. The modelling scenario seems to take an extremely optimistic view of all potential flows and their impact on navigation. The report is based on typical fluvial flows rather than high fluvial flows. Baseline flows are shown elsewhere as 0.5-1m/s before any construction (A17/2B - Volume 2b: Estuarine and Geomorphology Processes Technical Report) equating to 1-2 knots. On top of that the model shows an increase in baseline for temporary works of 0.75-1m/s, or 1.5-2 knots, for average fluvial flows. This gives a total flow past the bypass of 2.5-4 knots before any fluvial high flows, somewhat higher than has been produced here. Moreover, with higher fluvial flows (10 year event rather than the 1 in 2 year used here) additional flows increase to 4-6 knots over base, giving 5-8 knots total with a longer tail downstream. These are unsafe for many vessels, let alone those navigating in close proximity to construction, and trying to navigate in both directions. This is also almost 3 times higher than PIANC guidance referred to in 6.5.10. This is not safe and requires substantial and detailed mitigation proposals, if the barrier is to be approved for construction.

EA's report on its modelling is very wide of the mark for the range of conditions that may be experienced by navigators. It is very unsatisfactory that such an optimistic and biased summary has been produced for a highly safety critical aspect of the project. The Port of Boston Annual Standing Local Notice To Mariners, No.4: Tidal Range and Speed of Water, currently states 'On Spring Tides, tidal range in the river can be expected to exceed 7 metres, with tidal speeds in excess of 4 knots. At times, fresh water is released without notice, from the Grand Sluice and to a lesser extent South Forty Foot, Maud Foster and Hob Hole drains and other pumping stations along the river. Such releases can produce water speeds in excess of 6 knots and mariners should take caution'. This is before the river is restricted by coffer dam or barrier.

IWA wants to see that, as above the mitigation set out for management of traffic through the bypass is a requirement of the TWAO approval, and that the Harbour Authority can use the system in extreme circumstances to close the bypass for certain vessels or types of vessels.

Section 6.6 deals with the PoB Wet Dock gates work, where the potential maximum number of ships being 'swung' in the vicinity of the South Knuckle and Swinging Hole could be 6 in a single tide, equating to around 3 hours of time when ships are manoeuvring. In poor visibility particularly, this will be a hazardous operation requiring significant management from the Harbour Authority if collisions are to be avoided.

Section 6.7 refers briefly to barrier construction, but spends most of its discussion on operation of the coffer dam bypass. Bizarrely the report has evaluated the need for further quay space to be kept empty to allow vessels passing through the bypass safely, and makes a 'recommendation'. Given that unless this PIANC guideline is met there will not be sufficient space for vessels to move out of or into the bypass safely, IWA would have expected EA to view this as an essential requirement that it will negotiate with PoB to agree. A loose 'recommendation' is not sufficient for the safety of navigators.

IWA believes the TWAO approval process needs to ensure this specific provision is a requirement of approval, and that it should remain in place whilst the coffer dam exists.

Section 6.8 refers to the construction of the flood wall on the left bank (downstream) using potentially a 15m wide jack-up platform. This will significantly reduce working width for the duration of the work, and may cause problems as navigators attempt to manoeuvre around this and other obstacles- assuming the work is not carried out in the same place as ships are attempting to swing round on the tide.

Table 6.1 summarises the 'significance of effect during construction- temporary effects'. This is a rather meaningless exercise as, with more clarity of objective it is not difficult to see which activities require substantial and definite mitigating actions. However, specific comments are as below:

01 Enabling Works, 05 Phase 1 dredging and 07 phase 3 Dredging - Sensitivity of receptor and significance of effect- it is not correct to say that being present half of the year should reduce the sensitivity from high for recreational and commercial (non -fishing) boats. The sensitivity definitions do not permit such changes. Therefore the sensitivity and significance remain high and moderate- adverse for all boat types.

15a Falling objects from safe working platform might cause damage to passing vessels- this should be moderate negative impact- damaged vessels or passengers on them will have a potentially wide impact especially if seen as newsworthy nationally.

17 Relocation of all PoB traffic to riverside berths would impact the port's operation and in particular its berthing/unberthing operations, as all vessels would be turned outside the WDE. This impact will depend on whether the ships will be kept sufficiently clear of the bypass channel, and not reduce visibility. Otherwise its impact on fishing, commercial and recreational fleets could move to medium sensitivity, moderate magnitude. The outcome would then be 'significant'.

21 Traffic increase and increased risk of collision due to delivery of materials to the PoB- magnitude of impact would be moderate negative with a significant outcome -

this will be going on in daylight throughout the construction period, around the working area and various sites, and is likely to occur in the congested navigating space with unfamiliar boats milling around.

