South East Strategic Regional Coastal Monitoring Programme

BEACH MANAGEMENT PLAN REPORT

Bulverhythe

2008

BMP 71

April 2010

SOUTH EAST COASTAL GROUP
MANAGING THE SHORELINE

Canterbury City Council
Strategic Monitoring
Military Road
Canterbury
Kent
CT1 1YW

Tel: 01227 862401
Fax: 01227 784013
e-mail: Strategic.Monitoring@canterbury.gov.uk
Web Site: www.se-coastalgroup.org.uk
www.channelcoast.org

Document Title:	**Beach Management Plan Site Report 2008**
Reference:	**BMP 71**
Status:	**Draft**
Date:	**February 2009**
Project Name:	**Strategic Regional Coastal Monitoring**
Management Units:	**MU 25: Bulverhythe**
Author:	S. Scargill
Checked By	T. Mason
Approved By:	M. Mills

Issue	Revision	Description	Authorised
01	-	Draft Report for Consultation	M. Mills
02	01	Final Report	M. Mills

Report Log

Report Type	MU26 (Bexhill)	This Unit (MU25)	MU24 (Hastings)
Annual Report 2004	Dover Harbour to Beachy Head Annual Report – AR08		
BMP 2005	**BMP15**		BMP16
Annual Report 2006	Dover Harbour to Beachy Head Annual Report – AR19		
BMP 2006	**BMP34**		BMP35
Annual Report 2007	Dover Harbour to Beachy Head Annual Report – AR31		
BMP 2007	BMP51	**BMP52**	BMP53
Annual Report 2008	Dover Harbour to Beachy Head Annual Report – AR41		
BMP 2008	BMP70	**BMP71**	BMP72

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Summary

Shingle beaches provide a vital element of the flood and coastal erosion defences along the Bulverhythe frontage. The monitoring and management of this asset is therefore crucial to the successful and sustainable delivery of flood and coastal erosion protection.

The condition and performance of different beach sections are currently monitored through the Strategic Regional Coastal Monitoring Programme. This report evaluates changes along the coastline over between the BMP survey in June 2007 to the BMP survey in August 2008. The key findings are listed below:

- A net loss of 16,473m^3 was observed along the Bulverhythe frontage over the report period (June 2007 to August 2008)
- The area between Cliftonville Way and Cinque Ports Way (Section 25.5) is the most erosive area with loses of 17,116m^3 over the last year.
- The areas Galley Hill to Ravenside Retail Park and Cliftonville Way to Cinque Ports Way (Sections 25.1 & 25.5) show the highest rates of erosion, with a combined loss of 22,594m^3 over the reporting period. This is a reversal of the net gain of 25,315m^3 over the reporting period 2006-2007.
- The influx of material from MU26 into MU25 is likely to continue, although the distribution of material within the management unit is likely to remain uneven. It appears that new material is trapped in some areas by the new rock groynes, but some areas appear to still lose significant amounts of sediment
- Overall crest levels are generally acceptable but lack of significant berm width in places could become an issue.
- There were five storm events during the reporting period that exceeded the storm threshold of 3m. Although no post storm surveys were carried out during this reporting period, analysis of the spring 2008 profiles does show significant depletion of material across the beach face and at the crest.

Following the Bulverhythe Sea Defences Project the baseline for the Bulverhythe area has been reset. The new structure layout has altered the littoral transport regime; with this in mind trends will not necessarily be recognised or predicted until a more substantial dataset is collected over a longer period due to inconsistency in short-term trends.

It is important to recognise the potential inconsistency in short-term trends. As with many coastal areas a lot of annual variability is expected. Thus, drawing conclusions with increased confidence will become possible as more data is collected, with regard to annual losses, net sediment drift and erosion/accretion trends in section sub-units.

Scheduled future monitoring includes profile surveys in Autumn 2008 and Spring 2009, and in addition post-storm surveys may be carried out if any event is deemed to have significantly affected the frontage. An interim report will be issued on completion of the spring profile survey, with the next BMP report scheduled to be issued after completion of the Summer 2009 beach plan survey. All historic monitoring data is accessible online (www.channelcoast.org), and future surveys will be available after satisfying quality assurance procedures.

1.0 Introduction

As part of the Strategic Regional Coastal Monitoring Project, the section of coastline in Management Unit (MU) 25 is surveyed three times a year with land based GPS techniques. These comprise biannual profile surveys and an annual beach plan survey, full details of which can be found in the explanatory notes (Annex A). In addition to this bathymetric surveys of the adjacent seabed were conducted in 2003 and 2006. The location of the frontage is shown in Figure 1.1, along with the location of tide and wave gauges in the southeast region.

Data leading up to the Bulverhythe Sea Defences scheme is available from the summer of 2003.

In 2006 the Bulverhythe Sea Defences project was completed for the Environment Agency. The project consisted of:

- The removal of 36 ineffective and dilapidated timber groynes;
- The construction of 9 rock groynes and 700m of rock revetment;
- A capital recharge of 94,500m^3.

Due to the extensive nature of changes to the beach, the management unit boundaries were modified in 2007. MU25 now covers what was the eastern end of MU6 (BMP34, 2006) and the western end of MU7 (BMP35, 2006). This report covers the changes in beach topography between the summer 2007 BMP survey and the most recent 2008 BMP survey.

Bulverhythe frontage is managed by the Environment Agency who maintains the frontage as a ‘hold the line’ policy in line with the recommendations of the Shoreline Management Plan, in order to protect the rail/road infrastructure and settlements.

1.1 Management Unit 25: Bulverhythe

MU25 (Bulverhythe) consists of 2.5km of shingle beach situated in East Sussex between **Galley Hill**, Bexhill, and **Cinque Ports Way**, Hastings (Figure 1.1). The coastline at this location is generally well developed, with 80 commercial properties, over 700 residential properties, major transport infrastructure; including the A259, and the Brighton to Hastings railway line all proximal to the coast. This stretch of coastline is covered by the Beachy Head to South Foreland Shoreline Management Plan (SMP) and the Cooden to Cliff End Coastal Defence Strategy (CDS).

The study area includes sites of cultural importance, in particular the wreck of the *Amsterdam* (1749), which is designated and protected under the Protection of Wrecks Act, 1973, and a pre-historic submerged forest. Bulverhythe Shingle Beach and the Cliffs have also been designated a site of local importance to nature conservation (SNCI) in respect of coastal flora and the study area includes the Coombe Haven Site of Special Scientific Interest (SSSI).

At a regional scale, the coastal landscape comprises moderately resistant chalk cliffs at Beachy Head, low-lying shingle and alluvial areas at Pevensey and Hooe Levels (both west of MU25), as well as heavily faulted Cretaceous Ashdown Sands and Fairlight/Wadhurst Clay cliffs from the outskirts of Bexhill through to Cliff End. Over the past century the tendency has been for cliff line recession, with particular events occurring primarily where the less durable Fairlight Clay is present. The Coombe Haven inlet was blocked by drifting shingle in the 16th and 17th Century, but since then the frontage has receded. The Bulverhythe frontage has been characterised by erosion trends since 1872, some of which may be due to large quantities of ballast that were historically removed from the beach for industrial purposes.

Offshore wave data (Babtie Dobbie and HR Wallingford, 1991) shows that the majority of waves and storms originate from the southwest, thereby resulting in a west to east transportation of sediment along the frontage. Modelling has confirmed that there are high potential sediment transport rates along this section of the frontage (South Foreland to Beachy Head SMP, 1996), which suggests that this stretch of the coastline is vulnerable to erosion (Halcrow, 2000).

