

## Management Unit 2: East Beach to West Beach, Selsey

### Unit limits

4400m from 487200E, 094300N to 484450E, 093100N

*This Unit also forms Unit 1 of the South Downs SMP.*

### Coastal processes

The Selsey peninsula, prior to the construction of sea defences in 1956, was one of the most rapidly eroding shorelines in the country. Protection of the cliffs at Selsey Bill from erosion has significantly reduced the supply of shingle to downdrift beaches. There now exists a low intermittent supply of shingle from nearshore banks and from further offshore by kelp rafting. The Bill forms a drift divide with shingle being transported quite rapidly northeastwards towards Pagham Harbour and more slowly northwestwards towards Bracklesham. The potential for wave induced transport exceeds the rate of natural supply and as a result beach levels have tended to deteriorate, requiring artificial nourishment to make up the deficit. The sandy lower foreshore which exists west of the Bill has also been eroding, resulting in permanent lowering of the underlying Bracklesham Clays and increasing nearshore wave energy.

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|-------------------------------|--|
| <i>Geology</i>                | <ul style="list-style-type: none"> <li>- Easily eroded Bracklesham Beds overlain by a shingle storm beach</li> <li>- Raised beach deposits (sands and gravels) forming short length of exposed cliff west of Selsey Bill</li> <li>- Nearshore deposits of gravelly sands and sandy gravels with extensive areas of exposed bed rock south of Selsey Bill across a wide, shallow shelf</li> </ul> |
| <i>Wave climate</i>           | <ul style="list-style-type: none"> <li>- Southwesterly waves dominant west of Selsey Bill (45% of time), secondary waves from the south (30% of time)</li> <li>- Southerly waves dominant east of Selsey Bill (45% of time), secondary waves from the southeast (20% of time)</li> <li>- Energy reduced by nearshore banks, but future changes may allow increased energy</li> </ul>             |
| <i>Tidal regime</i>           | <ul style="list-style-type: none"> <li>- Strong, shore parallel currents east of Selsey Bill</li> <li>- Maximum nearshore currents between 1.0 m/s and 3.0 m/s</li> <li>- Complex currents off Selsey Bill due to banks and convergence of flows</li> <li>- West of Selsey Bill maximum currents are weaker at less than 0.5 m/s</li> <li>- Residual flows converge on Selsey Bill</li> </ul>    |
| <i>Sediment transport</i>     | <ul style="list-style-type: none"> <li>- Drift divide west of Selsey Bill</li> <li>- Strong shingle transport to the northeast, east of Selsey Bill</li> <li>- Weaker shingle transport to the northwest, west of Selsey Bill</li> <li>- Limited onshore shingle transport from Kirk Arrow Bank</li> <li>- Unit has a negative sediment budget</li> </ul>  |
| <i>Possible future change</i> | <ul style="list-style-type: none"> <li>- 300mm sea level rise over 50 years</li> <li>- Increased inshore wave energy with mean direction shifting clockwise</li> <li>- Reduced potential drift to northwest, west of Selsey Bill</li> <li>- Increased potential drift to northeast, east of Selsey Bill</li> </ul>   |

**Table 2.1** *Extreme wave heights and water levels*

Probability	1:1 year	1:10 years	1:50 years
Nearshore wave height Hs (m)*	3.9 to 4.6**	4.6 to 5.5	5.0 to 6.1
Maximum water level (m OD)	2.91 to 3.03**	3.28 to 3.42**	3.43 to 3.57**

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

\*\* lower value west of Selsey Bill, higher value to east

## Existing defences

The shoreline has seawalls over the greater part of the frontage. For most of the frontage west of Selsey Bill substantial walls protect low cliffs. However, immediately west of the Bill partial protection is afforded by a gabion revetment and there is also a short stretch of unprotected shore; plans have been proposed for closing this gap in the defence. East of the Bill seawalls protect low lying land. At the eastern end of this frontage the shingle beach widens and forms the first line of defence.

The walls maintained by CDC are in good condition but private stretches of seawall to the west of Selsey Bill are in need of repair. Private defences built to seaward of the general line will always be the focus for more energy and subject to heavier damage than adjacent frontages.

Outflanking of the defences is occurring at the boundary with Unit 3 due to rapid erosion of the unprotected soft cliffs. Properties potentially affected by this erosion are considered to be within Unit 2. Minor works have been carried out to reduce the risk to houses.

The frontage is extensively groyned. East of Selsey the shingle beach is steep and the groynes are short, steeply sloping and subject to heavy wave forces due to the obliquity of wave attack. West of the Bill there are a series of long and short groynes. The long groynes are designed to stabilise the lower foreshore. Groynes at East Beach have been recently repaired. Local renourishment has been carried out to make good losses of shingle on East Beach.

