CIWEM

Rivers and Coastal Group

Winter Meeting – SOAS University of London - 26 Jan 2007

From Directive to Detail: A joined up response to flooding?

WALLASEA WETLAND CREATION SCHEME

LESSON LEARNED

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Wallasea Wetland Creation Scheme - Lesson Learned

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1- INTRODUCTION

On the 4th July 2006 seawall breaching work was completed on the Wallasea Managed Realignment Scheme in the Crouch Estuary (Essex). This site now represents one of the largest coastal realignments in Europe; it is 4km in length, 108ha in extent (plus the new sea wall and landward mitigation habitats) and, on each tide, between 790,000m^3 and 1.7million m^3 of water (neap and spring tides respectively) are exchanged with the adjacent estuary.

Aerial view of the site (4th July 2006)

The project was undertaken by the Biodiversity Division of Department for Environment Food and Rural Affairs Habitats (DEFRA) with the support of the landowner Wallasea Farms Ltd and the advice of Natural England (NE), the Environment Agency (EA) and the Royal Society for the Protection of Birds (RSPB). Its central aim was to create new mudflat and saltmarsh in compensation for losses of these habitats (and associated impacts to seabird species that used them) which occurred following port developments at Lappel Bank (in the Medway Estuary) and Fagbury Flats (in the Orwell Estuary). The realignment was also designed to enhance the coastal protection afforded to the island which was at significant risk of flooding from 'unmanaged' seawall breaching.

Wallasea represents one of the latest in series of managed realignments undertaken in the UK since 1993 and one of at least four different realignments undertaken in 2006. While the initial realignments were relatively small in scale, recent projects have often been much bigger. In part, this is because they are driven by a need to create sufficient areas of

compensatory habitat but also because the lessons learned from past schemes have given coastal managers greater confidence in the requirements for, and efficacy of, this approach. Beyond the immediately obvious ecological gains provided, this scaling up of the size of realignments offers opportunities to deliver many social and economic benefits. However, it also introduces additional engineering and social challenges as well as increased total costs (at least for the up-front planning and build phases of the work). Therefore, it is vital that there is a continuation, and even an acceleration, of the feedback process in which we learn the lessons from past projects to inform future ones. Not only will this help to find solutions for common problems but it should also help to maximise the quality and, ideally, minimise the costs of future realignments.

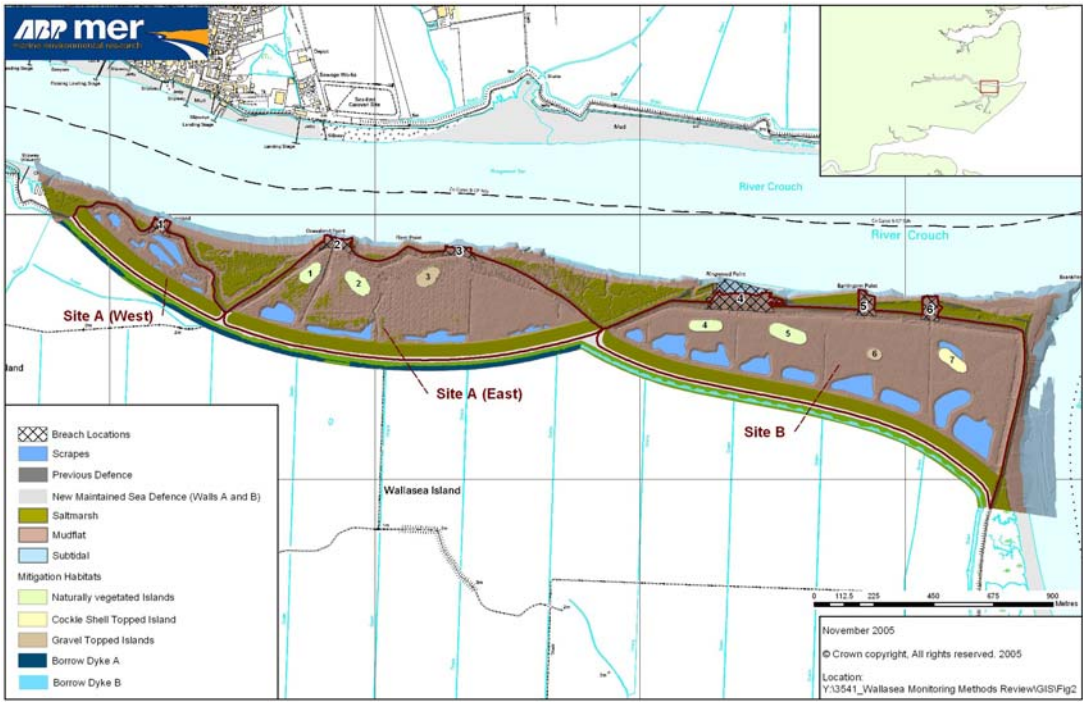
The large size of the Wallasea project (both *per se* and relative to the intertidal resource within the adjacent Crouch Estuary) and the variety of issues encountered during its development, make it a good platform for exploring how such projects can be designed and managed to deliver the highest environmental and social outcomes. This paper explores the lessons learned under a series of discrete subject headings. Project Management; Site Selection; Planning Approval and Consents; Scheme Design and Construction; Communications/Consultations and Environmental Monitoring.