However, there is a comparative lack of contemporary sediment input to this frontage, which has resulted in the diminishing stock of available foreshore sediments. Updrift developments are responsible for the interruption of sediment, despite recharge schemes; the shingle beach at Bulverhythe has suffered an overall loss of material since 1973.

1.2 Defence and management

Anthropogenic constraints have greatly influenced coastal evolution in this area. The first groyne system is evident on the 1875 edition of the Ordnance Survey maps, and since their construction this section of the coastline has remained reasonably stable (Halcrow, 2000). Frontages between Bexhill and Hastings are heavily managed, with defences holding the plan position of the shoreline.

Records as far back as 1845 describe coastal erosion along the frontage, this lead to the construction of a timber palisade wall to protect the railway. In the 1940s, concrete blocks were installed to prevent invasion during the war, serving a secondary sea defence purpose at the same time.

British Rail maintained the timber groynes until the 1960s when a dispute over defence responsibilities led to a period of inactivity prior to the current Environment Agency maintenance activities commencing in the mid 1970's. Post-1974, no less than twelve separate schemes or beach management measures, at various locations, have been implemented to address the problems of foreshore lowering, damage to timber groynes, shingle loss and the threat of breach along the frontage.

Since then, groynes have formed the primary sea defence along this section, whilst rock structures provide defence to vulnerable sections of cliffline. Protection to the residential area is provided by a shingle ridge, which is held in place by a series of timber groynes fronting a 420m timber sleeper wall. This affords protection to the Brighton to Hastings railway line and 358 ha of low-lying land, providing a standard of protection against breach of 1in 5.

The Shoreline Management Plan devised in April 2006 outlines the preferred management options for the section of coastline at Bulverhythe. In the short term protection is to be continued for the shoreline and low-lying hinterland, achieved by maintaining and upgrading existing defences, with a Hold The Line policy. This has been put into action, and the medium term policy of a continuation of the Hold The Line response, with the construction and upgrading of defences providing necessary flood and coastal defences, is now in place. The long term policy is to protect socio-economic and environmental assets by continuing to Hold The Line, and continuing to maintain defences which have been implemented. This maintenance may include more frequent and large-scale actions, and may be amended as beaches become more difficult to retain.

The option to maintain the existing defence alignment and provide a sustained 1 in 200 year standard of protection has involved heavy engineering completed in 2007. The scheme has been developed to take account of shingle feed onto the frontage from Bexhill, and permitting continued drift into MU24. This included replacing 18 groynes with a 700m long rock revetment fronting the existing timber sleeper wall; replacing 8 timber groynes west of Little Galley Hill with 4 rock groynes; replacing 10 timber groynes east of the revetment with 5 rock groynes; and 22,000m^3 shingle recharge. This option promotes a section of open beach in front of the rock revetment structure reducing the need for annual shingle replenishment. Coupled with annual recharge of around 9,500m^3 (to address ongoing losses), this is proving to be successful in maintaining the new defence standard, which will be sustained throughout the 100-year appraisal period.

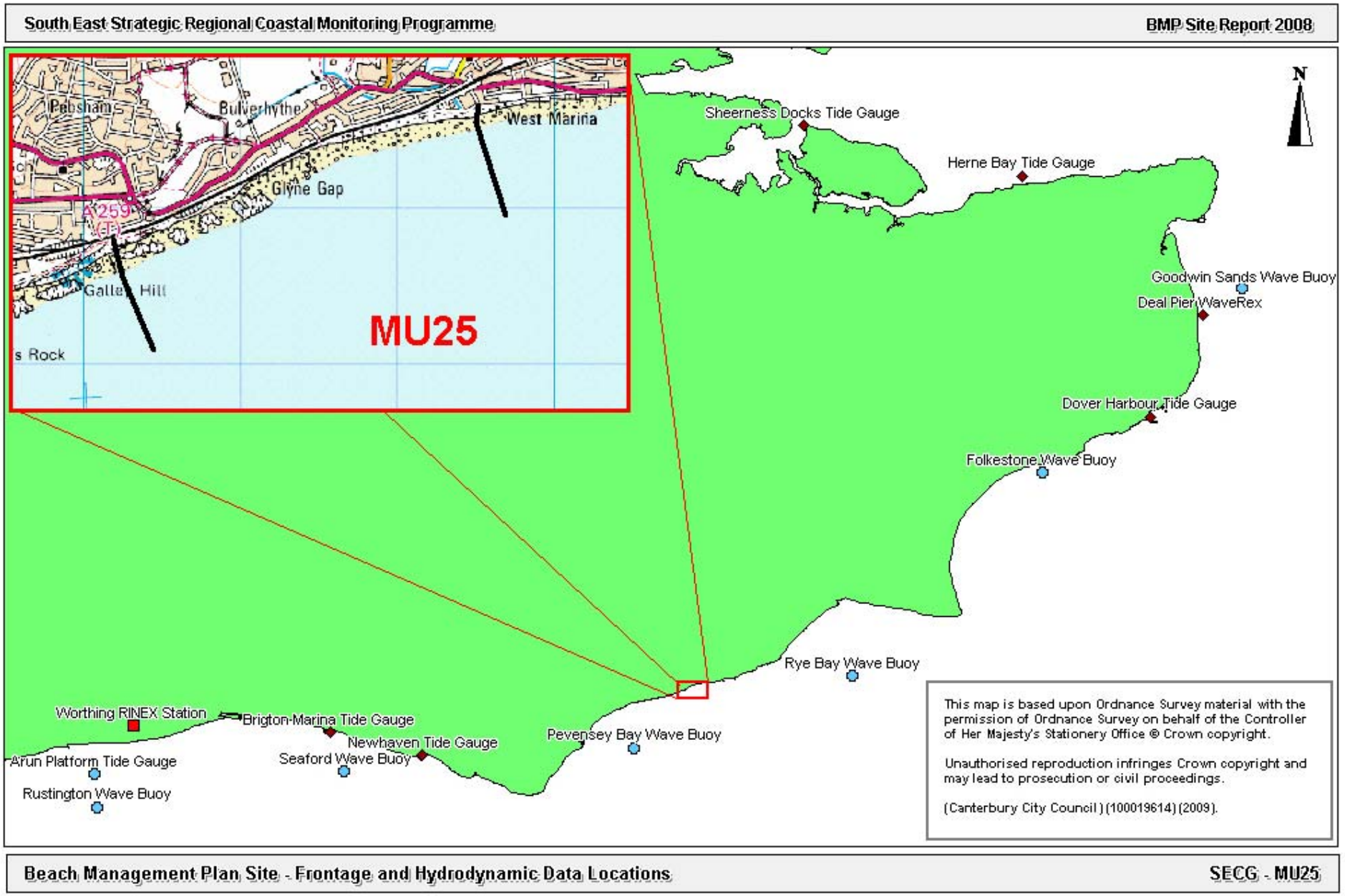


Figure 1.1: Site Location and Wave/Tide Gauges

2.0 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 (Annex A).

2.1 Topographic

The schedule of completed surveys since the start of the Regional Monitoring Programme is given in Table 2.1. Digital Ground Models of the 2007 Beach Management Plan topographic survey are shown in Annex B**,** superimposed upon the ortho-rectified aerial photographs of 2005. The method used for deriving Digital Ground Models is given in the Explanatory Notes (Annex A).

