

Pagham Harbour

Unit limits

Approximately 11km of shoreline, including the landward faces of the shingle ridges separating the harbour from the open sea, but not including Pagham Lagoon.

General characteristics

Pagham Harbour is the smallest of the East Solent harbours, and is the only one where management is strongly dependant on the future evolution of the open coast adjacent to the entrance channel (Unit 1 of the Open Coast).

Most of the surrounding area is low lying, including large areas of floodable land to the north and the southwest. The margins of the harbour are mainly farmland, but include a large holiday development around Pagham Lagoon and a small residential area at Siddlesham. The shoreline is defined by flood embankments, revetments and some natural shoreline, with unprotected shingle ridges defining the harbour mouth.

Coastal processes

The shoreline is influenced by waves generated within the harbour, by tidal currents, by water levels and by works associated with land drainage. Provided that the shingle ridges separating the harbour from the open sea remain intact, then the harbour processes will remain low in energy, ensuring relatively slow natural evolution of the shoreline. A breach in either one of the ridges would substantially alter the character of the harbour processes, resulting in rapid changes to the intertidal area and increased risk of flood defence failure. Similarly a breach in the harbour defences allowing significant flooding of surrounding areas would alter the tidal regime and increase the flows through the harbour entrance.

- | | |
|---------------------|--|
| <i>Geology</i> | - Underlying geology comprises easily eroded Tertiary Strata |
| | - Surface deposits comprise: <ul style="list-style-type: none"> · Alluvium within the intertidal area and most of the low lying margins · Shingle storm beaches along the open coast · Brickearth deposits in all other areas |
| <i>Wave climate</i> | - Depends on fetch and nearshore bathymetry |
| | - 0.5m H _s waves are predicted for 1:50 years storms in areas exposed to the south or southwest |
| <i>Tidal regime</i> | - Currents weak, except in the entrance channel |
| | - Maximum water levels are similar throughout the harbour |

Table 1 Extreme water levels

Probability	1:1 year	1:10 years	1:50 years	1:200 years
Maximum water level (MoD)	2.99	3.38	3.53	3.69

- | | |
|---------------------------|---|
| <i>Saltmarshes</i> | - Active marshes across much of the harbour, developed from reclaimed grazing land following breach in spit in 1910 |
| | - <i>Spartina</i> marshes believed to be in slow recession |
| <i>Sediment transport</i> | - Limited influx of sand and shingle through the entrance channel |
| | - Fine sediment carried in suspension throughout the harbour |
| | - Deposition of mud in sheltered areas |

- Some wave driven erosion and transport of muds and coarser sediments in areas exposed to larger waves

- Land drainage*
- Land drainage channels serving large areas around the harbour enter via a pumped system from the west and via a valved system to the north
 - Changes to the existing drainage structures could have wide ranging impacts on low lying areas
 - The harbour is separated from a large lagoon at Pagham by a narrow embankment. Breaching would result in flooding of residential and recreation areas.

- Possible future changes*
- 300mm sea level rise over 50 years
 - Increased wave energy
 - Increased tidal currents due to greater tidal volume

Existing defences

The Pagham Harbour shoreline is mainly defend by flood embankments, with revetments along the more exposed frontages. The landward faces of the shingle spits around the entrance are not defended. The defences are generally in need of some maintenance and upgrading to provide continual defence, taking account of future water levels and the possibility of increased wave action in the event of a breach of the spits. Table 2 summarizes the type and condition of the existing defences.

Areas of particular concern are the embankments separating the harbour from the large floodable areas to the north and west, although at present these defences are in reasonable condition. They are maintained as part of land drainage schemes. The Chichester Flood Relief Scheme may affect the north embankments. Maintenance of sea defences and management of natural habitats will have to be considered during construction and management of any new land drainage works.

Natural environment

The entire shoreline and intertidal area, plus large areas of the harbour margins, are within the Pagham Harbour SSSI (also SPA and Ramsar site), designated for a variety of habitats and for important bird populations. The shingle spit area is also designated as a GCRS for its coastal landforms and exposures of fossil rich London Clay. Shoreline management must give due consideration to environmental impacts and legislation.