Table 6.2 summarises Proposed Mitigations. In many ways they are a collection of the blindingly obvious, which brings the process into disrepute because it becomes a box-ticking exercise. Specific comments on some proposals are as follows:

01 Enabling Works- 'mariners' will need to include navigators inland who may travel down the Haven.

02 Dredging- If 1-way traffic is necessary- as IWA thinks it is- then it needs to be a firm proposal from the applicant, not a 'maybe'. The TWAO approval process needs to ensure this specific provision is a requirement of approval.

03 dredging- not all boats from inland waterways have or use VHF radios.

08 Cofferdam bypass- Given the likely bypass flows under not- unusual circumstances single direction working seems essential- IWA believes it is. The TWAO approval process needs to ensure this specific provision is a requirement of approval, rather than leave it to the applicant to muddle through. Likewise as has been mentioned above, provision of 'safe haven' areas above and below the barrier site seem to IWA to be an essential and necessary part of the 'safety case' for navigation, the details need to be clear and the TWAO approval process needs to ensure this specific provision is a requirement of approval.

09 Cofferdam bypass installation of rubbing strips- the narrowing of the 18m gap is highly undesirable. Strips might be useful provided they do not reduce the width below 18m.

10 Cofferdam velocities increasing risk of collision- it is hard to see how any 'notice to mariners' can be both effective in communicating the situation to all users of the Haven, and timely in providing advice relating to the situation on a particular tide and fluvial flow situation, let alone a part of the tide cycle. As PoB's Annual Standing Local Notice To Mariners, No.4: Tidal Range and Speed of Water on conditions states, fluvial water releases occur without warning.

11 Cofferdam placement of the gate- elsewhere the time of closure for gate fitting has been given as two days. Like closing a motorway, such times are always unwelcome and mean navigators have to make major changes to their arrangements. Such closures should not be allowed to extend to suit the contractor or the applicant, and need to face a test of reasonableness. IWA believes the concept of 'lane rental' on water would be a useful way of inspiring the applicant to minimise the time it takes his contractor to do such jobs requiring closures, and inserting something similar into the TWAO application approval would be helpful.

15a Falling objects from Safe Working Platform- the contractor must be expected by his client to provide extensive catch netting around his work area, along with other sensible safety precautions.

15b Risk of collision with moored ships on the river berths- suggesting mitigation by reducing the number of vessels navigating upstream is acceptable where it means the vessels associated with the project have to be deferred, however reducing other navigators going about their business or pleasure is not necessary or acceptable.

Section 6.14 Navigational traffic management

IWA remains concerned that the EA is applying for a TWAO before finalising all details of the safety arrangements for navigators, whereas the TWAO application process is designed to ensure that these, amongst other things are in place and appropriate before the applicant gets his approval. EA's lack of clarity is a very serious missed opportunity, which together with the poor and incomplete presentation of critical data indicates that the applicant is not taking the issue seriously. It also appears that the applicant has not spent sufficient time listening to the Harbour Authority who, with local mariners, has a great deal of knowledge of the Haven. EA needs to work quickly and accurately to fill this major gap in preparedness, and work with key individuals and organisations to produce concrete details which meet the need if it is to gain approval for this project. It is not acceptable to expect to gain blanket approval through the TWAO Application when the applicant has not detailed what they intend to do to provide safe navigation.

6.14.7 Communications- inland boaters will expect EA to place details of daily impacts on navigation through the Haven on the Boaters' website, and also pass details to Canal and River Trust for their boater alert system.

6.15 these items should be part of the safety case as above, prepared and ready to go.

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6.17 There seems to be some doubt that the fishing fleet has indeed agreed to move. In these circumstances of uncertainty, either the project has to be deferred whilst these unresolved issues are sorted out, or EA needs to plan for the worst case scenario that the fleet will be moving through the construction area several times each day.

6.19 Summary main residual impacts

There is very little in EA's NRA that makes a sensible and firm case to allow the project to go ahead. Incomplete preparation and presentation of evidence and uncertain suggestions as to how impacts can be mitigated do nothing to reassure IWA that the Agency has made a serious attempt to define a safety case which addresses the construction risk. Much more work remains to be done before navigational safety can be assured. There is no likelihood that EA can make a credible case that the barrier construction will 'aid the safe navigation within Boston Haven' (MMO letter 22.5.15) based on this exposition.