Table 2.1: Schedule of Topographic Surveys

Management Unit 25		
Profile	**Beach Plan**	**Post-storm**
14/09/2003*****	14/09/2003*****	
27/09/2003**^**	27/09/2003**^**	
24/10/2003*****		
26/10/2003**^**		
20/03/2004*****		
25/03/2004**^**		
27/09/2004*****	27/09/2004*****	
30/09/2004**^**	30/09/2004**^**	
25/04/2005**^**		
26/04/2005*****		
20/06/2005*****	20/06/2005*****	
22/07/2005**^**	22/07/2005**^**	
20/10/2005*****		
15/10/2005**^**		
		11/11/2005 *****
		13/11/2005**^**
		08/12/2005**^**
01/02/2006***P***	01/02/2006***P***	
02/02/2006**^*P***	02/02/2006**^*P***	
26/04/2006***L&B***		
27/04/2006**^*L&B***		
06/06/2006*****	06/06/2006*****	
26/06/2006**^**	26/06/2006**^**	
07/09/2006***L&B***		
08/09/2006**^*L&B***		
		09/12/2006*****
		10/12/2006**^**
19/03/2007*****		
20/03/2007**^**		
30/06/2007	30/06/2007	
26/09/2007		
05/02/2008		
		24/03/2008
03/08/2008	03/08/2008	

** Surveyed as part of Phase I MU6* *^ Surveyed as part of Phase I MU7*

P - *Post works survey conducted at Bulverhythe only*

L&B - *Additional Longdin & Browning intermediate survey*

2.2 Bathymetric

The schedule of surveys since the start of the Regional Monitoring Programme is given in Table 2.2.

Table 2.2: Schedule of Bathymetric Surveys

Management Unit 25		
Date	**Line Spacing**	**Distance Offshore**
19/09/2003 (MU6)	50m	1,000m
14/09/2003 (MU7)	50m	1,000m
06/05/2006 (MU6)	50m	1,000m
08/05/2006 (MU7)	50m	1,000m

3.0 Analysis

3.1 Difference Models

Now that the 2008 BMP data set has been compiled, it is possible to overlay the results of the survey with BMP data from 2007. This enables comparative volumetric analysis to be undertaken to determine change over a given period. Through the use of three-dimensional ground models and ortho-rectified aerial photography, it is possible to create a visual interpretation of the volumetric change that has occurred during each analysis period. This is shown in Plate 1 (1-7), which indicates areas of net erosion or accretion (N.B. a 0.25m difference in elevation is considered as “no change”) and the location of any extraction/deposition sites.

Negative values represent erosion that has occurred between 2007 & 2008, and positive values indicate accretion. Whilst these figures show an overall change in beach volume within each discrete section, it should be recognised that the data is based on the BMP survey, which is undertaken once each year. It is therefore only a snapshot of one moment in time, and the particular dynamics of each frontage need to be taken into account. This ensures that the information shown in the difference models represents the net change rather than capturing a particular extreme variation caused by a large event.

3.2 Profile Evolution

While beach plan surveys provide a more accurate view of morphological change and beach volume levels, profiles clearly illustrate the changes in beach cross section. In addition, the 2008 BMP survey beach profiles have been cross-referenced with the other profile surveys carried out over the past year in order to ensure that the results from the difference models are representative of net profile change. This then gives an indication of the beach variability over three time steps in each individual year.

The Cross-Sectional Area (CSA) has been calculated for all beach profiles. This is calculated as the area of profile above a Master Profile (MP). In general, the lower boundary of the MP is the transition between the beach face and the foreshore (i.e. the beach toe). The landward boundary is either the seawall or, where a hard structure is not present, the landward extent of the stable part of the beach. The Master Profile is held constant for a given profile line and therefore the changes in CSA through time can be derived.

3.3 Management Unit 25

To aid purposeful analysis the unit has been split into five sections as depicted in Figure 3.1. These reflect changes in beach configuration and/or the presence of terminal structures. Table 3.1 provides a summary of volume change within each section during the period between the 2006 and 2008 summer surveys.

Table 3.1: MU25 - Summary of Erosion/Accretion Totals

Cells	Area (m^2)	Error Estimate* (m^3)	Erosion/Accretion (2006 to 2007) (m^3)	Erosion/Accretion (2007 to 2008) (m^3)
1 – 2	*23,136m^3*	*+/- 695*	4,572	**-5,478**
3 – 6	*39,487m^3*	*+/- 1,185*	10,074	**2,781**
7 – 8	*24,698m^3*	*+/- 741*	-8,080	**8,488**
9 – 16	*35,599m^3*	*+/- 1,068*	-24,208	**-5,141**
17 – 21	*55,280m^3*	*+/- 1,658*	20,743	**-17,116**
Net			3,103	**-16,473**

** Error estimates are calculated as the survey area multiplied by a ± 30mm error margin, although unlikely the error of combined surveys can be up to double this figure*

