

# BEACH MANAGEMENT PLAN REPORT

## DEAL

## 2005

BMP 23

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**Beach Management Plan Site Report 2005**  
**Unit 9A: DEAL**  
*(Sandown Castle – Oldstairs Bay)*

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## **i. Executive Overview**

The shingle beach provides a vital element of the flood and coastal erosion defences along the Deal to Kingsdown frontage. The monitoring and management of this asset is therefore crucial to the successful and sustainable delivery of flood and coastal erosion protection.

Current beach management strategies are based on the recycling of shingle, which comprises the removal of material from borrow areas and transporting it to sections of the frontage that become denuded of beach due to the net northerly transport. The effectiveness of this operation and the performance of the different beach sections are monitored through both the Strategic Regional Coastal Monitoring Programme and Dover District Council's Beach Response Management System (BRMS). By combining the output and requirements of both, this report has drawn conclusions on the performance and behaviour of the beach during this last year and also makes recommendations as to the most appropriate management requirements for the coming year.

In general the frontage is relatively stable with only two areas of beach reaching the critical 'warning' threshold. The first of these is at the narrowest section of beach along Wellington Parade (profile 4b00504). The second area of beach, where a 'warning' threshold has been triggered, is at the southern end of the Kingsdown seawall (profile 4b00520). Here the loss of material from the groyne bay has been initiated by a realignment of the beach to the south, which has been as a result of the prolonged periods of northerly wave action experienced this year.

The alignment of the beach between Kingsdown and Oldstairs bay is expected to return to its more typical orientation during the autumn and winter south and south-westerly storms. When this occurs the base of the groynes at the southern end of the Kingsdown seawall will again be covered in shingle. This will prevent further washout of material and should make beach renourishment in this area effective.

Beach recycling opportunities have been discussed in detail in Section 11, however, in summary it would appear that there is sufficient material available at the borrow area to the south of Walmer Castle to allow extraction to take place this year without causing the beach to reach 'warning' levels. Any extraction from this location will be quickly replenished as the accretion of material to the north of Kingsdown moves northwards over this autumn and winter period.

When the overall sediment budget is calculated for this frontage it is apparent that there is a net loss of approximately 25,000m<sup>3</sup> per year. Given the net drift along the frontage is from south to north, it is likely that this material is being lost onto the Environment Agency's beaches to the north of Sandown Castle. The terminal groyne at the end of the Deal beach and the set-back nature of the beaches to the north means that it is highly unlikely that any of this material will return to the Deal frontage through natural processes.

## 1. Introduction.

Unit 9A extends from Sandown Castle to Oldstairs Bay on the East Kent Coast, comprising over 6km of shingle beach. In strategic appraisal and management terms, the frontage has been divided into three operational units.

The northern most unit is *Sandown Castle to Deal Castle* frontage, which is characterised by a series of concrete sea walls of various design and age fronted by a steep narrow shingle beach with a mixture of functional and redundant timber groynes. Landward of the defences the town of Deal is located on low lying land and as a consequence of continued beach movement in the area over time, a series of flood protection measures including sea walls, groynes and beach recharge have been completed in the area. The most significant flood events witnessed in recent time have occurred in 1953, 1978, 1990 and 1996. Contemporary accretion of beach levels in the Deal area has reduced the risk of overtopping in the area.

Between *Deal Castle and Kingsdown*, the frontage is characterised by a wide shingle beach with a foreshore slope of approximately 1:20 with no formal defences. The shingle beach is stable and there has been no need, to date, to construct defences. At Walmer the shingle beach is wider and historically more stable than that at Deal. At the northern extent of this unit the hinterland is relatively low-lying and at risk of flooding, however further south the land rises up until it meets the relic chalk cliffs. Whilst the majority of development that lies along the rear of the wide shingle beach and at the foot of the cliff line is not at risk from flooding as a result of a breach or overtopping of the beach crest, some properties are affected by floodwater percolating through the open matrix of the shingle beach.

The southern most operational unit within Unit 9A extends from the boundary between Walmer and *Kingsdown to the MoD Rifle Range*. A concrete seawall and timber groyne field protect the properties at Kingsdown from erosion and flooding from wave overtopping. The beach here is more volatile and has been retreating over the last century, which in part has been exacerbated by the extraction of shingle that has taken place. At the southern end of this unit there is the small village of Oldstairs Bay and at this point the line of the chalk cliff becomes coincident with the mean high water line. Whilst the majority of the cliffs are undefended between here and Dover Harbour there is a substantial concrete seawall which has been constructed between 15m and 70m from the base of the cliff and the area landward of this wall has been infilled with shingle to create an area of reclamation. This area is owned by the Ministry of Defence and was used as a rifle range.