2 - PROJECT MANAGEMENT

The successful delivery of the Wallasea project centred upon good project management, the competency of the contractors and a clear understanding of the process to be followed. DEFRA employed a full time Project Manager (Mark Dixon), seconded from the EA, to oversee the project from start to finish. They also established a team of national representatives from NE, RSPB, EA, DEFRA, land agents Smith Gore and the project's environmental advisors ABPmer. This Project Management Group (PMG) provided advice and input throughout the process for original site selection to project completion. Once Wallasea was selected, the landowners, Wallasea Farms Ltd, formed part of the PMG and a further team of local representatives from NE, RSPB, EA and CEFAS joined DEFRA and ABPmer to provide extra advice on the design, consenting and monitoring of the site. This latter team was able to provide valuable local knowledge and complemented the advice of the national group. For instance, the knowledge of RSPB team members was very useful for identifying cost-effective ways of maximising ecological value of the site based on their experience of comparable local habitats. Regular meetings of these local and national advisory groups were held throughout the lifetime of the project and these meetings allowed quick decisions to be made in response to emerging issues.

To manage the process of overall project implementation, a business plan was developed that proved to be essential to avoid any "creep" in project objectives. Once underway, such a project is vulnerable to a variety of key pinch points along the critical pathway, including clearing of consents in time for weather windows for groundwork, consolidation times for earthworks and coincidence of neap tides with fine weather windows. A timetable should be

identified early in the process which identifies these as far as possible. One potential obstacle/pinch point that is largely outwith project management control is the response of local people and politicians which held up, and eventually ended, attempts to undertake realignment at a previously selected site (Weymarks on the Blackwater Estuary). This latter aspect can be mitigated though consultation mechanisms and these aspects are discussed further in the following sections.



Pre-construction schematic design of the site. Key Lessons

- It is important to have good project management (ideally with a sole project manger as a consistent point of contact) supported by multi-disciplinary groups including local experts and competent contractors.

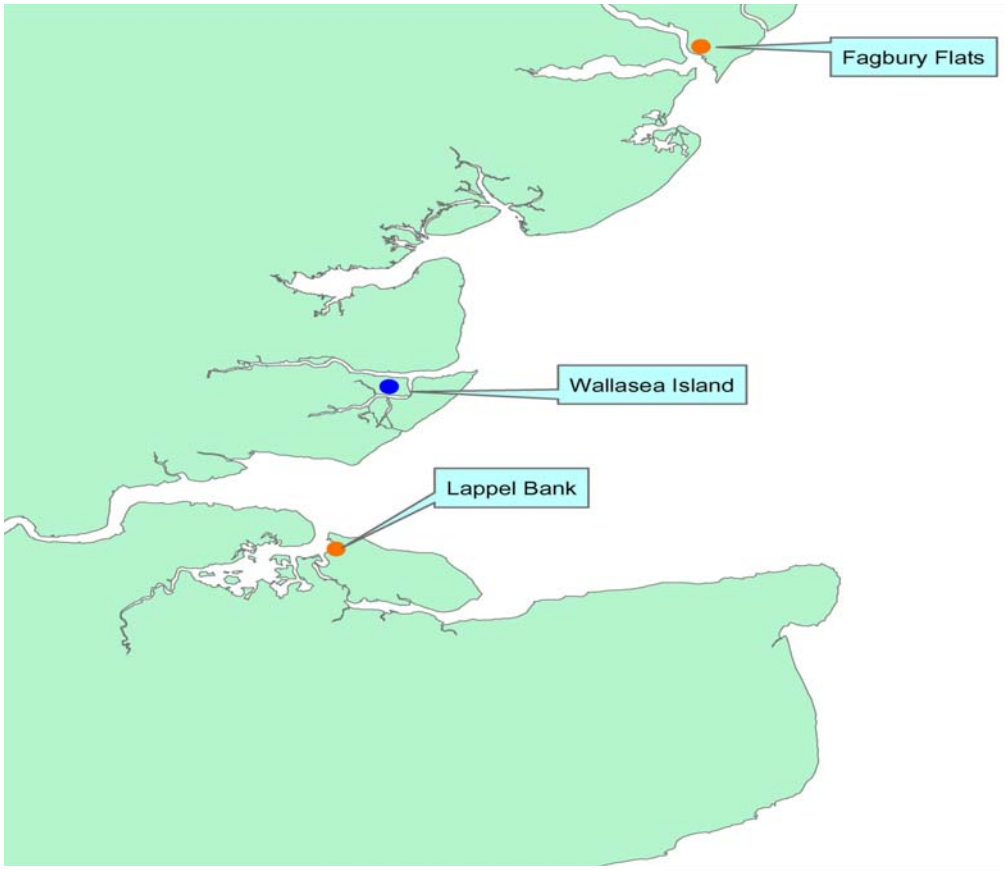
- It is vital to identify a timetable early in the process that highlights the foreseeable pinch-points and obstacles along the path to delivery.