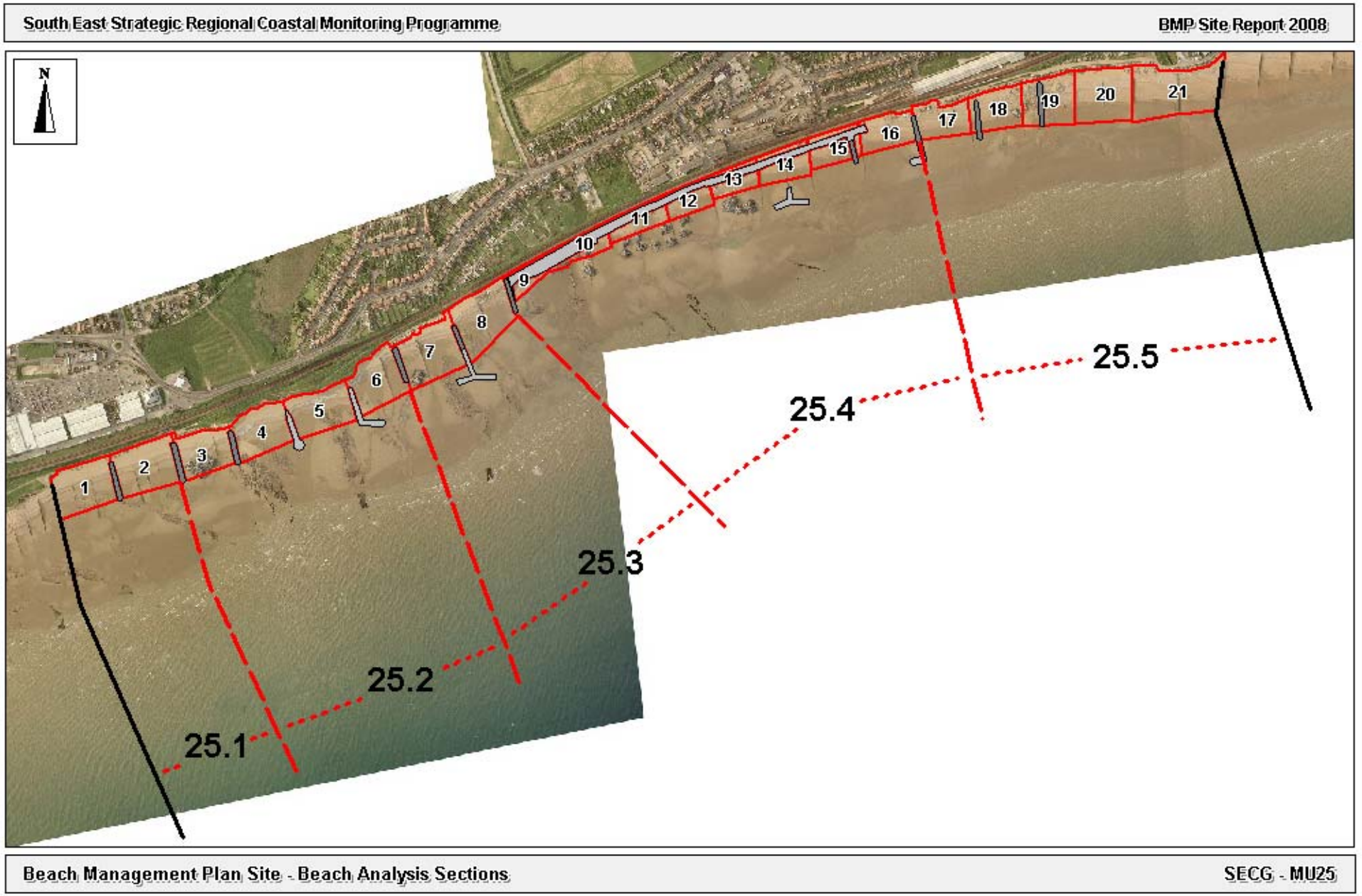
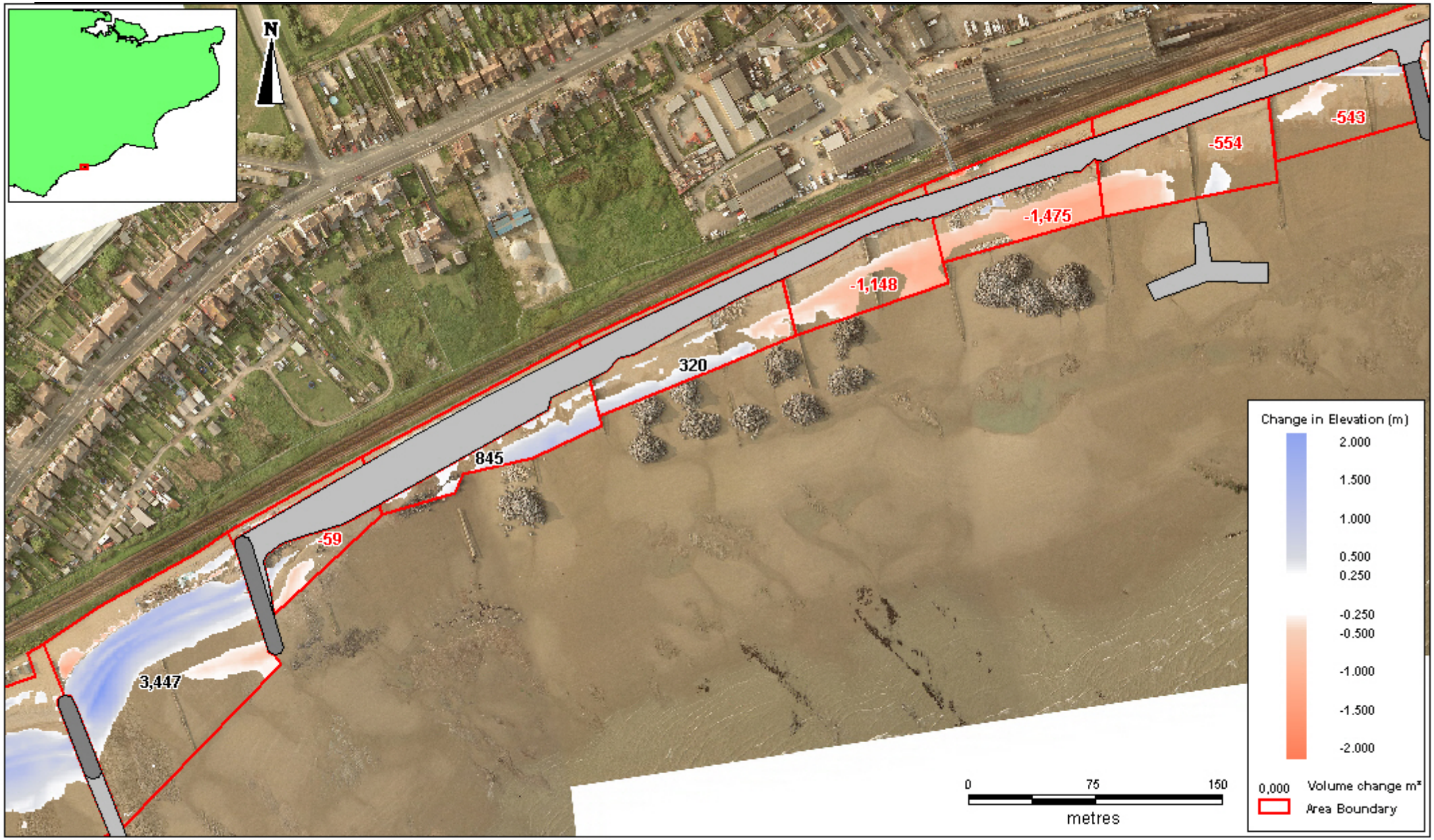


Figure 3.1: MU25 Beach analysis sections


N
5,034
3,032
2,974
-1,849
-1,376
-1,045
-4,433
Change in Elevation (m)
2.000
1.500
1.000
0.500
0.250
-0.250
-0.500
-1.000
-1.500
-2.000
0,000
Volume change m³
Area Boundary
0
75
150
metres


N
-543
-554
-1,475
-1,148
320
845
-59
3,447
Change in Elevation (m)
2.000
1.500
1.000
0.500
0.250
-0.250
-0.500
-1.000
-1.500
-2.000
0,000 Volume change m³
Area Boundary
0
75
150
metres


N
-2,527
-2,080
-2,231
-2,305
-3,942
-6,558
543
Change in Elevation (m)
2.000
1.500
1.000
0.500
0.250
-0.250
-0.500
-1.000
-1.500
-2.000
0,000 Volume change m³
Area Boundary
0
75
150
metres

This unit contains 58 profiles that are surveyed in conjunction with the annual beach plan survey. Of these, 21 are designated profiles that are re-surveyed twice a year in spring and autumn and in the aftermath of major storm events. In addition, because of the vulnerability of the site, and in order to assess the effectiveness of the scheme, full beach plan surveys (including intermediate and designated profiles) are carried out in the spring and autumn as well as the summer.

3.3.1 Section 25.1 (4c01523 – 4c01517)

Section 25.1 displays a net loss in material for the reporting period 2007-2008, with a total loss in material of 5,478m³. Both cells within this section show a loss in material, with one experiencing a greater loss than the other. Materials eroded have most likely been transported in the prevailing easterly drift, which occurs at this coastline.

Cell 1 is characterised by erosion, with a total loss of 4,433m³. This material has been lost from the entire beach face, which has consequently dropped by up to 1.5m in elevation, as shown by Profile 4c01523 (Figure 3.2). Cell 2 has also experienced erosion (-1,045m³), especially along the beach crest. Losses have also occurred at the beach toe towards the western extent of this cell. There has been a small area of accretion behind the beach crest, and in the west of the cell.