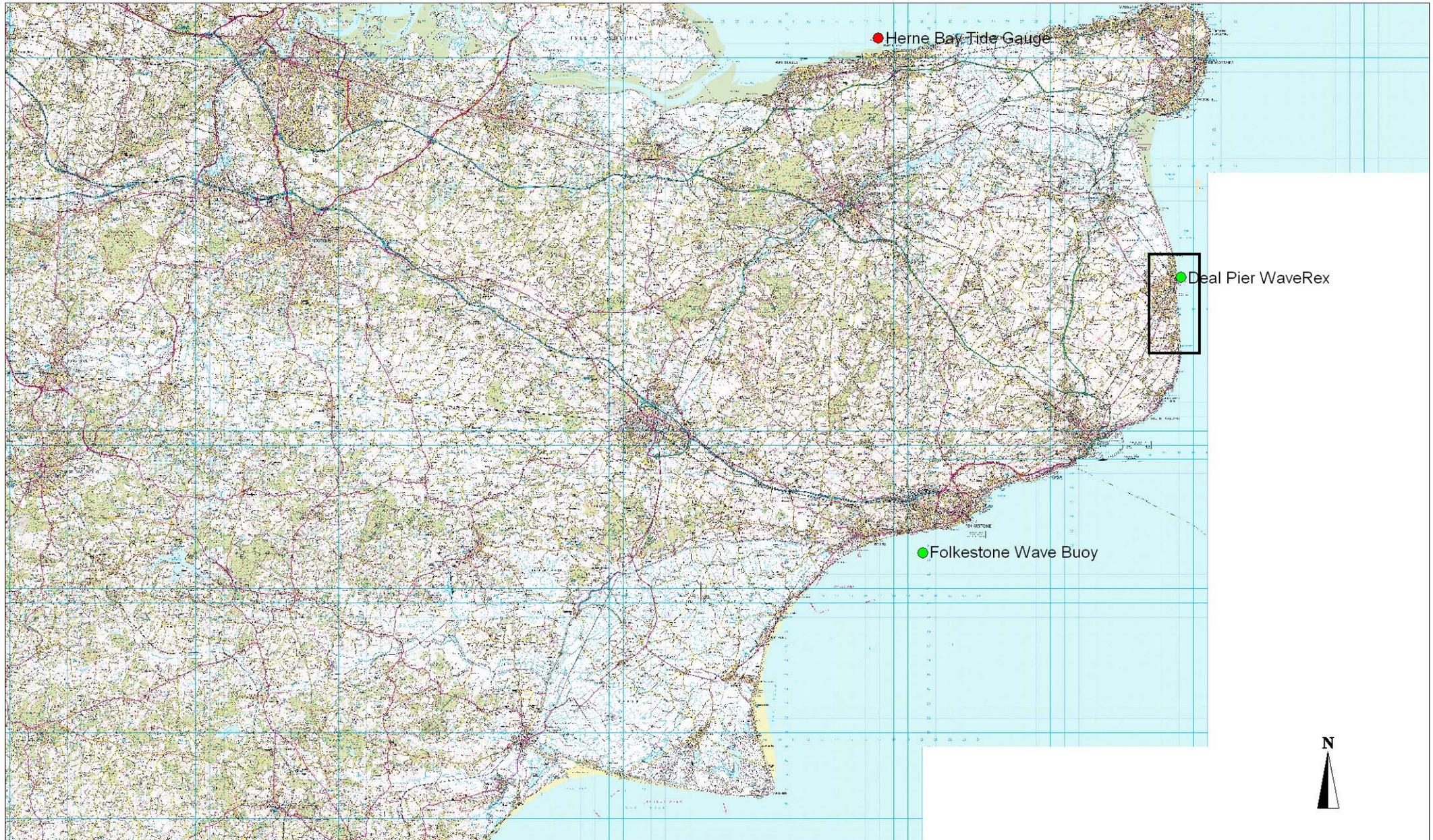
The frontage faces east and is consequently sheltered from the direct affects of the predominant south-westerly waves. However, through the affects of diffraction and refract, the inshore wave climate is still influenced by offshore waves from the south and south-west. Storms from the northern and eastern sector are generally the most damaging and waves from this direction also strongly affect beach behaviour. Offshore of the frontage the Goodwin Sands have a pronounced effect on wave propagation and this feature significantly attenuates the offshore wave climate, thus providing considerable protection to the frontage.

The net sediment drift direction along the frontage is from south to north although there is a significant secondary wave direction from the northeast, which influences littoral transport and can cause annual variations in transport volumes and even localised

reversal of the normal pattern of sediment transport.

Whilst beach monitoring and management have been carried out for some time on the three separate operational units that make up Unit 9A, the majority of the beach recycling has been carried out between the natural areas of accretion at Walmer and the depleted beaches at Kingsdown. Capital beach renourishment has also been undertaken at Kingsdown and Oldstairs Bay in the past.