3 - SITE SELECTION

The aim of the Wallasea project was to provide compensatory habitat following port developments at Fagbury Flats (Port of Felixstowe) and Lappel Bank (Port of Sheerness) undertaken in 1988 and 1994 respectively. Subsequent legal action by the RSPB relating to the process for notifying habitat under the EC Birds Directive (79/409/EEC) led to a judgement against the UK Government by the European Court of Justice in 1996 (C-44/96) and an ongoing threat of infraction proceedings and fines if compensation was not provided.

A total of 54ha of mudflat and saltmarsh was lost following these developments but, given the delay that occurred between the initial loss of habitat and the compensatory measures as well as the need to guarantee (as far as is possible) that the new habitats supported sufficient numbers of waterbirds, it was agreed that there should be a 'two for one' replacement of these habitats (i.e. a total of 108ha).

In contrast to the planning and building, which was relatively rapid (30 months), the process of selecting the Wallasea site was very long and took over 7 years in total from November 1996 to March 2004 (when Minister for Nature Conservation announced that Wallasea would be the Government's preferred site). This is because the process was significantly delayed when a suitable site was identified at Weymarks but problems were then encountered in the form of local and political opposition. At this location there were concerns about a range of factors including the effects on: wildlife interests (on arable fields), archaeological features, access to a small shingle beach and the local community from increased visitor pressure. Although the Weymarks site most closely met the design criteria it proved to be too contentious to progress with any certainty of gaining consent.



Location of Lappel Bank, Fagbury Flats and Wallasea

In addition to this issue, it was also the case that the selection process had to be undertaken across a relatively a large area from North Kent to South Suffolk (i.e the Greater Thames Natural Area or 'GTENA') and a lot of

investigative work was required to find a site or sites that would have the following criteria:

- Be sufficiently large to deliver the requisite amount of habitat (and especially appropriate numbers of waterbirds)
- Be a self-sufficient system that evolves in response to natural, physical, chemical and biological changes
- Be able to sustain habitats and thus bird populations over 50 years.
- Be assured of having no significant adverse effects on the geomorphological and ecological functioning of the existing coastal and estuarine habitats.

A range of other pre-defined project-specific criteria were also identified by the PMG including that as it should: not impact on existing infrastructure, not be already subject to nature conservation designation, be as close a possible to Lappel Bank and Fagbury Flats and should not have a new counterwall that will be not greater than existing sea wall (to minimise engineering and post-breach maintenance requirements).

The selection process involved several iterations to ensure that that the best available site had been selected but in essence it was done in three Phases. Phase 1 involved selecting a short-list of sites from within the GTENA flood plain; Phase 2 involved reducing these down to a final selection and Phase 3 involved preliminary hydrodynamic modelling of final five design options from two sites (Wallasea and Weymarks). For Phase 1, a number of different site selection approaches were used including:

- Objective 'bottom-up' techniques involving the interrogation of GIS/LiDAR maps to identify possible sites within the GTENA floodplain followed by the statistical comparison of these sites using multi-criteria analysis of a series of univariate site-descriptors (e.g. size of site, distance from estuary mouth etc.).
- Reviews of strategic 'top down' management plans (in particular the interrogation of Shoreline Management Plans and estuary flood defence strategies).
- Input from consultations with advisory teams, statutory authorities and the general public.

Once short-lists were identified through the above techniques the Phase 2 process involve a comparative evaluation. For this, a series of further univariate descriptors were developed to describe factors such as: the potential physical impacts of the site (e.g. using tidal prism volume as percentage of adjacent estuary), the likely extents of created habitat (based on land topography/LiDAR data); the potential for delivering sufficient bird numbers (based on BTO bird modelling work), the status of the existing flood defence option for the site, the number of land owners, proximity to Lappel Bank and Fagbury Flats etc [ABPmer & BTO 2002 and 2005]. These criteria

were weighted according to importance and were compared using multi-criteria analysis to objectively identify the most suitable sites.

Following these reviews Wallasea and Weymarks remained the preferred options and preliminary design work and hydrodynamic modelling were undertaken to confirm that the sites were likely to function effectively and to identify the gaps in knowledge that need to be filled during the EIA process for the preferred site.

Over the two, Wallasea was ultimately chosen for several reasons. Firstly, the contemporaneously produced Roach and Crouch Flood Management Strategy identified realignment at this location as both a necessary coastal defence measure and a component in the long-term sustainability of the estuary. Also, the landowner (Wallasea Farms Ltd.) was supportive of the proposal because of the flood protection benefits accruing.