## Natural environment

A short stretch of frontage northeast of Selsey Bill lies within a SSSI designated for geological interest. Shoreline management operations must comply with statutory procedures. Beach management operations should be designed to minimize the disturbance of the exposed beds.

## Land use

The area has been extensively developed for housing but includes recreational areas and extensive car parking at East Beach. Sections of privately owned seawalls to the west of the Bill have restricted access affecting both recreation and structural maintenance.

## Human environment



The area east of Selsey Bill has considerable recreational assets, particularly to the northeast of the lifeboat station where there are extensive car parking facilities, as well as a public slipway which are designated public open space. There are numerous sites of historic/archeological importance both inland and offshore. West of Selsey Bill the frontage is partly in private ownership. There is an unmanned Coast Guard Station at the western end of the Unit.

## Planning policies

Residential and industrial developments are planned for three areas. The largest of these is along East Beach south of the Life Boat Station in an area requiring continued coast protection, but not within the flood risk zone. The other areas are not affected by shoreline management.

A local authority planning initiative has been proposed to restrict residential development of property within 25m of the existing shoreline.

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

## Strategic options

**Table 2.2** *Impact matrix*

	Do nothing	Hold the line	Retreat the line	Advance the line
Effects on physical	Long term release	Continued loss of	Release of	Increased wave

environment and coastal processes	of sediment to downdrift beaches. Area will always be subject to erosion.	beach. Future increase in wave attack.	sediment to downdrift beaches. Area will always be subject to erosion.	attack. Drift patterns changed.
Effects on human environment	Loss of residential and public property. Loss of recreation and historic sites.	Existing situation maintained or improved.	Loss of residential and public property. Loss of recreation and historic sites.	Reclaimed land available for development and recreation.
Effects on natural environment	Improved geological interest.	Geology covered by structures or beach recharge.	Improved geological interest.	Loss of geological interest.
Implications for coastal defence	Increased overtopping followed by wall and groyne failure.	Improve beach and built defences.	New line of defence required, possibly including hard points with embayments.	Substantial new defences.
Impact on adjacent units	Long term beneficial increase of drift to east and west.	Recharge will benefit downdrift beaches to east and west.	Beneficial short term increase of drift to east and west.	Loss of drift will cause erosion to east and west.

### Losses due to “do-nothing” option

Lack of maintenance of the seawall and groyne system and cessation of local shingle recharge will result in the loss of the of the upper beach, followed by undermining and eventual failure of the seawalls. Deterioration of the groyne system will result in a drop in beach levels in front of the seawall localized erosion and severe local flooding due to overtopping at East Beach, prior to more extensive flooding due to wall failure in the medium term.

Loss of beach material at West Beach will cause the seawalls to be overtopped more frequently than at present, increasing the amount of damage to shorefront properties. Eventual failure of the defences will result in erosion and loss of property.

Continued outflanking of the defences at the western limit of the Unit will result in loss of property and may accelerate the failure of the main seawall.

Less tangible losses in the short and medium term include:

- reduced usage of public open space due to flooding
- reduced access and usage of the foreshore for recreational purposes
- loss of boat launching and other recreational facilities
- loss of historic sites
- loss of tourist based economy and loss of property value

### Preferred option

Economic, social and recreation losses due to do-nothing or retreat the line are not acceptable. Erosion would be ongoing as the headland comprises low lying soft geology and is exposed to severe wave attack. There is no present demand for land reclamation to justify the high costs of advancing the line. Therefore, the



preferred option is to **hold the line** by upgrading and extending the existing defences. Management operations must consider impacts on Units to east and west if drift is not maintained. A 1:150 year standard of defence is assumed appropriate.

Schemes should be implemented within a strategic defence programme for the Selsey peninsula, Pagham Harbour and the West Wittering frontage within Chichester Harbour.

This approach is in agreement with the South Downs SMP.

### **Suggested management operations**

- Short term*
- Close gap in defences immediately west of the Bill
  - Upgrade all defences to a common standard to prevent formation of weak points
  - Extend defences in west to prevent outflanking at junction with Unit 3
  - Carry out major beach recharge to prevent undermining and collapse of seawalls
  
  - Opportunistic purchase of private property along backshore zone to allow for easier maintenance and public access to the shoreline.
  - Support planning initiative to restrict additional residential development within 25m of existing shoreline.
- Medium term*
- Continue maintenance of hard defences
  - Continue beach management operations.

### **Preliminary economic assessment**

#### *Losses due to “do-nothing”*

- Medium density urban property within 50m of existing line £22M

#### *Cost of “hold the line”*

- Upgrade and extend defences, recharge beach £15M