The location of the frontage is shown on Figure 1.1, which includes the location of the nearest wave buoy and tide gauge.



## 2. Design Conditions

Tide Level	Tide Height (mODN)
MHWS	2.80
MHW	2.20
MHWN	1.60
MSL	0.14
MLWN	-1.30
MLW	-1.95
MLWS	-2.60

The following design conditions have been taken from the Deal to Kingsdown strategy (July 2001). Extreme wave conditions were only generated for a single location along this frontage and the results have been set out in Table 1 below along with the extreme water levels for the corresponding return period events.

No joint probability analysis has been undertaken for the frontage at this present time. However, through reference to the methodologies outlined in the recently published Technical Report 'Use of Joint Probability Methods in Flood Management – FD2308/TR1' that has been developed as part of the Defra/Environment Agency R&D Programme, an indication of the level of dependency between wave and water level events has been estimated.

This indicates that in general, there is a low correlation between wave heights from all directions and water levels. However, when wave heights and water levels are examined for the particular sector in which the dependence is significantly higher, it is suggested there is a modest correlation between waves from the north or northwest sector and water levels. Furthermore, it is also suggested that there is a strong correlation between wave heights and tidal surge conditions.

<b>Design conditions</b>				
Location	<b>1 in 10</b>	<b>1 in 25</b>	<b>1 in 50</b>	<b>1 in 100</b>
<b>Significant inshore wave height (m)</b>	2.58	2.73	2.80	2.98
<b>Water level (OD)</b>	3.68	-	4.03	4.23
<b>Joint Probability</b>	<i>There is a 'modest' correlation between wave and water level events</i>			

Table 1. Design conditions

## 3. Surveys

All topographic and bathymetric surveys are referenced to a Global Positioning System (GPS) control grid, established for this programme and conducted according to the current Environment Agency's National Specification, summarised in the Explanatory Notes. The schedule of completed surveys since the start of the Regional Monitoring Programme is given in Table 2.

Unit 9A			
Profile	Beach Plan	Post-storm	Bathymetric
01/04/1999			
14/11/2000			
23/05/2001			
01/09/2003	01/09/2003		
			14/09/2003
13/01/2004			
23/03/2004			
03/06/2004	03/06/2004		
04/08/2004			
31/03/2005			
07/06/2005	07/06/2005		

Table 2. Completed surveys

### 3.1 Topographic

Digital Terrain Models of the 2003 Baseline topographic survey are shown at Annex B Figure 3.1 with Figures 3.2 and 3.3 showing the 2004 and 2005 Beach Management Plan (BMP) surveys respectively, superimposed upon the ortho-rectified aerial photograph of 2001. The methods used for deriving Digital Terrain Models is given in the Explanatory Notes.

Hydrographic baseline surveys are shown at Figure 3.4. Contours are shown at 0.5m intervals.

### 3.2 Bathymetric

A Hydrographic baseline survey conducted in 2003/04 is represented at contour intervals of 0.5m in Figures 3.4 (Annex C). The survey extends a kilometre offshore and is scheduled to be repeated in 2006.

In general this units exhibit a steep gradient at the nearshore end followed by a steady gradient down to depths in the region of -10m ODN at a kilometre offshore (Figure 3.2-1).

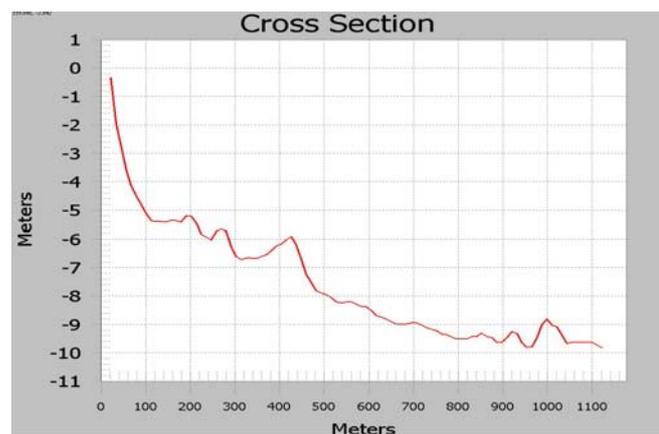


Figure 0.2-1: Example of Bathymetric data

#### 4. Difference models

Now that a sufficient data set has been compiled, it has been possible to overlay the results of the baseline survey with the successive year's data. This then enables comparative volumetric analysis to be undertaken to determine change over a given period. Through the use of three dimensional ground models and the ortho-rectified aerial photographs it has been possible to create a visual interpretation of the volumetric change that has occurred during each analysis period. This is shown in Annex C Figures 4.1 to 4.3, which indicate areas of net erosion or accretion (note that 0.25m difference in elevation is considered as "no change") and the location of any extraction/deposition sites.