Poor condition of defences on north bank of the island prior to breaching

Wallasea Farms had already recognised the risks and had constructed a counterwall on the site in front of which was a potential realignment area that amounted to some 54ha [ABPmer 2005]. The fact that Wallasea Farms Ltd were aware that their flood protection was in a parlous state in places and had already taken the precaution of creating a new floodbank not only made this site particularly attractive but they became a positive asset in the partnership required to deliver the project.

Wallasea Island therefore provides some useful insights into the commercial justification for construction of new floodbanks. At this site the economic

case for creating new flood banks is low in terms of the use of Government funds because the site fails to meet priority scores for funding according to current guidance [DEFRA 2004]. The 10km of flood defences safeguard over 700ha owned by a single landowner who found it economically viable to invest in new flood protection at a cost of over £1.8 million and who was looking at further options for realignments at vulnerable locations. Landowners with this approach are the most likely to be receptive to the concept of realignment and to be interested in a partnership approach.

This long site selection process illustrates the efforts that can be required to identify a location that meets particular design criteria. Ultimately the process was successful because realignment was supported by: a demonstrable flood protection need, (with attendant risks of unmanaged flood impacts to land and estuary), support from strategic estuary planning, a positive landowner and a detailed site selection process. These were vital in demonstrating to the public, specialist groups and the planning authority that this was a suitable site. In other potential realignment areas, support from long-term strategic flood defence planning is likely to be critical although the short-term flood risks may not be so manifestly obvious. In such cases a clear statement about commercial rationale for realignment may need to be made to achieve landowner backing and involvement.

Key lessons

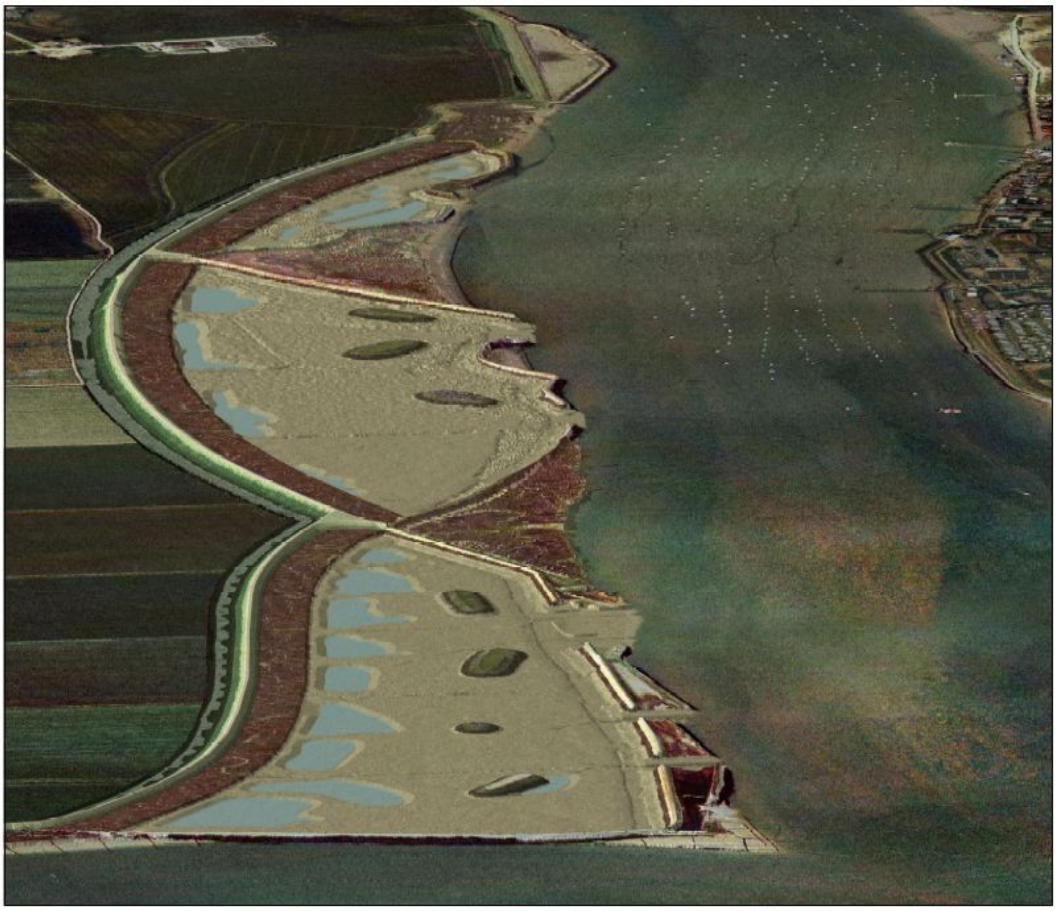
- Flood/Shoreline management strategies are clearly important for speeding up the selection of a suitable site and clearly demonstrating project need.
- When searching over large areas for suitable sites (especially where there is insufficient information from extant strategic plans) a range of theoretical and practical techniques may need to be applied. However, take care not to be too detailed too early in case some possible sites get missed.
- Landowner backing and involvement is very valuable but a clear statement about commercial rationale for realignment may need to be made to achieve this support.
- Be aware of the increased costs and delay risks that can arise where there are local objectors.

