

Management Unit 3: West Beach, Selsey to Bracklesham

Unit limits

4200m from 484450E, 093100N to 481450E, 095650N

Coastal processes

A shingle storm ridge, overlying a flat sandy foreshore, extends over the whole frontage, and forms the main line of defence against flooding of the hinterland. The potential flood area extends north to connect with Pagham Harbour. A short length of eroding cliff forms the southeastern length of the frontage. The backshore area is prone to flooding due to overtopping or breaching of the ridge, which has been recharged and is maintained by ongoing recycling. The sandy lower foreshore is subject to long term lowering; storm waves strip off the superficial sand cover and erode the underlying clay platform.

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| <i>Geology</i> | - Bracklesham Beds overlain by shingle storm beach and nearshore sands and gravels |
| | - Backshore is low lying and consists of alluvial mud deposits |
| | - Eroding cliff to south east is a gravely Raised Beach deposit |
| <i>Wave climate</i> | - Energy reduced by shallow banks to south |
| | - Southwesterly waves dominant (45% of time) |
| | - Secondary waves from south (30% of time) |
| <i>Tidal regime</i> | - Complex tidal regime, but with generally weak currents |
| | - Maximum nearshore currents < 0.5 m/s |
| | - Weak residual flow to southeast |
| <i>Sediment transport</i> | - Weak nett shingle drift from southeast to northwest, though significant reversals occur |
| | - Upper beach transport disrupted in the vicinity of Broad Rife outfall so beach to the west is particularly susceptible to breaching |
| | - Some onshore shingle transport by kelp rafting and some feed from southeast but general lack of natural input causes a negative sediment budget |
| | - Beach management operations maintain existing line, particularly along southeast half of frontage |
| <i>Possible future change</i> | - 300mm sea level rise over 50 years |
| | - Drop in foreshore level due to erosion |
| | - Increased inshore wave energy with mean direction shifting clockwise |
| | - Reduced nett drift to the northwest |

Table 3.1 *Extreme wave heights and water levels*

Probability	1:1 year	1:10 year	1:50 year
Nearshore wave height H_s (m)*	3.9	4.6	5.0
Maximum water level (mOD)	2.91	3.28	3.43

* at the -2m CD contour assuming MHWS tide level. Waves assumed to be depth limited to about 4.4m

Existing defences

The primary defence is a large shingle beach which is nourished and its width regularly maintained by recycling beach material and reprofiling the front face. A short length of sheet pile and timber wall protects a line of shorefront housing along the southeastern part of the frontage. A groyne field of short and long groynes undergoes a rolling programme of repair. However the rapid abrasion of the groyne planking gives the groynes a short life and much of the groyne field is ineffective in arresting littoral drift. Groynes around the Broad Rife outfall are generally better maintained and more-effective than elsewhere, leading to a concentration of downdrift erosion problems immediately west of the outfall.

The present standard of defence is low and variable (say 1:20 years after full maintenance, but less than 1:1 year following a severe storm) as it is dependant on the shingle ridge maintenance programme. Breaching and overtopping have occurred on several occasions since nourishment in the 1970's but serious damage has been avoided. Future damage may be much greater if at any time the Environment Agency are unable to respond adequately to storm erosion.

The soft cliffs to the southeast are eroding rapidly, increasing the risk of flooding due to outflanking of the shingle bank and the risk of erosion damage to homes due to outflanking the sea wall of Unit 2. At present the cliffs are unprotected.

Natural environment

The entire foreshore and the backshore around Broad Rife are part of the Bracklesham Bay SSSI. The foreshore is designated primarily for its geological interest and is a GCRS. The backshore is designated for its wet grasslands and bird habitats. There is also a backshore SNCI (Crablands Farm Meadow) and a marine SNCI (Bracklesham Balls). Shoreline management operations must comply with statutory procedures. In particular, operations should consider the classic exposure of Bracklesham Beds on the foreshore, unique sources of fossils, the value of the backshore for breeding, migrant and wintering birds and the rare unimproved wet grasslands around Broad Rife. The existing shingle ridge is largely sterile due to intensive management operations.

Land use

Primarily medium and high grade farmland, but the immediate backshore to the northwest is low grade grazing. To the southeast, the backshore is heavily developed as a holiday site. Houses, recreation facilities, services, offices, shops, cafes and roads have all been built to support the site. There is a land drainage outfall at Broad Rife, although much of the potential flood area drains northwards to Pagham Harbour.

Human environment

The area is important to the Selsey community due to the commercial benefits of the holiday camp and the recreational value of the beach and backshore. There are several sites of historical/archaeological importance.

Planning policies

The area is entirely designated as Countryside and is protected from significant development. There are two housing development sites just outside the flood risk area of Unit 3.

