

Application by The North Lincolnshire Green Energy Park Limited for North Lincolnshire Green Energy Park

The Examining Authority's written questions and requests for information (ExQ1)

Issued on 23 November 2022 – Response due by Deadline 2, Thursday 15 December 2022

Please find below answers to the Examining Authority's written questions from the Environment Agency (EA) [ID no. 20032333].

Ref No.	Question	EA response
1	General and Cross-topic Questions	
Q1.0.16	<p>Refuse Derived Fuel (RDF)</p> <p>(i) It is anticipated that both the volume of material going to landfill and the content will change over time as both recycling and other elements in the supply chain and manufacturing of materials changes. [APP-054, Table 5] Do you agree the anticipated nature of the change to RDF during the operational period has been reasonably assessed to reflect these changes that are anticipated to occur.</p> <p>(ii) Do you consider this has been adequately assessed within the ES to forecast potential areas of effect as predicted by the Applicant? If not, what areas of concern do you have?</p> <p>(iii) Table 5 of [APP-054] would appear to calculate the effects on climate change using 650,000 tonnes per annum (tpa) of RDF, yet the application references elsewhere [APP-051] paragraph 3.2.2.3</p>	<p>(i) In Table 5 the operator presents data for the required specification of the RDF. The operator will control the inputs to the plant to materials meeting this specification or within acceptable tolerances. We have no specific concerns regarding potential changes to the characteristics of available waste streams in the future.</p> <p>(ii) The EA does not have a view on this issue.</p>

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	and [APP-044] paragraph 1.1.1.1 [APP-045] paragraph 1.4.1 a capacity of up to 760,000 tpa. Please explain this discrepancy and whether this has any consequences for the conclusions reached?	
Q1.0.17	<p>Operational Environmental Management Plan (OEMP) (Annex 8 Doc 6.3.8) [APP-075]</p> <p>(i) The Applicant states the OEMP will cover all environmental pollution activities not covered by an environmental permit. Do you agree that this is the case?</p> <p>ii) In the event that there is not agreement please advise of the areas where you consider there are gaps between the planning and permitting regimes and advise how you consider they might be best addressed.</p>	<p>(i)The operator will be required by the environmental permit to operate to a written environmental management plan. This will be expected to cover all processes and procedures addressing actual or potential impacts on the environment. We will consider the following areas of potential harm, within the installation boundary, when assessing the permit:</p> <ul style="list-style-type: none"> · Management - including accident management, energy efficiency, efficient use of raw materials and avoidance, recovery and disposal of wastes · Operations - including incoming waste and raw material management, waste charging, furnace types and requirements, validation of combustion conditions, combined incineration, flue gas recirculation, dump stacks and bypasses, cooling systems and boiler design · Emissions - to surface water, sewer and air, odour, noise and vibration, monitoring and reporting of emissions <p>(ii) The EA cannot provide a view on the issues requiring control outside of the environmental</p>

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		permitting regime.
Q1.0.20	The Environment Act The Environment Act passed into law on 9 November 2021. While many of its provisions await detail and implementation, does this have any implications for the application documentation submitted for the Proposed Development?	We are not aware of any particular implications for the submitted application documents.
5	Biodiversity, Ecology and Natural Environment (including Habitats Regulations Assessment (HRA))	
Q5.0.2	Hatfield Moor SAC (i) The Applicant has screened out assessment of possible effects due to the distance from main stack of the ERF. [APP-058] explains the SAC is 12.4km from the DCO boundary, but more than 15km from the main emissions source, and paragraph 4.2.1.4 of [APP-043] states that air quality modelling showed there was no potential for a significant effect on a site more than 15km from the energy recovery facility (ERF) component of the Proposed Development. Are you satisfied with the Applicant's approach to assessment of effects on Hatfield Moor SAC?	We note that this question requests a response from the EA. However, as mentioned in paragraph 8.1 of our Relevant Representation [RR-060] the EA can only undertake a detailed review of the air quality modelling for a project when it determines the permit application to operate the site. Also, as the question relates to the potential impact on a designated site, we would defer to Natural England to provide a view on this issue.
7	Draft Development Consent Order (dDCO)	
Q7.1.27	Water Discharges 36 (1)	(i) Clause 36(7) acknowledges the requirement for an Environmental Permit before entry into controlled waters, which is considered adequate protection for

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	(i) Should this not be a conditional power subject to the approval, for example as described under 36 (3) and 36 (4)? (ii) What does the 'carrying out' of the authorised development mean?	the Environment Agency. However, the recently granted Keadby 3 Order does include a similar provision, that has been made conditional as the ExA is suggesting. (ii) The EA offers no explanation for this term but notes that it exists in most provisions relating to the discharge of water in other DCOs.
Q7.1.28	Work No. 1 (i) Should there be a limitation in the annual throughput of RDF to a maximum of 760,000 or 650,000 tonnes in the absence of an Environmental Permit? (This was recommended in the South Humber Bank Energy Centre rDCO)	The EA notes that the inclusion of the annual throughput was recommended by the ExA in the South Humber Bank Energy Centre DCO, due to the absence of an environmental permit and the transport assessment (fuel deliveries) for that project. The maximum fuel throughput would be specified in an Environmental Permit to operate the site, if granted. The EA makes no request for the throughput to be included in the DCO and defers to the ExA and Secretary of State to decide if this is necessary.
Q7.1.41	Refuse Derived Fuels (RDF) (i) The description of Work No 1. Includes 'an electricity generating station fuelled by RDF. Is RDF defined in guidance/legislation or other form of document which the ExA can rely upon to understand the standard/constituent parts of the fuel and how this then might influence the outcomes considered in the ES for example in respect of air quality? (ii) Is the content of RDF monitored and if so by whom?	Waste is commonly referred to as RDF by operators when some form of pre-treatment is applied to it in order to control the waste characteristics such as moisture or calorific value. The operator will monitor waste/RDF inputs to ensure their plant will operate within the tight constraints imposed by the environmental permit. Waste inputs to the plant are controlled by the environmental permit specifying each waste type as applied for by the operator. The determination of waste type suitability depends on the operator's demonstration that the waste can be input to the plant without significant risk to emission

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	(iii) Please explain how Requirement 15 limiting the fuel to processed waste corresponds with/relates to RDF and how this would be monitored and enforced. (iv) The basis of the assessment appears to be an assumed composition of the RDF described at 5.4.2.11, other operating assumptions (Tables 6-10) supported by sensitivity analysis. - How is this secured/controlled?	standards specified by the permit at the permitting stage.
Q7.1.43	Requirement 16 (i) Does this requirement achieve and set out appropriately the acknowledgment that the decommissioning will need to have due regard to flood risk as set out in Table 2 of [APP-057] ? (ii) In the event that any party considers this requirement should be changed please provide an alternative wording.	(i) The impact of decommissioning the site on flood risk has not been assessed within the submitted flood risk assessment. Requirement 16 refers to the implementation of a 'decommissioning environmental management plan'. Whilst not explicit, it would be reasonable to expect a comprehensive environmental management plan to encompass matters relating to flood risk. (ii) for the avoidance of doubt it may be prudent to amend this requirement to read "...and a decommissioning environmental management plan to include, but not be limited to, matters such as flood risk".
Q7.1.46	Permitted preliminary development works construction environmental management plan (PPDW CEMP) (i) Please clarify if the intention is to provide a single PPDW CEMP for the Proposed Development, or to provide a	(vi) The EA did not request the inclusion of the Requirement for a detailed operational environmental management plan to be submitted under the DCO and cannot, therefore, provide any information in respect of how this will (or is intended to) interact with the Environmental Permit. For information, the

Ref No.	Question	EA response
	<p>series in line with the phasing of the proposed development. The wording in the CoCP does not make this explicit ExQ1: 23 November 2022 Responses are due by Deadline 2, Thursday 15 December 2022 Page 43 of 77 ExQ1 Question to: Question: (ii) If preliminary works was changed to pre-commencement activities as described under Part 1 Article 2 previously (1) would not be required and 'save for the preliminary works' could be removed from (2)? (iii) Should 4 (3) also include traffic and noise plans to address such impacts during construction? If this is not considered appropriate, please provide a justification for the approach. (iv) Is it correct to understand that the relevant local authority can override their approval of a CMP/CEMP that they have approved? (v) Is it accepted that 4(2) would appear to be adequate on the basis that the approved CEMP would include provisions for change management and revision? (vi) Other DCOs where there is a reliance on the environmental permit to be the primary regulatory tool for operations of a generating station or ERF do not appear to</p>	<p>operational environmental management system (EMS), required by an environmental permit, covers all environmental aspects of the permitted site operation.</p>

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	include reference to an operational environmental management plan. Could it be clarified how these requirements would interact with the Environmental Permit and any other necessary permits, licences and consents?	
Q7.1.47	Requirement 2 (i) Would it not be appropriate to have a CEMP provided in advance of each part to be approved by the relevant local authority?	Requirement 4(2) appears to secure the submission of a CEMP in advance of each part of the authorised development, to be approved by the relevant planning authority.
Q7.1.48	Requirement 4 Environmental management (i) (5) onwards seeks to deal with operation. Please explain how this would engage with the licensing and permitting regime. (ii) In the event there were a conflict, what regime would take precedence and how would any conflict be managed? (iii) Requirement 4 (4) – Should this be a CEMP rather than CMP? Please clarify (iv) Requirement 4 (4) - The EM appears to suggest preliminary works are excluded; this would appear to contradict the dDCO, please clarify the approach? (v) Requirement 4 (5) - Does there need to be a clause covering the rail land as well as the energy park works?	(i) & (ii) Please see answer above for Q7.1.46

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Q7.1.49	<p>Requirement 4 (6) (c) Environmental management</p> <p>(i) What relationship does the surface water strategy have with the construction flood management plan, FRA etc.?</p> <p>(ii) Should they be cross referenced within requirements and the dDCO?</p>	<p>The EA is unable to provide a view on this issue until the Applicant provides further information on the intended contents of the Construction Flood Management Plan to be submitted under Requirement 4 (the CEMP) and the Flood Management Plan to be submitted under Requirement 12.</p>
Q7.1.55	<p>Requirement 8 – Surface water drainage Should there be prior consultation with NLC, the Water Management Board and or EA?</p>	<p>The Environment Agency would be pleased to be included as a specific consultee to this Requirement to ensure that the surface water drainage does not cause pollution of controlled waters. However, the EA has no remit in respect of surface water flooding/risk assessment.</p>
Q7.1.56	<p>Requirement 8 – Surface water drainage</p> <p>Do you consider the timing appropriate such that it would ensure that the mitigation/plan is in place in a timely manner?</p>	<p>It is appropriate for Environment Agency purposes, but we would defer to the Lead Local Flood Authority (North Lincolnshire Council) for the definitive view as it is the lead for surface water management issues.</p>
Q7.1.57	<p>Requirement 9 – Foul water drainage</p> <p>Do you consider the timing appropriate such that it would ensure that the mitigation/plan is in place in a timely manner?</p>	<p>Yes</p>
Q7.1.60	<p>Requirement 12 – Flood risk</p> <p>(i) Is the timing appropriate? If not submitted until after commissioning, will it not be too late to resolve any potential</p>	<p>Further to discussion during the Issue Specific Hearing on the dDCO (17th Nov 22) the Applicant agreed to consider the wording for this Requirement alongside that included in Requirement 4(3)(e), which seeks to secure a construction flood management</p>

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	difficulties and or to consider during the design stage?	<p>plan.</p> <p>It is the EA's view that there is a need to secure a flood management plan prior to any development commencing in order to secure the detailed mitigation scheme in advance of construction taking place. Whilst the broad flood risk mitigation measures have been agreed and tested there remains a need to finalise the designs of some of these mitigation measures to ensure that they operate effectively and can be suitably maintained for the lifetime of the development.</p> <p>To not require such a scheme until the pre-commissioning stage would be too late to resolve any issues that need to be incorporated into the detailed design/construction of the project.</p>
Q7.1.62	<p>Requirement 15 – Fuel Would it not be more appropriate to restrict the waste to non-recyclable wastes to ensure compliance with the 2011 Waste Regulations?</p>	The EA does not have a view on this question. For information, there is a standard condition for an environmental permit which limits input of separately collected fractions of recyclables.
12	Noise and Vibration	
Q12.0.6	<p>Operational noise Paragraph 7.3.1.1 [APP-055] On the basis that operational noise emissions will be regulated by the Environment Agency through the</p>	Currently noise impact assessment is undertaken at a permit application stage using BS4142, and appropriate measures are agreed pre-design to reduce the risk of significant impact. Advice on this issue could be given to the Applicant under the EA's

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	<p>permitting regulations would the Applicant and the EA accept that it would be preferable for them to agree operational noise limits derived from relevant guidance, for example BS4142 and BS8233 to demonstrate consistency with the NPSs? This could be used to inform the subsequent design and procurement stages, and the operation and maintenance of the proposed scheme.</p>	<p>enhanced pre-application permit service, if required. Compliance assessment during operation may be undertaken where issues arise.</p>
14	Policy	
Q14.0.4	<p>Planning Policy Paragraph 4.7.10 of NPS EN-1 in dealing with policy on carbon capture and storage states "all applications for new combustion plant which are of generating capacity at or over 300 MW and of a type covered by the EU's Large Combustion Plant Directive should demonstrate that the plant is 'Carbon Capture Ready'" For clarity can you confirm whether the Large Combustion Plant Directive will apply</p>	<p>If this plant is permitted as an incinerator/co-incinerator the Large Combustion Plant Directive will not apply.</p>
17	Water Environment	
Q17.0.2	<p>Discharge to River Trent (i) At Table 2 [APP-057] it would appear that there will not be a new connection to the River Trent, but an existing connection may be utilised. Is this a correct understanding of the proposal?</p>	<p>(i) This is the correct. The proposed drainage strategy predominantly utilises the existing Lysaghts Drain to dispose of surface water. The existing Lysaghts pumping station pumps water from Lysaghts Drain into the River Trent.</p>

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	(ii) The third bullet point of paragraph 7.1.1.1 of [APP-057] states there would be no abstractions or discharges to the River Trent – please explain how this correlates with Table 2.	(ii) Table 2 refers to surface water. Paragraph 7.1.1.1 refers to the abstraction and discharge of treated operational water from the development.
Q17.0.3	<p>The Water Framework Directive (WFD) Table 1 of [APP-057] states “With the removal of the wharf extension from the Project and the limiting of vessels to an additional 2 per day, it has been agreed with the Environment Agency that a Water Framework Directive (WFD) compliance assessment is not required for the project.”</p> <p>(i) Do the EA agree that there is no need for a WFD compliance assessment?</p> <p>(ii) How is the limitation of 2 additional vessels per day secured and against what baseline figure does this rely?</p> <p>(iii) Please explain how this limitation corresponds with the Navigation Risk Assessment which would appear to allow for 350 vessel movements per year for the import of RDF, offloading of bulk materials and the loading of CO2</p>	<p>(i) During pre-application consultation the EA had discussions with the Applicant around the need for a WFD compliance assessment, which were based upon the physical footprint of the works proposed at that time. These were subsequently amended so that extension of the wharf and requirement to abstract from the river no longer forms part of the proposed development. On this basis, the EA agreed that a WFD compliance assessment was no longer required for the physical development. However, we also advised the Applicant that this does not preclude the need for a WFD compliance assessment should there be potential for significant discharge or pollution to any receiving waterbody as part of the operation of the proposed development. From the perspective of the physical development we can confirm that the Environmental Statement contains an adequate assessment of the potential risk from the proposed development and proposes appropriate mitigation to manage those risks.</p> <p>(ii) The EA can provide no assistance in respect of this question, as its topic falls outside of our remit.</p>
Q17.0.4	Water Disposal	(i) The EA expects the Applicant to follow published

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	<p>(i) How are the methods of water disposal secured? Paragraph 8.2.1.3 states "Construction activities could require the disposal of water from the Application Land. Therefore, all construction contractors will be required, in conjunction with the Project, to reach an agreement with the EA with regard to detailed methods of disposal."</p> <p>(ii) In light of the above can the ExA be confident there would not be discharge to the River Trent?</p> <p>(iii) As currently drafted the CoCP requires CEMPS to be submitted at each stage of development for NLGEP approval. Do either NLC or EA consider this appropriate?</p>	<p>guidance on the disposal of water from the site and apply for any relevant permits/consents/exemptions etc as required under the relevant environmental legislation.</p> <p>(ii) in light of the above the ExA can be confident that if a discharge to the River Trent were to be required this would be assessed/regulated through the relevant environmental legislation.</p> <p>(iii) The EA has no objection to the requirement to submit CEMPS prior to each stage of the development commencing – this appears to be standard practice in most DCOs.</p>
17.1	Flood Risk	
Q17.1.5	<p>Flood Defences</p> <p>The Proposed Development will make use of the existing flood defences.</p> <p>(i) Please provide details of the current condition of these assets, and proposals for maintaining them in the future.</p> <p>APP-070 at paragraph 5.1.10 states that the existing defences are due to be inspected and an improvement programme to be identified later in 2021.</p> <p>(ii) Please advise on any progress or updates on this work</p>	<p>(i)&(ii) The EA has undertaken ground investigation works on the River Trent embankments during the last year. We are still assessing this information, which will be used to inform future repair works or improvements. However, we can confirm that these defences are not on any of the EA's concern registers or highlighted for any further investigation at this time.</p> <p>As long as the EA continues to receive Government funding to secure the maintenance of its flood defences, then the current standard of protection will be maintained.</p>

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	<p>(iii) In the event the DCO is granted should there be a mechanism that supports the future maintenance of the flood defences from the DCO scheme?</p>	<p>(iii) This has not been discussed with the applicant as it was not clear at the time what works, if any, may be required following the asset/ground investigation.</p> <p>Depending on what the asset investigations show this may be any opportunity for both parties to secure the long-term maintenance of the flood defence. However, as stated above, flood defence maintenance is currently funded by the Government so this may not be required unless there is a desire to raise the standard of protection by the Applicant.</p>
Q17.1.7	<p>FRA The FRA proposes numerous design measures to be implemented (eg recommended flood levels which are not secured in the Parameters Table in Schedule 1 Part 3 of the draft DCO), as well as three mitigation options in respect of flood risk for the Steel Works warehouse. The ExA notes the need for a flood management plan to be submitted to and approved by the relevant planning authority prior to commissioning of the Proposed Development.</p> <p>(i) Would it be more appropriate for these measures to be determined at an early stage, ie during design, as opposed to only</p>	<p>Yes, the final designs of all the flood risk mitigation measures/flood management plan should be fully determined prior to construction work commencing.</p>

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	being required before the energy park works are commissioned?	
Q17.1.8	<p>Flood Risk Reference is made in Table 2 of [APP-057] of additional measures to be employed by EA or NLC over the next 40 years.</p> <p>(i) Please explain what these measures might include, how they are assessed and delivered and if they should be secured as part of this DCO.</p> <p>(ii) In the event that they are not to be secured through this DCO, what reliance does the FRA make on these future measures in ensuring the proposed development is not at flood risk throughout the life time of the project?</p> <p>(iii) Are there implications for off site flooding in the event these measures do not occur?</p>	<p>(i) This is an assertion by the Applicant; the EA has given no indication to them of any likely future works to the defences in this location. In the short term our plans for the River Trent defences will be guided by the recently undertaken ground investigation works. Long term, the Humber Flood Risk Management Strategy (HFRMS) will support determination of the preferred options for these defences. We attached at Appendix A, a copy of the adopted HFRMS (please see pages 39-40 for information relevant to this location), but please note this is currently undergoing a comprehensive review and the final outputs and a revised strategy will not be available for 4-6 years.</p> <p>(ii) The proposed lifetime of the development is 40 years. The FRA has assessed the impact of the development over this period using the current standard of protection of these Trent defences. No assumptions have been included in the modelling with regards to potential future improvement works. The impact on flood risk of the decommissioning process, and the form of the land once decommissioning is complete, should be assessed as part of the decommissioning environmental management plan under Requirement 16.</p> <p>(iii) No.</p>