Section 7 Impact Assessment (Operations)

Section 7.2 identifies that the width of the barrier, at 25m over its full width, is equal to other areas of the Haven, and may require 'navigational restriction' but remains navigable, impacting traffic only in the vicinity of the barrier.

Section 7.5 sets out the results of modelling by EA's consultant on typical flows through the barrier, showing that velocities are not affected. However in 7.5.4 localised flow increases of 1.5 knots are mentioned, shown in Plate 7.1. Plates 7.2 and 7.3 show flow velocities in the Haven with the barrier in place, modelled at baseline fluvial flow and MHWS. Modelling also

shows flow increases around the swing bridge of 2 knots, although Plate 7.1 does not show any appreciable difference in flows at the swing bridge once the barrier is in place.

Section 7.5.10 states PIANC's guidance on strong cross currents of over 1.5 knots and strong longitudinal currents of over 3 knots as 'challenging but still navigable, for vessels with low power and manoeuvrability'.

In IWA's view this section is deeply misleading, which is a cause of great concern given that the impression is left that velocities are not a hazard- which is not the case- and therefore mitigation or change to the barrier project is not required. Is the misrepresentation deliberate?

These modelled velocities are not maxima, but based on typical fluvial flows rather than high fluvial flows. Baseline flows are shown as 0.5-1m/s before any construction (A17/2B - Volume 2b: Estuarine and Geomorphology Processes Technical Report) equating to 1-2 knots. On top of that the model shows an increase in baseline for permanent works of 1-1.5 knots, for average fluvial flows. This gives a total flow through the barrier gap of 2-3.5 knots before any fluvial high flows, somewhat higher than has been produced here. Moreover, with higher fluvial flows (extreme 100 year event quoted) flows increase by 2-4 knots in already high fluvial flows giving 4-7.5 knots total with a longer tail downstream. These are unsafe for many vessels, let alone those navigating whilst passing others in both directions in a relatively narrow channel. This is not safe, and not within PIANC guidelines.

EA was advised to model flows including fluvial flows at meetings in September and again in December 2015, at various differing stages of ebb and flow tide as well as fluvial floods. Clearly it has chosen either not to, or not to present the results in the NRA. Yet IWA understands that EA has in the past measured flows through Grand Sluice at around 200 cumecs (cubic metres per second), with the lock gates chained open during a period of very high fluvial flooding. Likewise land drainage pumping into Black Sluice to maintain water levels for agricultural purposes can require pumped discharges through Black Sluice pumping station, when fluvial flows from Grand Sluice prevent gravity discharges. Under these circumstances, admittedly rare, Black Sluice can add up to a pumped 60 cumecs to the ebbing tide and fluvial flood flows from Grand Sluice. Ebb and flow tides are usually only difficult for navigating when added to strong fluvial flows, and when the addition can be over 260 cumecs that is hardly surprising. EA has recently confirmed flood discharge rates at Grand Sluice as in a 1:10 (1%) scenario 161 cumecs and in a 1:100 (1%) scenario 164 cumecs which when added to those from the Black Sluice, show a significantly different scenario to that presented in this section.

In A17 Volume 1: Environmental Statement Table E1 Comments of [sic] the draft Environmental Statement (2016), Canal and River Trust, operators of the Grand Sluice lock and barrier upstream of the Haven, included a specific comment on navigation and fluvial flows. Its concerns over the inadequacy of EA's project proposals were made clear as follows:

'A further concern is the barrier's predicted width of 25 metres. Working on a figure of 60

metres of Haven width at that point, reducing the width of the flow of water to 25 metres will reduce the water flow to 40% of the original flow; less than half, not a desirable situation in times of fresh water run off! The addition of a lock of a suggested 10mts width would increase the width of flow to 60% of the original. However this still results in a much greater rate of current at that point as it is on the outer bend of the flow especially every fortnight when we experience the 'spring tides' some with tidal heights in the region of 8 metres.

Twin screw motor boats with powerful engines may not be compromised but many yachts have far less power and only one engine coupled with far more windage aloft to contend with in a cross wind when under power. Other vessels that could be compromised are the long narrow boats. Competent boat owners who navigate tidal flows will know that control of their vessel is far easier when stemming the flow as opposed to going in the same direction as the flow. These flows will be at their worst when both the Witham and South Forty Foot are being run off together. That situation is made worse when you factor in the fact that the water can only flow out to sea for about 8 hours before the next tide stops that flow for a further 4 hours. Add the above restricted flow figures due to the presence of the barrier's fixed wall across the river to the limited time when excess fresh water can flow and common sense would indicate a definite argument for the installation of the lock.

Historically in my lifetime I recall 3 times when the Witham has nearly breached its bank further upstream and when the sluice gates were unable to cope and the lock had to also be opened.'