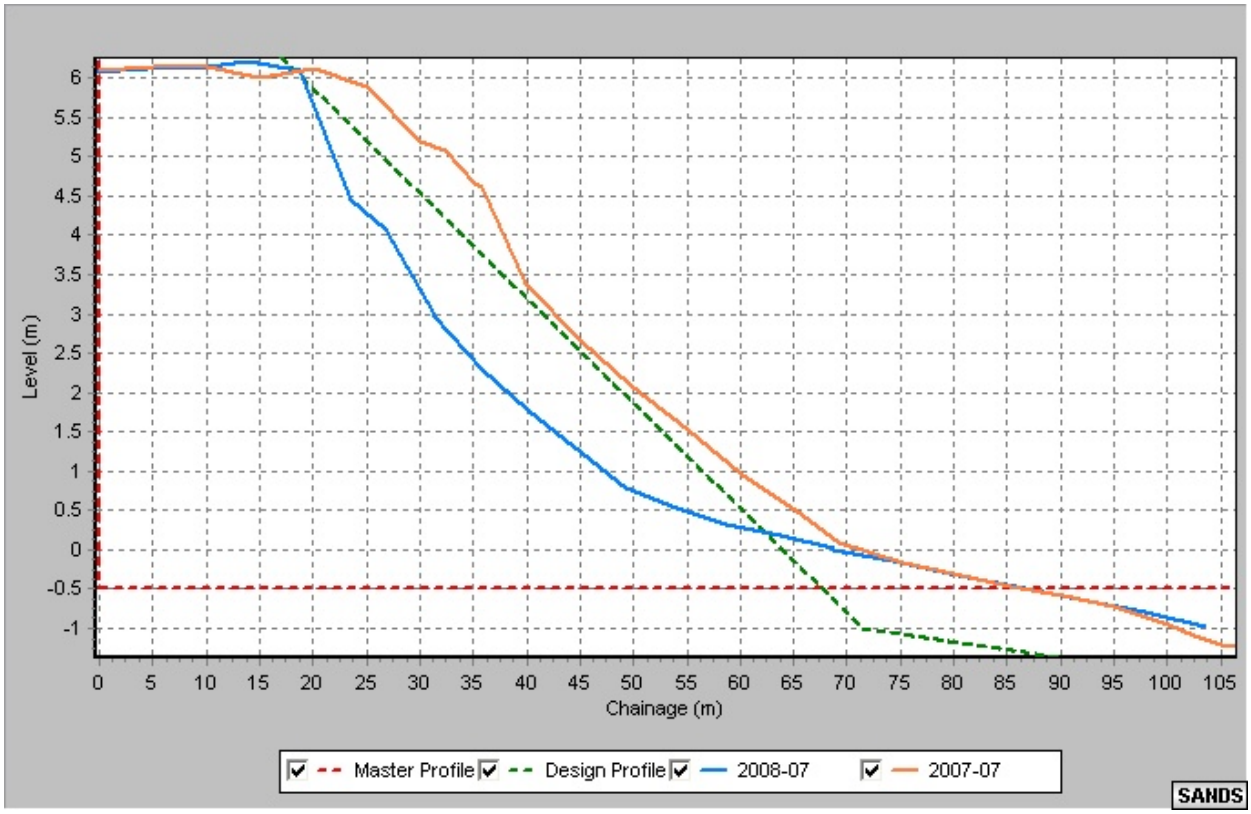


Figure 3.2; Profile 4c01523

3.3.2 Section 25.2 (4c01516A – 4c01504A)

Comprising 480m of beach divided by rock groynes and backed by a rock revetment, this area gained 2,781m^3 in the reporting period 2007-08. The accretion occurred in the eastern cells of the section (Cells 5 & 6), with erosion prevailing in the western end of the section (Cells 3 & 4).

Cells 3 and 4 show a similar pattern to each other, both displaying a loss in sediment, which is focused at the beach berm, with the area of erosion encroaching upon the beach toe towards the eastern extents of the cells. There has also been marked linear deposition of material at the top of the beach, the result of cross-shore berm translation. This pattern of erosion is expected to be a result of the predominant wave direction, and the relative shelter afforded to parts of the beach by the rock groynes present. The amount of material lost within Cells 3 and 4 was 1,376m³ and 1,849m³ respectively.

Conversely, Cells 5 and 6 are characterised by accretion over the past reporting period (2,974m³ and 3,032m³ respectively). These gains cover a high proportion of the beach face, with only small areas of the beach crest exhibiting no significant change. Therefore, it would appear that in this section, the rock groynes are having the desired effect on the dynamics of this section of coastline.

3.3.3 Section 25.3 (4c01503A – 4c01498)

This section of coastline covers Cells 7 & 8, which over the past reporting period have shown a change in beach sediment dynamics. In 2006-07 there was a combined loss for this section of 8,080m³, whereas in 2007-08 there was an increase in sediment of 8,488m³. The majority of gains are found along the beach crest and upper beach face, in a similar pattern to Cells 5 & 6. the accretion in this section is most likely to have been caused by recharge works, but will also benefit from material lost from the eastern end of the MU26 Bexhill frontage, or additional material from foreshore and offshore sources.

The eastern end of the section (Cell 8) shows a small amount of loss, along the beach crest. This may be because the post recharge scheme profile is very steep in places, and the profile has now evolved to a more stable and consistent slope with a slope ratio closer to that of the design profile.

Figure 3.3 shows Profile *4c01500*, located at the western end of Cell 8. This profile illustrates the erosion that has occurred at the top of the beach (up to 18m chainage), as well as the significant accretion that occurred on the foreshore, advancing the profile up to 2m seaward (20m - 60m chainage).

