

Management Unit 1 : Pagham Beach to East Beach, Selsey

Unit limits

3800m from 489150E, 097200N to 487200E, 094300N

This Unit also forms Unit 2 of the South Downs SMP.

Coastal processes

Strong wave driven littoral drift has formed shingle spits enclosing Pagham Harbour. Ebb tide currents out of the harbour have produced a large shingle delta seaward of the entrance. The northern spit has been stabilized by a sheet pile retaining wall at the entrance channel. The southern spit is historically unstable and tends to extend into the harbour entrance. Both spits and the ebb tide delta are vital for protecting the harbour. A breach of either spit or an increase in the entrance width would expose the harbour to damaging wave action and would increase the risk of wide spread flooding of low lying land around its margins. Conversely, a reduction in the discharge capacity of the entrance channel could impact land drainage around the harbour. The Pagham Harbour Management Unit must be considered in conjunction with this Unit.

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| <i>Geology</i> | - Easily eroded Bracklesham Beds and London Clay, overlain by gravel storm beach and nearshore sandy gravel deposits |
| <i>Wave climate</i> | - Dominant waves from south (45% of time)
- Secondary waves from southeast (20% of time)
- Strongly influenced by nearshore banks formed by ebb delta |
| <i>Tidal regime</i> | - Shore parallel currents except in entrance channel
- Maximum nearshore current between 0.5m/s and 0.75m/s
- Ebb (south west) dominated residual flow
- Maximum entrance channel current between 1.0m/s and 1.5m/s |
| <i>Sediment transport</i> | - Dominant drift from southwest to northeast
- Weak drift reversal zone along Pagham beach, with local drift towards the harbour entrance.
- Ebb delta off entrance, subject to long term change
- Considered to be a nett sediment sink
- Some minor wave induced erosion to landward face of spits |
| <i>Possible future change</i> | - 300mm sea level rise over 50 years
- Increased inshore wave energy with mean direction shifting clockwise, possibly causing nearshore bank to shift and erode
- Increased potential drift to northeast |

Table 1.1 *Extreme wave heights and water levels*

Probability	1:1 year	1:10 years	1:50 years
Nearshore wave height H_s (m)*	3.9	4.7	5.2
Maximum water level (m OD)	3.06	3.45	3.60

* at the -2m CD contour assuming MHWs tide level. Waves assumed to be depth limited to about 4.5m

Existing defences

The shoreline consists of shingle spits and has no seawalls or revetments, except the ageing sheet pile training wall along the north side of the harbour entrance.

There are timber groynes near the distal end of the south spit and further south towards East Beach. The former are in poor condition and are having little impact. The southern groynes have been recently rebuilt. They allow updrift deposition and improved local beach stability, but do not cut off all drift.

North of the entrance, Arun DC have recently built four rock groynes which have not yet had a noticeable impact on beach processes.

The existing standard of protection is dependent on the spit maintenance programme. In consequence there is a variable standard of defence depending on management response to erosion events.

Natural environment

Pagham Harbour, its margins and the full length of the foreshore are all within designated nature conservation areas (including SSSI, SPA and Ramsar sites), due to the presence of a wide range of coastal habitats and geomorphology/geology interests. There is also a marine SNCI east of Pagham Beach at the site of submerged Mulberry Harbour units. Shoreline management operations must give appropriate consideration to environmental impacts and must comply with statutory procedures including the Habitats Directive. In particular, the potential for widespread saltmarsh and wetland habitat destruction in the event of a spit breach and the impact of beach management operations on bird nesting along the spit must be considered.

Land use

Primarily undeveloped shingle ridges but with grazing and high grade arable farmland along the Pagham Harbour margins. To the north of the harbour entrance the shingle foreland has been partly developed for housing, holiday accommodation and recreation.

Human environment

The area has important recreational assets, particularly for walking, bird watching, camping, fishing and some water sports. The south spit is remote and not heavily used by the general public. Preservation of the existing coastal landscape is desirable. There are numerous sites of historic/archaeological importance and two Scheduled Ancient Monuments within the area affected by the SMP.

Planning policies

There are a number of minor private recreational developments along Pagham beach which are under consideration and may be affected by future shoreline changes. The remaining area affected by the SMP is designated as Countryside and is protected from significant development.