Section 7.5.14 mentions the modelling work done for the WSC and BDFA scenarios earlier in 2016. It should be no surprise that the model showed no increase in flow velocities around the swing bridge, as this is what Plate 7.1 shows. However, comparing the velocities seen in the vicinity of the barrier with similar velocities elsewhere in the Haven overlooks two issues. Firstly, the Haven experiences much higher velocities than a 1:2 year fluvial flow and a MHWS tide and secondly the Haven currently has good sight lines, open known channels and in many places soft areas and havens. The barrier is being installed on the outside of a bend, with poor visuals when approached from either side and short sight lines, as well as increased flows in the 'gap' and downstream which can be much higher at certain times. These significantly increase the hazards in navigating.

Section 7.5.16 qualifies the NRA in terms of extreme events. However, a NRA for a TWAO application must cover all potential navigational circumstances. The TWAO application is for a restriction on navigation, and the proposer must take significant steps to prevent impacting the navigation. This is not being adequately done in this case, as the extreme scenarios present- had EA carried out more modelling in the transition zones between commonplace and more severe but not unreasonably extreme navigational conditions it would have been clear whether or not velocities in the vicinity of the barrier would have exceeded PIANC guidelines. In IWA's view it is reasonable to expect that velocities will be well above the guidelines given that the benign 1:2 fluvial flow scenario modelled shows, from the Estuarine and Geomorphology Processes Technical Report, flows were up to 3.5 knots.

Section 7.7 explains the impact of the barrier closure. It seems remarkably complacent that EA has not yet been in touch with 'appropriate authorities' on how the barrier closure will be handled.

Comments on the accuracy of derivation of Table 7.3 are as follows:

08 & 09 Localised flow velocities- combination of high sensitivity and moderate negative is moderate adverse, not 'minor adverse/ moderate adverse' in both cases.

10 Localised slower flow velocities at the Black Sluice- there is no evidence in models of this effect. Where has it come from? Gravity flows from Black Sluice are a normal feature and would add to tidal and fluvial effects, creating eddys and cross currents- not quiet areas of water.

11 Changes in situation- localised accretion- combination of high sensitivity and moderate negative is moderate adverse, not 'minor adverse/ moderate adverse'

12 Gate closed- flood event-magnitude criterion is given as 'minor negative'. As the closure of the barrier is expected, this should be 'moderate negative'. This then results in a 'moderate adverse' significance, which is 'significant'.

Table 7.4 and Table 7.5 prolong the agony of setting out specific mitigation measures without committing to implement them. EA needs to make specific commitments to putting in place traffic management through the Harbour Authority, providing 'safe havens' of adequate capacity above and below the barrier for the permanent use of navigators once it is in operation, and the provision of other routine safety measures- not pluck them out of a hat. Mitigation needs to also recognise that not all users have VHF radio or radar, and that as IWA has demonstrated above with EA's model results there are risks of significant flow increases above PIANC 'strong current' guidelines as the barrier is operating within the normal range of conditions navigators will consider acceptable for using the Haven.

Sections 7.11-7.15 seem to be unnecessary padding based on previous statements and IWA's comments. This is a Navigational Risk Assessment, not an Environmental Statement.

Section 7.11 goes back to summarising mitigation measures, 'recommending' that measures proposed for construction be retained for operation. IWA wants to see a much firmer commitment to putting specific measures in place, and paying for them. The 'recommendation' suggests EA has not yet put any effort into detailing and agreeing such measures with the Harbour Authority, however without specific measures the TWAO application should not be approved.

Section 7.12 is a rather odd reference to suggestions for traffic management, without making any specific commitments or showing any attempts to agree safety precautions with the Harbour Authority. IWA's comments above on the requirement for traffic management apply, for construction and operation.

Sections 7.14 and 7.15 need to demonstrate specific commitments with details of what is to be provided, before approval for the TWAO application can be given. Without such detail, consultees must assume a 'worst case scenario' and that navigation risk is too high for the application to be approved without substantial qualification. The numbers in this section provided and modelled by EA are so different to what is actually known to exist that they

must also give concerns to the ability of the barrier to pass fluvial flows adequately over a possible period of time. This will no doubt be a feature of the TWAO Application of interest to other bodies.

Section 7.18 and Table 7.5 purport to show that almost all significant effects are mitigated. As IWA has detailed above, this is not the case due to poor use of modelling by failing to apply a sufficiently challenging range of navigation conditions, and therefore underplays the significance of the likely increases in velocities to be experienced around construction and operational sites. As has been stated above, it is also clear that EA has not consulted with those responsible for managing safe navigation in the Haven, so is unable to put forward the necessary specific commitments to provision and maintenance of the facilities needed to provide and maintain this.