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Q17.1.10	<p>Off site Flood Risk</p> <p>Paragraph 6.2.9 concludes “the effects of the project operation will result in a significant effect at just one receptor”</p> <p>(i) Please explain how this conclusion meets with the tests set out on NPS EN-1 particularly paragraphs 5.7.3 “Where new energy infrastructure is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and, where possible, by reducing flood risk overall.” (Type in bold is our emphasis). Paragraph 5.7.16 final bullet point which states “a FRA must demonstrate that the project will be safe, without increasing flood risk elsewhere subject to the exception below”</p> <p>(ii) Does the Applicant seek to rely on the Exception set out under paragraph 5.7.17? If this is the case, please explain the benefits of the scheme and the relative weight to be applied to those benefits versus the potential harm of any flood risk.</p> <p>(iii) The NPS allows for an exception where energy infrastructure is exceptionally necessary. Should this exception also be applied to the associated development? In responding, please provide any evidence of precedent elsewhere.</p>	<p>(iii) The EA does not take a definitive view and would defer to the decision maker on this issue. However, we would draw your attention to Annex 3 of the National Planning Policy Framework (flood risk vulnerability classifications) in respect of ‘highly vulnerable’ classifications (5th bullet point), for the types of development that may need to be co-located with facilities classified as ‘essential infrastructure’. This may be relevant to your consideration of Work No. 2 parts (a) and (b). Part (c), offices are usually considered ‘less vulnerable’ development and are acceptable in flood zone 3, without application of the Exception Test (<i>National Planning Practice Guidance, Flood Risk & Coastal Change section, paragraph: 079 Reference ID:7-079-20220825</i>).</p> <p>To assist further with your consideration of the Exception Test, we can also advise on the safety of the development and its impact on flood risk as follows:</p> <p>During the design flood event (100 year plus climate change), there is no increase in flood risk to third parties. The only increase in risk would be as a result of a breach or overtopping of the flood defences, which is a residual risk. The Applicant has detailed the increases in flood risk to the steel works (site B) during the breach event within table 5-5, p80 of the FRA [APP-070]. There is a post mitigation 120mm</p>

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		<p>depth increase to the steel works during the Breach 1 scenario. However, the site already floods to a depth of 180mm in the baseline overtopping event, which is not impacted by the scheme. There is no change in flood hazard rating.</p>
Q17.1.11	<p>Flood management Chapter 9 [APP-057] at paragraph 9.1.1.3 states "To manage the areas where the increase in flood risk has not been mitigated, a Flood Management Plan will be developed for the Project." (i) Please provide commentary on whether this approach is regarded as policy compliant in light of the approach set out in NPS EN-1 and EN-3</p>	<p>The increased flood depth affects a 'less vulnerable' (<i>Annex 3, National Planning Policy Framework, flood risk vulnerability classifications</i>) property during a residual risk event. EN-1 states that the developer must demonstrate how residual risk has been taken into account, and that this can be safely managed. The developer proposes to manage this residual risk through provision of a flood management plan (more commonly referred to as a flood warning and evacuation plan) and the EA does not comment on or approve the adequacy of flood emergency response procedures accompany development proposals, as it does not carry out these roles during a flood – the relevant emergency planning authority would need to provide advice on this.</p>
Q17.1.12	<p>Strategic Flood Risk Assessment (SFRA) The FRA [APP-070] relies in part on the North Lincolnshire SFRA (2011). (i) Is this SFRA the agreed starting point for flood risk in the area? (ii) Is this the most up to date information available?</p>	<p>(i) The Council's SFRA is generally the agreed starting point. (ii) No, North Lincolnshire Council published an updated SFRA in November 2021. This SFRA uses updated modelling from the Lincolnshire Lakes development (a large urban extension proposed to the west of Scunthorpe) to update the SFRA. The applicant obtained a copy of North Lincolnshire</p>

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		<p>Council's Lincolnshire Lakes model for use in their Flood Risk Assessment, this is the best available data on flood risk at the current time. The Applicant would need to contact the EA before carrying out any further assessment work (post consent) to ensure this remains the best available data, as new model data is being produced and is expected to be available for use towards the end of 2023.</p>
Q17.1.14	<p>Mitigation</p> <p>(i) Do the EA and the Council agree that the timing of the mitigation set out under Requirement 12 is appropriate to safeguard the site from flood risk?</p> <p>(ii) Should the Requirement also need the approval of the Council as Lead Local Flood Authority/Emergency Planning Authority or would prior consultation in advance of approval be sufficient?</p>	<p>(i) As discussed during the ISH, the final details of the physical mitigation measures that need to be incorporated into the development and surrounding area will need to be agreed prior to construction commencing. Ideally, to ensure the increased risk to the commercial building is managed appropriately (and is acceptable to the relevant emergency planning authority), the flood management plan should be developed and approved prior to construction work commencing too.</p>

APPENDIX A

Humber Flood Risk Management Strategy, March 2008

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or about your environment?

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08708 506 506 (Mon-Fri 8-6)

email
enquiries@environment-agency.gov.uk

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planning for the rising tides

The Humber Flood Risk
Management Strategy

March 2008



We are the Environment Agency. It's our job to look after your environment and make it a **better place** – for you, and for future generations.

Your environment is the air you breathe, the water you drink and the ground you walk on. Working with business, Government and society as a whole, we are making your environment cleaner and healthier.

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 Environment Agency
 Rivers House
 21 Park Square South
 Leeds LS1 2QG
 Tel: 08708 506 506
 Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

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Aims and objectives

Overall aims

To manage the risk of flooding around the Humber Estuary in ways that are sustainable for the people who live there, the economy and the environment, taking into account:

- natural estuary processes; and
- future changes in the environment (built or natural), sea levels or the climate.

To ensure that all proposals are:

- technically feasible;
- economically viable;
- environmentally appropriate; and socially beneficial.

Within these overall aims the strategy seeks to achieve the following objectives:

Detailed objectives	Subsidiary objectives
To maintain and, where possible, enhance public safety, health and security	To protect people and their property from the adverse effects (physical and psychological) of flooding
To respond to natural processes and to avoid contamination and erosion	To minimise adverse effects on wider estuarine processes
	To prevent ‘contaminated sites’ having an adverse effect on the estuary
To protect and, where appropriate, provide opportunities for economic development and employment (including protection of existing land uses where appropriate)	To protect areas of employment from the adverse effects of flooding
	To provide, where appropriate, a secure environment for economic activity and development
	To minimise adverse effects on high quality agricultural land
To protect existing transport infrastructure (land and sea)	To minimise adverse effects on navigation (e.g. on channels, deepwater docks and beacons etc)
	To minimise adverse impacts on road and rail infrastructure
To protect and, where appropriate, enhance flora and fauna (biodiversity)	To minimise adverse effects on European Site(s) and ensure direct losses are compensated
	To address the adverse effects of ‘coastal squeeze’ on European Site(s)
	To support and, where appropriate, enhance biodiversity, including the delivery of national and local Biological Action Plan (BAP) targets
To protect the historic environment	To minimise adverse effects on undiscovered or buried archaeology
	To protect designated archaeological and historic features within the floodplain
To protect and, where appropriate, enhance landscape, amenity and recreational features	To protect and, where appropriate, enhance the characteristics and local distinctiveness of all landscapes
	To protect and promote, where appropriate, regional and local recreational and amenity features

Foreword

This strategy sets out the Environment Agency's vision for managing the risk of flooding from the Humber Estuary as the climate changes and sea levels rise.

Nearly 400,000 people living near the estuary are at risk, as are key industries, businesses, agriculture and the jobs they provide. Our Humber Strategy shows how we aim to limit the impact on people, property and industry in ways that won't damage the area's landscape character or its historical or wildlife importance. This will help safeguard the growth and prosperity of the Humber's communities and its economy, which are vitally important both to the Yorkshire and Humber and the East Midlands Regions, and to the country as a whole.

Overall, our Humber Strategy will ensure that more than 99 per cent of the people living round the estuary will continue to have a good standard of protection from tidal flooding. To achieve this, we will start a major programme of flood defence improvements this year. There will be losers as well as winners, however, since we will not be able to raise all the estuary's defences in line with sea levels, particularly where they protect only a few people or businesses. In due course any defences not raised are likely to fail and the land behind them to flood. This document identifies where these defences are and how long they're likely to last, so the people affected will have as much warning as possible about the consequences. It also describes what they can do to limit the impacts and what help will be available to them.

Flooding in the area doesn't only come from the estuary, as we know from the impact of the very heavy rain in June and July 2007 and again in January 2008. We can't stop all floods from happening and the water has to go somewhere, so we need to look closely at how we manage them when they do and how to help people take preventative action. We're working with the local authorities, the emergency services and the government to review what happened during the recent floods and will adjust our Humber Strategy in the light of any changes and lessons learned.

It has taken 10 years to develop our Humber Strategy and get it approved by the government. Doing so has involved much hard work from many people, not only the Environment Agency's staff and consultants but also those who have given their time to think and talk about the issues it raises. Our thanks to you all, and in particular to the members of the Steering Group (listed on page 55), who have met regularly since the work started and have been unstinting in their support and guidance.

Jeremy Walker

Chairman, Yorkshire Regional Flood Defence Committee

Robert Caudwell

Chairman, Anglian (Northern) Regional Flood Defence Committee

Tim Farr

Chairman, Severn-Trent Regional Flood Defence Committee

Alkborough flood storage site



Introduction

On the night of 31st January 1953, the most damaging storm surge on record in the North Sea struck, leading to the loss of 300 lives, damaging 24,000 homes and flooding almost 100,000 hectares of land between Yorkshire and the Thames Estuary.

After 1953 the defences along the East Coast were improved and if the same event happened now the flooding wouldn't be as extensive, but would be tremendously damaging. Looking to the future, our climate is changing, causing sea levels to rise and severe storms to happen more often, and our defences are ageing. If they are not improved, they will become less and less effective and in due course they will fail. Furthermore, more of the land behind them has been developed, so more homes and more industry will be affected if it is flooded.

Currently about 90,000 hectares of land around the Humber is at risk of being flooded by a storm surge in the North Sea. This area, shown on the map opposite, contains the homes of about 400,000 people. Most of them are in cities such as Hull and Grimsby, or in smaller towns or villages, and the area also contains major industries, including power stations, refineries and the country's largest port complex, handling 80 million tonnes of cargo each year. Most of the remaining land, over 85 per cent of the total, is farmed and consequently has relatively few people living on it. The whole area has an important history and heritage while the importance of the estuary's wildlife and habitats has led to its designation under the Birds and Habitats Directives, which provides them with legal safeguards under the Conservation (Natural Habitats etc) Regulations 1994, otherwise known as the Habitats Regulations.

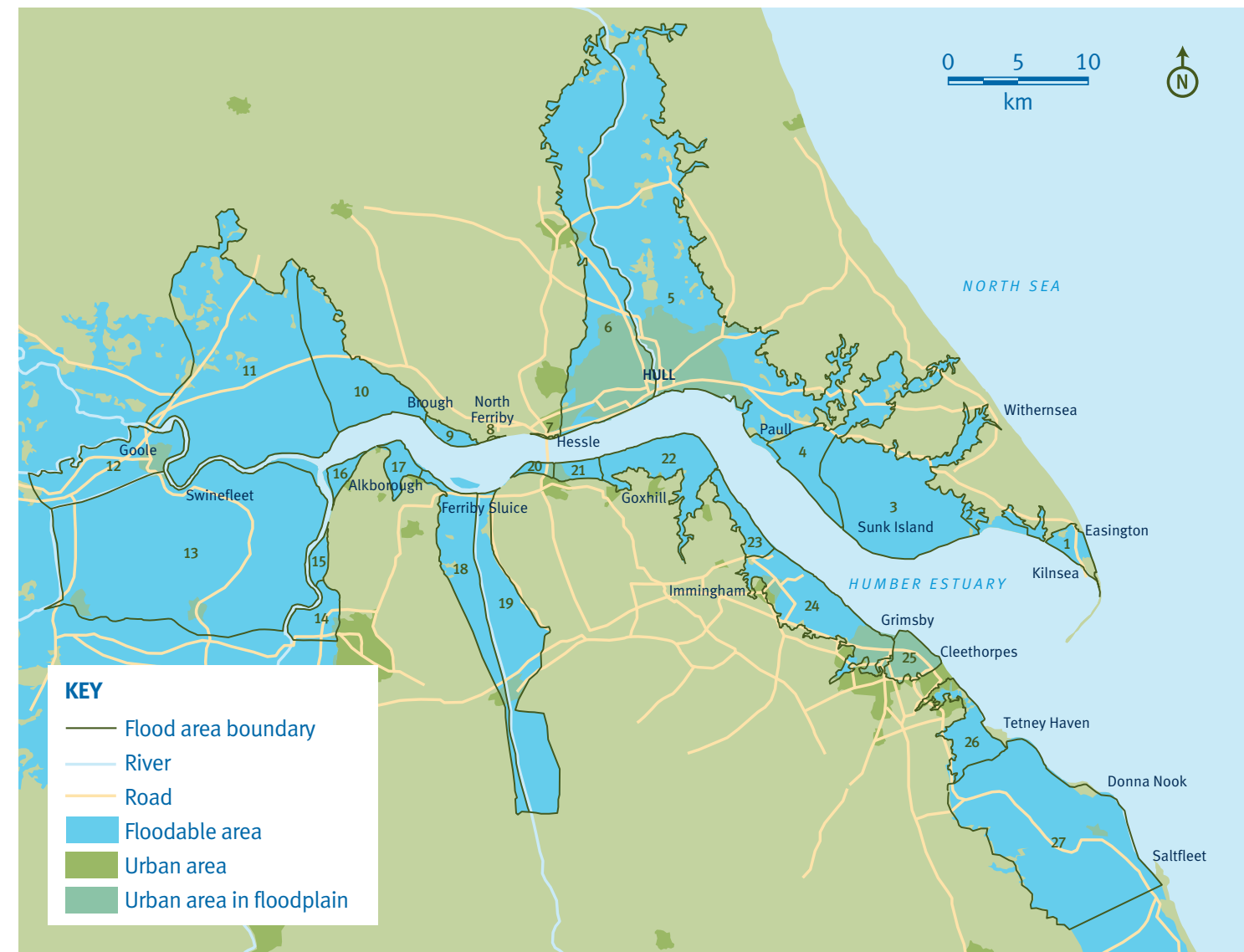
In 1997 we began developing a long-term strategy for managing flood risk around the Humber Estuary and the lower reaches of its main tributaries, the Ouse and the Trent. We published a consultation draft of our

proposals for the next 100 years in August 2005 and received approval for the first 25 years from the Department for Environment, Food and Rural Affairs (Defra) in March 2007. This document sets out the strategy that has resulted. It covers flooding from the estuary and the lower reaches of the Ouse and the Trent only; separate strategies are being developed for flooding from other sources. The first section gives a brief outline of how it was developed and is followed by a summary of the comments we received on the consultation draft and of recent developments in government policy, in particular its 'Making Space for Water' initiative, which is aimed at 'managing the risk from flooding and coastal erosion by employing an integrated portfolio of approaches which reflect both national and local priorities'. These are taken into account in the general description of our Humber Strategy and the summary of what will happen now it has been adopted, given in the third and fourth sections respectively. They are followed by more detailed descriptions of what will happen in different areas beside the estuary.

Although we have based our strategy on the best information we currently have, circumstances can change and better information may become available in the future. We will therefore review it regularly, generally every five years, and will carry out a detailed assessment before taking final decisions about any part of the estuary or its defences. During all reviews and detailed assessments we will consult widely.

If you would like any more information please contact us using the details inside the back cover.

The floodplain of the Humber Estuary



Section 1

How we developed the strategy

Strategy objectives

Our objectives for the Humber Strategy are set out on page 3. They are based on the objectives in our Humber Estuary Shoreline Management Plan (HESMP), published in September 2000, revised to take into account the government's developing policy on managing flood risk.

Drawing up the strategy

The first step in drawing up the strategy was to define the problem; finding out about the people and property at risk in the area; about the defences protecting them; about the way the estuary behaves and how this influences the flooding that can occur; and about the natural and historic environment this flooding might affect. With this information we drew up our overall approach and set it out in the HESMP. We then looked at the implications in more detail, and in particular established what we must do to comply with the Habitats Regulations. This allowed us to draw up a programme of the work needed to maintain the defences for the next 100 years and to look in more detail at the works planned for the first 15 years. From this we produced the consultation draft for the full strategy.

We submitted our proposals to Defra in May 2006 and in March 2007 received approval in principle for the first 25 years at an estimated cost of just under £323 million. The approval drew attention to the changes in government policy that had occurred since the draft strategy was published, in particular through the 'Making Space for Water' programme and the publication of Planning Policy Statement (PPS) 25 'Development and Flood Risk', both of which had been strongly influenced by Foresight 'Future Flooding' report produced in April 2004. These changes are described in the next section and have been taken into account in the current Humber Strategy.

The main studies carried out as the strategy was developed are outlined on page 53 and a full list of reports is given on page 54.

Keeping people informed

Consultation has played an important part in the strategy's development. As well as the consultation draft of the strategy itself, we published two consultation documents while the HESMP was being prepared, and two information documents about the managed realignment of existing defences. We circulated six newsletters before the strategy consultation document was produced and have distributed a further three since then. We have also held meetings throughout the project, either with individual stakeholders or open to the public. At every stage we have invited people to tell us about their concerns and have taken these into account as the strategy has developed.

We established a Steering Group when we began to develop the strategy and this has played a fundamental role ever since. It contains representatives from the key stakeholder organisations listed on page 55 and meets about three times a year to review progress and discuss the issues raised. We have also received advice from the Liaison Panel, a small group of people from outside the Environment Agency chosen for their knowledge of the area and understanding of local issues.



Flood defence at Brough

Section 2

What's happened since the consultation draft

The public's reaction

In August 2005 we issued over 3000 copies of the consultation draft and subsequently held drop-in sessions around the estuary, for members of the public to come and talk about the strategy and the effect it could have on them. The main points raised and how we are addressing them are summarised in the table below.

Points raised	Response
Concern about the coastal defences near Kilnsea.	See page 11.
Too much emphasis placed on 'green' issues, in particular managed realignment. Concern that the strategy is more about protecting birds rather than people.	The strategy includes managed realignment because this is the most cost-effective way of creating the new habitat needed to comply with the Habitats Regulations. If this wasn't included the strategy would not have been approved and none of the work it covers would go ahead.
Standards of protection will fall in some areas, blighting the people who live there and making flood insurance more difficult to obtain. There is no compensation for this.	As explained later in the document, the national flood defence budget is limited, so we can only maintain or improve defences where there is a good business case for doing so. The defences we can't improve will deteriorate and in due course fail, unless others are willing to take on the responsibility of managing them and can obtain the appropriate approvals. Property owners will get no compensation in these circumstances but we will advise them about what they can do to minimise the impacts (see page 20). The availability of flood insurance will depend on individual circumstances, including the resilience of the property at risk.
The role of Environmental Stewardship and related schemes is not properly set out.	The effects of rising sea levels are likely to be felt most in sparsely populated areas, as these are the areas where we may not be able to improve the defences. Many of the people living there are farmers, who may have not only their homes but also their livelihoods at risk if they can't continue working their land as before. Environmental Stewardship and similar schemes can help cushion the change from one type of agriculture to another (see page 21).
Lack of public awareness either about the strategy or about the drop-in sessions and other public meetings.	We will be placing more emphasis on contacts with parish councils and individual households, particularly in the areas likely to be most affected by our proposals. We will use the approaches tried out in our Coastal Futures research project (see page 11).
National policy needs to change from managing flood defences to managing flood risk. Important to work with planners (at regional and local levels) and developers.	This is happening through the government's 'Making Space for Water' initiative, discussed later in this section. We're now working more closely with both regional and local authority planners than before, as discussed in Section 3.