4 - PLANNING APPROVAL AND CONSENTS

The fact that several alternatives had been considered, and the rationale for realignment at Wallasea was clearly understood (Section 3) not only helped to inform site selection but provided crucial support for the subsequent planning process. The planning application was also greatly enhanced by pursuing a communication strategy (see Section 6) which ensured that officers of the local authority and key stakeholders were fully involved. The consultations held with statutory authorities were also used to inform the EIA scoping process.

For the assessment a detailed EIA was required that had to be supported by a very comprehensive hydrodynamic impact study (using numerical modelling techniques) to describe the effects of the development on the water flow patterns, sediment transport patterns, ecology and navigation of the Crouch Estuary. This model also used to inform the design of the site itself by indicating the level of potential sediment accretion in the site; confirming that the breaches will be physically stable and ensuring that the island features did not significantly interfere with flow patterns across the area). Alongside the core numerical modelling work which described the immediate effects of the scheme, Regime Modelling was used to understand how, on a system-wide basis, the estuary 'try to respond' to this morphological change over the long terns (10s or 100s of years).

In addition, to assessing the impacts of the scheme, the modelling was also used, along with GIS mapping and image manipulation work, to provide easily understood graphics that informed as part of the consent process as well as other communications with consultees.



One of the 3D computer visualisations used to communicate proposal

Over the course of the full planning application the following the planning/consent issues were encountered: -

1. Town and Country Planning Act 1990 – Planning permission required from Planning Authority

2. Town and Country Planning Act (EIA) Regulations 1999 (the EIA Regulations) - Proposal classed as Schedule 2 coastal works and EIA required.

3. Habitats Regulations (1994) - Appropriate Assessment required and information required was provided in EIA. Impacts to Ramsar-cited aquatic invertebrate species/habitats were the major concern and need to be mitigated.

4. Wildlife and Countryside Act (1981) – EIA included assessments of impacts to species protected either under Section 9 (and under the Habitats Regulations). At Wallasea, impacts to breeding birds and reptile species were the major concern and need to be mitigated.

5. Land Drainage Act 1991 - Consent from EA because existing drainage systems and coastal defences were affected. It was agreed that a single application would cover all works and future seawall maintenance.

6. Water Resources Act 1991 - Consent from EA Flood Defence Committee required and obtained for proposed works affecting tidal flood defences.

7. A footpath diversion order – Required under the Highways Act 1980 or the Town & Country Planning Act 1990

8. Coast Protection Act 1949 (CPA) - No consent was needed for construction works below mean high water Springs (MHWS) or for temporary blocking of navigation during the recharge operations. This consent was obtained via the Works Licence from Crouch Harbour Authority.

9. Food and Environment Protection Act 1985 (FEPA) – Construction or sediment deposition licences under Part 2 were not needed. With respect to the sediment recharge works, a formal FEPA consent was not required (because arisings were not deposited below MHW) but the quality of the material was still double-checked and subject to FEPA-standard studies.

10. Waste Management Licensing Regulations 1994 - A waste management licence or an exemption under Regulation 17 was not required (sediment volume <20,000m^3).

11. Water Resources Act 1991 - No discharge consent was required because there will be no discharge from the site to the estuary. The dredge arisings were dewatered entirely within the site. Water abstraction licence was not needed because the scheme involves altering the coast to allow "natural" abstraction.

Key Lessons

- Give early notification to consenting authorities and maintain good communication with these decision makers and also local people to help the consenting process to go more smoothly.

- Use the hydrodynamic modelling and GIS work, that is usually needed to support the EIA and AA reports, to also provide easily understood graphics that inform as part of the consent process communications.

- Be prepared for strong opposition from pressure groups (e.g. those with specialist environmental interests) and respond to concerns rapidly.

5 - SCHEME DESIGN AND CONSTRUCTION

The main objectives of the scheme design work was to:

- Deliver required proportions of saltmarsh and mudflat

- Deliver mitigation habitats for impacts to protected species and designated features from the flooding of the land.

- Allow safe access/egress for construction plant and enable access by wildlife and people to the foreshore and river frontage after the flooding.

- Ensure stable breach configurations and no strong flows (or 'jetting' of water) into the estuary.

For this scheme a new secondary wall was constructed about 400m back from existing sea defences. This new wall was an extension to one that had been constructed three years previously by Wallasea Farms Ltd. Material for constructing the new wall was won on site and landscaped to include shallow water lagoons for fish nursery areas and islands topped with gravel or shells for wetland bird nesting. These islands formed part of a mitigation package to offset impacts from the flooding of the land. An additional wetland bird nesting and feeding area (particular, avocet and redshank) was provided in the form of a 4km long brackish water "borrow pit" landward of the new sea walls.