Further sections of the NRA, and the appendices have already been referred to or commented on above. IWA was not invited to the 'local river community' group in 2016, so was unable to contribute to the specific conditions chosen on which EA carried out more detailed modelling. These conditions did not include high fluvial flood flows so did not involve the more challenging combination of conditions that navigational safety requires must be addressed.

Once again this process has demonstrated that the Haven will become a much more hazardous place for navigators when the barrier is in place. Had EA continued with the original project, involving provision of a second permanent bypass channel alongside the barrier in the form of a lock channel (initially only needing a flood gate or similar rather than a lock), this additional hazard could be mitigated by providing safe two way working for boats as part of a managed traffic arrangement, as well as providing additional capacity for running off excess fluvial flows in inland flooding conditions. The evidence provided shows both may be necessary to ensure navigational safety, and provide capacity for inland flooding which in its haste to erect a tidal surge barrier EA has overlooked.

Based on this Navigational Risk Assessment, IWA considers the TWAO application should be rejected as making inadequate provision for the safety of the navigation during construction of the barrier, and later during its operation.

Comments on other relevant parts of the Environmental Statement

A17.1 Environmental Statement Main Report

This summarises the detail in later Technical Reports, and only limited references are made here to it.

Enabling Works- this refers to the useful provision of facilities for Witham Yacht Club and their RYA youth training programmes, although only for the construction period. It also mentions temporary use of a permanent pontoon in the vicinity of Black Sluice which presently is beached 3m above water level for much of the tide cycle. These enabling works need to be better detailed, more comprehensive and provided for permanent use during barrier operation as has been discussed in the NRA above.

There is also reference to movement of the fishing fleet to the Lairage Quay to avoid transit through the construction area. At the present time IWA understands this has not been agreed with all parties.

EA has during consultations assured navigational recreation users that the site to be created between the barrier and the PoB quay is available for future location of a lock, for bypassing the barrier when used for WLM as part of their commitment to future use of the barrier in water level management. This appears to be the same site as the loading platform extension mentioned in enabling works. It appears that EA has promised the same area for mutually exclusive uses.

Consideration of Alternatives- as a result of only advancing part of the original BCS project, the following benefits are lost if approval of the TWAO Application is given:

- Provides long term security of existing and future investments.
- Encourages long term investment opportunities.
- Approach would provide an important recreational resource.
- Would allow safe navigation of The Haven and wider waterway network

So, although EA has continued with this option, it now proposes a project which does not deliver a safe or economically valuable answer for Boston.

Estuarine processes and geomorphology- The summary suggests only small increases in flows will be seen in the Haven. The Technical Report is rather more candid, covering a range of tidal and fluvial flows and impacts. EA has not provided or apparently modelled maximum flows from Grand Sluice and Black Sluice (Grand Sluice discharge IWA understands was measured by EA at a maximum 200 cumecs, Black Sluice given as 60 cumecs pumped). Despite IWA requests, EA appears not to be prepared to have its model externally verified, or confirmed whether it represents Boston and the Witham specifically, rather than generic local East Coast tides and flows. This should be a matter of great concern to those depending on EA's modelling for their tidal surge and fluvial flooding protection.

Table D1 refers to Updated Scoping Report Stakeholder consultation and Response Location. At one point the Marine Management Organisation(MMO) comment:

‘If the design of the project has changed since the 2011 modelling was undertaken, a new modelling exercise should be performed to inform of potential changes to the hydrodynamics and sediment dynamics. Modelling should be undertaken for all aspects of the construction and possible stages of the Barrier throughout its operation to provide a realistic scenario of the potential impacts which may occur. Where the design and construction methodology is still to be determined, the modelling will need to be based on a worst case scenario.’

EA’s reply identifies its response in ‘See ES (Volume 1): Chapter 12 and the ES (Volume 2b): Estuarine Process and Geomorphology’. IWA has looked at and comments below on this report.

The ES main report concludes that all significant permanent impacts are mitigated. In IWA’s view and as has been detailed above, this is wishful thinking. Without any details on many issues, a worst case scenario approach is needed which clearly confirms significant and adverse effects in many areas and on many issues.