The public's reaction (continued)

Points raised	Response
Need to consider potential as well as current land use (particularly near Immingham), economic importance of ports.	We understand how important the Humber, its ports (with their deepwater access) and the land nearby are, both regionally and nationally. We will work closely with planners and others to make the best use of these assets while following the principle that the developer should pay for any new or improved defences needed for a development to go ahead.
Important to consider impact on health	We are reviewing how the costs of flooding should be calculated and which ones to include when we assess whether a flood defence scheme is worthwhile. The impact on health is one of the issues being addressed.
Doubts that sea levels are rising, concerns about the future of Spurn	The tidal record confirms that sea levels are rising and the latest research confirms that the rate of rise will increase significantly in the future. We too are concerned about the future of Spurn and the pilot and lifeboat facilities there, so we have commissioned, with others, a study to look at the risks and implications.
Importance of maintenance (of defences and drainage arrangements)	We agree it is vitally important that defences and drainage arrangements are properly maintained, provided the resulting benefits due to the reduced flood risk are greater than the cost. We describe in Section 3 how we will do this.
Links with other strategic initiatives	Again, we agree this is very important and describe in Section 3 what we will do about it.
Limited reference to historic environment, sports, recreation	We will look in more detail at these and other site-specific environmental issues through the Environmental Assessment procedures we will follow as normal when developing proposals for specific defences.
Need for Appropriate Assessment	We are preparing an Appropriate Assessment for the Humber Strategy and will produce supplementary assessments for individual schemes as we seek approval for them.

What we have done since 2005

Since we published the consultation draft we have:

- realigned the coastal defence at Kilnsea using funds partly raised by the local residents, as described in the adjacent panel;
- completed repairs to the defences at Saltmarshes, Goole and north of Keadby as set out in the consultation draft;
- realigned the defences at Alkborough to provide flood storage and create 170 hectares of new intertidal habitat, which we expect will allow us to comply with the Habitats Regulations in this part of the estuary for many years, with reedbeds and other BAP habitat on the remainder of the site;
- developed our plans for the defence works we said we would carry out in the five years after the strategy had been approved, in particular at Brough; Halton Marshes and Stallingborough near Immingham; Swinefleet; and Donna Nook, where we are planning a managed realignment scheme to create new intertidal habitat to help us comply with the Habitats Regulations in the outer estuary;
- set up the Coastal Futures Humber Community Project with the RSPB, a scheme to support communities experiencing coastal change along the north bank of the estuary (further information can be obtained from the project website at www.coastalfutures.org.uk);
- followed up the issues raised by coastal erosion at Easington, where the coastal lagoons in front of the defences are being threatened, and are looking at the long-term flood risk issues in the area at the same time; and
- reviewed our storm tide forecasting arrangements and installed new flood warning sirens at Grimsby.



Improving the defences at Kilnsea

The consultation draft drew attention to the erosion taking place at Kilnsea (marked on the map on page 23), which was threatening to wash away the coastal defences protecting the village.

While preparing the consultation draft we had carried out a high-level appraisal, which suggested that we would not be able to spend money from the national flood and coastal defence budget on realigning the defences there. When we looked in more detail, however, we concluded that we could carry out the work provided a significant part of the funding was raised by others, since even though no money would be available from the national budget we could make up the balance using money raised locally by the Yorkshire Regional Flood Defence Committee.

The residents formed the Kilnsea and Spurn Flood Defence Group to raise the funds needed and the grants they obtained, together with a contribution from East Riding of Yorkshire Council for infrastructure protection, allowed us to go ahead and complete the work in time for the 2006/07 winter storms. The Group has taken on the responsibility for managing the new defence, which will protect the village for a further 30 years or so.

We have also been developing the strategy itself. In particular we have divided the large management units considered in the consultation document into smaller flood areas, where any flooding that occurs can generally be prevented from spreading to neighbouring areas, so we can assess the issues in more detail. These are shown on the map on page 13 and are listed in the accompanying table together with the references used in the consultation draft.

Although there have been some big storms since the consultation document was published, there has been no serious flooding from the estuary. The extensive flooding in June and July 2007 was caused by extremely heavy rainfall running off land already saturated by earlier rain, and was not affected by conditions in the estuary. We are working with the local authorities, the emergency authorities and the government to review what happened and will adjust the Humber Strategy in the light of any changes to our role as a result. In particular, we are looking at how we can integrate it with the strategy being developed for the River Hull, something Defra mentioned specifically when giving their approval.

Local and regional initiatives

The Yorkshire and Humber Regional Assembly has published its Regional Spatial Strategy, a core component of which is that development should be located so as to secure urban and rural renaissance and to minimise both the need to travel and the development of greenfield sites. It highlights the importance of the Humber ports and the associated industry to the region while recognising our strategy and the need to take flood risk into account when planning future developments. Yorkshire Forward, the Regional Development Agency responsible for promoting economic development in the region, has an extensive programme of urban and rural regeneration and also regards the estuary as a vitally important economic asset.

Regeneration and development proposals have been produced or are being prepared for Hull, Grimsby, the South Humber Bank (near Immingham), Goole and Scunthorpe. The four local authorities around the estuary are all preparing or have produced Strategic Flood Risk Assessments to help them plan development in their areas. We are taking a stronger role in assessing proposals and recommending rejection for those that don't take flood risk into account properly.



Grey seal pup at Donna Nook

Flood area boundaries

Flood area ref.	Flood area name	Ref. used in consult. doc.
1	Kilnsea and Easington	1/1
2	Skeffling	1/2
3	Sunk Island	1/3
4	Stone Creek to Paull Holme	1/4
5	Hull East	2/1
6	Hull West	2/2
7	Hessle	2/3
8	North Ferriby	2/4
9	Brough	3/1
10	Brough Haven to Weighton Lock	3/2
11	Faxfleet to Saltmarshe	4a/1
12	Goole	4b/1
13	Goole Fields and Crowle	4c&d/1
14	Gunness to Flixborough	4e/1
15	Flixborough Grange	4e/2
16	Alkborough Flats	4e/3
17	Whitton to Winteringham	5/1
18	Winteringham Ings	5/2
19	South Ferriby	5/3
20	Barton Cliff to Barton Haven	6/1
21	Barton Haven to Barrow Haven	6/2
22	Barrow Haven to East Halton Skitter	6/3
23	Halton and Killingholme Marshes	7/1
24	Immingham to R Freshney	7/2
25	East Grimsby	7/3
26	Cleethorpes and Humberston	8/1
27	Tetney to Saltfleet Haven	8/2



National guidance and government policy

In October 2006 the government issued new guidance on the likely effects of climate change, taking into account the latest output from the UK Climate Impacts Programme (UKCIP). This was incorporated in the Planning Policy Statement (PPS) 25, Development and Flood Risk, which was published in December 2006 to replace PPG 25 (published in 2001). PPS 25 confirms our role as the lead authority with regard to flood risk and flood defences, a role that is further strengthened by the government's 'Making Space for Water' initiative. We are now responsible for putting into practice the policies emerging from this initiative and have been working closely with Defra to determine what changes are needed to do this.

These changes will affect how we manage our defences in the future. In the past we have generally carried out routine maintenance (such as grass-cutting and minor repairs) each year and, when a defence's condition or standard is no longer acceptable, undertaken an improvement scheme. Each scheme has gone through a rigorous assessment process, comparing whole life costs and benefits, to determine whether it's worthwhile. Schemes passing this test have been funded through the national flood and coastal defence budget. Although this process will remain much the same as before, the policy changes will affect the way schemes are funded, how they are delivered and what happens if the costs of continuing to maintain a defence are greater than the potential benefits. The changes are summarised below while their effect on the strategy is discussed in the next section.

Changes in national guidance and policy

(a) New guidance on climate change

The rate of sea level rise is now expected to be slower over the next 20 years than assumed before, but to get much faster after that. The implications are that in 50 years from now sea levels will be about 350 mm (slightly more than one foot) higher than they are now while in 100 years they will be more than one metre (over three feet) higher. New figures are also given for increases in peak rainfall intensity and river flow, and for extreme offshore wind speed and wave heights. The estimates are continually being reviewed as our understanding of climate change improves and the guidance will be updated regularly to reflect this. Further information can be obtained from Defra's website at www.defra.gov.uk/environ/fcd

(b) PPS 25, Development and flood risk

PPS 25 aims to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and to direct any development away from areas at highest risk. Where, exceptionally, new development is necessary in such areas PPS 25 aims to make it safe without increasing flood risk elsewhere and, where possible, reducing flood risk overall. It emphasises that flood risk assessments should be carried out at all levels of the planning process, sets out the minimum requirements for them and confirms the Environment Agency's role as a statutory consultation body for all issues concerning flood risk and its management, including all applications for development in flood risk areas. Further information can be obtained from the Communities and Local Government website at www.communities.gov.uk/planningandbuilding/planning

(c) Affordability and spending priorities

The national flood and coastal defence budget (the amount of money the government provides for spending on the country's defences each year) is not enough to keep all our defences in good order. In view of this we now rank all the proposed defence schemes across the country on the basis of their value for money, the number of houses they protect and their impact on the environment, and direct the budget we have towards the ones at the top of the list as they have the highest priority. Any scheme falling below the point where the budget runs out won't be funded that year although it will remain on the list and be re-considered next time. If it has a very low priority, however, the chances are against it ever getting near the top so the work may never be carried out. Further information can be obtained by following the links under 'Grant Aid' on Defra's website at www.defra.gov.uk/environ/fcd

(d) National policy on withdrawing maintenance

Our national policy on managing uneconomic defences is described in 'Information for Owners and Occupiers of Land Adjacent to Sea Defences in England'. We will withdraw maintenance from a defence if the whole life cost of continuing to maintain it is greater than the value of the property it protects (i.e. it is an uneconomic defence), and there are no other reasons for carrying on. We will give property owners reasonable notice of our intentions, generally between six months and two years but possibly longer in special circumstances, and will continue routine maintenance during the notice period. We will not repair the defence if it is damaged, for example during a storm. No financial compensation will be payable as a result of our decision to withdraw but we will do our best to make

Changes in national guidance and policy (continued)

sure all those affected are aware of the implications and what they can do in the circumstances. This could range from taking over and maintaining the defences themselves to making their property more flood-resilient, so it is easier to recover from a flood. Further information can be obtained by searching for 'sea defences' on our website at www.environment-agency.gov.uk/

(e) Contributions from developers and major beneficiaries

PPS 25 makes it clear that all developers should take flood risk into account when making their decisions and, in particular, should expect to pay the full cost of any new works needed to protect their development. Other proposals, which could

involve seeking contributions that reflect the protection that developers and major beneficiaries receive from existing defences, are also being considered and policy guidance is being prepared.

(f) Delivery arrangements

We are keen to work with the government and others to explore different ways of delivering flood risk management that could lead to savings in time and money. In particular we will examine whether the private sector can be involved through public-private partnerships or similar private finance initiatives (known collectively as PPP/PFI arrangements), as have been used for other large infrastructure projects such as roads and hospitals.



Section 3

The Humber Strategy

Overall approach

We have adapted our overall approach to managing flood risk around the Humber to take the changes described earlier into account. A summary of our Humber Strategy is given below and is followed by more information about its main features.

1	<p>We will manage flood risk round the estuary to protect people and property by:</p> <ul style="list-style-type: none"> – continuing to maintain existing defences where this is sustainable; – identifying potentially unsuitable development in the floodplain; – providing targeted and timely flood warnings.
2	<p>We will withdraw maintenance from defences that are uneconomic but will examine other ways of protecting people and property where this happens, including:</p> <ul style="list-style-type: none"> – building secondary lines of defence; – advising people on how to prepare for flooding.
3	<p>We will move defences where doing so will:</p> <ul style="list-style-type: none"> – provide flood storage to help manage water levels during serious floods and so benefit others; – allow us to stop maintaining defences that are uneconomic; – replace inter-tidal habitat lost because of the strategy.

Much of the August 2005 consultation draft was concerned with managing the estuary’s flood defences. While this remains a key part of our strategy, the overall aim is to manage flood risk within the floodplain. Accordingly we will also help prevent unsuitable development in the floodplain, taking on the role set out for us in PPS25, and help limit the amount of damage caused when a flood does occur, by issuing warnings and advising people on how to prepare for it.

Managing the defences

The strategy sets the direction for managing the estuary’s defences but does not make the final decision about specific defence lengths. We will continue to maintain the estuary’s defences where this is sustainable, taking technical, economic, environmental and social issues into account, and will start a major programme of improvements this year. We will look at potentially more efficient ways of doing this, such as through a PPP/PFI arrangement. Where these are not suitable we will continue with our current practice of assessing a full range of options and the likelihood of getting funds from the national budget when a defence needs to be improved. If at any time we cannot get the funds to improve a defence that could fail very soon, we will stop maintaining it. The areas most likely to be affected as a result are shown on the map on page 23. More details about our approach to managing the defences are given at the end of this section.

Links with the planning system

We are building links with planners at both regional and local levels, to make sure that flood risk is taken fully into account as their plans are drawn up. We have contributed to the recently published Regional Spatial and Economic Strategies for Yorkshire and the Humber and will work with Yorkshire Forward on any initiatives that may affect the estuary. We are also liaising with local planning authorities about the Local Development Frameworks and the supporting Strategic Flood Risk Assessments they are required to produce.

Controlling development on the floodplain

We are working with the local planning authorities to make sure that applications for development in the floodplain take flood risk issues into account, as required by PPS 25, and are accompanied by a Flood Risk Assessment demonstrating this and identifying any measures proposed to deal with the problem. We will provide advice to those proposing developments and undertaking assessments and, where appropriate, will review the applications when submitted. While doing this we will pay particular attention to proposals in areas where we may withdraw maintenance from the defences in the future or that have already been identified as suitable for creating the new inter-tidal habitat we will need to comply with the Habitats Regulations. Further

information can be obtained by following the links to ‘Policy’ and ‘Planning’ on our website at www.environment-agency.gov.uk/aboutus

Responding to emergencies

We will continue to work closely with the emergency services during and after an extreme event, so we can bring our knowledge of the area to help manage flood flows, dispose of flood water and clear up afterwards. We have reviewed the flood warning arrangements around the estuary and will work on making them consistent and updating them as forecasting capabilities improve. We can give detailed advice about how to make buildings and their contents more resistant to flooding and more resilient in coping with flood incidents, and we are supporting government research into providing grants for doing this. Further information is given at the end of this section.

Planning where the water goes

An important aspect of managing flood risk is directing floodwaters when and where they occur so as to minimise the damage that occurs. We will not be able to raise the estuary’s defences enough to prevent all flooding in the future, so we will look carefully at where they are likely to be overtopped first and where the water will go when this happens. When we improve the defences we will do it so that if any overtopping does occur, it will be where we can manage it most easily. We will look at the implications of this flooding, identifying the property and infrastructure most at risk, reviewing our flood warning arrangements and discussing the need for additional controls on development with the local planning authorities.

Providing flood storage

If any defences in the areas 10 to 17 shown on the map on page 23 are overtopped during an extreme event, the water stored on the floodplain will result in lower river levels. When we assess options for raising defences upstream of the Humber Bridge we will take this effect into account. We will also look in more detail at the two sites we previously identified as possible flood storage schemes, also shown on the map, to determine whether we can make a good case for building them.

Complying with the Habitats Regulations

We will meet our obligations under the Habitats Regulations by creating new inter-tidal habitat to replace the losses caused by the strategy, as set out in our Coastal Habitat Management Plan. We will do this by acquiring land where we can move the defences back when new habitat is needed in that part of the estuary.

We have already identified some sites for this purpose, shown on the map on page 23 and listed in the table below with an indication of the dates they are likely to be built. These dates are based on our current predictions of the losses that will occur and assume that no other defences fail or are re-aligned. If they do, either because we stop maintaining them or for any other reason, we will adjust the predictions taking into account any impact on the area of suitable inter-tidal habitat in the estuary. We are very willing to consider other sites as well, and any landowner who might be interested in making their land available should get in contact with us using the details given inside the back cover.

Site for creating new inter-tidal habitat	Likely completion date*
Paul Holme Strays	Completed in 2003
Alkborough	Completed in 2006
Donna Nook	2010
Skeffling	Between 2010 and 2020
Welwick	After 2020
Keyingham	After 2030
Goxhill	Medium to long term

* Actual completion dates will depend on actual habitat losses

Supporting the environment

We will continue to monitor the environmental and social impacts of our strategy and to prepare all the assessments necessary to get the planning and other approvals needed to carry out our proposals. We will work to conserve and enhance both the natural environment, including the habitats behind the defences as well as those in front of them, and the historic environment (known and still buried). We will take account of the impact our work will have on the landscape and its character and will look for opportunities to improve the area’s amenity and recreational facilities, including access to the coast.

Paying for the work

Initially we expect the bulk of the funding that will be needed to come from the national flood and coastal defence budget. We know this is limited, however, and will become increasingly difficult to obtain as the effects of climate change cause the demand from other parts of the country to increase. We will therefore look for funding from other sources and in particular will seek contributions to new defence works from major beneficiaries and developers, liaising with local and regional planners as appropriate.

Links with other strategies

We will continue to keep in touch with the strategies and other plans, including Catchment Flood Management Plans, being developed for the rivers discharging into the Humber; the Ouse, Don, Aire, Trent, Ancholme, Freshney and the Hull. We will work particularly closely with the River Hull team as the flood risk in much of Hull City is strongly affected by a combination of events in the river and the estuary. We will also work closely with those responsible for land drainage to ensure that the impacts of changing sea levels and sedimentation patterns in the estuary are taken into account. In addition, we will work closely with the team reviewing the Humber Estuary Coastal Authorities Group (HECAG) Shoreline Management Plan (SMP) covering the coastline between Flamborough Head and Gibraltar Point including the outer estuary. The conclusions arrived at within the Humber Strategy may also be adopted within the SMP in the area where the strategies overlap (see map on page 23). This team will review our decisions for these frontages to confirm they are appropriate in the broader coastal context.

Reviewing progress

We inspect the defences regularly and draw up our annual maintenance plans on the basis of these inspections. We will continue to do this and will also continue to monitor the estuary, recording in particular the area of inter-tidal habitat to show we are complying with the Habitats Regulations and the data needed to confirm our understanding of how the estuary behaves. The results will be used when we

review our strategy, which will be at intervals of about five years. We are currently producing a 'State of the Estuary' report, which will describe its condition and the changes that are taking place, and will produce another one in time for the next review. Every 15 years or so we will carry out a detailed review of the scientific studies that underpin our strategy, making full use of any improvements in estuary and flood modelling and forecasting techniques as well as any new data.

Preparing for what's coming

We are the competent authority for implementing the Water Framework Directive in England and Wales, which requires all inland and coastal waters within the European Community to reach 'good status' by 2015. We will also be involved in implementing the Floods Directive, which is likely to come into effect within the next two years. The government's policy on flooding and flood risk management will develop as 'Making Space for Water' is put in place. We will follow all these initiatives to make sure our strategy takes them fully into account. Further information can be obtained by following the links at the following websites:

Water Framework Directive
www.environment-agency.gov.uk/subjects/waterquality

Floods Directive
www.defra.gov.uk/enviro/fcd/eufldir

Paull Holme Strays



Talking to others

We want to strengthen the links between our strategy and the community. We have a number of advisory groups with external representatives to review different aspects of our work and make sure our Humber Strategy continues to serve the needs of the country and the community. The key ones are listed on page 55 and further information about them can be obtained from the contact details given inside the back cover of this document. We will continue to keep in close contact with the local authorities around the estuary (East Riding of Yorkshire Council, Kingston upon Hull City Council, North Lincolnshire Council (North East), East Lindsey District Council) and, following the example of our Coastal Futures research project, will

also aim to work more closely with the Town and Parish Councils and to make direct contact with people who might be unfavourably affected by our strategy. These will include, for example, people living where we are planning to work on the defences, where we would like to create new inter-tidal habitat or where we may stop maintaining the defences. Some of the issues that might affect these people are summarised at the end of this section.

We are also keen to work with any others who think our Humber Strategy might affect them. In particular we would encourage any developers who are proposing to build in places where there might be a risk of flooding from the estuary, or from any other source, to get in touch with us as early as they can. Our contact details are given inside the back cover.

Our approach to managing the defences

(a) General

We will continue carrying out routine maintenance to all the defences around the estuary for which we are responsible and where it is economically worthwhile. We will improve the defences as set out in the strategy programme subject to the review arrangements described below and the availability of funding from the national flood and coastal defence budget. We will review the standard and condition of defences for which we are not responsible and if they are below the required standard will seek to get them improved.

(b) Improving defences

Before we improve any defences we will carry out a detailed assessment of the case for doing so, considering a wide range of options and taking technical, social, environmental and economic issues into account. If this confirms that funding is likely to be available we will carry on to design the works, obtain the appropriate approvals and build them when the funding comes through. If it is not, we are likely to withdraw maintenance in the future so will start the withdrawal process described below.