Figure 4.1 is the difference model of the 2004 survey minus the baseline survey with negative values representing erosion that has occurred during that past period and positive values accretion. Figure 4.2 is the difference model of the most recent survey minus the previous year's survey and Figure 4.3 is the difference model of the most recent survey minus the baseline survey. This final figure represents the overall erosion or accretion that has taken place since the start of the programme.

Whilst these figures show an overall change in beach volume within each discrete 'area change boundary' it should be recognised that the data is based on the beach management survey, which is undertaken once each year. It is only a snapshot in time and therefore the particular dynamics of each frontage need to be considered. This will ensure that the information shown in the difference models represents the net change rather than capturing a particular extreme variation caused by a large event.

The remainder of this section of the report contains a narrative summarising the changes that have taken place over the last two years, and as part of this exercise a hypothesis of the processes driving these changes has been made. This has been carried out for a number of locations along the frontage, with the extent and nature of the change generally depicting the boundaries of each location. Also, to ensure that the results from the difference models are representative of the year's change rather than a particular event that may have been captured by the survey, the difference models have been cross referenced with the other beach profile surveys carried out each year. This then gives an indication of the beach variability over three time steps in each individual year.

Between **Sandown Castle and North Street** beach volumes have reduced steadily during both the 2003/04 and 2004/05 periods and this erosion has been fairly uniform along this section. On average some 10,000m<sup>3</sup> has been lost each year and given that the net drift direction along this frontage is from south to north, this material is likely to have moved past Sandown Castle and is not therefore expected to return.

There has been a net increase in material between **North Street and Deal Pier** although much of this accretion has been below the crest of the beach. Inspection of the profile data shows that there has been a significant reduction in the elevation and width of the beach crest. This reduction in crest elevation is, however, as a result of works carried out by Dover District Council in early 2005 to prevent shingle being thrown onto the prom/road.

Between **Deal Pier and Deal Castle** there has been a net increase in material during both the 2003/04 and 2004/05 periods. To the south of the pier the beach was relatively

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stable in 2003/04, however in 2004/05 there was some erosion between the pier and Deal Castle.

The frontage between **Deal Castle and the Walmer Lifeboat Station** was relatively stable during the 2003/04 period and has accreted during this past 2004/05 period. However, the accretion along this frontage has again been on the lower section of the beach profile, with the upper parts of the beach suffering losses. Net accretion in this area has been approximately 5,000m<sup>3</sup> over the three year appraisal period.

**South of the Walmer Lifeboat Station** there was a small amount of erosion from the upper section of the beach in front of the Downs Sailing Club in 2003/04. This net loss was more than compensated for in 2004/05 when the beach has accreted on both upper and lower sections.

The erosion and accretion pattern that has occurred all the way along the frontage from the **Walmer Lifeboat station to Walmer Castle** in the 2003/04 period has been reversed during 2004/05. When the change model figures are inspected, it can be seen that the areas that have accreted during the first period have eroded during the second and vice versa. This suggests that the material is moving along the frontage in series of waves rather than in a uniform stream. Notwithstanding this, however, when the figures for the overall period between 2003 to 2005 are examined, it can be seen that there is only a small net change since 2003. This suggests that the frontage between the Lifeboat Station and north of Walmer Castle is relatively stable at this point in time.

In front of **Walmer Castle and at the beach recycling borrow area** there has been a net erosion over the two periods, although as with the rest of the frontage, the losses have been from the upper section of the beach.

From approximately **400m south of the recycling borrow area to the north of Kingsdown** there is a significant amount of accretion shown during both the 2003/04 and 2004/05 periods. To a greater extent this is due to the capital beach renourishment that took place during the winter of 2003/04 at Kingsdown, although some of the material arriving in this location is likely to have been transported naturally from the neighbouring areas. In total, there has been an accretion of approximately 20,000m<sup>3</sup> during the 2003/05 period along this section.

During the winter of 2003/04 the beach between **Walmer and Kingsdown** received a capital renourishment of 48,365m<sup>3</sup>. 35,765m<sup>3</sup> of this material was distributed between Hawkeshill Down and the 'boat shed' opposite Jarvist Place and 12,600m<sup>3</sup> between Jarvist Place and the last groyne at the end of the Kingsdown Wall. This is evident in the 2003/04 difference model with all of the groyned bays showing signs of significant accretion. However, the results of the difference modelling for 2004/05 show that a significant volume of material has been lost from the Kingsdown seawall frontage.

When this erosion is considered in context with the nature and scale of the beach renourishment works that were carried out in the previous year, the figures are less alarming. In 2003/04 the model is showing an accretion of 15,000m<sup>3</sup> at Kingsdown, i.e. the product of the renourishment scheme. In 2004/05 the model shows a loss of approximately 7,000m<sup>3</sup>, which registers as a significant erosion. Overall there has been a net increase in beach volume of 8,000m<sup>3</sup> during the 2003/05 period.