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

Strategic defence options

Table 3.2 *Impact matrix*

	Do nothing	Hold the line	Retreat the line	Advance the line
Effects on physical environment and coastal processes	Natural shingle beach will be subject to breaching and ongoing recession, leading to development of new saltmarsh and changes to land drainage over a large area. Continued erosion of cliffs to east.	Erosion of lower foreshore and increased wave energy.	Reduced wave attack. Development of more stable shoreline. Future erosion may force a further retreat.	Increased wave attack. Drift pattern changed.
Effects on human environment	Loss of large area of farmland and a major holiday development. Increased risk to property in adjacent Units.	Existing situation maintained. Opportunity for further development,	Loss of several holiday homes, some low grade farmland and resiting of some holiday facilities.	Reclaimed land available for development or recreation. Opportunity for further development of existing land.
Effects on natural environment	Change of backshore habitat to saltmarsh. Improved geological interest.	Geological interest gradually reduced due to loss of low tide access.	Minor loss of wetland, but improved geological interest.	Loss of geological interest.
Implications for coastal defence	New saltmarsh and remaining shingle ridge will provide main defence, but shoreline will follow max. high water contour	Increased beach management. Hard defences along full frontage, plus beach recharge.	New line of defence, reduced beach management, improved land drainage and transition defences at ends of unit required.	Major beach control structures or hard defences required. Also changes to Broad Rife outfall.
Impact on adjacent units	Increased erosion to east and west threatening property. Potential flooding to Pagham Harbour margins.	Beneficial beach supply if recharge is undertaken. Increased erosion to west if no recharge.	Reduced beach stability to east and west.	Increased erosion to west. Increased beach stability to east.

Losses due to “do-nothing” option

Existing sheet pile wall along part of the holiday development is likely to collapse within 5 years and the shorefront properties will be damaged or lost due to erosion. The rate of erosion is difficult to predict, but is likely to result in short term loss of holiday homes along the backshore and medium term loss of the holiday site offices and the leisure complex.

If not maintained continuously the existing timber groynes will become totally ineffective and the shingle beach will become more mobile. Localised erosion and breaching has occurred in the past and the threat of flooding is ever present and will increase dramatically. Future increases in water levels, wave heights and lowering of foreshore levels will result in major breaches and flooding of the hinterland. Many areas of low lying land will become unusable for farming and the holiday development will no longer be viable. The footpath from Selsey to East Wittering will be lost. Existing wet grassland habitats will revert to saltmarsh while arable farmland will become wet grasslands. Geological interest will improve due to fresh exposures of beds and fossils. Natural shingle beach will support a new habitat. Environmental gains may be useful as compensatory habitat for losses elsewhere in the region, in compliance with the Habitats Directive.

Erosion of the soft cliffs to the southeast of the Unit will result in flooding of lowlying areas due to outflanking of the shingle ridge and property damage due to outflanking of the seawall of Unit 2.

Preferred option

Economic losses and changes to the land drainage due to a do-nothing policy are not acceptable. Changes to the natural environment may be beneficial but there would be a loss of important fresh water grassland habitat. There is no existing need for land reclamation to justify the high costs of advancing the line. Maintaining the existing shoreline will become increasingly expensive, with the main benefit being maintenance of the holiday developments, where the existing fixed assets have a limited residual life in relation to the 50 year life of the SMP. Provision of an appropriate standard of defence through the existing beach management operations is not sustainable and substantial investment in hard defences would be required in the short term if the existing shoreline is to be held.

An improved standard of defence can be established by implementing a tiered defence with a recognition of the possible need for a review in the medium to long term. This approach will require construction of a substantial flood embankment landward of the existing shingle ridge, combined with improved defences along either end of the Unit and a managed realignment of the shingle ridge by ongoing beach management. The location of the flood embankment would depend on the cooperation of the landowners. Land and property seaward of the embankment would be subject to occasional flooding in the short term and gradual loss of use as the shingle ridge recedes in the future. Low lying land behind the embankment would be protected to a much higher standard than at present. Higher ground in the centre of the holiday site frontage would not need flood protection, but would suffer erosion when the existing sheet pile wall fails, providing natural feed to the sediment budget. Erosion of this higher ground would continue as the shingle ridge on either side recedes in the future. If the new defence line was built close to the existing shoreline then continued recession of the shingle ridge would lead to exposure of the embankment to wave attack in the medium to long term; a further review of options would be required at that time to determine whether to defend the embankment and the higher ground or undertake a second realignment.

Consultation within the SMP development produced strong opposition to the tiered defence option and support for holding the line through construction of substantial defences. This opposition came from the Operating Authority (Environment Agency), the Local Authority (CDC), West Sussex County Council, the adjacent Parish Councils, the owners of the caravan site and adjacent farms and from many local residents. The SMP, therefore, recommends that existing management operations are continued while detailed investigations of options are undertaken as a matter of urgency. Investigations should include prediction of shoreline recession rates under different options, detailed benefit-cost analysis, assessment of land drainage impacts, detailed definition of flood risk areas, consideration of local funding for schemes not attracting MAFF grant aid, environmental impact assessment including impact on classic intertidal geological exposures, as well as further investigations of predicted increases in wave energy and changes in sediment budget.



Schemes should be implemented within a strategic defence programme for the Selsey peninsula, Pagham Harbour and the West Wittering frontage within Chichester Harbour. A 1:50 year standard of defence is assumed appropriate.

Suggested management operations

Short term - Continue beach management operations while urgent investigations are undertaken as set out above. In view of existing risks the investigations should be completed and a strategy accepted before 1999.

Preliminary economic assessment

Losses due to "do-nothing"

- Reduction in value or loss of farmland (400ha) £1.2M
- Loss of houses and fixed assets in holiday site £10M

(Potential environmental **gains** are not included, but could be of importance in providing compensatory habitat for losses elsewhere in the region in fulfilment of obligations under the Habitats Directive.)

Cost of "hold the line"

- Rock revetment, groynes, recharge, maintenance £20-25M

Cost of "retreat the line"

- Armoured flood embankment, continued beach management, land purchase, protection of cliffs £8M
(assumes flood embankment close to existing ridge)