The majority of the site fronting the two walls is at an elevation half way between Mean Low Water (MLW) and Mean High Water Neap (MHWN) and was be suitable for mudflat development. Therefore, to also create an area of saltmarsh, 700,000 tonnes of clean (see above) maintenance dredge arisings (from the Port of Harwich) were placed on the seaward side of the walls. This recharged sediment was contained by the wall and a clay bund on the seaward side to create a 45m-wide strip where the topography was raised to a level that was just below the MHWS level.

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Final sediment recharge deposition (May 2006)

The alignment of the new sea wall and the sediment recharge are such that the site is divided into three discrete areas with no exchange of water flow between them. Therefore, it acts like three separate but contiguous realignment sites. After the construction and land preparation, the sea wall breaching work as undertaken in three stages across these areas. At each stage the amount of seawall being removed and the extent of the area being flooded increased. In total, there were six breaches of between 60m and 210m in width each (total 590m) and on the final stage, 330m length of sea wall material was removed at three breach points during a single 7-hour tidal window.

Although selecting the site took a long time, it took only 18 months from the initial approach to the landowner approach to the completion of the final breach (February 2004 to July 2006) and cost £7.50 million.

Key Lessons

- Throughout the process of design and construction, attention to health and safety risk is the major concern especially during the breach events. The installation of escape routes for machinery and people is essential.

- Seek opportunities to obtain opinions from expert (especially those that live and work locally) about the design as this can help to identify make cost-effective ecological and socio-economic enhancements.

- Consider the possible need for visitor facilities (car park, disabled access routes etc.) if the site becomes popular.

- Sediment recharge is evidently a valuable mechanism for elevating landform and represents a beneficial use option for dredge arisings.

- There is a need to factor the risk into costing for the project because even where surveys and planning are exhaustive unforeseen problems can occur.

6 – COMMUNICATIONS/CONSULTATIONS

For the Wallasea scheme, DEFRA engaged in comprehensive and early consultation with a wide range of groups and individuals (including the general public, statutory authorities specialist interest groups and estuary users). This was a valuable element and, in particular, it aided the Planning Consent and EIA process by enabling key issues to be highlighted. It also ensured that interested parties (especially locals) felt involved in the process and lead to extra components being included in the scheme design (e.g. a recreational area inside the site and signage on the new sea walls). Although some negative comments were received, and were addressed, the responses were largely positive. This, however, contrasts directly with the attempts at effective communication on the Weymarks scheme that met with strong opposition despite similarly early consultations.

To underpin the Wallasea scheme, a communication strategy was developed and regularly reviewed by the project manager during the development. As part of this strategy, regular communications and consultations were maintained with interested parties and estuary users. This was particularly valuable at a local level where meetings and presentations were held with local groups. However, it also included opportunities to inform the wider technical and non-technical community through: the provision of guided visits to the site, production of leaflets, conferences, workshops and other written publications.

Communication with the coastal management community has also continued in the since the final breaching. The objective is to make sure that the lessons learned for this work are as widely communicated as possible. This paper represents part of this dissemination. A key component of this process has been the deployment of a web camera on site and the development of a dedicated web site that collates information (www.abpmer.net/wallasea) about the site and the results of the monitoring work that is being done. This was co-funded by the EA, the EU ComCoast (COMbined functions in COASTal defence zones) project and DEFRA and it involved the installation of a 25m mast with six live web cameras on the site. This will take hourly photos of the site as it develops over the next five years. The central objective of this work is to find a mechanism for informing and engaging the whole community (technical and general) about managed realignment.

One of six web-cam views taken hourly (showing eastern half of the site).

Communication and liaison with the general public has also continued since the breach. In addition to the web-site, this has been achieved though the circulation of annual newsletters, discussion papers, and details of specialist site visits. These details are regularly sent to up to 600 people and organisations who have expressed an interest in the site. Furthermore, on the site itself, information boards have been put in place to inform the public about why these wetlands have been created and to help them identify the different types of birds that they will be able to see as the site develops.

Finally it is worthy of note that there was large amount of media coverage on the final day of breaching (4th July 2006) and this resulted in almost exclusively positive reporting. Whether the media maintain this positive stance on the subject will only become apparent over the coming years as new managed realignment are pursued. However, the ongoing communication process (for Wallasea as well as for other sites) will have a part to play in this.

Key Lessons:

- Although no guarantee of success, engage in early and comprehensive consultation (the extent and detail of the which is likely to be dependent on the sensitivity of the location and/or the proximity of residential areas and socio-economic resources).

- Seek to alter aspects of the design in response to local viewpoints where it is viable to do so.

- Develop a communication strategy which includes a database on contacts and a clear point of contact for consultees to direct concerns.