A17.2B - Volume 2b: Estuarine and Geomorphology Processes Technical Report

Section 4.3.2 explains the interaction of water flows that impact the estuary and its morphology as follows:

‘Freshwater flows through these sluices are controlled by the Environment Agency (Grand Sluice, Black Sluice and Maud Foster Sluice) and the Witham 4th Internal Drainage Board (Hobhole Drain). Grand Sluice, Black Sluice and Maud Foster Sluice are used to maintain water levels upstream (in the River Witham, South Forty Foot Drain and Maud Foster Drain), with lower water levels in the winter months. The higher water levels in the River Witham and SFFD during the summer are primarily for agricultural benefit but also permit recreational craft navigation on the River Witham and SFFD. The structures are also used to increase discharges downstream during periods of high fluvial flows upstream.’

Section 4.4.2 identifies that Climate Change scenarios from DEFRA 2006 were also used to account for potential Climate Change variations, a 20 per cent increase in flows and a 1.14m rise in sea level to 2115. IWA notes that these CC variations have recently been replaced by DEFRA, and EA updated its guidance to developers in February 2016. As a result, CC allowances for essential infrastructure with a ‘2080’s’ planning horizon in Zone 3a should be 65% for fluvial flooding and 1.21m for tidal flooding. The TWAO Application would be more credible if current criteria were used, as the barrier is both essential infrastructure, and designed to meet 100 years of climate change which is challenging enough.

Section 4.5.7 advises that the range of tides studies included a full spring- neap cycle, but no higher fluvial run-off conditions either for sediment or flow.

Section 5.2.7 noted that modelling provided the best indication of likely future change, however there was always some uncertainty associated with hydrodynamic models. IWA agrees with this caveat.

Plate 5.1 showed a modelled flow based on average upstream flows and MHWS tide, which resulted in an increased flow above baseline through the coffer dam bypass of 1.5- 2 knots, over a length of channel of 100m. This model did not show any change over baseline in the area of the swing bridge or other parts of the Haven.

Plate 5.3 showed an increased upstream flow of 1:10 years AEP, a not unusual higher flow. This resulted in a flow increase over baseline of 4-6 knots over a channel length of 200m.

The report makes the point that for sediment and morphology, the average flows largely control the impact- however for navigation the higher flows still represent a safety hazard. Adding in baseline flows for average and 1:10 scenarios is likely to create problems for navigators as vessels lose steerage way, or approach the construction bypass downstream at excessive flows.

The modelling is then repeated for the 'barrier in place' scenario. Plate 5.5 shows modelled flows for average upstream flows and MHWS tidal boundary, which creates within the barrier opening, a peak increase in flow of 1-1.5 knots. Plate 5.7 shows a 1:100 year fluvial upstream flow resulting in an increase in flow of 2-4 knots in the barrier gap and for a long tail downstream- much of it in already high fluvial flows.

No explanation is given why 1:100 flows were reported for this modelling rather than the previous 1:10 year flows, although Table 5.2 does state that 1:100 year flows for the barrier example showed little difference in flow and shear increase to those for 1:10 models- it is not clear what in this case 'little difference' means.

Plate 5.9 shows absolute flow velocities during the average downstream flow and MHWS scenario in Plate 5.5, with 1.5-2 knots in the barrier 'gap' and some eddys or spots of 2-4 knots, with a further section of 300m in the centre of the channel about 500m below the barrier where flows are 1.5-2 knots. Extrapolating using the difference between Plates 5.5 and 5.7 indicates absolute flows of 2.5-4.5 knots at least, with the 'long tail' downstream also.

It appears from these modelled results that as expected, high fluvial flows will represent the most difficult navigating conditions. When added to a MHWS ebb, flow velocities will exceed PIANC strong flows longitudinally with possible eddys in the area of the coffer dam bypass and the barrier in operation. This is on top of an existing situation in the Haven where, as detailed in PoB advice to navigators No.4: Tidal Range and Speed of Water, 'On Spring Tides, tidal range in the river can be expected to exceed 7 metres, with tidal speeds in excess of 4 knots. At times, fresh water is released without notice, from the Grand Sluice and to a lesser extent South Forty Foot, Maud Foster and Hob Hole drains and other pumping stations along the river. Such releases can produce water speeds in excess of 6 knots and mariners should take caution'.

A17.2B - Volume 2b: Estuarine and Geomorphology Processes Technical Report: Boston Modelling Report: Non-Technical Summary

Section 2.1.2 identifies the coffer dam bypass width is 16m, rather than the 18m shown elsewhere. Reducing the width to 16m seems an unacceptable risk. IWA believes this lower width is incorrect, however it is essential to confirm this if the TWAO application is to proceed. It is another example of inconsistencies in even key figures within the documentation for the TWAO Application.