(c) Withdrawing maintenance

We have looked at all the flood areas and identified those where, on the basis of the information currently available, we think we could have difficulty funding improvement work. If so, the risk of these defences failing will increase and, when it gets very high, we will generally stop maintaining them. At the appropriate stage we will write to all property owners in these flood areas, advising them about when we are likely to do this and the possible consequences. We will issue formal notice of our intentions to withdraw maintenance in accordance with our national policy for uneconomic sea defences,

although we will aim to provide up to five years notice where we can rather than between six months and two years as it states. Before giving notice we will assess the case for building secondary defences or cross-banks to protect part of the area and talk to property owners about what they can do to help themselves. Information about some of the options is given on the next page.

(d) Maintaining third party defences

We will tell everyone who owns or maintains a defence that their property is part of the protection system. We will check the condition of these defences to confirm they are safe and provide a suitable standard of protection. If they are not adequate, we will tell the owners and, if possible, agree what improvements they will make. If this is not possible we will take whatever steps we think are needed to make the risk of flooding acceptable and may take action to recover the costs.

(e) Repairing failed defences

The advisory letters about withdrawing maintenance from a flood area will set out what we will do if the defences deteriorate or fail earlier than expected. If this happens when we have not already sent a letter, we will carry out temporary repairs to make the defence safe, review the case for making permanent repairs and confirm that funding is likely to be available. If it is, we will carry on to design and build the work as quickly as we can. If it is not, we will issue formal notice of our intention to withdraw, setting out a timetable and describing the process we will go through. This will include looking at the possibility of building secondary defences or cross-banks to protect part of the area and talking to property owners about how they can help themselves.

Information for property owners

The key issues affecting the owners of property in the estuary floodplain and the main ways they can manage flood risk are reviewed below. The information is particularly relevant where we may withdraw from maintaining the defences in the future.

(a) Risk of flooding

All the areas shown in the map on page 13 are at risk of being flooded. The frequency and depth of flooding at a property depends on its level and location; the severity of the event; whether the area has any flood defences; and, if so, on their condition, standard and future management. Both the frequency and the depth of flooding will increase in the future as sea levels rise. More information about each area can be obtained from the descriptions following the next section or by contacting us using the details given inside the back cover.

(b) Flood warning arrangements

We fund a national Storm Tide Warning System that uses information from the Meteorological Office to predict when a combination of high tides and storm surges might cause tidal flood conditions around the UK coastline. The results are fed into our Floodline Warnings Direct service, which is free to join and is available to everyone living in a flood risk area. It can be accessed by calling 0845 9881188 or if a warning is in place for your area, you can arrange to have flood warnings telephoned to you automatically. More information can be obtained from our website at www.environment-agency.gov.uk/subjects/flood/floodwarning

(c) Availability of flood insurance

Insurance companies look at the risk of flooding at the property being insured rather than at the standard of protection provided by the defences. They also consider the amount of damage likely to be caused if a flood does occur, so will take into account any flood resistance or resilience measures that have been installed. Property owners will therefore need to find out from their insurance company whether a new policy for their property is likely to be issued or an existing one renewed. The insurance industry has, however, agreed with the government to continue to renew existing policies where flood defences providing at least a 1.3 per cent standard of protection (one in 75 years) or better are in place or planned to be built within the next five years. Further information can be obtained by following the links on the Defra website at www.defra.gov.uk/enviro/fcd

(d) Developing or selling property

The Local Planning Authority is responsible for approving any applications to develop a property, although we advise each authority about the flood risk associated with an application. In doing this we will take into account the nature of the proposed development, the standard and condition of the defences and how we expect to manage them in the future. Inevitably the value of any property will be affected by the risk of it being flooded.

(e) Standard of defence

The standard of a defence indicates the severity of the event it will protect against, so a defence with a 20 per cent standard will protect against all events with a 20 per cent chance or more of happening each year (i.e. likely to occur once or more every five years on average). If a more severe event occurs the structure will be overtopped and is likely to fail, flooding the area behind. A defence's standard will fall as sea levels rise unless it is raised or other improvements are carried out.

(f) Consequences of withdrawing maintenance

If a defence is not improved the likelihood of it failing will increase with time and will accelerate once maintenance is withdrawn. If anyone else wishes to carry on maintaining it we will not object provided they comply with the Habitats Regulations and obtain all the other approvals necessary. If this doesn't happen and the defence fails, the risk of any property in the area behind it being flooded will increase significantly and may make it difficult to continue living there. Installing flood resistance or resilience measures might delay the need to leave some properties but will not be suitable for all cases. The areas that may be affected in this way are shown in the map on page 23.

(g) Flood resistance and flood resilience measures

Flood resistance measures are aimed at preventing water getting into a property and include such things as flood boards (installed in doorways or to close off airbricks), plastic skirts surrounding a property, permanent earth bunds and free-standing flood barriers. Their suitability depends on a wide range of factors, such as ground level and emergency access, and so needs to be assessed for each property individually. Flood resilience measures do not prevent water from entering a property but limit the damage caused when it does. They include such things as having solid tiled floors rather than carpets at ground level, raising electrical sockets and circuits above flood level, using water-proof rather than conventional plaster, plans for

Information for property owners (continued)

moving furniture and similar items upstairs. Again, their suitability needs to be assessed for each property individually. Further information can be obtained by following the link to 'Prepare for flooding' on our website at www.environment-agency.gov.uk/subjects/flood

(h) Changing land use

If the flood risk increases it may no longer be possible to continue the current land use. Environmental Stewardship and similar schemes

can help cushion the change from one type of agriculture to another. Further information can be obtained by following the link to 'Grants and funding' on Natural England's website at www.naturalengland.org.uk/planning/. We may be interested in buying land that can be used to create the new inter-tidal habitat we will need to comply with the Habitats Directive. Further information can be obtained by contacting us using the details inside the back cover.



Flood defences at Goole

Section 4

What happens next?

Summary of programme and issues

Some important features of each flood area covered by the strategy are listed in the table overleaf together with an indication of when we expect its defences will need to be improved. The table also identifies the areas where:

- there may be habitat creation or flood storage opportunities;
- some of the defences are managed by others;
- it may be difficult to obtain funding to improve the defences;
- we may stop maintaining the defences in the future.

Further information about individual flood areas is given in the next section.

Work in the next five years

Over the next five years we are planning to improve the defences at four sites around the estuary, review the need for improvements at a further site, create about 140 hectares of new inter-tidal habitat and sustain an internationally important conservation site, as detailed in the table below. We have already begun contacting the people who will be affected by three of these schemes (at Brough, Swinefleet and Donna Nook) and will contact those affected by the others in due course.

Flood Area	Location	Work planned
1	The Lagoons, Easington	Re-create features and habitats being lost due to coastal erosion.
5	Paull Village	Review risk of waves overtopping sea wall and flooding adjacent properties, carrying out improvements if necessary.
9	Brough (BAe Works)	Improve standard of protection to houses in Brough and to BAe works; withdraw from uneconomic defences.
13	Swinefleet	Improve standard of protection to houses in Swinefleet; prevent erosion from undermining defences.
23	Halton Marshes	Prevent erosion from undermining defences; withdraw from uneconomic defences.
24	Stallingborough	Prevent erosion and channel movements from undermining defences.
27	Donna Nook	Create about 140 ha of new inter-tidal habitat; build new defences behind the area.

Work in later years

We will soon begin preparing for the works that we expect will be needed in 10 to 15 years, in particular at Hull, Grimsby and near Immingham where the risks are high, some of the defences are managed by third parties and there are major development issues. We will work closely with those who manage the defences to make sure the improvements needed are carried out and with the local and regional authorities to confirm that all development plans take flood risk into account.

Creating new inter-tidal habitat

We have already started acquiring the land we will need to develop our proposed habitat creation site at Skeffling and are in discussion about the land we will need for the site at Welwick. We will continue this process and are interested in any land that might be suitable for creating inter-tidal habitat in the areas where we will need it (marked in green on the table on page 25), or that could be exchanged for land that is suitable. Any landowner who might be interested in making their land available should contact us using the details inside the back cover.

Habitat creation, flood storage and potential withdrawal of maintenance



Opportunities for flood storage

We are beginning to look at the opportunities for managing flooding in Flood Area 13, which lies between the Trent and the Ouse, and in due course will do the same for areas 10 to 17. We will look at the potential gains to be made from leaving some lengths of defence lower than others so that they would overtop first, and then managing the flooding that would result. In doing this we will take into account any reduction in damage elsewhere because of the lower river levels (caused by losing the floodwater from the river). We will also review the potential benefits of the proposed flood storage schemes at Sandhall and Flixborough Grange and assess whether they are economically worthwhile. Once we have examined these opportunities and considered how any proposals might be implemented we will contact the people who may be affected by our findings.

Withdrawing maintenance

We have looked at whether we might have difficulty funding the improvements needed to make it worthwhile continuing to maintain the defences where there are only a small number of houses at risk and few other assets. We will write to the property owners in the flood areas marked in pink on the map above and listed in the table overleaf, advising them that they might be affected. The way we will manage this process is described on page 19. At this stage we expect that very few, if any, properties are likely to be affected in the next 10 years, about 800 in the following 10 years and a further 1000 subsequently, although we anticipate being able to protect a significant proportion of them by building secondary defences.

Management Proposals

Key

Habitat creation opportunities (managed realignment)

No suitable land or not needed in this area (unmarked)

Possible if land available ✓

Site already included in Strategy programme ✓

Flood storage opportunities

No suitable land or not needed in this area (unmarked)

Possibly suitable ✓

Probably suitable (includes existing proposals) ✓

Responsibility for managing defences

All defences managed by Environment Agency □

Some defences managed by others ◻

Most defences managed by others ◻

All defences managed by others ◻

Other economic assets in flood cell

Limited value (e.g. agricultural land only) □

Important value (e.g. major infrastructure etc) ◻

Primary value (e.g. key industrial facilities etc) ◻

Case for improving defences

Probably not difficult to make •

Possibly difficult to make ••

Probably difficult to make •••

Withdrawal warnings (EA defences only)

Environment Agency will not issue warnings None

Warnings may be issued in more than 20 years > 20

Warnings may be issued in 10 to 20 years 10-20

Warnings may be issued in less than 10 years < 10

N.B. Uncertainty about rate of sea level rise means timings are approximate

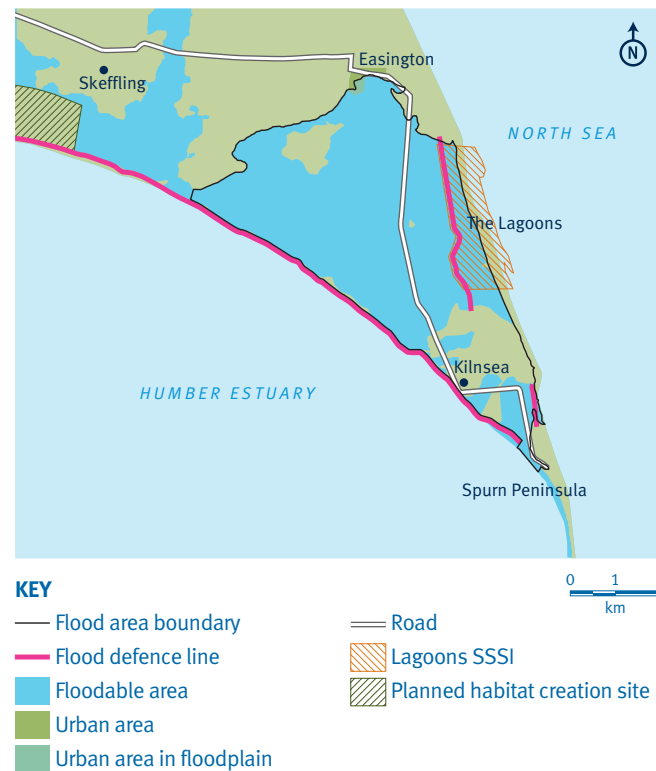
Notes: *No EA defences, so no withdrawal warning. #Further study may show building secondary defences to protect some groups of properties is economically worthwhile. †Although all the defences will continue to be maintained, some of them are likely to be raised earlier and to a higher standard than others.

Flood cell	Name	Area (ha)	Length of defences (km)	Estimated residual life (years)	Works needed in years			Habitat creation	Flood storage	Currently managed by	Residential properties (No)	Other economic assets	Case for improving defences	Withdrawal warnings may be issued	Number of properties affected
					1-5	5-15	15-25								
1a	Kilnsea (Spurn Road)	97	2.0 (coast)	10-20					◻	9	◻	•••	10-20 yrs	9	
1b	Kilnsea (Kilnsea Village)	17	5.3 (estuary)	< 10					◻	14	◻	•••	None*	14	
1c	Kilnsea (Easington)	567		10-20	✓		✓	✓	◻	53	◻	•••	10-20 yrs#	53	
2	Skeffling	411	4.8	10-20		✓		✓✓	◻	10	◻	•••	10-20 yrs#	10	
3	Sunk Island	6,812	11.8	10-20		✓	✓	✓✓	◻	668	◻	••	10-20 yrs#	668	
4	Stone Creek to Paull Holme	3,300	11.5	10-20				✓✓	◻	195	◻	••	None*	195	
5a	Hull East (Paull Village)	2,613	13.2	< 10	✓				◻	5,728	◻	•	None		
5b	Hull East (Victoria Dock Village)	12,355		10-20		✓			◻	51,356	◻	•	None		
6	Hull West	9,471	8.4	10-20		✓			◻	79,974	◻	•	None		
7	Hessle	35	2.4	< 5	✓				◻	24	◻	•••	None*	24	
8	North Ferriby	32	3.2	> 20			✓		◻	28	◻	••	> 20 yrs#	28	
9a	Brough (East)	389	6.1	< 10	✓				◻	0	◻	•••	< 10 yrs	0	
9b	Brough (West)			< 10	✓				◻	483	◻	•	None		
10	Brough Haven to Weighton Lock	4,259	6.5	< 10			✓		◻	697	◻	•	None		
11a	Saltmarshe (Blacktoft to Yokefleet)	14,143	24.4	10-20		✓			◻	2,821	◻	•†	None		
11b	Saltmarshe (Sandhall)			> 20		✓	✓		◻		◻	•	None		
12	Goole	3,380	8.6	> 20					◻	9,960	◻	•	None		
13a	Goole Fields (Swinefleet)			< 10	✓				◻		◻	•†	None		
13b	Goole Fields (Swinefleet to Reedness)	19,626	28.7	10-20		✓			◻	10,654	◻	•†	None		
13c	Crowle (Amcotts to Keadby)			> 20			✓		◻		◻	•	None		
14	Gunness to Flixborough	1,070	5.9	10-20		✓			◻	2,649	◻	•	None		
15	Flixborough Grange	365	6.3	> 20					◻	7	◻	•••	> 20 yrs#	7	
16	Alkborough Flats	427	6.4	> 20				✓	◻	Scheme completed in 2006	◻	•	None		
17	Whitton to Winteringham	636	4.6	10-20			✓		◻	59	◻	•••	10-20 yrs#	59	
18	Winteringham Ings	4,760	4.5	< 10		✓	✓		◻	536	◻	•	None		
19	South Ferriby	6,170	3.2	> 20			✓		◻	1,107	◻	•	None		
20a	Barton Cliff to Barton Haven (West)	206	2.9	> 20					◻	10	◻	••	> 20 yrs#	10	
20b	Barton Cliff to Barton Haven (East)								◻	429	◻	•	None		
21	Barton Haven to Barrow Haven	442	3.3	> 20			✓		◻	958	◻	•	None		
22	Barrow Haven to East Halton Skitter	2,551	10.5	> 20			✓	✓✓	◻	634	◻	••	> 20 yrs#	634	
23a	Halton Marshes	876	7.3	< 10	✓	✓	✓		◻	0	◻	•••	< 10 yrs	0	
23b	Killingholme Marshes			< 10		✓	✓		◻	26	◻	•	None		
24	Immingham to River Freshney	3,613	12.6	< 10	✓	✓	✓		◻	11,687	◻	•	None		
25	East Grimsby	802	3.9	10-20		✓			◻	18,909	◻	•	None		
26	Cleethorpes and Humberston	1,669	9.2	> 20			✓		◻	2,243	◻	•	None		
27	Tetney to Saltfleet Haven	13,138	17.4	> 20	✓	✓	✓	✓✓	◻	2,928	◻	•	None		

Section 5 Proposals for each flood area

Flood area 1 – Easington and Kilnsea

Key information	
Size of flood area	681 ha
Number of properties in floodplain	76
Area of agricultural land	597 ha
Length of defences (a) sea	2.0 km
(b) estuary	5.3 km
Current standard of protection	Varies, minimum 20% (1 in 5)
Remaining life of defence	Varies, generally 10 to 40 years
Defences managed by	Environment Agency, apart from new sea defences at Kilnsea which are managed by the villagers



About 25 of the properties at risk are in Kilnsea but most of the rest are in Easington, at the edge of the floodplain. The area is used almost entirely for agriculture but contains important wildlife habitats, particularly at Spurn and The Lagoons. The habitats at The Lagoons are threatened by erosion, which is causing the coastline to retreat by two to three metres each year on average. Spurn Peninsula is a Heritage Coast site and the estuary's main pilotage and lifeboat facilities are at Spurn Head.

Existing flood defences

The area is protected by two sets of defences, beside the estuary and the sea. The sea defences are threatened by the retreating coastline; those protecting Kilnsea have recently been replaced and are expected to last for between 20 and 30 years before the retreating coastline reaches them, while those protecting Easington are expected to last for between 30 and 40 years. The estuary defences are expected to need minor repairs every few years and major improvement in about 20 years.

Proposed management approach

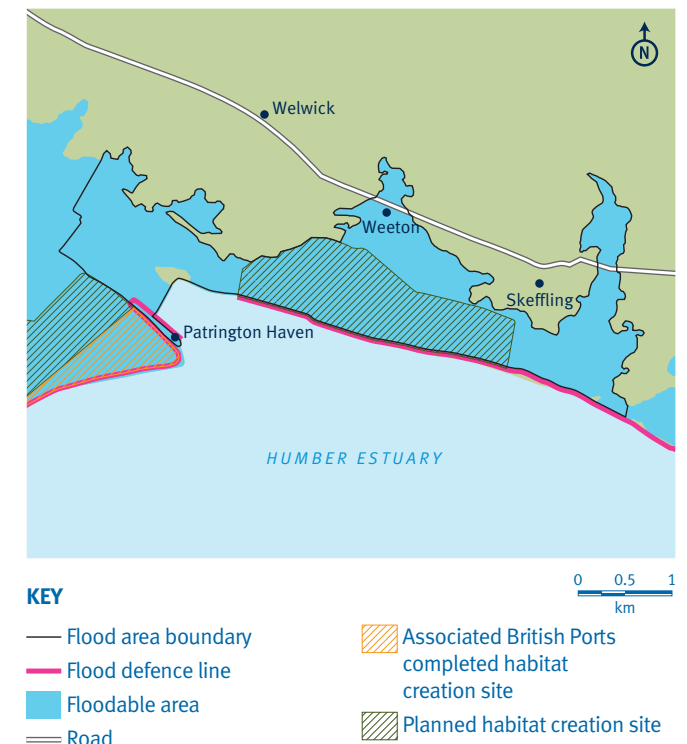
At present we are continuing to maintain the defences and are looking at how to provide replacement habitat

for The Lagoons. In the future we will not maintain the new flood defence embankment built near to the sea at Kilnsea. We are continuing to maintain the other defences. Uncertainty about the rate at which sea levels will rise and the defences deteriorate means we cannot say exactly when this might happen but currently we expect it to be in between 10 and 20 years. We will re-assess the situation each time we review the strategy and tell all property owners in the area about the outcome.

Although we may not be able to carry on maintaining the defences, others may wish to. Provided they can comply with the Habitats Regulations and obtain the approvals needed, we will provide all the advice and information we can to help them. If not, we will look at building a secondary bank to protect properties in Easington. Without further study we cannot confirm this will be possible or say exactly where the bank might be located. The owners of any property not protected may wish to consider other options, which in some cases might include flood-proofing individual houses. Again we will provide all the advice and information we can.