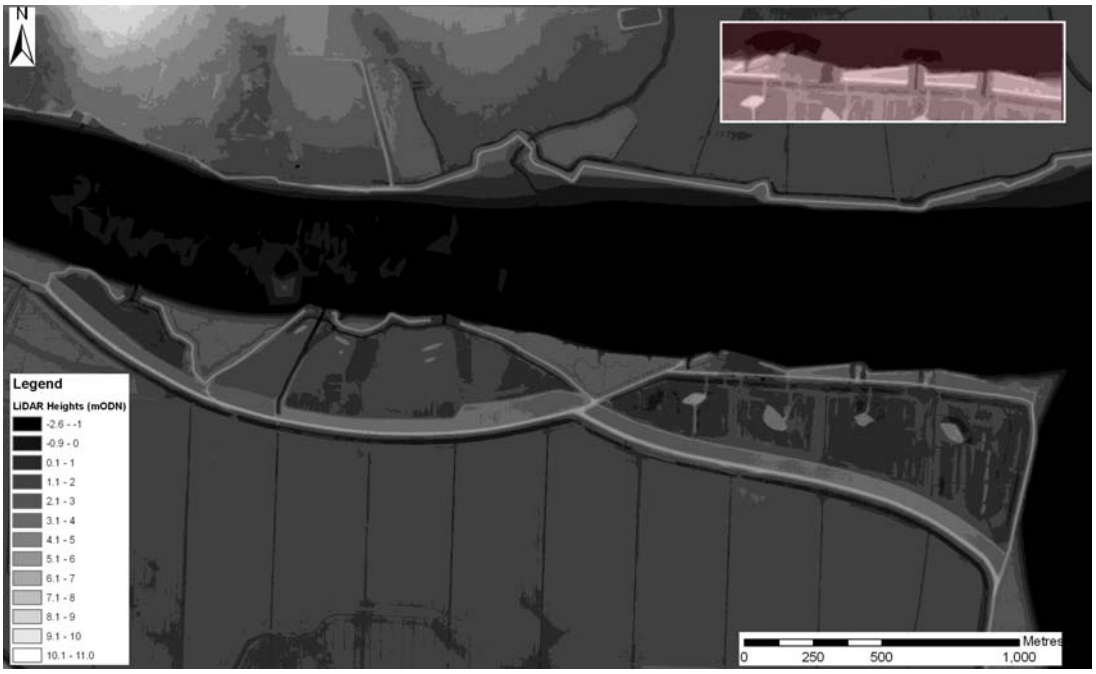
- Continue to involve consultees (e.g. though provision of leaflets or web-site) and respond to feedback as rapidly as possible.

One of the information signs placed on the new sea wall

7 - MONITORING

The environmental monitoring phase (which is being undertaken by ABPmer and Jacobs-Babtie) began in early 2006 before the final breaching and will continue until the end of 2011 [ABPmer 2006]. At which time a further review of the monitoring needs will be made. This work is designed to both identify any impacts of the scheme (against EIA findings) and to confirm delivery of ecological objectives (verified against compensation targets).

Many of the lessons about monitoring are only really going to be learned as the work is carried out. However, a number of key points can be identified from the scoping and pricing of this programme. In this case the work is, inevitably, very detailed and costly because Wallasea is a large site and there is need to robustly identify any change in the estuary and determine whether the requisite wetland functioning is being delivered. However the costs are still comparable with those for other, often smaller, compensatory sites such as those being implemented and monitored by ABP on the Humber (Welwick and Chowder Ness).



LiDAR image taken in June 2006 showing site topography when western half was already breached (inset shows final design of eastern breaches)

To rationalise the monitoring scope, and keep costs down, the survey work clearly needs to be tailored to specific requirements for the scheme. In this case, the scope of the work was based directly on the findings of the EIA so that, for example, the flow/current monitoring takes place in areas of maximum change identified by the hydrodynamic modelling. Less obviously, the temporal frequency of sampling also needs careful consideration. In general terms sampling work is usually undertaken on an annual basis so that any sudden changes can be responded to. However, for realignments, it is not always necessarily to provide detailed information on a regular basis (however interesting that may be from an scientific perspective). Instead there is a need to confirm end-point delivery and to highlight any significant areas for concern along the way. Taking this into account, selected studies (e.g. topographic and bathymetry surveys) at Wallasea are being carried out biennially or only at the start and end of the five-year period.

Similarly, the detail of the sampling analysis can be tailored to need. At Wallasea, for instance, the sampling of the benthic invertebrates does not need to be assessed in a quantitative and more costly way during each annual survey. Instead the analysis is being done qualitatively (i.e approximately guide to species present) in alternate years. This will still provide information on the success of the site's ecological development without unnecessary extra analysis and data processing.

Although efforts should be made to ensure that the monitoring work meets the needs and doesn't incur excessive expenditure, it is recommended that thought is given to funding cost-effective surveys that may demonstrate a site's ecological or socio-economic value beyond the requirements of the compensation objectives. For instance the value of realignments to fish species (and thus angling and fisheries) is increasingly apparent and

monitoring programmes should seek to include relevant levels of fish sampling work either as part of the direct funding stream or indirectly through links to research groups. At Wallasea this has been done indirectly by fostering links to research work. Since its construction, surveys of fish populations (for a PhD under the ComCoast initiative) have been carried out and it is also being used as a focus for studies into vegetation growth, benthic invertebrate colonisation and a PhD is being carried out to study applications for the beneficial use of dredged sediment.