Section 2.2.3 discusses fluvial flood risk during barrier operation. One of the concerns for Boston is the impact of the barrier, as an immovable obstacle, on upstream fluvial flooding. The report states that the 'tide lock window' for Grand Sluice and Black Sluice will increase by 40 minutes in a 1% AEP event- that is, there will be 40 minutes less for water to leave the Lower Witham, and 40 minutes less gravity discharge time available from Black Sluice. The report states this will create 4 centimetres additional water level in the South Forty Foot Drain and 6 centimetres on the Lower Witham. Although 1% AEP is a very 'acute' challenge for fluvial flooding, there will normally be long periods when 10% AEP or higher flooding levels exist across the Lower Witham catchment. For the South Forty Foot, Black Sluice can increase pumping times to remove excess water, however this will affect both navigation through the barrier and potentially further reduce the 'tide lock' period Grand Sluice experiences.

IWA considers more extensive modelling is required to demonstrate the effect of the barrier reduction in Haven width and ability to discharge high fluvial floodwaters. Local Bostonians have already expressed concern that the barrier will exacerbate fluvial flooding, potentially over a large area. The modelling carried out here in no way addresses these concerns.

In comments on the draft Environmental Scenario (A17 Volume 1: Environmental Statement Table E1 Comments of [sic] the draft Environmental Statement (2016)), Canal and River Trust (operators of the Grand Sluice lock and barrier upstream of the Haven) made the following statement:

'A further concern is the barrier's predicted width of 25 metres. Working on a figure of 60 metres of Haven width at that point, reducing the width of the flow of water to 25 metres will reduce the water flow to 40% of the original flow; less than half, not a desirable situation in times of fresh water run off! The addition of a lock of a suggested 10mts width would increase the width of flow to 60% of the original. However this still results in a much greater rate of current at that point as it is on the outer bend of the flow especially every fortnight when we experience the 'spring tides' some with tidal heights in the region of 8 metres.

Twin screw motor boats with powerful engines may not be compromised but many yachts have far less power and only one engine coupled with far more windage aloft to contend with in a cross wind when under power. Other vessels that could be compromised are the long narrow boats. Competent boat owners who navigate tidal flows will know that control of their vessel is far easier when stemming the flow as opposed to going in the same direction as the flow. These flows will be at their worst when both the Witham and South Forty Foot are being run off together. That situation is made worse when you factor in the

fact that the water can only flow out to sea for about 8 hours before the next tide stops that flow for a further 4 hours. Add the above restricted flow figures due to the presence of the barrier's fixed wall across the river to the limited time when excess fresh water can flow and common sense would indicate a definite argument for the installation of the lock. Historically in my lifetime I recall 3 times when the Witham has nearly breached its bank further upstream and when the sluice gates were unable to cope and the lock had to also be opened.'

IWA also understands that EA or its predecessor has measured maximum flows through Grand Sluice in the past (with the lock open and gates chained back) at 200 cumecs. In addition to that, Black Sluice can pump up to 60 cumecs when the South Forty Foot needs reducing in level due to IDB pumping into it. EA has also recently responded to an enquiry on Grand Sluice flows saying 'In reference to your enquiry about maximum discharge rates of flood waters through Grand Sluice, our Asset Performance team have looked at our models and the quoted flow at 1:100 scenario (1%) is 161 cumecs, and at 1:1000 (0.1%) is 164 cumecs. We don't model flows higher than this'.

Has EA adequately modelled the ability of the barrier to pass such flows given a 2080's fluvial climate change flow scenario, and has EA modelled the consequences of the barrier being raised for more than 9 hours whilst such flows are coming down the Lower Witham and being pumped from Black Sluice?

There appears to be at least circumstantial evidence that the barrier may not be able to cope with these admittedly extreme upstream flows. These will in any event significantly impact navigation, and as seriously if not more so could cause or contribute to flooding of the Lower Witham and South Forty Foot drain within the design life of the barrier, given the Climate Change developer advice EA currently has on its website.

Under these circumstances, IWA believes the TWAO application needs significant further work to test these uncertainties, before any approval is given. This may allow the design to progress, but with additional flood relief capability in the form of a second channel as IWA has suggested elsewhere, which will also benefit navigation. Focusing on tidal surge appears to have blinded EA to an equal if not greater risk to Boston and its surrounding area, and this needs to be checked.