The majority of the losses during this period can be put down to a combination of two factors. The first is the natural reduction in beach volume that occurs after a capital

renourishment scheme as a result of the fine material being washed out of the beach. The second is as a result of the groyne bays being overfilled during the renourishment works, which meant that the material was free to move over and around the groynes and hence was not retained.

The figures are also somewhat skewed by the significant losses that have taken place in the southern most bays (in front of the Zetland Arms), which has been as a result of material leaking out of the bays due to lowering beach levels to the south. The mechanism for the loss of material from these groyne bays was triggered when beach levels on the updrift side of the groynes (southern side) fell dramatically in 2004/05. This uncovered the base of the groynes and gaps in the planking, which can be seen in Figure 4.1, thus allowing material to move out of the bays.



*Plate 4.1 – Groyne at southern most end of Kingsdown beach*

The frontage between **Kingsdown and the MoD Rifle Range** was relatively stable during 2003/04 with some accretion in front of the new revetment at Oldstairs Bay. However, in 2004/05 there has been significant change. In total, there has been a net increase of 6,000m<sup>3</sup> of material during 2003/05 and this has been as a result of the material that has moved south from the Kingsdown frontage.

Whilst the net accretion in 2004/05 between the Zetland Arms and the Rifle Range has been only 2,000m<sup>3</sup>, this year has seen a considerable realignment of the beach crest of some 5 degrees anticlockwise. This change in alignment has been driven by the prolonged periods of northerly waves experienced on this frontage during this period. As a consequence of this temporary realignment, the crest of the beach in front of the Zetland Arms has retreated by approximately 10m and this has caused beach levels to fall below the base of the timber groynes in front of the Kingsdown seawall.

This realignment is expected to reverse during the autumn and winter south and south-westerly storms and when this occurs the base of the groynes at the southern end of the Kingsdown seawall will again be covered in shingle. This will prevent further washout of material and should make beach renourishment in this area effective.

*Frontage Overview*

The graph shown below in Plate 4.2 shows the volumetric change per linear metre of the frontage. From inspection of this plot it is possible to draw some rudimentary conclusions as to how the frontage is behaving as a single unit.

- Firstly, the northern end of the frontage, between Sandown Castle and North Street has been eroding at a relatively constant rate and it is likely that this material has been permanently lost to the beaches north of Deal.
- In the central section, between Deal Pier and Walmer, the frontage is relatively stable, with material moving freely along it.
- In front of Walmer Castle and the beach recycling borrow area to the south, the frontage has suffered some erosion.
- Between the beach recycling borrow area and the north of Kingsdown there has been significant accretion.
- Along the Kingsdown frontage the capital beach renourishment works have increased the beach volumes considerable, however, the majority of the capital recharge has now moved to adjacent beach sections. The exposure of the base of the southernmost groyne has resulted in significant losses from these groyne bays.
- The beach between Kingsdown and the MoD Rifle Range has accreted by about 6,000m<sup>3</sup> during the 2003/05 period, although the realignment of this frontage has resulted in erosion in the northern half.