Key Lessons:

- Create a bespoke monitoring package with the sampling frequency and analytical detail tailored to project objectives.
- Obtain consensus with main interest groups.
- Consider including monitoring work that might be statutorily non-essential but will still provide valuable extra information in support of the scheme (e.g. fish population studies).

8 – CONCLUSIONS

This paper seeks to highlight some to the key techniques used and lessons learned on the Wallasea project. However, it is necessarily limited in detail with more information being available in the supporting documentation. This information will also be added to over the next few years as information becomes available on aspects such as the methods and results of the monitoring work and the physical and ecological development of the site (including details about where further intervention and management was needed). To date though a selection of the primary messages emerging are as follows: -

Set up a good project management structure

The Wallasea project benefited greatly from having a dedicated full-time project manger with responsibility who took the project from concept to completion. The manager not only held public meetings but also met concerned individuals on a one to one basis. This approach paid dividends as various detractors subsequently became positively supportive of the project. In the end there was a lack of any major objections to the scheme. It also benefited from having small multi-disciplinary project management teams, with a collective interest in achieving the wetland, overseeing to the project.

Pursue early consultations and maintain them to facilitate and enhance project

Consultations should form a key part of the site selection and planning work not only to inform interested parties (including the general public) but also because the process itself can be used to identify after-use strategies and opportunities for environmental, social and economic gain (e.g. borrow dyke design, island design, recreational beach, shoreline access, web-site resource

and sea wall signage). Public consultations/involvement were also beneficial at Alkborough which benefited from the creation of a liaison group that has met regularly with local representatives throughout the duration of the project. At the onset of any future realignment, it is particularly recommended that the officers and elected members of the local authority who will determine consents are brought up to speed about the project as early as possible.

Select and design sites using a range of relevant techniques (with strategic support and hydrodynamic modelling being especially important)

Site selection and design must be informed by robust and accurate hydrodynamic assessments as the first and main priority. The selection of a site should also ideally be underpinned by a clear strategic planning wherever possible. Wallasea, like many recent realignments, benefited from the EA's Estuary Shoreline Management Plans and related flood defence strategies. This is particularly noteworthy on the Humber where the highest concentration of realignments has occurred in recent years. These programmes have included significant levels of modelling that are a considerable aid to understanding the factors influencing options for realignment.

Seek multiple benefits beyond core project objectives and treat the project as if it is a commercial "product"

Linked to the preceding point, the Wallasea wetland is a bird reserve, a sustainable and improved flood management, a fish nursery, a pollutant and carbon soak and offers a new public footpath, swimming areas, sport fishing opportunities and has been landscaped to look attractive. It makes space for water, for wildlife and quiet recreation. Monitoring programmes can be adapted to include cost effective monitoring programmes to demonstrate these benefits subsequent to breaching. In essence it is recommended that the wetland creation is seen as a commercial "product" and marketed accordingly based identifying on always selling its multi–benefit lines in all communications and to all consultees.

Develop clear graphics/visuals as part of assessment process

At Wallasea, it was found that clear visuals and computer generated graphics which showed how the site would behave were highly beneficial in explaining what was proposed and what was expected to happen. A lot of the analytical work required to achieve these outputs has to be done for the assessment process anyway so the costs of producing these need not be excessive.

Consider Visitor Impacts/benefits

Wallasea, and other sites such as Freiston Shore have attracted good numbers of visitors and therefore it is always worth considering design provisions for visitors and car parking.

Ensure lessons from past schemes are learned and that there is a dissemination of new lessons from future schemes

A lot of lessons have been learned over the last 14 years from realignment work in the UK. The large resource of information on Wallasea, that is contributed to here, will complement this information base. These lessons from past schemes, allied to contemporaneous advances in analytical techniques, information collation and knowledge dissemination, now put coastal managers in a strong position to undertaken further realignment work backed by good case example evidence. Equally, future realignment projects need to ensure that useful and relevant experiences are similarly disseminated.

8 - REFERENCES

ABPmer (2006) Wallasea Island North Bank Realignment: Proposed Monitoring Programme Nov 2005 Report R1187.

ABPmer (2005). Wallasea Island North Bank Realignment: Environmental Statement. 2004. Report R1114.

ABPmer & British Trust for Ornithology (2002). Lappel Bank and Fagbury Flats compensatory measures: Phase 1. 2002. ABPmer Report R947.

ABPmer & British Trust for Ornithology (2004). Lappel Bank and Fagbury Flats compensatory measures: Phase 1 – Second review of short-listed sites. 2004. ABPmer Report R1021.

DEFRA (2004). Flood and Coastal Defence Project Appraisal Guidance FCDPAG3 Economic Appraisal: Supplementary Note to Operating Authorities. DEFRA, London. 2004.