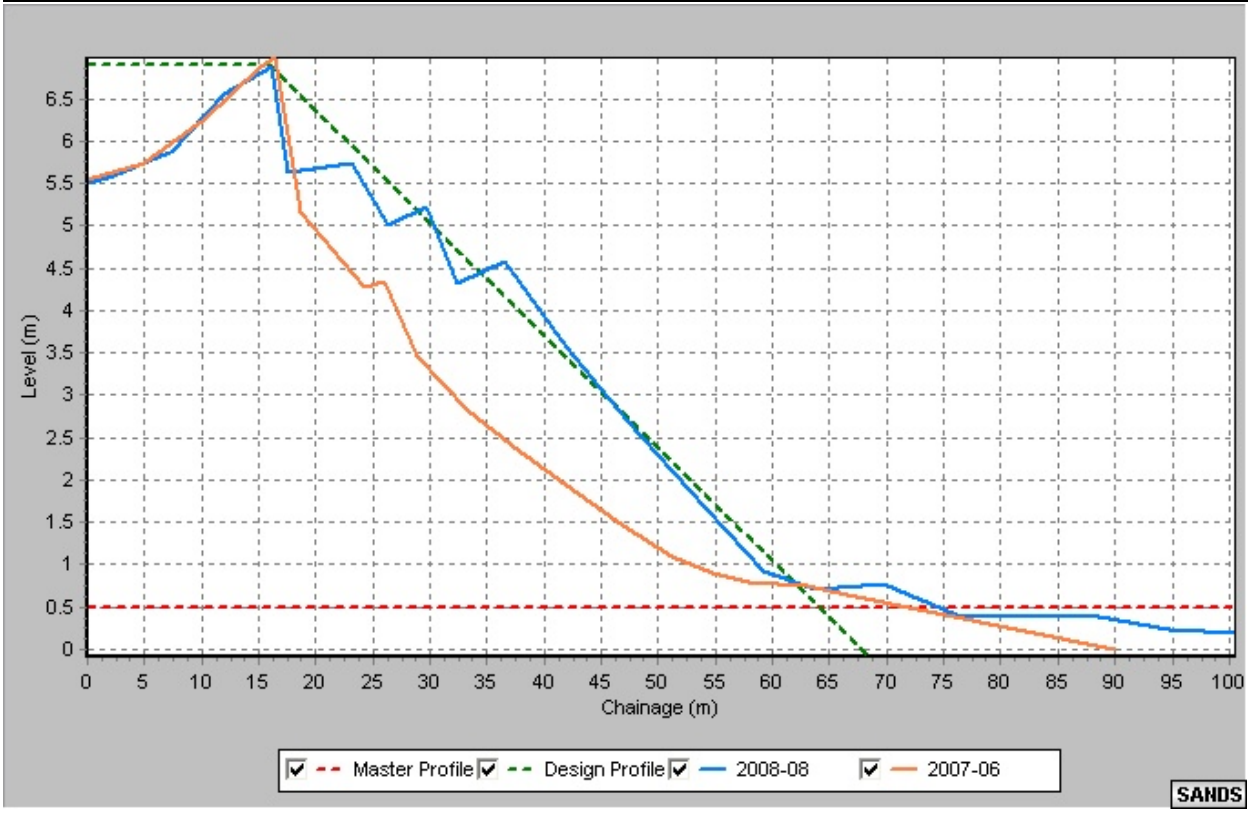


Figure 3.3; Profile 4c01500

3.3.4 Section 25.4 (4c01497 – 4c01474A)

Section 25.4, which is divided up into 8 individual analysis cells, has shown an overall loss of 5,141m³ of beach material over the reporting period 2007-2008. Within this section there have been several different patterns of both erosion and accretion, the severity of each relating to the protection afforded by the beach defences implemented.

Cell 9, to the far west of Section 25.4, has shown a loss of 59m³ of beach material over the past year. This loss has been from the beach face at the western end of the cell, and is in a sheltered area of beach, which is protected from receiving sediment by a protruding rock groyne. There is also a small area of accretion behind the area of erosion, possibly due to beach material being pushed up the beach by high-energy waves during the storm events of early 2008.

Cell 10 and 11 display accretion of sediment over the reporting period 2007-2008. Between these two cells 1,165m³ of beach material has accreted in a linear pattern across the beach face. There is also a small area of erosion in the east of Cell 11, however, this aside, the cells show accretion exclusively.

Cells 12-14, as a whole, display a net loss (3,177m³) in 2007-2008, mainly on the beach face. Significant erosion has occurred in Cells 12 & 13, across much of the beach face. The cause is as yet unknown, and insufficient data has been collected to establish whether this is a long-term trend. It may be due to scour, an edge effect of the rock revetment, or merely due to the low elevation of the beach face at this location.

Cell 15 shows a similar pattern of sediment movement to Cell 14, with a loss of 543m³. The erosion has occurred in the west of the cell, removing material from the beach face. There has also been a small amount of accretion, in a linear pattern, in the eastern top

section of the beach. There has been little change within this cell over the past reporting period, possibly the result of the rock groynes that have been constructed.

Cell 16 shows the greatest loss of sediment for Section 25.4, having lost 2,527m³ of beach material. The erosion has taken place over the majority of the cell, resulting in a decrease in elevation of approximately 0.5m, as illustrated on Profile 4c01475 (Figure 3.4).

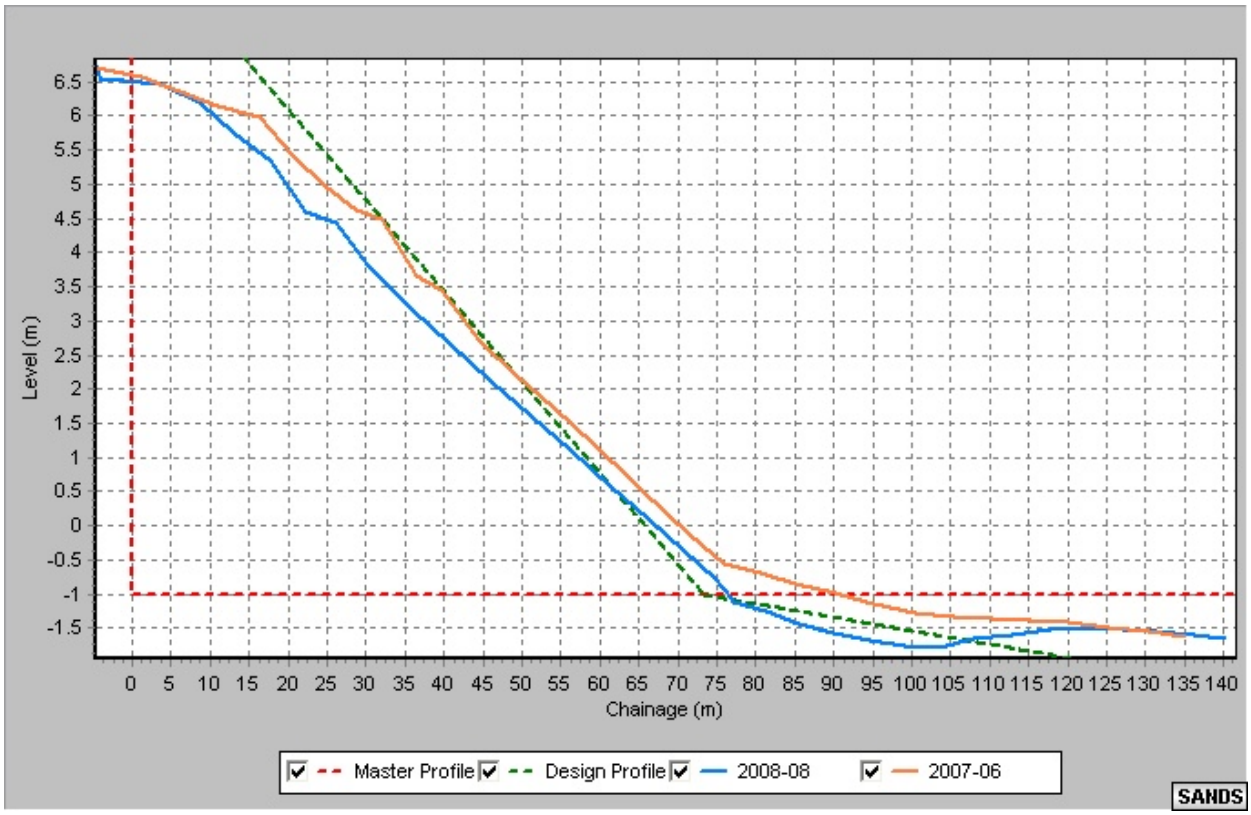


Figure 3.4: Profile 4c01475

3.3.5 Section 25.5 (4c01473A – 4c01459)

This section consists of five analysis cells, which have all experienced erosion over the past year. In total, this section has lost 17,116m³ of sediment since 2007, with in excess of 2,000m³ being lost from each individual cell. This loss accounts for 82.5% of the 20,743m³ of sediment that accreted in this section in the same period.

Cells 17 and 18 display similar characteristics of erosion, with the loss of 2,080m³ and 2,305m³ of sediment respectively. These cells show erosion on the upper beach face at the western-most extents, with erosion reducing towards the beach toe, and towards the east where little or no erosion has occurred against the rock groynes. These cells are sheltered from prevailing waves by rock groynes, which reduce sediment loss.

Cells 19 and 20 have experienced notable depletion of sediment over the past reporting period, with a combined sediment loss of 6,247m³. This has occurred across the whole beach face, with only one small area of accretion, to the west of Cell 18 in shelter of the last rock groyne. These two cells share similarities with Cell 21, which has the highest erosion levels over the past year. Here 6,558m³ of material have been removed, with most being eroded from the west, and a notable amount from the eastern extent. There is also an area of accretion at the beach toe, which may be the result of material drawn down from the beach face.

Profile 4c01462 intersects the area of most significant erosion, and is shown in Figure 3.5. This cross section from Cell 21 shows little change at the top of the beach, as well as the reduction in beach level of up to 1.5m (20m – 94m chainage).