Interestingly, the report has a section (4.3) assessing modelled flows to test scour at the barrier. At one point it states 'Therefore the worst case scenario is rare compared to' but goes no further. Ironically, the report goes on to say this 'is not to be used for typical navigation conditions'. Whilst local mariners do not suggest this is typical, these conditions do occur as EA has heard in consultations. The Port of Boston Annual Standing Local Notice To Mariners, No.4: Tidal Range and Speed of Water, states 'On Spring Tides, tidal range in the river can be expected to exceed 7 metres, with tidal speeds in excess of 4 knots. At times, fresh water is released without notice from the Grand Sluice and to a lesser extent South Forty Foot, Maud Foster and Hob Hole drains and other pumping stations along the river. Such releases can produce water speeds in excess of 6 knots and mariners should take caution'. Moreover, these models do inform extreme flows around the barrier that will be

experienced many times in its 100 year operational life, especially given expected increases in fluvial flooding from climate change.

Figure 4 (a) shows the output of the 1% AEP river flow on scour in the vicinity of the coffer dam. This indicates the substantial risk to navigation of the bypass. Just below the bypass, flow velocities of 6-7m/s or 12-14 knots are very high whatever the circumstances. This accords with local experienced mariners' views on possible flows that they have experienced as part of the base situation- not an outlier. Even at half these flows navigating through the bypass would be impossible for many of the recreational boats using the Haven.

Likewise with the barrier in place, figure 4 (b) shows flow velocities of 6-8 knots over the whole barrier and a long tail downstream, with areas of 8-10 knots in places. As above, these conditions have been seen when very high flood flows occur without the additional impact of the barrier, so need to be planned for and managed rather than dismissed as aberrations as EA would have navigators believe. IWA can see significant distrust of EA's motives amongst local navigators, and this is not helping EA make progress with this project.

Sections 5.2 and 5.3 compares flows through the coffer dam bypass and barrier with other flows in the Haven, suggesting these flows are feasible to navigate. However the comparison made is between open structures with good sight lines whether travelling up and down, as well as 'soft' alternatives in the event that avoiding action is urgent. Within the bypass or barrier structures there is nowhere 'soft' to go, flows are not smooth and eddy-free and sight lines are very poor- with high piling and concrete structures limiting advance vision for most vessels. The swing bridge for example is open and easy to see beyond.

EA would also help people understand its case if it adopted consistent measures on flooding probability and frequency.

A17 2b Surface Water and Flooding Risk

Section 3.5 provides guidance, and lists EA PPGs. However the Environment Agency withdrew all these PPGs in December 2015, because 'Pollution prevention guidance contained a mix of regulatory requirements and good practice advice. The Environment Agency does not provide good practice guidance.' It is surprising that EA has not amended its September 2016 documentation accordingly.

A report on 'Preliminary Water Framework Directive Compliance Assessment' is also included. In section 3.1.2 this states 'There is a lock at Grand Sluice for the passage of recreational craft, although narrow boats are unable to use the lock as it is too short.' This is not quite correct- narrow boats come in various lengths, and full length boats do have to go through the lock when the tide and Lower Witham make a level, however boats can also lock through using the width of the lock to get across the chamber and safely lock up into the Witham or down into the Haven for lengths which in theory are longer than the lock chamber.

A18 Order Plans and Planning Direction Drawings

Planning Direction drawings contain the drawings related to the lower WSC facilities which are also the permanent 'safe haven' facilities for boats unable to transit beyond either the construction works or the operational barrier:

- 23. IMAN001472-PLG-024 - Enabling Works - Construction Compound Locations
- 24. IMAN001472-PLG-025 - Witham Sailing Club Temporary Works - Slipway - Site Plan and Section
- 25. IMAN001472-PLG-026 - Witham Sailing Club Temporary Works - Slipway - Section and Details
- 26. IMAN001472-PLG-027 - Witham Sailing Club Temporary Works - Pontoon Mooring - Section and Details
- 27. IMAN001472-PLG-028 - Witham Sailing Club Temporary Works – Services

Section A17/2a – Volume 2a: Landscape and Visual Impact Assessment Technical Report 5.4.11 states that:

'The Witham Sailing Club facility would be temporarily moved adjacent to the existing commercial building and hard standing/car parking area on the left bank. The facility is expected to be small scale including a temporary small jetty and club house. No additional areas of hardstanding would be required and access would be off Fishtoft Road. The scale of sailing club facility would be compatible with the existing land use and key landscape characteristics of the LLCA would be unaffected.'

It is not correct to say that these facilities are temporary, as they are a permanent requirement of a safe navigation around the project work area and the completed and operational barrier. They are noted as such in several of the documents forming part of the TWAO Application. They are also for the use of any navigator who cannot pass the barrier for whatever reason and needs to moor.

IWA suggests this change should be made as soon as possible to take advantage of the Planning Direction accompanying the Order.

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