Flood area 2 – Skeffling

Key information	
Size of flood area	411 ha
Number of properties in floodplain	10
Area of agricultural land	403 ha
Length of defences	4.8 km
Current standard of protection	Varies, generally about 5% (1 in 20) but 50% (1 in 2) locally
Remaining life of defence	Varies, generally 10 to 20 years
Defences managed by	Environment Agency



Most of the properties at risk are in Weeton (at the edge of the floodplain), there are none in Skeffling itself. The area contains farms and high-grade agricultural land and is drained to the estuary, either by gravity or by being pumped. A large part of the area has been identified as suitable for creating the new inter-tidal habitat we will need to replace the losses caused by our flood defence improvements and sea level rise. We have already bought some of the land and plan to buy more so we can develop the site between 2010 and 2020.

Existing flood defences

The defences are generally in good condition. They are expected to need minor repairs every few years and major improvement in about 20 years.

Proposed management approach

At present we are continuing to maintain the existing defences. However, in the future the relatively small number of properties at risk means that we could find it difficult to justify spending public money on the existing defences and so may have to withdraw from them. Uncertainty about the rate at which sea levels will rise and the defences deteriorate means we cannot say exactly when this might happen but currently expect it to be in between 10 and 20 years. We will re-assess the situation each time we review the strategy and tell all property owners in the area about the outcome.

Withdrawing from the existing defences will not affect properties behind the habitat creation site, as this will include new defences to protect them. The defences either side of the site will not be improved, however, so once we withdraw they will deteriorate and in due course fail. Although we may not be able to carry on maintaining the existing defences, others may wish to. Provided they comply with the Habitats Regulations and can obtain the approvals needed, we will provide all the advice and information we can to help them. The owners of any property not protected may wish to consider other options, which in some cases could include flood-proofing individual houses. Again we will provide all the advice and information we can.

Flood area 3 – Sunk Island (Winestead Drain to Stone Creek)

Key information	
Size of flood area	6812 ha
Number of properties in floodplain	668
Area of agricultural land	6733 ha
Length of defences	11.8 km
Current standard of protection	Varies, generally about 10% (1 in 10) or better but 50% (1 in 2) locally
Remaining life of defence	Varies, generally 10 to 20 years
Defences managed by	Mostly Crown Estate but also Associated British Ports, Environment Agency



Most of the properties are at the edge of the floodplain, in the villages of Keyingham, Ottringham, Pattrington or Pattrington Haven. It contains scattered farms and high-grade agricultural land. The land is drained to the estuary by a system of ditches leading either to the Winestead Drain (which is pumped) or to Keyingham Drain (which flows by gravity). Although this and the neighbouring area of Stone Creek to Paull Holme Strays (Flood Area 4) are separated by Keyingham Drain, flooding in one can affect the other. Therefore the two areas should be considered together.

Associated British Ports has created a new inter-tidal habitat at a site near Welwick to compensate for losses due to their development at Immingham. We have identified land behind this site for creating the inter-tidal habitat we will need to replace the losses caused by our flood defence improvements and sea level rise. We plan to develop it after 2020.

Existing flood defences

Some work is needed to protect the defences against erosion and this will probably need to be repeated every few years. Major improvements are likely to be needed in 20 to 30 years.

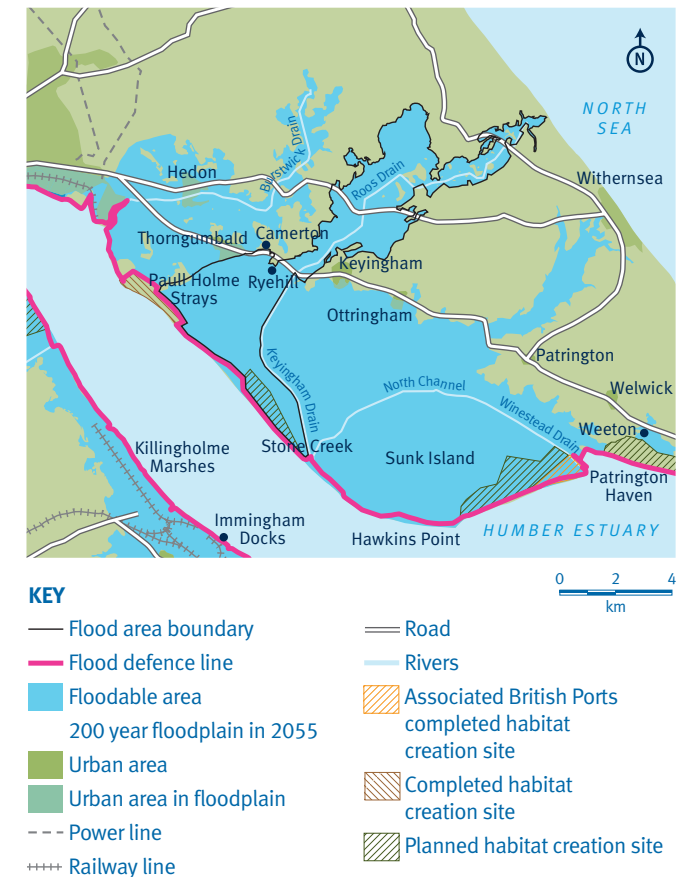
Proposed management approach

Currently, the banks in this part of the estuary are mostly owned by the Crown. It will become increasingly expensive to maintain the existing defences in the future as sea levels rise and at some point the owners may decide it is not worthwhile carrying on. We think this is unlikely to be within the next 20 years.

If maintenance is withdrawn from the existing defences, we will look at building secondary banks to protect the villages at the edge of the floodplain. Without further study we cannot confirm this is possible or say exactly where the banks might be located. The owners of any property not protected may wish to consider other options, which in some cases might include flood-proofing individual houses. We will provide all the advice and information we can to help.

Flood area 4 – Stone Creek to Paull Holme Strays

Key information	
Size of flood area	3300 ha
Number of properties in floodplain	195
Area of agricultural land	3268 ha
Length of defences	11.5 km
Current standard of protection	About 12.5% (1 in 80) or better
Remaining life of defence	Varies, generally 10 to 20 years
Defences managed by	Environment Agency responsible for defences at Paull Holme Strays, other defences managed by Crown Estate



Most of the properties at risk are at the edge of the floodplain, in the villages of Ryehill or Camerton (Thorngumbald, the village next door, is in Flood Area 5). It contains scattered farms and high-grade agricultural land. The land is drained to the estuary by a system of ditches leading to Keyingham Drain. Although this and the neighbouring area of Sunk Island (Flood Area 3) are separated by Keyingham drain, flooding in one can affect the other. Therefore the two areas should be considered together.

In 2004 we completed a scheme at Paull Holme Strays that created new inter-tidal habitat to replace the losses due to flood defence improvements and sea level rise. We have identified another site near Keyingham as suitable for creating additional habitat but are unlikely to develop it until after 2030.

Existing flood defences

The defences are generally in good condition. Major improvements are likely to be needed in 40 years or so.

Proposed management approach

We have looked at the costs and benefits of continuing to maintain the existing defences in the future and concluded that this will become increasingly expensive as sea levels rise. In the long term those responsible may decide it is not worthwhile carrying

on. Uncertainty about the rate at which sea levels will rise and the defences deteriorate means we cannot say when this might happen, although we think it is unlikely to be within the next 20 years. We will re-assess the situation when we review the strategy and keep in touch with those responsible for the defences.

If maintenance is withdrawn from the existing defences, we will look at building secondary banks to protect the villages at the edge of the floodplain. Without further study we cannot confirm this will be possible or say exactly where the banks might be located. The owners of any property not protected may wish to consider other options, which in some cases might include flood-proofing individual houses. We will provide all the advice and information we can to help.

Flood area 5 – Hull East (including Paull Village)

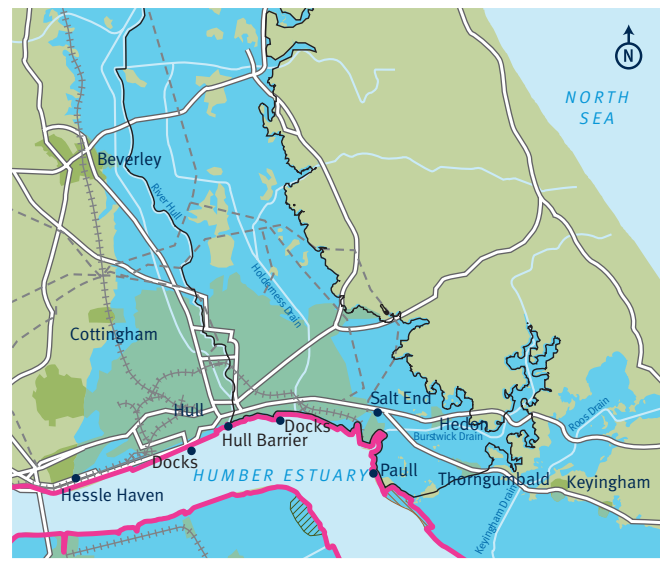
Key information	
Size of flood area	14,968 ha
Number of properties in floodplain	57,084
Area of agricultural land	9,328 ha
Length of defences	13.2 km
Current standard of protection	Hull, 0.5% (1 in 200) or better. Paull, 1% (1 in 100)
Remaining life of defence	10 to 20 years
Defences managed by	Mixed; Hull City Council, Associated British Ports and Environment Agency

Most of the properties at risk are in Hull, although there is a significant number in the smaller communities east of the city including Hedon, Burstwick, Thorngumbald and Paull. The area also contains major industrial and commercial facilities, including petro-chemical and port-related developments. Surface water is drained by a combination of sewers (mostly managed by Yorkshire Water) and open channels, all of which flow or are pumped to the estuary. An independent review of these arrangements has been carried out following the extensive flooding in June 2007. Hull City Council has prepared a Strategic Flood Risk Assessment to inform their planning decisions and the future development of the city.

Existing flood defences

The estuary defences are in good condition. We are reviewing the standard provided at the Victoria Dock development and may improve the defences there in the next 10 years if necessary. We are also looking at the Paull defences, in particular how to manage the large volumes of spray from waves that can occur during severe storms.

The city of Hull is also at risk of flooding from the River Hull and from surface water overwhelming the drainage system. We are developing a separate strategy for the River Hull defences that takes into account the crucial role of the Hull Barrier and are working closely with the other relevant authorities to develop effective approaches for dealing with the complex flooding issues in the city.



KEY	
— Flood area boundary	++++ Railway line
— Flood defence line	— Road
■ Floodable area	— River
■ Urban area	▨ Completed habitat creation site
■ Urban area in floodplain	▨ Planned habitat creation site
- - - Power line	

Proposed management approach

We will continue to protect this area and will work with the local and regional authorities, property owners and developers to make sure flood risk is taken into account at all stages of the planning process. The defences will need to be improved as sea levels rise. This will be expensive so we will seek to supplement public funds with contributions from major beneficiaries and from developers, who will be expected to pay the full cost of any new works needed to protect their development.

Flood area 6 – Hull West (Hull Barrier to Hesse Haven)

Key information	
Size of flood area	9,471 ha
Number of properties in floodplain	79,974
Area of agricultural land	5,191 ha
Length of defences	8.4 km
Current standard of protection	Generally 0.5% (1 in 200) but locally 5% (1 in 20)
Remaining life of defence	Generally 10 to 20 years, locally 5 years
Defences managed by	Mixed; Hull City Council, Associated British Ports and Environment Agency

The properties at risk are in Hull and further inland (e.g. at Beverley). The area also contains major infrastructure, industrial and commercial facilities. Surface water is drained by a combination of sewers (mostly managed by Yorkshire Water) and open channels, all of which flow or are pumped to the estuary. An independent review of these arrangements has been carried out following the extensive flooding in June 2007. Hull City Council has prepared a Strategic Flood Risk Assessment to inform their planning decisions and the future development of the city.

Existing flood defences

The estuary defences are generally in good condition and provide a good standard of protection, except from the Hull Barrier to Victoria Pier and from Albert Dock to St Andrews Quay, where the standard needs to be improved.

The area is also at risk of flooding from the River Hull and from surface water that overwhelms the drainage system. We are developing a separate strategy for the River Hull defences that takes into account the crucial role of the Hull Barrier and are working closely with the other relevant authorities to develop effective approaches for dealing with the complex flooding issues in the city.



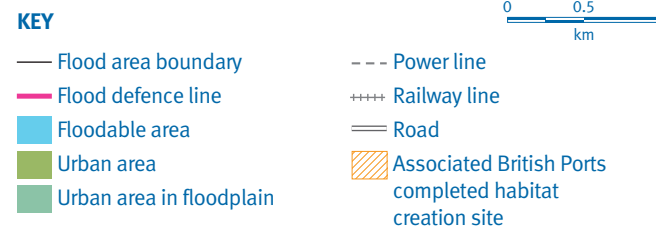
KEY	
— Flood area boundary	- - - Power line
— Flood defence line	— Railway line
■ Floodable area	— Road
■ Urban area	— River
■ Urban area in floodplain	▨ Completed habitat creation site
	▨ Planned habitat creation site

Proposed management approach

We will continue to protect this area and will work with the local and regional authorities, property owners and developers to make sure flood risk is taken into account at all stages of the planning process. The improvements needed to the defences will be expensive so we will seek to supplement public funds with contributions from major beneficiaries and from developers, who will be expected to pay the full cost of any new works needed to protect their development.

Flood area 7 – Hesse Frontage (Hesse Haven To Hesse Country Park Hotel)

Key information	
Size of flood area	35 ha
Number of properties in floodplain	24
Area of agricultural land	8 ha
Length of defences	7.4 km
Current standard of protection	Varies, locally 20% (1 in 5) or less
Remaining life of defence	Varies, locally 5 years
Defences managed by	East Riding of Yorkshire and others



Clive Sullivan Way separates this small area from the main part of Hesse and Hull (which is included in Flood Area 6). As well as residential properties, it contains recreational areas and some commercial and industrial premises. Surface water is drained by a combination of sewers (mostly managed by Yorkshire Water) and open channels, all of which flow or are pumped to the estuary.

Existing flood defences

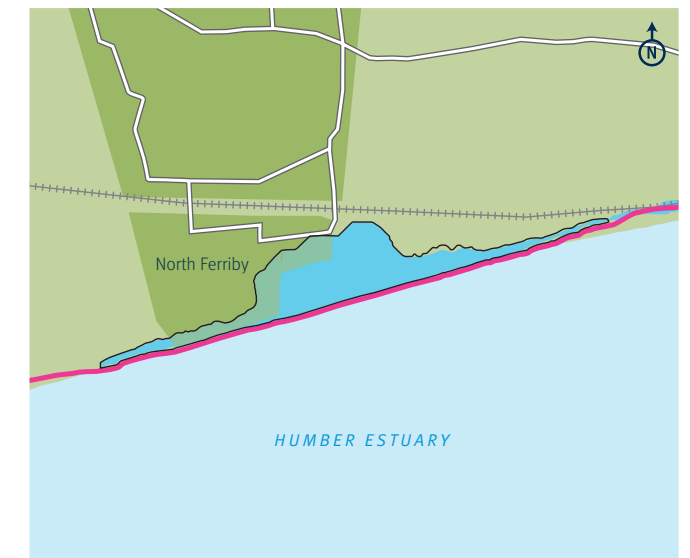
The defences are generally in a poor condition and provide a low standard of protection. The shoreline is being worn away by tides and waves in places, which in time will threaten some of the defences.

Proposed management approach

We expect that continuing to maintain these defences in the future will become increasingly expensive as sea levels rise. In the long term those responsible may decide it is not worthwhile carrying on. Other ways of managing the flood risk may need to be considered. We will review the situation regularly and keep in touch with those responsible for the defences.

Flood area 8 – North Ferriby

Key information	
Size of flood area	32 ha
Number of properties in floodplain	28
Area of agricultural land	8 ha
Length of defences	3.2 km
Current standard of protection	Generally 1% (1 in 100) or better, locally 20% (1 in 5)
Remaining life of defence	10 to 20 years
Defences managed by	Environment Agency



The area is mainly residential, although there is some farmland and a old landfill site at the eastern end. The edge of this site is being eroded by tides and waves, which could release contaminants into the estuary. Part of the main railway to Hull is on the edge of the area but is above the level of flood risk.

Existing flood defences

There are two lines of flood defences protecting this area both of which are in reasonable condition and provide a good standard of protection.

Proposed management approach

At present we are continuing to maintain the defence along the edge of the estuary. As sea levels rise we may find it difficult to justify spending public money doing this, in which case we may have to withdraw. Before doing so we will consider other options for protecting the area. Uncertainty about the rate at which sea levels will rise and the defences deteriorate means we cannot say when this might happen, although we think it is unlikely to be within the next 20 years. We will re-assess the situation each time we review the strategy and tell all property owners in the area about the outcome.

We are reviewing the risk of allowing the erosion of the landfill site to continue. Any work needed as a result will be separate from the flood defence strategy.

Flood area 9 – Brough

Key information	
Size of flood area	389 ha
Number of properties in floodplain	483
Area of agricultural land	148 ha
Length of defences	6.1 km
Current standard of protection	Varies, western end (new defences) 0.5% (1 in 200), eastern end 2.5% (1 in 40)
Remaining life of defence	Varies, western end 20 years or more, eastern end 10 to 20 years
Defences managed by	Environment Agency

Most of the properties are residential and are located in Brough, at the western end of the area, which also contains an important factory and airfield owned by BAe. The eastern end contains old gravel/clay extraction pits, which are now used for recreation (fishing, sailing) or nature conservation and a landfill site. Although not a flood defence issue, the landfill site is being eroded by waves and tides, which could release contaminants into the estuary.

Existing flood defences

The defences at the western end have been improved within the last 10 years and as a result are in good condition and provide a good standard of protection. Work is needed to improve the condition of the remaining defences and the standard they provide.

Proposed management approach

We will continue to protect Brough and the BAe factory and will improve the standard they receive by building a new defence from the end of the recently completed one across the airfield to high ground behind Welton Water. We cannot justify spending public money on maintaining the defences at the eastern end of the area, as they protect very few properties. After giving due notice we will withdraw from these defences. Although we may not be able to carry on maintaining the existing defences, others may be able to obtain the approvals



needed to do so while complying with the Habitats Regulations. If anyone does we will provide all the advice and information we can to help them.

We are reviewing the risk of allowing the erosion of the landfill site to continue. Any work needed as a result will be separate from the flood defence strategy.

Flood area 10 – Brough Haven to Weighton Lock

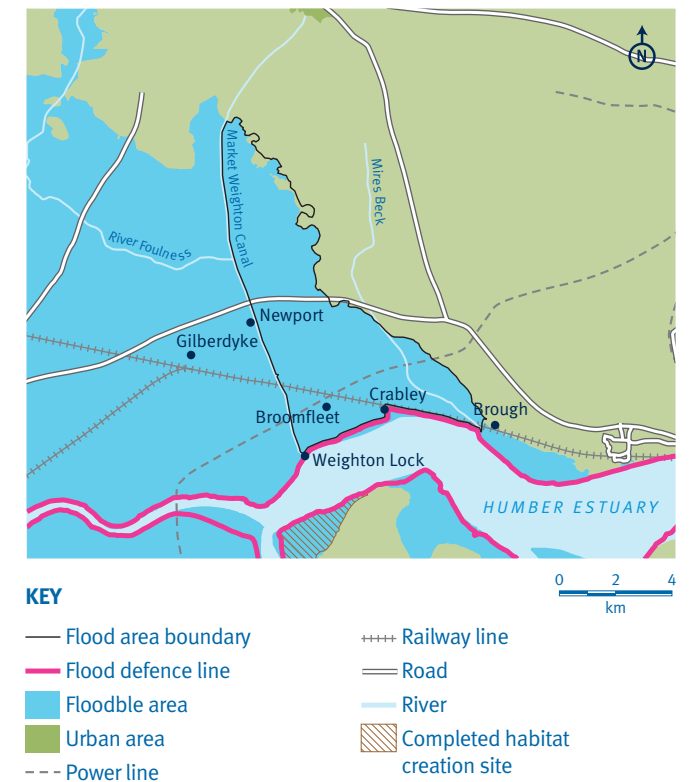
Key information	
Size of flood area	4259 ha
Number of properties in floodplain	697
Area of agricultural land	4208 ha
Length of defences	6.5 km
Current standard of protection	Varies, eastern end (new defences) 0.5% (1 in 200), western end 10% (1 in 10) locally
Remaining life of defence	Varies, eastern end 20 years or more, western end 10 to 20 years
Defences managed by	Environment Agency, Associated British Ports and others

The properties are scattered throughout the area, which is largely devoted to farming but also contains key infrastructure including road and rail links to Hull and high-voltage power lines. The land is drained by a system of ditches flowing either to the estuary by gravity or to the Market Weighton Canal, which itself flows into the estuary by gravity through Weighton Lock.