Statutory policy documents: West Sussex Structure Plan, Deposit Draft
West Sussex Minerals local Plan, Consultation Draft
Chichester District Local Plan, Deposit Draft
Arun District Local Plan, Consultation Draft

Strategic defence options

Table 1.2 Impact matrix

	Do nothing	Hold the line ¹	Retreat the line ²	Advance the line ³
Effects on physical environment and coastal processes	Breach of spit will form new entrance. Increased wave attack in Pagham harbour. Drift pattern changed.	Future increase in wave energy	Little effect on open coast. New shoreline may be more stable.	Drift patterns changed. Ebb delta not sustained. Increased wave attack.
Effects on human environment	Possible flooding of large area of recreational/ agricultural land around harbour.	Negligible	Negligible, providing realignment is within reasonable limits.	Improved protection around harbour, but change to land drainage.
Effects on natural environment	Loss of saltmarsh and shingle beach communities.	Continued interference with shingle ridge.	Loss of some marsh habitat, but less interference with shingle ridge.	Loss of habitats and geological interest, but new wetlands created.
Implications for coastal defence	Improved defences required in harbour.	Increasing requirement for management.	Spits would need to be maintained but could be gradually shifted landward.	Major beach recharge, control structures and pumped land drainage required.
Impact on adjacent units	Exposure of harbour to larger waves.	Negligible	Loss of water area in harbour	Loss of ebb delta may increase erosion to east. Loss of harbour in its existing form.

¹*Hold the line* - The existing shoreline is not fixed by hard defences and the backshore is largely undeveloped, so there is no need to retain a rigidly defined shoreline. A beach management policy of retaining the shore within pre-determined limits would allow natural variation to take place while guarding against a breach or blockage of the entrance channel.

²*Retreat the line* - A gradual landward realignment of the shoreline may become appropriate in the medium to long term.

³*Advance the line* - There is no benefit in advancing the shoreline beyond the seaward limits of the “hold the line” option but it would be possible to close the harbour entrance, allowing reclamation of the intertidal area of the harbour. New land drainage infrastructure would be required.

Losses due to “do-nothing” option

South spit will continue to be vulnerable to breaching. Northern spit is likely to remain relatively stable. A breach or change in the width of the entrance would result in damage to flood defences within the Harbour,

with consequent increased risk of widespread flooding in the short to medium term. Lack of maintenance to the entrance channel could also result in partial blocking and formation of a low tide lagoon, with impacts on land drainage from the low lying catchment areas beyond the harbour limits.

Direct land and property losses due to a breach of the south spit will be limited. Indirect and less tangible losses and problems include:

- loss of important natural assets, including shingle and salt marsh habitats
- increased costs of maintaining Harbour shoreline (see Pagham Harbour Unit Plan) and/or possible flooding of up to 900ha of farmland and holiday developments
- possible creation of land drainage problems.
- loss of historic sites.

Values for these losses have not been estimated. Further assessment will be required to justify management operations in economic terms. Consideration must be given to possible double counting of losses relative to this Unit and to the Pagham Harbour Unit and Unit 3.

Preferred option

Economic and environmental losses due to do-nothing are not acceptable. Environmental losses due to closure of the harbour entrance are also not acceptable. The costs of closure would have to include pumped drainage and long term maintenance of the spits using structures and beach management making this option unsustainable on economic grounds as well. In the short term the preferred option is to continue to **hold the line** within pre-determined limits. Gradual managed retreat along the south spit should be considered in the future if the costs of maintaining the line begin to escalate. A 1:50 year standard of defence is assumed appropriate. The preferred policy should be implemented within a strategic defence programme for the Selsey Peninsula and Pagham Harbour.

This approach is in agreement with the South Downs SMP.

Suggested management operations

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| <i>Short term</i> | - | Minor recharge and continued recycling along Environment Agency frontage. |
| | - | Maintain entrance channel and refurbish training wall. |
|
<i>Medium term:</i> |
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Improve and extend groyne field at north end of south spit. |
| | - | Groyne maintenance along Chichester DC frontage towards East Beach. |
| | - | Review the retreat option for the south spit. |

Preliminary economic assessment

Although direct and tangible benefits are limited, the relatively low levels of investment required are likely to be fully justified against the indirect benefits of reducing defence costs within Pagham Harbour and the maintenance of existing natural assets.