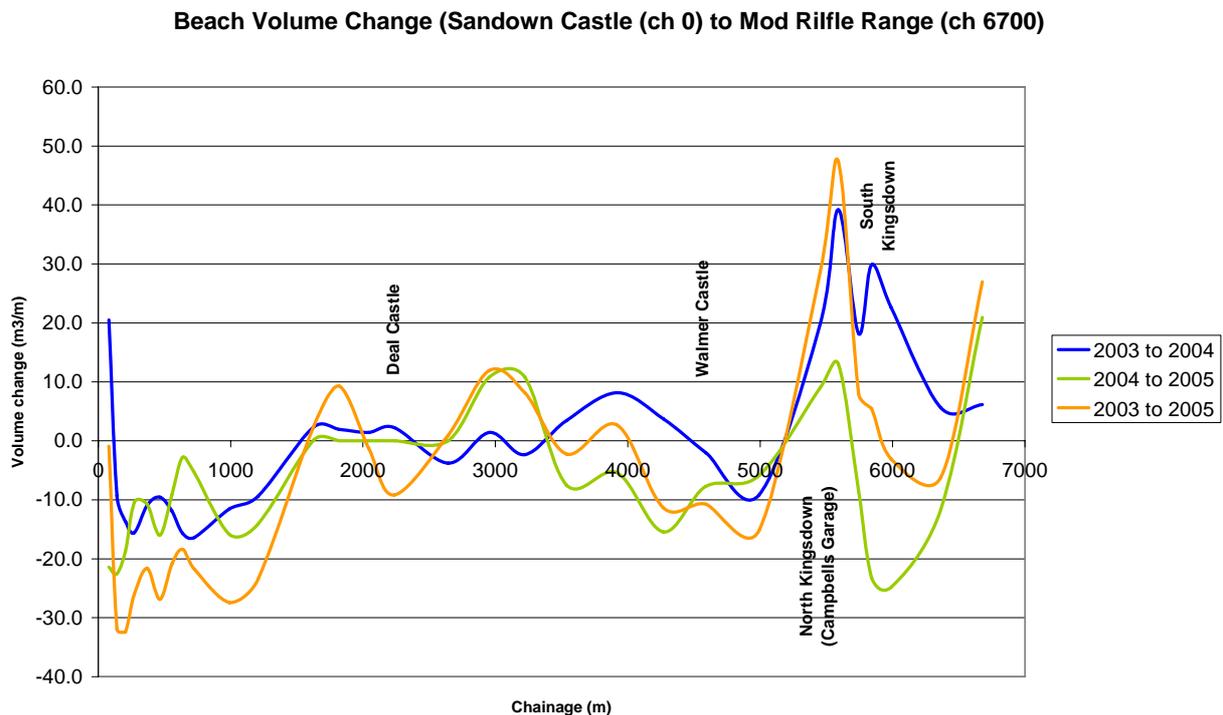


Plate 4.2 – Graph showing beach volume change per linear metre

The overall net loss/gain along this frontage is summarised below:

- 2003/04 – Net gain of 17,500m<sup>3</sup>
- 2004/05 – Net loss of 23,500m<sup>3</sup>
- 2003/05 – Net loss of 7,100m<sup>3</sup>

When considering these figures it should be noted that there was a capital beach

recharge of 48,365m<sup>3</sup> at Kingsdown in December and January 2003/04. If this is taken into account then the net gain shown for 2003/04 actually represents a net loss of 30,500m<sup>3</sup>. If the natural losses that are expected following a capital renourishment scheme are considered, then it is likely that the actual net loss from this frontage is in the region of 25,000m<sup>3</sup> per year.

## 5. Profile Change Analysis

A Cross-sectional area (CSA) has been calculated for all beach profiles. This is calculated as the area of profile above a Master Profile. Along the Deal and Kingsdown frontage, the lower boundary of the Master Profile is Mean Low Water Springs. The landward boundary, which is either the seawall or, where a hard structure is not present, the landward extent of the stable part of the beach has been adopted. The Master Profile is held constant for a given profile line and therefore the changes in CSA through time can be derived. Graphs of the individual profiles plus the Master Profile are included at Annex D and on the CD attached to this report, as are the time series of change in CSA for individual profiles.

Figure 5.1 shows the location of the profile lines, which are colour-coded to represent the change since the previous year. The method of calculation of change in CSA, can be found in the Explanatory Notes.

Whilst much of the beach behaviour has been inferred from the beach change models, which are discussed in detail in Section 4 of this report, the beach profiles also play an important part in describing the way in which the beaches along this frontage have changed. The location of each profile is shown on Figure 5.1 and as well as profile location, these figures also give an indication of the annual change in terms of actual and percentage change in cross sectional area at that location.

These changes in cross sectional area correspond with the overall erosion and accretion trends that are depicted in the beach change model figures in Section 4. However, because the profile surveys are carried out more frequently than the beach management surveys, it is possible to gain a better understanding of the beach's behaviour throughout each year. The profiles also give a more accurate representation of the cross-shore change in the beach and the following comments have been made based on inspection of the profiles.

**North Deal (Profile 4b00364 to 4b00397)** - In general the profiles along this frontage are showing a gradual reduction in beach volume and elevation over time. Between September 2003 and June 2005 the crest of the beach has dropped by approximately 1m.

**Middle Deal (Profile 4b00397 to 4b00413)** – The profiles throughout this area show that whilst the crest and upper beach have lowered in elevation, the beach below MHWS has increased.

**South Deal and Walmer (Profile 4b00413 to 4b00466)** – The upper and back beach elements of the profiles along this section appear to be very stable, with the majority of the changes taking place below 4.5mOD, i.e. in the zone of the profile affected by wave action. The only exception to this is at Profile 4b00373 where in August 2004 the crest has been flattened. Given that the location of this profile is within the commercial fishing boat plot area, it is hypothesised that this has been carried out mechanically to aid boat

launching rather than by means of wave action.

**Walmer Castle and the Beach Recycling Borrow Area (Profile 4b00466 to 4b00489)** – Again the upper crest of the beach has remained stable over the two year period with the only variations occurring between MHWS and MLWS.

**Borrow area to North Kingsdown (Profile 4b00489 to 4b00508)** - At the southern end of the borrow area Profile 4b00489 shows the upper crest moving landwards by approximately 5m during the winter of 2003/04. However, following this initial retreat there has been no further movement of the upper crest. This pattern is repeated all the way to about 400m north of Kingsdown, where at the narrowest section of beach the crest position has remained stable and there has been significant accretion over the last 2 years.