Land use

The margins of Pagham Harbour are mainly agricultural use, with a small residential area at Sidlesham and a large holiday development at Pagham. Most of the farmland within the areas at risk from flooding is pasture, with little high grade arable land. There is a small land fill site along the western margin, north of Ferry House.

Human environment

The harbour margin is valued for public access to an area of high environmental value. There are few facilities for water sports. A number of sites of historical/archaeological importance are found along the shore, including two Scheduled Monuments.

Planning policies

The harbour margins are designated as Countryside, and there are no plans for development.

- Statutory policy documents*
- West Sussex County Structure Plan, Deposit Draft
 - West Sussex Minerals Local Plan, Consultation Draft
 - Chichester District Local Plan, Deposit Draft
 - Arun District Local Plan, Consultation Draft

Shoreline defence options

Most of the existing defences around Pagham Harbour are in need of some repair and upgrading to provide an adequate standard of defence under existing or future sea conditions, particularly in the event of a breach to the shingle spits. Lack of maintenance would result in a failure of many defences within the short to medium term.

Crest levels of some of the embankments are lower than the 1:50 years return period water level. Failure of the north or west revetments would lead to wide spread flooding, major changes to land drainage and significant changes to the existing natural habitats.

As discussed in the introductory sections of this document, the harbour shoreline has been classified by management types according to potential for flooding or erosion, the existing defences and the existing land use.

The frontages referred to by each type are presented on the accompanying map. The preferred option for each length of frontage is in line with the statements in Chapter 4 and summarized in Table 2 below. It should be noted that only three of the seven management types used in other harbours are represented in Pagham Harbour. The text also provides preliminary guidance for setting boundaries relevant to the scheme strategy studies that will follow the adoption of the SMP.

Table 2 Preferred options for management types

Type	Description	Preferred option
1	No risk, or minor risk of flooding/erosion Undeveloped area No existing protection	Non-intervention
2	No risk Developed or sensitive area No existing protection	Non-intervention
3	Erosion risk, no flooding Undeveloped area Existing protection	Maintain standards along the existing line of defence
4	Erosion risk, no flooding Developed or sensitive area Existing protection	Maintain standards along the existing line of defence
5	Flooding risk (possible erosion) Undeveloped area Existing protection	Maintain or upgrade standards along the existing line of defence
6	Flooding risk (possible erosion) Developed or sensitive area Existing protection	Maintain or upgrade standards along the existing line of defence
7	Shoreline formed by structure designed for purpose other than defence	Maintain or upgrade standards along the existing line of defence (review when structure becomes redundant)

Existing defences around most of the harbour perimeter comprise earth embankments which are revetted in areas of greatest wave exposure. Although these defences require some maintenance and will need upgrading in the future they will not require substantial investment due to the relatively short perimeter of the harbour and the



limited exposure to wave attack. Little economic benefit would be derived from realignment as a new line of defence would be required. Although some additional saltmarsh habitat could be created by limited retreat it is considered that the costs involved would not justify the benefits gained. Hence it is recommended that maintaining or upgrading standards along the existing alignment are the preferred options throughout.

Managed retreat has been discussed for the area to the north of the harbour on the grounds that the existing embankment and revetment will require substantial future investment to maintain an adequate standard of service. However, removal of the existing defence would result in flooding of a very large area of farmland. This would alter land drainage and land use over an even larger area, and would have a significant impact on the harbour tidal regime, including increasing currents in the entrance channel and therefore widening the entrance. If the defences were replaced by a line of defence to landward, then the new defences would have a greater length than the existing ones, and consequently construction and maintenance costs would be higher. Neither of these scenarios would be economically justified. Although there would be environmental gains due to the creation of new saltmarsh and mudflat, there would also be losses of grazing meadows and associated habitats. Retreat is therefore not considered appropriate for this frontage.

The only other area considered as a potential retreat site is along the south shore of the harbour. Retreat in this area would have no coastal defence benefit, but could provide an opportunity to create compensatory habitat for possible future damages to areas of SPA/SAC saltmarshes around the Solent.

Shoreline management within Pagham Harbour must be considered within a scheme strategy including open coast Management Units 1, 2 and 3.

Management operations

Upgrading of existing defences will be required around much of the harbour. Designs should take account of the factors discussed in Chapter 4 of the introductory section. All frontages will require ongoing monitoring to ensure that the management policies and operations continue to provide an appropriate standard of service.