Existing flood defences

The defences between Brough Haven and Crabley Farm have been improved within the last 10 years and as a result are in good condition and provide a good standard of protection.

The remaining defences are owned by others and are in fair to poor condition and are narrow and difficult to maintain. They are likely to need improvement in the next 15 to 20 years.



Proposed management approach

We will continue to inspect all the defences and to maintain and improve the ones for which we are responsible as necessary. We will also keep in touch with those responsible for the other defences, telling them about any maintenance or improvements needed.

We are considering the possibility of keeping some lengths of the defences lower than others, so that we will know which areas will be flooded during a major event and can take steps to minimise the damage. We will look carefully at all the implications of this approach, taking into account the benefits of the lower river levels that will result from any overtopping that occurs or from the flood storage schemes that have been identified in the Humber and Ouse strategies. Before deciding whether or not to adopt the approach we will discuss the issues it raises with all those who might be affected.

Flood area 11 – Weighton Lock to Boothferry Bridge

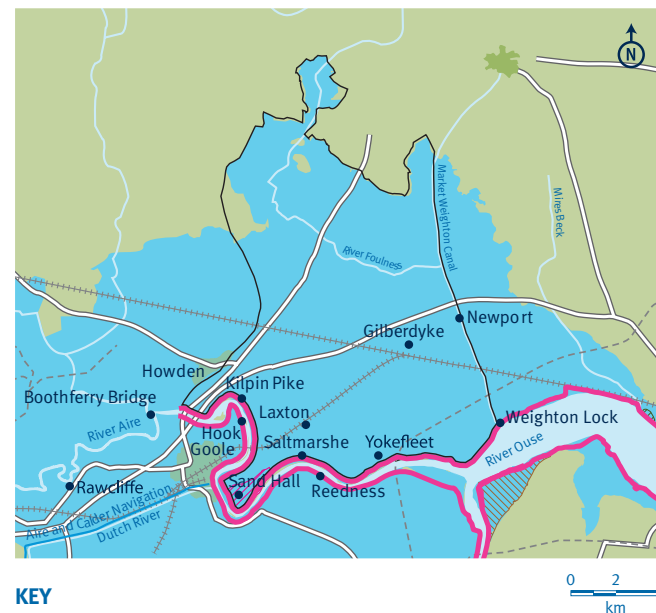
Key information	
Size of flood area	14,143 ha
Number of properties in floodplain	2821
Area of agricultural land	14,074 ha
Length of defences	24.4 km
Current standard of protection	Varies, generally 5% (1 in 20) or better but locally 20% (1 in 5)
Remaining life of defence	Varies, generally 10 to 20 years
Defences managed by	Environment Agency, Associated British Ports Ltd and others

This area contains several villages together with many scattered residential properties and farmsteads. It also contains a large area of high-grade agricultural land together with key infrastructure including road and rail links to Hull and high-voltage power lines. The land is drained by ditches that flow either to the River Ouse by gravity or to the Market Weighton Canal (directly or through the River Foulness), which itself flows to the estuary by gravity through Weighton Lock.

Existing flood defences

The defences are generally in reasonable condition and provide an appropriate standard of protection. The banks of the River Ouse are being eroded in a number of places and there is concern about the stability of the defences at some points. Two lengths have been identified as needing to be improved within the next 15 years; between Blacktoft and Yokefleet; and at Sand Hall. The latter has also been identified as a possible flood storage scheme, although this needs further study.

The area is also at risk of flooding from high flows in the River Derwent and the River Ouse. We are preparing separate strategies or management plans for these rivers.



Proposed management approach

We will continue to inspect all the defences and to maintain and improve the ones for which we are responsible as necessary. We will also keep in touch with those responsible for the other defences, telling them about any maintenance or repairs needed.

We are considering the possibility of keeping some lengths of the defences lower than others, so that we will know which areas will be flooded during a major event and can take steps to minimise the damage. We will look carefully at all the implications of this approach, taking into account the benefits of the lower river levels that will result from any overtopping that occurs or from the flood storage schemes that have been identified in the Humber and Ouse strategies. Before deciding whether or not to adopt the approach we will discuss the issues it raises with all those who might be affected.

Flood area 12 – Goole

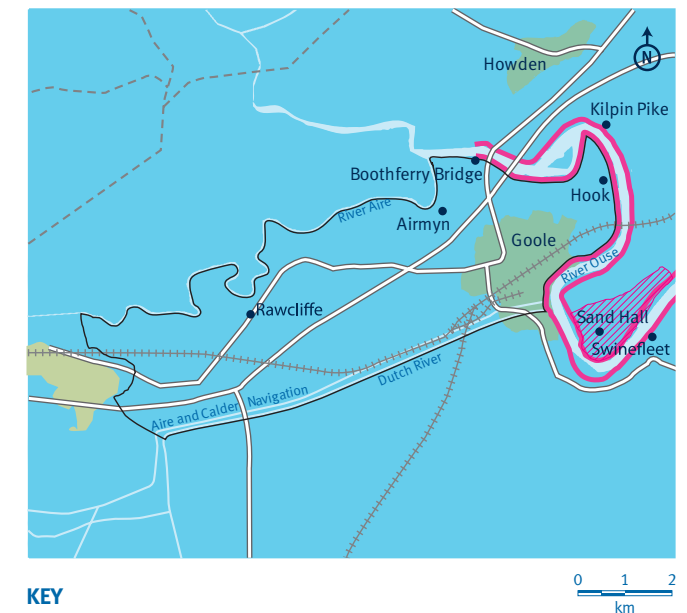
Key information	
Size of flood area	3380 ha
Number of properties in floodplain	9960
Area of agricultural land	2855 ha
Length of defences	8.6 km
Current standard of protection	0.5% (1 in 200) or better
Remaining life of defence	20 years or more
Defences managed by	Environment Agency

All the properties in Goole, which is very low-lying, are at risk of flooding. There is also a significant number of properties in smaller communities nearby including Hook, Airmyn and Rawcliffe. The area contains important industrial, commercial and port-related facilities together with key infrastructure (including major road and rail links) and high-grade agricultural land.

Existing flood defences

The defences are generally in good condition and provide a good standard of protection. However, in places the banks of the River Ouse are being eroded by the river and showing signs of instability, for example at Hook Road.

Parts of the area are also at risk of flooding from high flows in the rivers Ouse, Aire and Don. We are preparing separate strategies for these rivers.

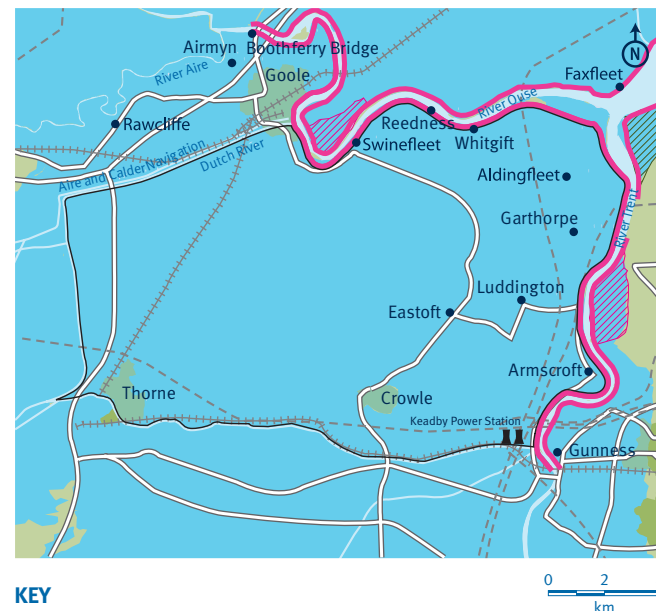


Proposed management approach

We will continue to maintain and improve this area's existing defences, carrying out further investigations as necessary. We will also work with the local and regional authorities, property owners and developers to make sure flood risk is taken into account at all stages of the planning process. The defences will need to be improved as sea levels rise. This will be expensive so we will seek to supplement public funds with contributions from major beneficiaries and from developers, who will be expected to pay the full cost of any new works needed to protect their development.

Flood area 13 – Goole Fields and Crowle

Key information	
Size of flood area	19,626 ha
Number of properties in floodplain	10,654
Area of agricultural land	19,787 ha
Length of defences	28.7 km
Current standard of protection	Varies, 3.3% (1 in 30) to 0.5% (1 in 200) or better
Remaining life of defence	Generally 10 to 20 years, 5 years locally
Defences managed by	Environment Agency, Associated British Ports Ltd and others



Many of the properties at risk, such as those in Thorne and Crowle, are some distance from the flood defences. There are also significant numbers of properties in small communities close to them including Swinefleet, Reedness, Garthorpe, Amcotts and Keadby. The area is largely used for agriculture and contains scattered farms as well as a rail link, power station, high-voltage power lines and the internationally important Humberhead Peatlands. The land is drained by several systems of ditches and pumping stations flowing either to the River Ouse or the Trent. The future management of the system leading to Keadby Pumping Station (draining a part of this area as well as an extensive area further south) is being reviewed.

Existing flood defences

The defences are generally in reasonable condition and their height provides an adequate standard of protection. However, the riverbanks are being worn away in places and there are concerns about the stability of the defences at some points. We have recently improved the defences near Amcotts and are planning to do so at Swinefleet within the next five years and at Reedness within the next 15.

The area is also at risk of flooding from high flows in the rivers Ouse, Don and Trent. We are preparing separate strategies for these rivers that will link with this strategy.

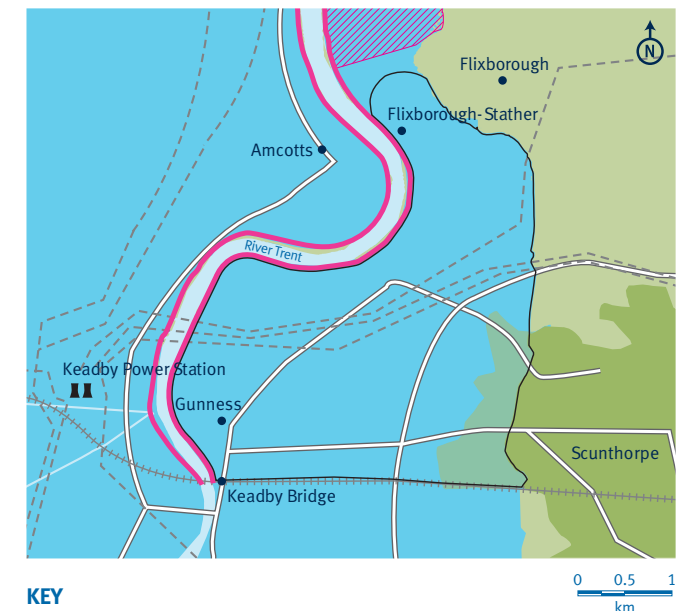
Proposed management approach

We will continue to inspect all the defences and to maintain and improve the ones for which we are responsible as necessary. We will also keep in touch with those responsible for the other defences, telling them about any maintenance or repairs needed.

We are considering the possibility of keeping some lengths of the defences lower than others, so that we will know which areas will be flooded during a major event and can take steps to minimise the damage. We will look carefully at all the implications of this approach, taking into account the benefits of the lower river levels that will result from any overtopping that occurs or from the flood storage schemes that have been identified in the Humber and Ouse strategies. Before deciding whether or not to adopt the approach we will discuss the issues it raises with all those who might be affected.

Flood area 14 – Guinness to Flixborough

Key information	
Size of flood area	1070 ha
Number of properties in floodplain	2649
Area of agricultural land	934 ha
Length of defences	59 km
Current standard of protection	Varies, 1% (1 in 100) to 0.5% (1 in 200)
Remaining life of defence	Varies, generally more than 20 years but locally 10 to 20 years
Defences managed by	Environment Agency and others



Most of the residential properties at risk are in Scunthorpe or Guinness but there are industrial and commercial developments at Flixborough Stather and Grove Wharf. The remainder of the area is largely used for agriculture but includes road and rail links and high-voltage power lines. The land is drained by a system of ditches that flow into the River Trent. North Lincolnshire Council is examining development opportunities in the area through its Lincolnshire Lakes project.

Existing flood defences

In places the defences are formed by quays, elsewhere they are earth banks. They are generally in good condition and provide a good standard of protection, although in places there is some concern about erosion and stability. We will look into the stability of the defences between Grove Wharf and Neap House within the next five years, carrying out any improvements necessary. Defences between Neap House and Flixborough will be improved within the next 15 years.

The area is also at risk of flooding from high flows in the River Trent. We have produced a separate strategy for the tidal reaches of this river that will link with this strategy.

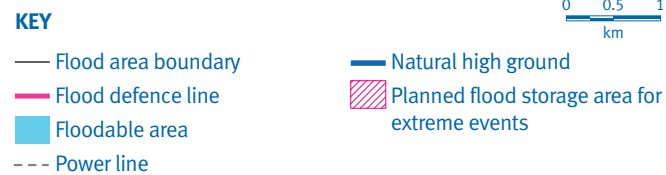
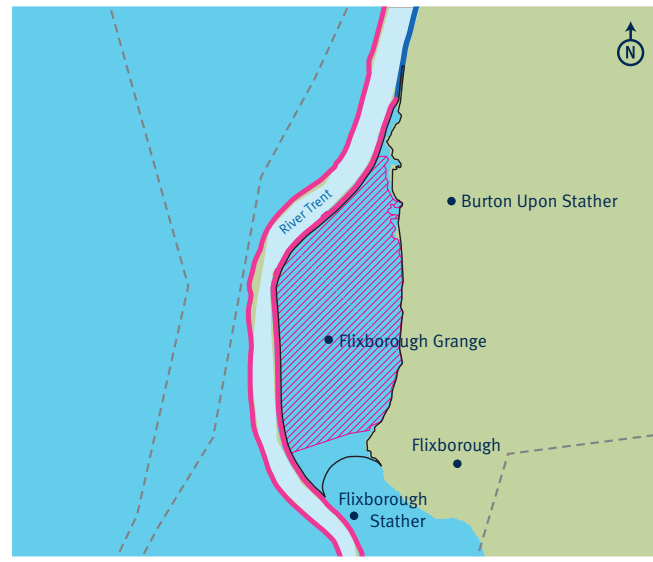
Proposed management approach

We will continue to maintain and improve our defences in this area as necessary and will keep in touch with those responsible for the other defences about any work needed. We will also work with the local and regional authorities, property owners and developers to make sure flood risk is taken into account at all stages of the planning process.

The defences will need to be improved as sea levels rise. This will be expensive so we will seek to supplement public funds with contributions from major beneficiaries and from developers, who will be expected to pay the full cost of any new work needed to protect their development.

Flood area 15 – Flixborough Grange

Key information	
Size of flood area	365 ha
Number of properties in floodplain	7
Area of agricultural land	355 ha
Length of defences	6.3 km
Current standard of protection	0.5% (1 in 200) or more
Remaining life of defence	More than 20 years
Defences managed by	Environment Agency



All but one of the properties at risk are in Burton upon Stather, where there is also a wharf. The other one is set in high-grade agricultural land that drains to the River Trent by gravity.

Existing flood defences

The defences are in good condition and provide a good standard of protection. They are not expected to need major improvement for at least 20 years. The area has been identified as a possible flood storage scheme, although this needs further study.

Proposed management approach

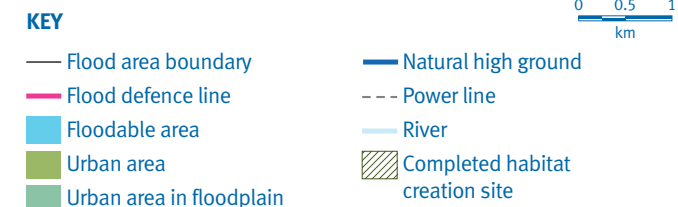
At present we are continuing to maintain the defences but the relatively small number of properties at risk means that in future we could find it difficult to justify spending public money doing this. The area could be used for flood storage, which would lower water levels, if further study shows this to be worthwhile. If not, we may withdraw. Uncertainty about the rate at which sea levels will rise and the defences deteriorate means we cannot say exactly when this might happen, but currently we expect it to be in more than 20 year's time. We will re-assess the situation each time we review the strategy and tell all property owners in the area about the outcome.

Although we may not be able to carry on maintaining the existing defences, others may wish to. Provided they comply with the Habitats Regulations and can obtain the approvals needed, we will provide all the

advice and information we can to help them. If not, we will look at building secondary banks to protect properties in Burton upon Stather. Without further study we cannot confirm this will be possible or say exactly where the banks might be located. The owners of any property not protected may wish to consider other options, which in some cases might include flood-proofing individual houses. Again, we will provide all the advice and information we can.

Flood area 16 – Alkborough

Key information	
Size of flood area	427 ha
Number of properties in floodplain	0
Area of agricultural land	408 ha
Length of defences	6.4 km
Current standard of protection	Varies (partly inter-tidal)
Remaining life of defence	More than 20 years
Defences managed by	Environment Agency



The recently completed scheme at Alkborough covers the whole 427 ha of the flood cell. The land is now managed for nature conservation and provides about 170 ha of inter-tidal habitat to replace the losses caused by our flood defence works and sea level rise. The remainder of the area will provide grazing marsh and reedbed habitats.

Existing flood defences

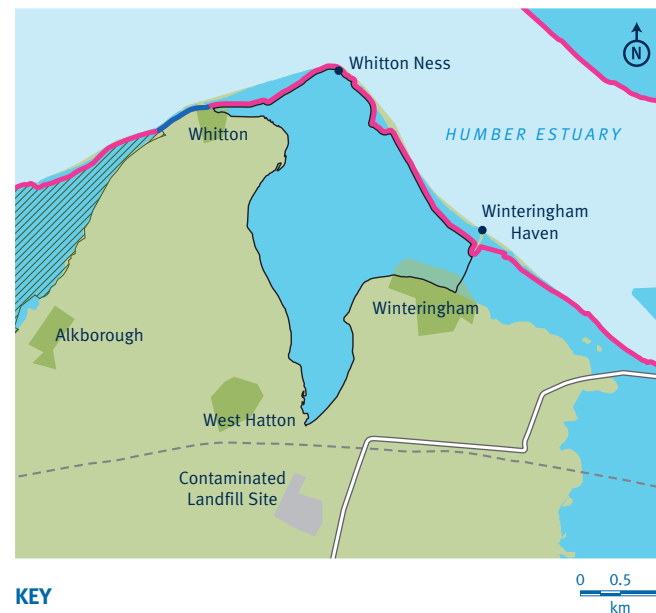
The defences have been modified and new structures built so that just under half the area will flood on most high tides while the remainder will be available to store water during extreme events. As a result water levels in the Trent and the Ouse during these events are likely to be up to 150 mm lower than they would be without the changes. The defences are in good condition and are expected to last for at least 30 years before any major improvements are needed.

Proposed management approach

We will maintain the existing defences and the new structures so the scheme continues to provide flood defence benefits by lowering water levels during extreme events. We will also work with our partners, Natural England, North Lincolnshire Council and Associated British Ports, to make sure our joint objectives for the area are achieved.

Flood area 17 – Whitton to Winteringham

Key information	
Size of flood area	636 ha
Number of properties in floodplain	59
Area of agricultural land	635 ha
Length of defences	4.6 km
Current standard of protection	1% (1 in 100 years on average)
Remaining life of defence	Varies, generally more than 25 years, except at Whitton Ness
Defences managed by	Environment Agency



Most of the properties at risk are in Whitton and Winteringham, at the edge of the floodplain. The rest of the area is high-grade agricultural land containing scattered farms and a high-voltage power line. The land is drained through a system of channels to an outfall at Winteringham Haven.