**Kingsdown (Profile 4b00508 to 4b00520)** – The profiles along the Kingsdown frontage extend back to the concrete seawall and what is evident from the seven surveys to date is that the beach profile is quite changeable. Profile 4b00520, which is at the southern end of the Kingsdown frontage shows just how variable the beach is in front of the seawall, with crest levels varying from +2.5mOD in January 2004 to +4.1mOD in June 2004 and back down again in June 2005.

**Kingsdown to the Rifle Range (Profile 4b00520 to 4b00538)** – At the northern end of this section the profiles show the crest of the beach moving progressively landward with the mean high water line and the upper crest having retreated by up to 10m. This erosion trend reverses by profile 4b00527 and becomes a trend of accretion with the crest moving seawards by approximately 10m and the increasing in elevation by around 600mm.

## 6. Wave Climate

There were no storms above the threshold during the reporting period, but the largest events were all from the south. The extended period of strong south-easterly winds, which caused extensive coastal flooding the West County in late October 2004, produced nothing significant at Folkestone, although they contributed to a 10-day period of moderate wave conditions. Accordingly, the reporting period as a whole was quieter than the previous reporting year, which experienced several storms. A detailed analysis of the wave climate for 2004/5 is given at Annex F.

## 7. Storm Event Performance

There were a number of storm events, during the reporting period, that exceeded the storm threshold, but no post storm profiles have being taken. Systems have now been put in place to allow early notification of storm threshold ascendance thus allowing early mobilisation of survey contractors to collect post storm profile data.

Whilst the wave buoy at Folkestone can alert the existence of a storm it is difficult to access which areas of the coastline will have been affected. Local frontage managers can assist in this process by notifying the lead authority of any possible 'damage' to beaches.' so that survey contractors can be mobilised and the most beneficial data collected.

## **8. Determination of Critical Beach Conditions**

As part of the ongoing management of the Deal to Kingsdown a beach monitoring programme known as the Beach Response Management System (BRMS) was introduced in 2000. The objective of the BRMS was to provide Dover District Council (DDC) with a monitoring and management system for their overall Coastal Defence Strategy.

A significant stress point is outlined within the BRMS as being on the northern end of Sandown Castle where defence outflanking is a significant issue. A second stress point coincides with the change in seawall section at the base of the Sandown Castle at the northern end of the existing groyne field (Profile 4b00364). This is significant because a lowering of beach to failure levels would influence the old wall far greater than the newer wall foundations.

Storm events can cause significant drawdown of beach levels at Deal, forming embayments and headlands in the area around Deal Pier. The standard of protection against flooding is currently moderate as beach accretion has reduced the overtopping risk over recent years. Nevertheless, damages may occur for events with return periods in excess of 1:20 years. Significant overtopping has occurred between the Royal Hotel and Horsa Road (Profile 4b00388) when beach levels are low. Another stress point has been identified in the vicinity of the seawall at north Kingsdown (Profile 4b00504), as here, a significant change in shoreline orientation is apparent.

As part of the development of the BRMS, beach critical beach locations were examined and a range of trigger levels determined for each individual profile. These trigger levels have been listed below for a range of locations along the frontage.

BRMS ref. no	Location	Closest profile	Critical threshold	Actual beach dimension/level
G1	North of Sandown Castle	Not in this beach management frontage	n/a	n/a
G2	Sandown Castle	Not in this beach management frontage	n/a	n/a
G3	1 <sup>st</sup> groyne bay south of Sandown Castle	4b00364	Warning level <3.5mOD Failure level <1.7mOD	4.2mOD
G4	Between groynes 15 & 16	4b000379	Warning level <3.7mOD Failure level <1.8mOD	4.1mOD
G5	Most southerly groyne	4b00397	Warning level <3.6mOD Failure level <1.6mOD	5.5mOD
G6	100m south of pier	4b00410	Warning level <3.9mOD Failure level <1.9mOD	5.4mOD
G7	Deal Castle	4b00421	Warning crest width <10m Failure crest width <5m	21m
G8	Downs Sailing Club	4b00444	Warning crest width <30m Failure crest width <10m	52m
G9	Sign post on Wellington Parade	4b00466	Warning crest width <30m Failure crest width <10m	55m
G10	Channel View – Wellington Parade	4b00489	Warning crest width <40m Failure crest width <10m	71m
G11	Beach Crest – Wellington Parade	4b00504	Warning crest width <25m Failure crest width <10m	<b>17m [below warning level!]</b>
G12	Last groyne bay north of Kingsdown	4b00508	Warning level <3.0mOD Failure level <1.2mOD	4.5mOD
G13	Public Slipway	4b00520	Warning level <3.2mOD Failure level <1.4mOD	<b>2.7mOD [below warning level!]</b>
G14	SSSI signpost on Undercliffe Rd	4b00527	Warning crest width <40m Failure crest width <10m	72m
G15	Marker superseded by new scheme			

## 9. Special Site Conditions

There are a number of statutory and non-statutory designations relevant to this beach management frontage.