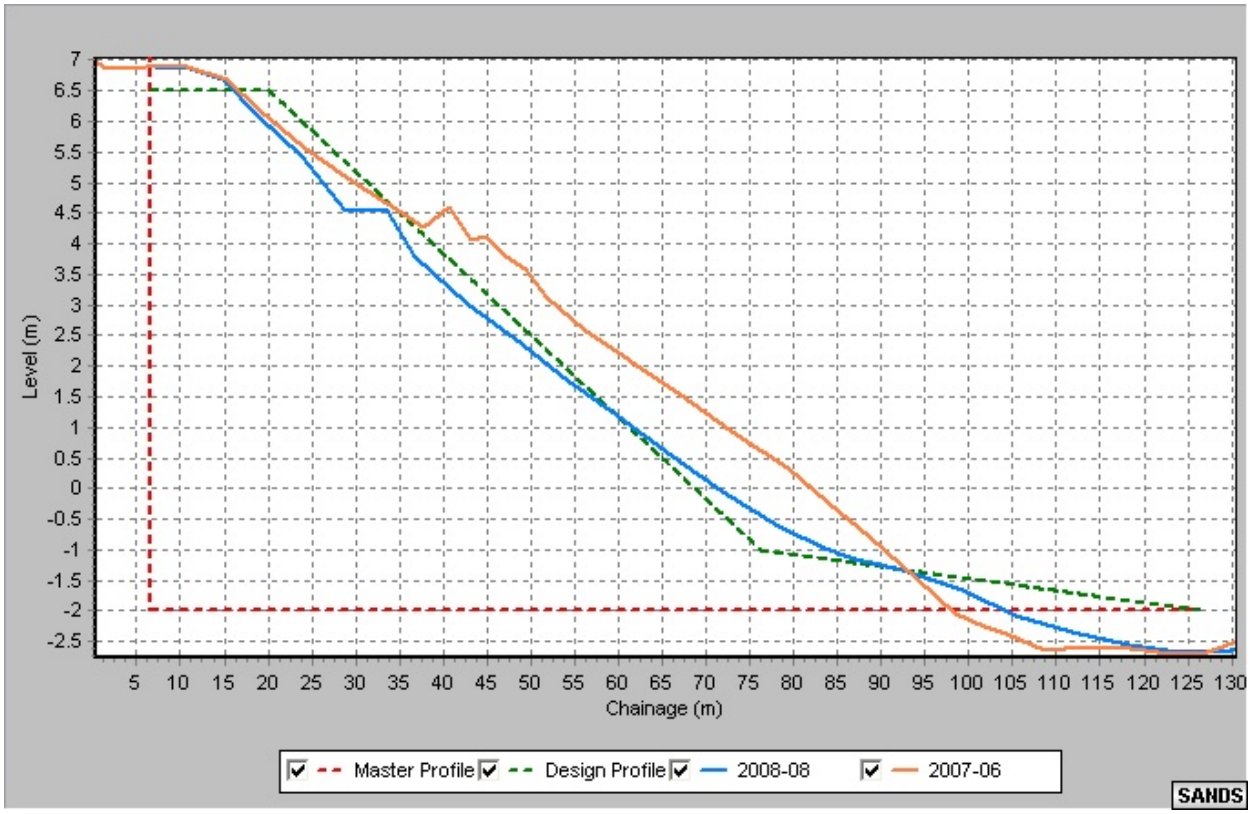


Figure 3.5: Profile 4c01462

3.4 Long-term summary

There has been a net loss of over 16,473m³ (Table 3.2) across the management unit during the 2007-2008 reporting period.

Section 25.1 is characterised by erosion, and this is likely to continue in the short term until the beach levels in this area have stabilised following the construction of the new rock groynes. The increasing trend of loss in the adjacent MU26 will be a likely source of material for future accretion in MU25.

Section 25.2 has experienced both erosion and accretion, with a significant gain in material. Contrary to this, the erosion from Cells 3 and 4 is equally significant, and is of particular concern as beach volumes in these cells are already low.

Section 25.3 has experienced marked gains in sediment; this may be driven by losses in Sections 25.1 and 25.2, although there is currently not enough data to draw accurate conclusions from.

Section 25.4 has been characterised by losses over the past reporting period, with the exception of Cells 10 & 11. This trend is one repeated from the previous year, and is of concern as this section fronts the new rock revetment. Without a beach in front of the revetment, there is a danger of the structure being undermined. This section should be monitored closely in the future to prevent such a scenario from occurring.

Section 25.5 has experienced significant widespread erosion over the past reporting period, although this may be the result of the newly reprofiled beach adjusting to a natural equilibrium state. However, should losses continue to occur at the current rate, action may be required to stabilise the beach.

Table 3.2: Beach Volume Change Summary (2006 - 2008)

Cell	Volume Change (m^3)		
	2006-2007	2007-2008	NET
1	-1,006	-4,433	-5,439
2	5,578	-1,045	4,533
3	7,497	-1,376	6,121
4	2,639	-1,849	790
5	102	2,974	3,076
6	-164	3,032	2,868
7	-3,187	5,034	1,847
8	-4,893	3,447	-1,446
9	-374	-59	-433
10	-1,048	845	-203
11	-3,336	320	-3,016
12	-4,062	-1,148	-5,210
13	-3,212	-1,475	-4,687
14	-6,634	-554	-7,188
15	-4,121	-543	-4,664
16	-1,421	-2,527	-3,948
17	-121	-2,080	-2,201
18	1,469	-2,231	-762
19	4,659	-2,305	2,354
20	3,833	-3,942	-109
21	10,903	-6,558	4,345
NET	**3,101m^3**	**-16,473**	**-13,370**

4.0 Wave Climate

The wave data is measured using a directional WareRider buoy in ~10mCD water depth in Pevensey Bay. This reporting year was less stormy than the previous year, both in terms of storm magnitude and frequency, though it remained significantly stormier than prior to 2006. Storms were concentrated between November and March.