Existing flood defences

The defences are generally in good condition except at Whitton Ness where there is a risk that they could be eroded. If this is prevented from happening and regular maintenance continues the defences are expected to last for more than 25 years.

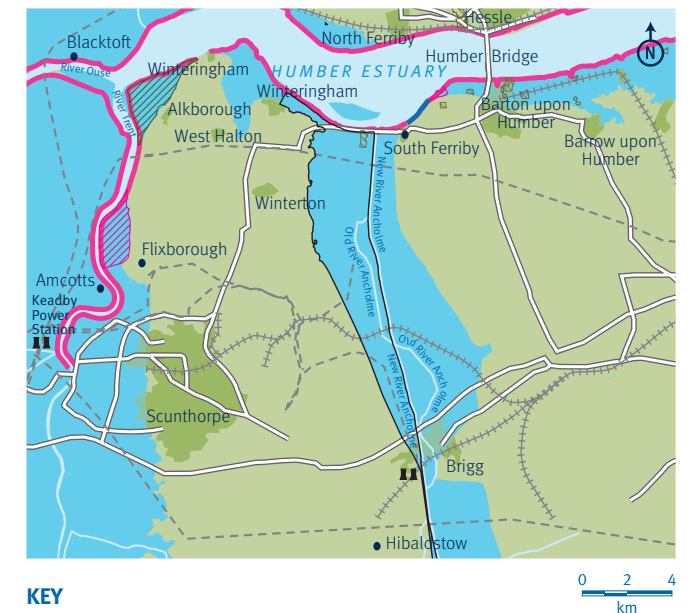
Proposed management approach

At present we are continuing to maintain the defences. In the future, however, the relatively small number of properties at risk means that we could find it difficult to justify spending public money on the defences and so may have to withdraw. Uncertainty about the rate at which sea levels will rise and the defences deteriorate means we cannot say exactly when this might happen but currently expect it to be in between 10 and 20 years, possibly more. We will re-assess the situation each time we review the strategy and tell all property owners in the area about the outcome.

Although we may not be able to carry on maintaining the existing defences, others may wish to. Provided they comply with the Habitats Regulations and can obtain the approvals needed, we will provide all the advice and information we can to help them. If not, we will look at building short secondary banks to protect properties in Whitton and Winteringham. Without further study we cannot confirm this will be possible or say exactly where the bank might be located. The owners of any property not protected may wish to consider other options, which in some cases might include flood-proofing individual houses. Again we will provide all the advice and information we can.

Flood area 18 – Winteringham Ings

Key information	
Size of flood area	4,760 ha
Number of properties in floodplain	536
Area of agricultural land	4,745 ha
Length of defences	4.5 km
Current standard of protection	Varies, 20% (1 in 5) to 1% (1 in 100)
Remaining life of defence	10 years or less
Defences managed by	Environment Agency



The area extends along the Ancholme Valley past Brigg, which contains a significant number of the properties at risk. The remainder are scattered along the valley, which is largely devoted to agriculture but also contains a cement works together with key infrastructure including major road and rail links and high-voltage power lines. Although this and the neighbouring area of South Ferriby (Flood Area 19) are separated by the River Ancholme, flooding in one can affect the other. Therefore the two areas should be considered together.

Existing flood defences

Very strong tidal currents flow along the channel between the shore and Read's Island and there is a serious threat they will wash away the existing defences and the A1077 behind them. We've strengthened and repaired the defences at various times over the last 10 years and more repairs are likely to be needed within the next 10, both to manage the erosion threat and improve the standard of protection.

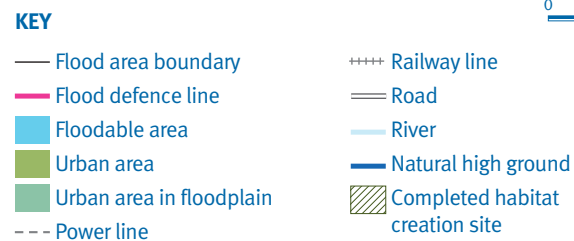
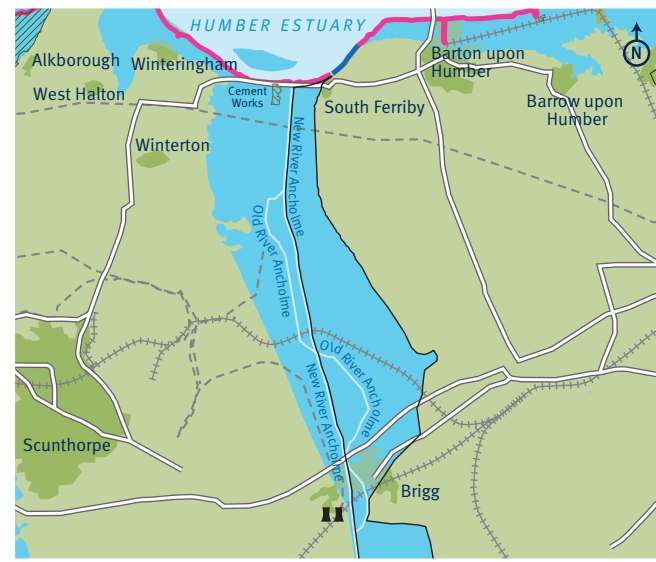
The area is also at risk of flooding from high flows in the River Ancholme, for which a separate strategy was initiated some years ago, but which is currently stalled. We are keen to progress that plan alongside the Humber Strategy if the opportunity arises.

Proposed management approach

We will continue to maintain and improve the estuary defences protecting this area. This may involve moving them back from the shore in places and we will work with North Lincolnshire Council to make sure the effects on the A1077 are taken into account. The work will be expensive so we will seek to supplement public funds with contributions from major beneficiaries.

Flood area 19 – South Ferriby

Key information	
Size of flood area	6,170 ha
Number of properties in floodplain	1,107
Area of agricultural land	6,075 ha
Length of defences	3.2 km
Current standard of protection	Varies, 10% (1 in 10) to 0.5% (1 in 200)
Remaining life of defence	More than 20 years
Defences managed by	Environment Agency



The area extends along the Ancholme Valley past Brigg, which contains a significant number of the properties. The remainder are scattered along the valley, which is largely devoted to agriculture but also contains key infrastructure including major road and rail links and high-voltage power lines. Although this and the neighbouring area Winterringham Ings (Flood Area 18) are separated by the River Ancholme, flooding in one can affect the other. Therefore the two areas should be considered together.

Existing flood defences

The existing defences are in good condition but are expected to need major improvement in about 20 years time.

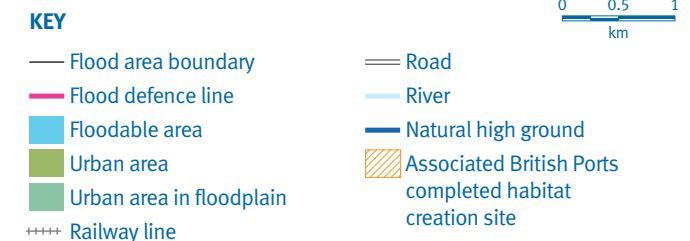
The area is also at risk of flooding from high flows in the River Ancholme, for which a separate strategy was initiated some years ago, but which is currently stalled. We are keen to progress that plan alongside the Humber Strategy if the opportunity arises.

Proposed management approach

We will continue to maintain and improve the estuary defences protecting this area as necessary.

Flood area 20 – Barton Cliff to Barton Haven

Key information	
Size of flood area	206 ha
Number of properties in floodplain	439
Area of agricultural land	196 ha
Length of defences	2.9 km
Current standard of protection	Varies, 5% (1 in 20) to 2% (1 in 50)
Remaining life of defence	More than 20 years
Defences managed by	Environment Agency, Associated British Ports



Most of the properties at risk are in Barton-upon-Humber. The rest of the area contains several disused clay pits, which are internationally important for their fresh-water habitats. There are also some scattered properties and farmland. The area is drained to the estuary by gravity.

Associated British Ports has created new inter-tidal habitat at a site near Chowder Ness to compensate for losses due to port development at Immingham.

Existing flood defences

The estuary defences are in good condition and are not expected to need major improvement for more than 20 years. The defences along Barton Haven have been improved within the last five years.

Proposed management approach

At present we are continuing to maintain all the existing defences. There are very few properties at the western end of the area. This means that in the future we could find it difficult to justify spending public money on maintaining the defences protecting them, rather than building a secondary shorter defence near the Humber Bridge that only protects Barton-upon-Humber. Without further study we cannot confirm this would be the best option or say exactly where the new defence might be located. If a new defence is built, we would withdraw from the defences further west. Uncertainty about the rate at which sea levels will rise and the defences deteriorate means we cannot say exactly when this might happen, although currently, we expect it will not

be for 20 years or more. We will re-assess the situation each time we review the strategy and tell all property owners in the area about the outcome.

Although we may be unable to carry on maintaining the existing defences, others may wish to. Provided they comply with the Habitats Regulations and can obtain the approvals needed, we will provide all the advice and information we can to help them. The owners of any property not protected may wish to consider other options, which in some cases might include flood-proofing individual houses. Again we will provide all the advice and information we can.

Flood area 21 – Barton Haven to Barrow Haven

Key information	
Size of flood area	442 ha
Number of properties in floodplain	958
Area of agricultural land	362 ha
Length of defences	3.3 km
Current standard of protection	Varies, 5% (1 in 20) to 1% (1 in 100)
Remaining life of defence	More than 20 years
Defences managed by	Environment Agency



Most of the properties at risk are in Barton-upon-Humber with a few near Barrow Haven. The rest of the area contains several disused clay pits (important for their fresh-water habitats), a rail link and farmland.

Existing flood defences

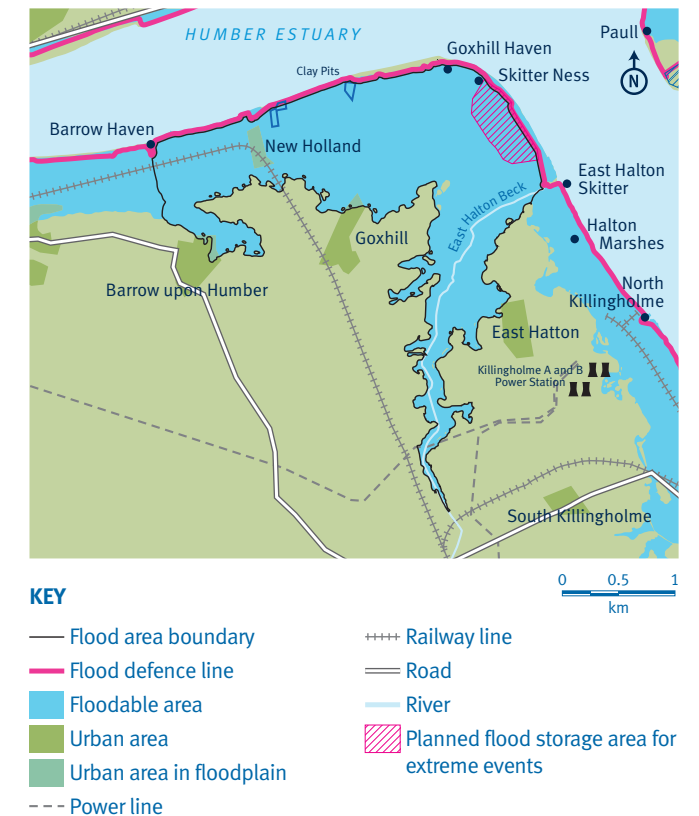
The existing defences are in good condition but are expected to need major improvement in about 20 years. The defences along Barton Haven have been improved within the last five years.

Proposed management approach

We will continue to maintain existing defences protecting this area and improve them as sea levels rise. This will be expensive so we will seek to supplement public funds with contributions from major beneficiaries and from developers, who will be expected to pay the full cost of any new works needed to protect their development.

Flood area 22 – Barrow Haven to East Halton Skitter

Key information	
Size of flood area	2551 ha
Number of properties in floodplain	634
Area of agricultural land	2542 ha
Length of defences	10.5 km
Current standard of protection	Varies, 10% (1 in 10) to 0.5% (1 in 200)
Remaining life of defence	More than 20 years
Defences managed by	Environment Agency



Most of the properties at risk are in Barrow upon Humber and New Holland, at the western end of the site, or near the edge of the floodplain at Goxhill. There is a wharf with industrial and commercial developments and a rail line at New Holland. The rest of the area contains high-grade agricultural land with scattered farms. The land is drained to the estuary by gravity.

We have identified a suitable site for creating new intertidal habitat north of East Halton Skitter at Goxhill. This habitat is needed to replace the losses caused by flood defence improvements and sea level rise. However, the site's development depends on whether the defences continue to be maintained and is unlikely to be until after 2040.

Existing flood defences

The existing defences are good condition and are expected to need major improvement in 20 to 30 years.

Proposed management approach

At present we are continuing to maintain the defences. There is a possibility, however, that we could protect most of the properties at risk in Goxhill, Barrow upon Humber and New Holland by building a secondary line of new defences. If so, we will find it difficult to justify spending public money on maintaining the existing defences to protect the rest of the area. Without further study we cannot confirm secondary defences would be the best option or say exactly where they would be located. Uncertainty about the rate at which sea levels

will rise and the defences deteriorate means we cannot say exactly when this might happen, although currently we expect it will not be for 20 years or more. We will re-assess the situation each time we review the strategy and tell all property owners in the area about the outcome.

Although we may not be able to carry on maintaining the existing defences, others may wish to. Provided they comply with the Habitats Regulations and can obtain the approvals needed, we will provide all the advice and information we can to help them. The owners of any property not protected may wish to consider other options, which in some cases might include flood-proofing individual houses. Again we will provide all the advice and information we can.

Flood area 23 – Halton and Killingholme Marshes

Key information	
Size of flood area	876 ha
Number of properties in floodplain	26
Area of agricultural land	871 ha
Length of defences	7.3 km
Current standard of protection	Varies, 2% to 0.67% (1 in 50 to 1 in 150)
Remaining life of defence	Varies, 5 to 15 years
Defences managed by	Environment Agency, Associated British Ports



The areas of Halton and Killingholme Marshes lie within the proposed South Humber Bank development site which has been allocated for estuary related industry or commercial activities. Most of the properties at risk fall into this category, including wharf facilities and a major petro-chemical plant. There is also a significant area of high-grade agricultural land. The local authorities have prepared a Strategic Flood Risk Assessment to inform their planning decisions and the future development of the area. The land drainage is designed to cater for these developments and releases surface water into the estuary through a combination of pumped systems and gravity.

Existing flood defences

The foreshore is being worn away, which is weakening the defences along the whole frontage, particularly at Halton Marshes. If they are not repaired these defences are likely to fail within the next five years.

We are currently planning to improve the standard of protection in 10 to 20 years, although the timing will depend on the rate of sea level rise.

Proposed management approach

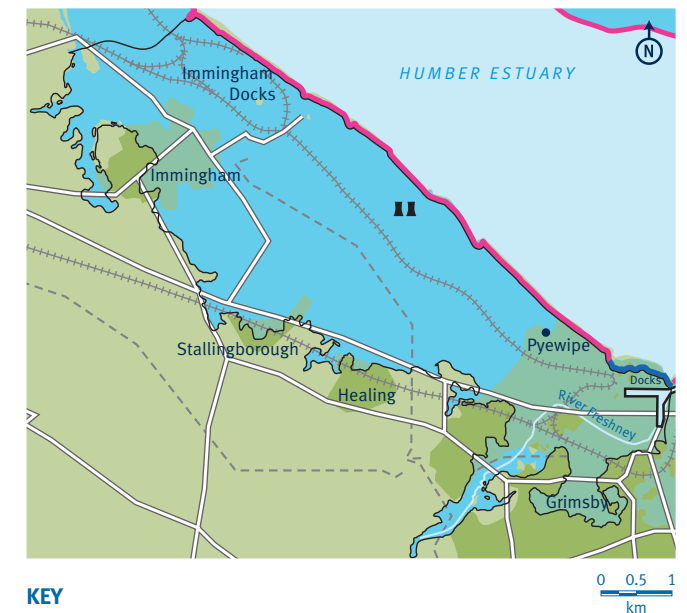
We will continue to protect most of this area and will work with the local and regional authorities, property owners and developers to make sure flood risk is taken into account at all stages of the planning process. We will also work with the local planning authorities to

avoid any permanent buildings being located immediately behind the defences.

We will improve the defences that protect existing development but plan to stop maintaining those that protect currently undeveloped areas. The work will be expensive so we will seek to supplement public funds with contributions from major beneficiaries and from developers, who will be expected to pay the full cost of any new works needed to protect their development.

Flood area 24 – Immingham to River Freshney

Key information	
Size of flood area	3613 ha
Number of properties in floodplain	11687
Area of agricultural land	2233 ha
Length of defences	12.6 km
Current standard of protection	Varies, 1% to 0.5% (1 in 100 to 1 in 200)
Remaining life of defence	Varies, 10 to 20 years generally, 5 years locally
Defences managed by	Environment Agency, Associated British Ports



Most of the residential properties at risk are in Immingham and West Grimsby, although there are some in Stallingborough and Healing. A large part of the area lies within the proposed South Humber Bank development site and has been allocated for estuary related activities. It already contains major industrial and commercial facilities, including wharves, storage areas, petro-chemical and power plants. The area also contains important road and rail links and high-voltage power lines, while most undeveloped land is used for agriculture. The local authorities have prepared a Strategic Flood Risk Assessment to inform their planning decisions and the future development of the area. The land drainage is designed to cater for the level of development and releases surface water into the estuary through a combination of pumped systems and gravity.

Existing flood defences

The existing defences generally provide a good standard of protection. However, the foreshore is being eroded which is weakening the defences along much of the frontage. We are planning to improve a length of the defences near Immingham within the next five years and to carry out further improvements later.

Proposed management approach

We will continue to protect this area and will work with the local and regional authorities, property owners and developers to make sure flood risk is taken into account at all stages of the planning process. We will

also work with the local planning authorities to avoid any permanent buildings being located immediately behind the defences. We will have to work on the defences to deal with erosion and maintain a good standard as sea levels rise. This will be expensive so we will seek to supplement public funds with contributions from major beneficiaries and from developers, who will be expected to pay the full cost of any new works needed to protect their development.

Flood area 25 – East Grimsby

Key information	
Size of flood area	802 ha
Number of properties in floodplain	18909
Area of agricultural land	0 ha
Length of defences	3.9km
Current standard of protection	Varies, 20% to 0.5% (1 in 5 to 1 in 200) or better
Remaining life of defence	Varies, 10 to 20 years generally, less than 5 years locally
Defences managed by	Associated British Ports, North East Lincolnshire Council, Environment Agency

The area at risk covers the docks at Grimsby as well as a large part of the town. In addition to residential properties it contains important industrial and commercial developments, including cold storage and associated facilities, together with key road and rail links. The local authorities have prepared a Strategic Flood Risk Assessment to inform their planning decisions and the future development of the area. Surface water is drained by a combination of sewers (mostly managed by Anglian Water) and open channels, all of which flow or are pumped to the estuary.

Existing flood defences

North East Lincolnshire Council manage the defences at the eastern end of the flood area, which are in good condition and provide a good standard of protection. Most of the remaining defences are along the dock frontage and are managed by Associated British Ports. Their condition varies, with a significant proportion being in poor condition. The standard of protection they provide also varies. If flooding does occur it is likely to be initially in the dock area rather than in the town. Nevertheless, major improvements are needed within the next 10 years.



Proposed management approach

We will work with those who manage the defences, particularly Associated British Ports, to make sure properties in Grimsby receive an appropriate standard of protection, with defences being maintained and improved as necessary. We will also work with the local and regional authorities, property owners and developers to make sure flood risk is taken into account at all stages of the planning process. Maintaining and improving the defences will be expensive so we will seek to supplement public funds with contributions from major beneficiaries and from developers, who will be expected to pay the full cost of any new works needed to protect their development.