### *Dover to Kingsdown Cliffs Site of Special Scientific Interest*

The coastline from Dover Harbour to Kingsdown is designated as a SSSI under Section 28 of the Wildlife and Countryside Act 1981. The SSSI covers approximately 299.9 hectares.

The coastline is of extreme importance geologically and for its varied floral and faunal communities that include many rare species. Areas outlined in the SSSI designation include the broad shingle plateau near Kingsdown. The extent and composition of plant species present in the area are influenced by the stability of the shingle. Typical species include Sea Sandwort (*Honkenya peploides*) and the rare Sea Pea (*Lathyrus japonicus*). More secure, stable shingles inland support a sward of Sheep's Fescue together with colonies of the Early Spider Orchid. Also of note is a prostrate oak tree (*Quercus robur*) which has branches radiating from its root base.

#### *Kingsdown and Walmer Site of Nature Conservation Interest*

This site has been identified by the Kent Trust for Nature Conservation and is not a statutory designated site. The site consists of a 2km long stretch of the shingle beach backed by rough grassland. The site shows a succession of plants from unconsolidated shingle characterised by pioneer species to a rich community of lichens and bryophytes on consolidated shingle. The consolidated shingle in particular is characterised by a number of unusual plants including the Sea Pea (*Lathyrus japonicus*), Sea Kale (*Crambe maritima*) and a number of ragwort species.

## **10. Recycling Operations**

Potential recycling sites are identified on Figure 10.1

The last capital renourishment scheme was carried out between December 2003 and January 2004 along the Kingsdown frontage. At the same time improvement works were undertaken to the beach recycling borrow area opposite the Walmer Castle, which included constructing a compound area and a concrete access road to the beach crest.

Dover District Council's current coastal defence strategy plan identifies the need to continue recycling material along this frontage to maintain beach levels at Kingsdown.

#### *Beach Management Recommendations*

There are two areas of significant accretion that could be used as borrow locations for any beach recycling works in this coming year. The first is at Oldstairs Bay which has gained approximately 8,400m<sup>3</sup> during the 2003/05 period. However, the material that has accreted here is as a result of a slight realignment of the beach crest between Kingsdown and Oldstairs Bay and the excess material at the southern end of this frontage is likely to move north again this coming year, therefore providing benefit to the Kingsdown frontage. Removal of material from this frontage is therefore likely to have a detrimental effect in the short to medium term.

The second area that has accreted significantly is section between Kingsdown and Cecil Road where close to 20,000m<sup>3</sup> of shingle has accumulated since 2003. However, given that some of this material is accreting in an area where the beach crest is relatively narrow, it would be prudent to take material only from the wider parts of the beach.

Alternatively, material could be extracted from the established beach recycling borrow area, which is only 400m to the north. This could be done in the knowledge that the material that has accreted to the south will, through natural processes, move northwards and replenish the material extracted from the borrow area.



## 11. Conclusions

Overall the frontage is relatively stable with only two areas of beach reaching the critical 'warning' threshold. The first of these is at the narrowest section of beach along Wellington Parade (profile 4b00504). The width of the beach at the crest line has remained stable for the past two years, suggesting that the erosion of the beach crest was caused by a large single event rather than a steady erosion process. The profile data also shows that this section has accreted quite significantly below the level of the storm crest, therefore whilst the warning threshold has been exceeded, the beach condition in this location has not deteriorated and has begun to improve again.

The second area of beach where a 'warning' threshold has been triggered is at the southern end of the Kingsdown seawall (profile 4b00520). Here the groyne bay is almost empty and this rapid loss of material has been initiated by the realignment of the beach to the south. This has caused beach levels to fall below the base of the timber groyne, therefore allowing shingle to move freely out of the groyne bay.

Beach recycling opportunities have been discussed in detail in Section 11, however, in summary it would appear that there is sufficient material available at the borrow area to the south of Walmer Castle to allow extraction to take place this year without causing the beach to reach 'warning' levels. There is also a significant volume of material that has accreted to the north of Kingsdown, largely as a result of the capital recharge in 2003/04. It is likely that this will move northwards towards the borrow area during this coming year, therefore replenishing the borrow area.

When the volume of material placed onto the frontage as part of the capital renourishment scheme in 2003/04 is taken into account, the frontage between Sandown Castle and the MoD Rifle Range is losing approximately 25,000m<sup>3</sup> per year. Given the net drift along the frontage is from south to north, it is likely that this material is being lost onto the Environment Agency's beaches to the north of Sandown Castle. The terminal groyne at the end of the Deal beach and the set-back nature of the beaches to the north means that it is highly unlikely that any of this material will return to the Deal frontage through natural processes