Flood area 26 – Cleethorpes and Humberston

Key information	
Size of flood area	1669 ha
Number of properties in floodplain	2243
Area of agricultural land	1234 ha
Length of defences	9.2 km
Current standard of protection	Varies, Cleethorpes 0.5% (1 in 200) or better, Humberston Fitties 20% (1 in 5)
Remaining life of defence	More than 20 years
Defences managed by	North East Lincolnshire Council, Environment Agency

Most of the properties at risk are in Cleethorpes and Humberston with some at Tetney. Humberston Fitties contains a considerable number of seasonally occupied chalets and a large caravan site. Between Humberston and Tetney there is a large area of high-grade agricultural land. Surface water is drained by a combination of sewers (mostly managed by Anglian Water) in the built-up areas and open channels elsewhere, all of which flow or are pumped into the estuary.

Existing flood defences

North East Lincolnshire Council manage most of the defences protecting Cleethorpes and Humberston. These are generally in good condition and provide a good standard of protection, except at Humberston Fitties, where they consist of reinforced sand dunes with significant low spots. We manage a second line of defences behind them, which protects the caravan site. Most of the chalets are in front of these defences, and so, are at serious risk of being flooded if waves wash over the sand dunes. Our defences continue along the shoreline to protect the agricultural land beyond them.



Proposed management approach

We will continue to inspect all the defences and to maintain and improve the ones for which we are responsible as necessary. We will also work with North East Lincolnshire Council to make sure the flood risk in Cleethorpes and Humberston remains acceptable, paying particular attention to the situation at Humberston Fitties.

Flood area 27 – Tetney to Saltfleet Haven

Key information	
Size of flood area	13,138 ha
Number of properties in floodplain	2,928
Area of agricultural land	11,540 ha
Length of defences	17.4 km
Current standard of protection	Varies, 10% (1 in 10) to 0.5% (1 in 200) or better
Remaining life of defence	More than 20 years
Defences managed by	Environment Agency

The properties at risk are scattered across the area, many in villages such as North Cotes, Marsh Chapel, Grainthorp, Conisholme, North Somercotes and Saltfleet. There is also a large number of isolated residential properties and farms. Most of the land is used for agriculture and is drained through a system of channels and ditches, some of which are pumped and some flow by gravity.

We have identified a site near Donna Nook as suitable for creating new inter-tidal habitat. This will replace the losses due to flood defence improvements and sea level rise. We are planning to develop it within the next five years.

Existing flood defences

The defences consist of a combination of earth banks and sand dunes. They are generally in good condition but some of the dunes appear to be deteriorating as the beaches in front of them change. At present we do not expect major improvements will be needed for the next 20 years but this will be reviewed.

The area is also at risk of flooding from high flows in the Louth Canal. We are preparing a separate management plan for this watercourse.



Proposed management approach

At present we expect to continue maintaining the existing defences and improving them as necessary, though this will depend on the availability of government funding and on whether the sand dunes continue to deteriorate and the rate at which this happens. We will keep this under review.

Studies undertaken

Producing the HESMP (1997-2000)

Land use: identifying the assets lying within the floodplain and so benefiting from the protection provided by the defences.

Flood defences: consolidating and reviewing data about the defences to determine their condition and the standard of protection they provide.

Historic and current estuary behaviour: examining the estuary's geology and historic development as well as the processes taking place there now.

Environmental baseline: collecting environmental data (natural and historic) about the estuary and floodplain and identifying the constraints on managing the defences.

Producing the strategy consultation draft (2001-2005)

(a) Studies covering the whole estuary

Future estuary behaviour: examining the effect of sea level rise on the sediment balance and inter-tidal habitat in the estuary (and on the adjacent coast-line) and assessing the impact of possible management options, including managed realignment.

Coastal Habitat Management Plan (CHaMP): drawing up a CHaMP to determine how the integrity of the SPA/SAC can be maintained while continuing to manage the estuary's defences.

Potential managed realignment sites: identifying sites where the defences could be re-aligned, costing the work needed and starting to discuss the implications with landowners and tenants.

Standard of protection: identifying and costing the work needed over the next 50 years to provide a high or low standard of protection to each of the 12 management units (subsequently subdivided into flood areas) around the estuary.

Strategic Environmental Assessment (SEA): undertaking an SEA to assess the impact of the work and determine which option is to be preferred in each unit on environmental grounds.

Economic appraisal: comparing the costs and benefits of each option to determine which is to be preferred in each unit on economic grounds.

Long-term programme of work: selecting the preferred option for each unit taking all issues into account and drawing up a prioritised programme of the work needed over the next 50 years (including managed realignment as necessary).

Sustainability Appraisal: assessing the sustainability of the overall strategy using a methodology developed by the Yorkshire and Humber Regional Assembly.

Strategic Environmental Assessment (SEA): undertaking an SEA to assess the impact of the strategy as a whole to complement the earlier study of the individual options.

(b) Studies covering work at individual sites or in specific parts of the estuary

Work in first 15 years: reviewing the work in the first 15 years of the programme to identify key issues (including the possibility of realigning the defences), re-assessing their priority and so confirming the work to be included in a package covering the first five years.

Approval process: establishing the approach to be followed when applying for outline approval of a package of flood defence work affected by the Habitats Regulations.

Work in first five years: developing the designs and assessing the impacts (technical, environmental, economic and social) of the work in the first five-year package sufficiently to allow outline approval to be obtained.

Monitoring and maintenance: reviewing the monitoring and maintenance work needed to manage the defences in the future (including erosion protection to prevent them being undermined).

Benefits of flood storage: determining the reduction in risk and saving in cost that will result from the provision of flood storage upstream of the Humber Bridge in the future.

'Shadow' Appropriate Assessment: assessing the impact of the work included in the package as required by the Habitats Regulations and drawing the individual assessments together to provide a 'shadow' assessment of the whole package.

Technical reports

Producing the HESMP (1997 – 2000)	
Joint Probability Analysis of Large Waves and High Water Levels	Environmental Baseline Study
Geomorphological Studies	Historic Environment Baseline Study
Urgent Works Review	Humber Estuary Shoreline Management Plan (SMP)
Producing the strategy consultation draft (2001 – 2005)	
(a) Studies covering the whole estuary	(b) Studies covering work at individual sites or in specific parts of the estuary
HESMP Phase 2 Geomorphology Studies	Key Issues Assessments (of work in first 15 years)
Coastal Habitats Management Plan (CHaMP)	Detailed Appraisals (of work in first five years)
Engineering Studies Report	Water Level Modelling Report
Economic Assessment Report	Technical Report
Strategic Environmental Assessment (of the Long-Term Programme)	‘Shadow’ Appropriate Assessment
Sustainability Appraisal	Sustainability Appraisal
Strategic Environmental Assessment (of the strategy)	Strategic Environmental Assessment (of the strategy)
Getting the strategy approved (2005 – 2007)	
Project Appraisal Report for the Strategy	Project Appraisal Report for the Works in the First 5 Years

Consultation and information documents

General consultation documents	
A Strategy for Flood Defence (April 1999)	Humber Flood Risk Management Strategy, Consultation Document (August 2005)
Options Consultation Document (November 1999)	
Information documents	
Managed Realignment: Information for Landowners and Tenants (June 2002)	Newsletters ‘TidesNews’ #1 (July 2001) to #6 (March 2005)
Update on Managed Realignment (July 2003)	Newsletters ‘Humber tides news’ #1 (August 2007) to #3 (January 2008)

Advisory groups

Advisory groups	
<p>Humber Joint Committee: consists of the Chairman and another representative from each of the three Regional Flood Defence Committees with responsibilities on the Humber. Meets about three times a year to agree programme and funding arrangements and act as a co-ordinating link to the three parent committees.</p> <p>Steering Group: contains representatives from the key stakeholders listed on the next page. Meets about three times a year to review progress in all aspects of strategy and discuss issues raised.</p> <p>Liaison Panel: small group of people chosen for knowledge of the area and understanding of local issues. Meets about three times a year to discuss strategy and provide advice.</p>	<p>Technical Group: contains representatives from key organisations involved in estuary and estuary process studies. Will meet about once a year to review current behaviour (including effects of sea level rise) and to advise on technical developments and opportunities for co-operation with others.</p> <p>CHaMP Review Group: drawn from organisations with conservation interests. Will meet about twice a year to review programme for creating new habitat and advise on managing sites where habitat has been created.</p>

Organisations on the steering group

Organisations invited to Steering Group meetings	
<p>Environment Agency</p> <ul style="list-style-type: none"> Anglian Region Midlands Region North East Region <p>Local authorities</p> <ul style="list-style-type: none"> East Lindsey District Council East Riding of Yorkshire Council Kingston upon Hull City Council Lincolnshire County Council North Lincolnshire Council North East Lincolnshire Council <p>Government and regional bodies</p> <ul style="list-style-type: none"> Department for Environment, Food and Rural Affairs English Heritage Government Office for Yorkshire and Humber (Rural Affairs) Natural England Yorkshire Forward 	<p>Non-government bodies</p> <ul style="list-style-type: none"> Associated British Ports Ltd British Association for Shooting and Conservation Country Landowners and Business Association Humber Estuary Management Strategy Humber Industry Nature Conservation Association Humberside Internal Drainage Boards Lincolnshire Wildlife Trust National Farmers Union Royal Society for the Protection of Birds The Crown Estate Yorkshire Wildlife Trust

Glossary

Affordability

The ability to pay for the repairs or improvements needed if a flood defence is to continue performing satisfactorily.

Assessment process

The process of defining objectives, examining options and weighing up the costs, benefits, risks and uncertainties of an action before a decision is made to proceed or not.

Asset

Any item in the floodplain with a value that can be assessed.

Beneficiary

In this document, an individual or organisation that benefits from the presence of flood defences.

Biodiversity

The variety of life; the different plants, animals and micro-organisms, their genes and the ecosystems of which they are a part.

Birds Directive

An EC Directive that provides a framework for the conservation and management of wild birds in Europe. Covers the classification of Special Protection Areas (SPAs).

Blight

Adverse impact on property and land value or the ability to use it to its full extent brought about as a consequence of future plans.

Business case

A comparison of the costs, benefits, risks and uncertainties associated with a decision.

Catchment Flood Management Plan (CFMP)

A plan prepared by the Environment Agency with other key decision-makers within a river catchment to identify and agree sustainable flood risk management policies.

Climate change

Radiation passes through the Earth's atmosphere and warms its surface before being reflected back into space. Some gases, including carbon dioxide and methane, trap some of the heat from radiation in the atmosphere. Human activity has increased the concentration of these gases dramatically, trapping more heat, causing global temperatures to rise and the climate to change. Sea level rise (q.v.) is a particular consequence of these changes.

Coastal Habitat Management Plan (CHaMP)

A plan for managing a length of coastline to conserve and promote the habitats and wildlife it supports and to ensure compliance with the Habitats and Birds Directives (q.v.).

Coastal defence

A structure, such as a groyne, length of piling or rock armour, intended to stop the coast from being eroded (worn away) by the sea.

Coastal squeeze

A process whereby the area between high and low tide decreases as sea levels rise because the low water line moves towards the land while the high water line is fixed by the presence of flood or coastal defences (or high ground).

Competent authority

The organisation responsible for implementing policy.

Contribution

A payment made by an organisation or individual benefiting from flood defences, covering all or part of the costs of providing, maintaining or improving them.

Department for Environment, Food and Rural Affairs (Defra)

The UK government department responsible for flood defence policy, the environment and animal welfare and regulation of the food industry.

EC Directive

Legislation issued by the European Union that is binding on Member States in terms of the results to be achieved, but that leaves choice as to methods.

Economically worthwhile

Describing the result of an assessment process (q.v.) in which the benefits of the action assessed, in monetary terms, are greater than the costs.

Environmental Stewardship

A scheme administered by Natural England which provides funding to farmers and other land managers who deliver effective environmental management on their land.

Erosion

The wearing away of material, in this document it generally refers to the wearing away of land by waves and currents in a river, estuary or the sea.

Estuary processes

The movement and interaction of water, sediment and other materials (chemical or biological) in an estuary due to the action of waves, freshwater flows, tides, wind and other disturbing forces.

Financial compensation

Monetary payments to offset damages or losses.

Flood area

An area bounded by high ground or raised structures that will contain any flooding that occurs there (i.e. prevent it from extending outside the area).

Flood defence

A wall, embankment or similar structure intended to exclude floodwater from the land behind it. The term includes any other items integral to its function such as sluices, weirs, barriers, locks, outfall culverts or pumping stations.

Flood defence standard (see also Standard of protection)

The protection provided by a flood defence, generally expressed in terms of the average return frequency (e.g. once in 50 years, or 2 per cent per year) of a flood event that would cause it to be overtopped.

Flood proofing (see also Flood resistance measures)

Actions taken to prevent floodwater from entering an area or a building.

Flood resilience measures

Measures to minimise the damage caused to a building if flooding occurs.

Flood resistance measures

Measures to limit the volume of floodwater entering an area or a building, or to keep water levels inside from rising too far.

Flood risk

The risk of an area or building being flooded, generally expressed in terms of the average return frequency (e.g. once in 50 years, or 2 per cent per year) of an event that would cause this.

Flood storage

Allowing floodwater to flow out of a river or estuary onto the adjacent floodplain and storing it there until river/estuary levels have fallen; a flood storage scheme is an area separated from the rest of the floodplain and designed to optimise the flow of floodwater into and out of it.

Floodplain

Land next to a river, estuary or the coast over which water flows in times of flood, or would flow if there were no flood defences.

Habitat

The natural home of an animal or plant.

Habitat creation site

An area designed to allow new habitat to develop within its boundaries. In the context of the Humber Strategy it generally involves the conversion of farmland to inter-tidal habitats (q.v.).

Habitats Directive

An EC Directive that provides for the maintenance of biodiversity in Europe by maintaining or restoring natural habitats and wild species. Covers the classification of Special Areas of Conservation (SACs).

Habitats Regulations

The Conservation (Natural Habitats &c.) Regulations (1994), the legislation enacting the EC Habitats and Birds Directives in the United Kingdom.

Improvement (to a flood defence)

A scheme to improve the condition of or the standard provided by a flood defence, often (but not always) increasing its height so it can withstand rising sea levels.

Inter-tidal habitat

Habitats that occur naturally between the low and high tide lines on land that is open to the sea or estuary; including saltmarsh, sandflats and mudflats.

Managed realignment

Moving flood defences back from their existing position, either to reduce the cost of maintaining them in the future, or to provide an area that can be used for flood storage, or to create new inter-tidal habitats.

Management unit

An area of the floodplain considered as a unit while developing the Humber Strategy.

National flood and coastal defence budget

The money allocated by the government each year for maintaining and improving the country's flood defences.

Overtop

Water flowing over the top of a defence, either because the water level in the river or estuary has risen above it or because the water level is high enough for large waves to wash over it.

Routine maintenance

Inspections and other activities (such as grass-cutting, vermin control and minor repairs) that are carried out regularly to limit the deterioration of a defence.

Sea level rise

Sea levels have been rising since the end of the last Ice Age but the rate is predicted to increase rapidly due to climate change caused by man's activities. The main direct causes of the increase are the melting of glaciers and ice packs and the expansion of seawater as its temperature rises.

Secondary defence

A relatively short defence, generally built behind an existing longer defence to provide extra protection to part of the floodplain.

Shoreline Management Plan (SMP)

A document that brings together information about issues such as flooding, erosion, coastal processes and human and environmental needs for a particular stretch of coastline. The preparation of SMPs is a national initiative for the future planning of the coastline.

Special Area of Conservation (see also Habitats Directive)

An internationally important site where conservation measures are applied for the maintenance or restoration of the habitats and/or species for which the site is designated.

Special Protection Area (see also Birds Directive)

An internationally important area classified for rare and vulnerable birds (listed in Annex I to the Birds Directive) and for regularly occurring migratory species.

Stakeholder

An organisation or individual affected by or interested in the Humber Strategy.

Standard of protection (see also Flood defence standard)

The protection provided by a flood defence, generally expressed in terms of the average return frequency (e.g. once in 50 years, or 2 per cent per year).

Strategic Flood Risk Assessment (SFRA)

A strategic analysis of flood risk prepared by a local planning authority or other decision-maker and providing information about areas that flood, sources of flooding, the influence of climate change and other relevant issues. Forms the basis for preparing policies for flood risk management in these areas.

Storm surge

The temporary rise in sea level caused by the low pressure and strong winds associated with a severe storm. During an extreme surge sea levels near the Humber can be raised up to two metres above the expected tide level.

Sustainable

'Meeting the needs of the present generation without compromising the ability of future generations to meet their own needs' 1985 Brundtland Commission. Balances economic development, social development, and environmental protection.

Tidal flooding

Flooding from the sea (and so influenced by tidal conditions) rather than from a river.

Uneconomic defence

A defence for which the whole life cost of keeping it functioning satisfactorily over a given period will be greater than economic benefits that will result.

Water Framework Directive

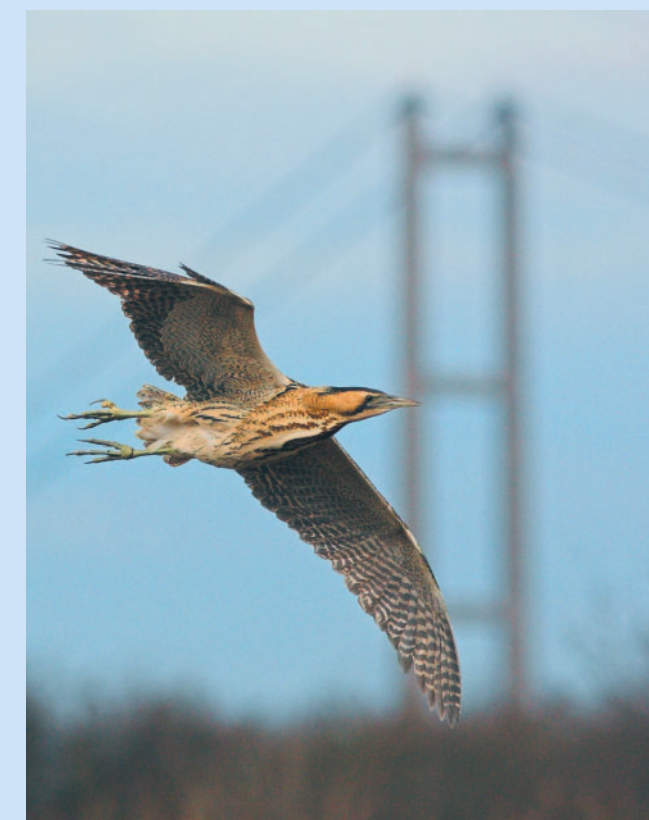
An EC Directive that aims to establish a framework for the protection of rivers and lakes, estuaries, coastal waters and groundwater.

Whole life cost

The overall cost of keeping something functioning satisfactorily for a given period, including both routine maintenance and more significant periodic repairs and improvements.

Withdrawing maintenance

The decision to stop carrying out any further work of any nature (including routine maintenance, repairs or improvements) to a defence.



Bittern

Abbreviations



- ABP** – Associated British Ports
- BAe** – BAe Systems plc
- CFMP** – Catchment Flood Management Plan
- CHaMP** – Coastal Habitat Management Plan
- Defra** – Department for Environment, Food and Rural Affairs
- HECAG** – Humber Estuary Coastal Authorities Group
- HESMP** – Humber Estuary Shoreline Management Plan

- PPP/PFI** – Public-private partnership/private finance initiative
- PPS 25** – Planning Policy Statement 25: Development and Flood Risk
- SEA** – Strategic Environmental Assessment
- SFRA** – Strategic Flood Risk Assessment
- SMP** – Shoreline Management Plan
- UKCIP** – UK Climate Impacts Programme

Contact details

This document summarises the Humber Flood Risk Management Strategy and is supported by the reports listed on page 54. If you would like any further information about the strategy or about the estuary's flood defences, please visit our website, www.environment-agency.gov.uk/humberstrategy, or contact the Humber Strategies Manager, Philip Winn, by post, telephone or e-mail to the address given below:

Address:
Philip Winn
Humber Strategies Manager
Environment Agency
1 Viking Close
Great Gutter Lane East
Willerby
Hull
HU10 6DZ

Telephone:
08708 506506

e-mail:
humber.strategy@environment-agency.gov.uk

www.environment-agency.gov.uk/humberstrategy

Planning for the rising tides

The Humber Flood Risk Management Strategy