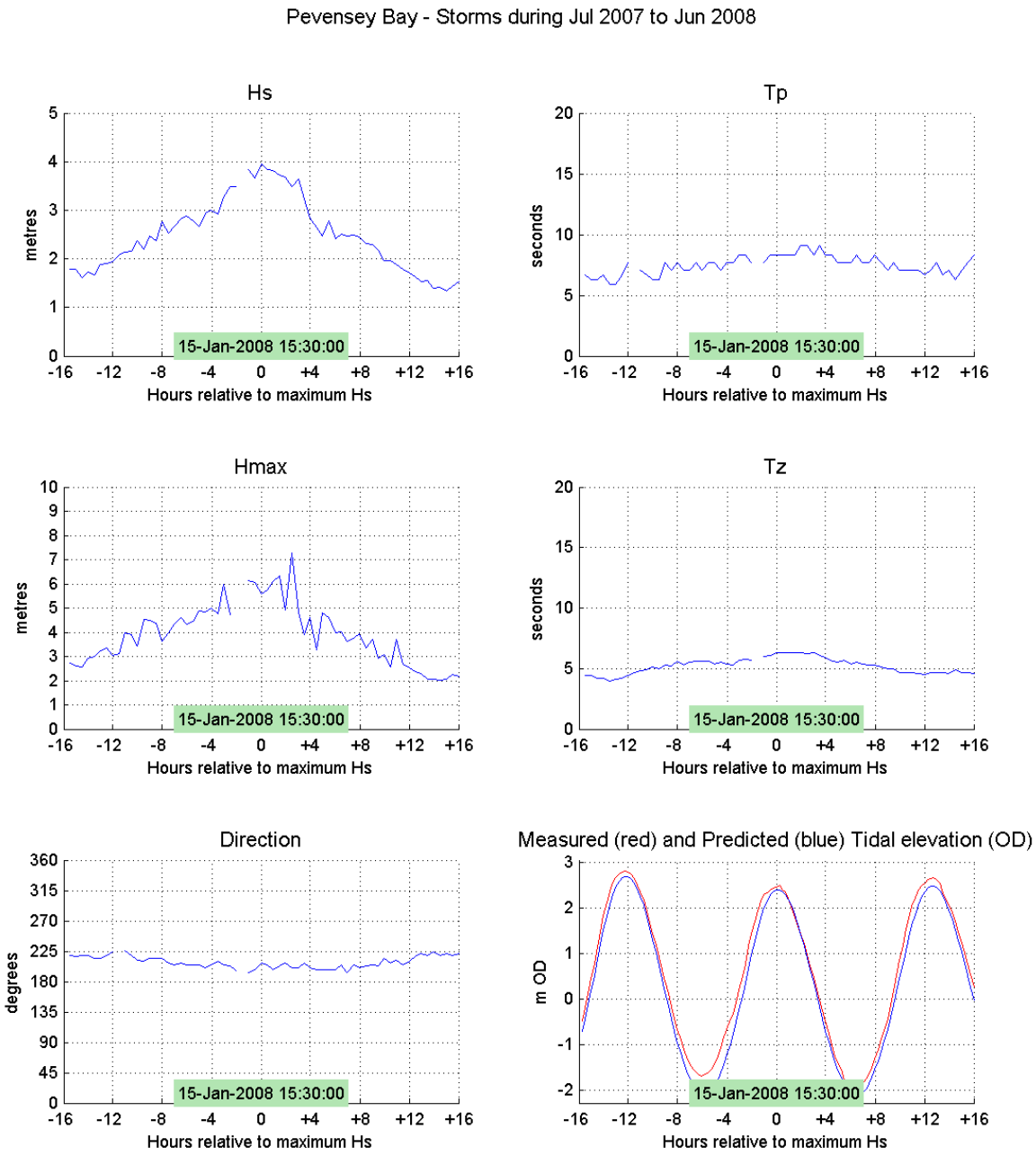


Figure 4.1: Highest storm for 2007-2008 reporting period

A detailed analysis of the wave climate for July 2007 to June 2008 is given in Annex C.

5.0 Storm events

There were five storm events during the reporting period that exceeded the storm threshold of 3m. These occurred on 8th December 2007, 9th January 2008, 15th January 2008, 31st January 2008 and 10th March 2008. The largest recorded significant wave height (Hs) was 3.96m and occurred during the 15 January 2008 storm. No post storm surveys were able to be carried out.

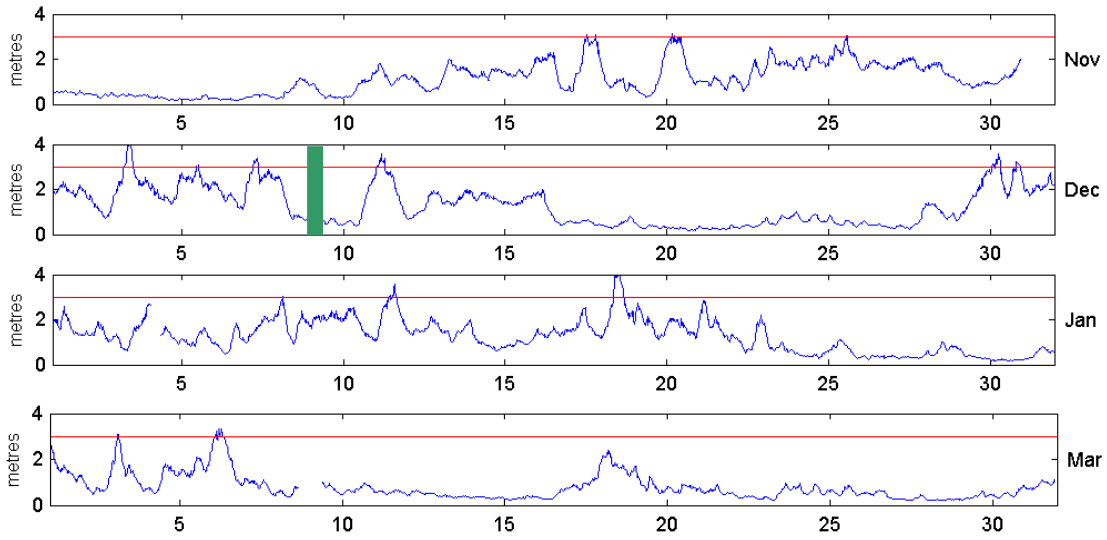


Figure 5.1: Monthly time series of Hs at Pevensey Bay

Blue Line – Significant wave Height (Hs)
Red Line – Storm Threshold (3m)
Green Line – Post Storm Survey

The storm of 10 March 2008, which affected much of the south coast, was accompanied by a storm surge of 0.80m at Newhaven and coincided with near-equinoctial spring tides (tidal elevation reached 3.7 OD). However, although this was the most significant event of the year for much of the south coast, it was only the second highest of the reporting year at Pevensey Bay. From the 5 years worth of measurements, there is now sufficient evidence to suggest that this site seldom experiences the long period Atlantic swell which is regularly measured at wave sites further west (including Rustington). Wave conditions at Pevensey Bay are dominated by in situ, wind-driven waves associated with the passage of low pressure systems. During this reporting year, storm peak wave periods, T_p, remained less than 10s.

Tidal surges (at Newhaven) exceeded 0.5m during the three highest storms, with a similarly large surge (~0.8m) as accompanied the highest storm in the last reporting year. This, again, is in contrast to years prior to June 2006, when storms surges were generally negligible.

Although no post storm surveys were carried out during this reporting period, analysis of the spring 2008 profiles does show significant depletion of material across the beach face and at the crest. However, the summer 2008 profiles highlight the recovery of this frontage from the winter storms, indicating the frontage copes well with annual variation in weather and wave patterns.

6.0 Performance Overview

6.1 Critical Beach Conditions

As part of the Bulverhythe Sea Defences Project, the Environment Agency sets out proposed beach crest levels and berm widths, which are presented in Figure 6.1. Trigger levels also are marked both 'action' (yellow) and 'emergency' (red). It should be noted that in this management unit the design, action, and emergency parameters often coincide. The crest levels are extracted manually from the SANDS database. Crest levels are taken at the height functional berm height. The majority of profiles along the MU25 frontage are above or near the required trigger levels. However, there are a couple of locations that are consistently below the trigger levels.

The peaks and troughs of the trigger levels in Figure 6.1 correspond approximately to the beach analysis sections. Thus, (reading left to right) the crest levels in Sections 25.2 & 25.4 are higher than the trigger levels, mainly because they are backed by rock revetments. Sections 25.1, 25.3, & 25.5 are consistently failing to reach the trigger levels, although the crest levels in Section 25.5 have improved slightly in 2008. it is likely that recycling would benefit these three sections, raising crest levels.

7.0 Coastal works

7.1 Recycling

No records of recycling activities have been received, and it is presumed none have taken place. Bulverhythe does not lend it self to regular beach recycling operations due to the lack of a suitable borrow area; there are areas that demonstrate consistent long-term accretion.

7.2 Replenishment

As part of the Bulverhythe Sea Defences Project, MU25 underwent a capital recharge of 94,500m³, and no further replenishment has taken place since the new baseline survey conducted in February 2006.

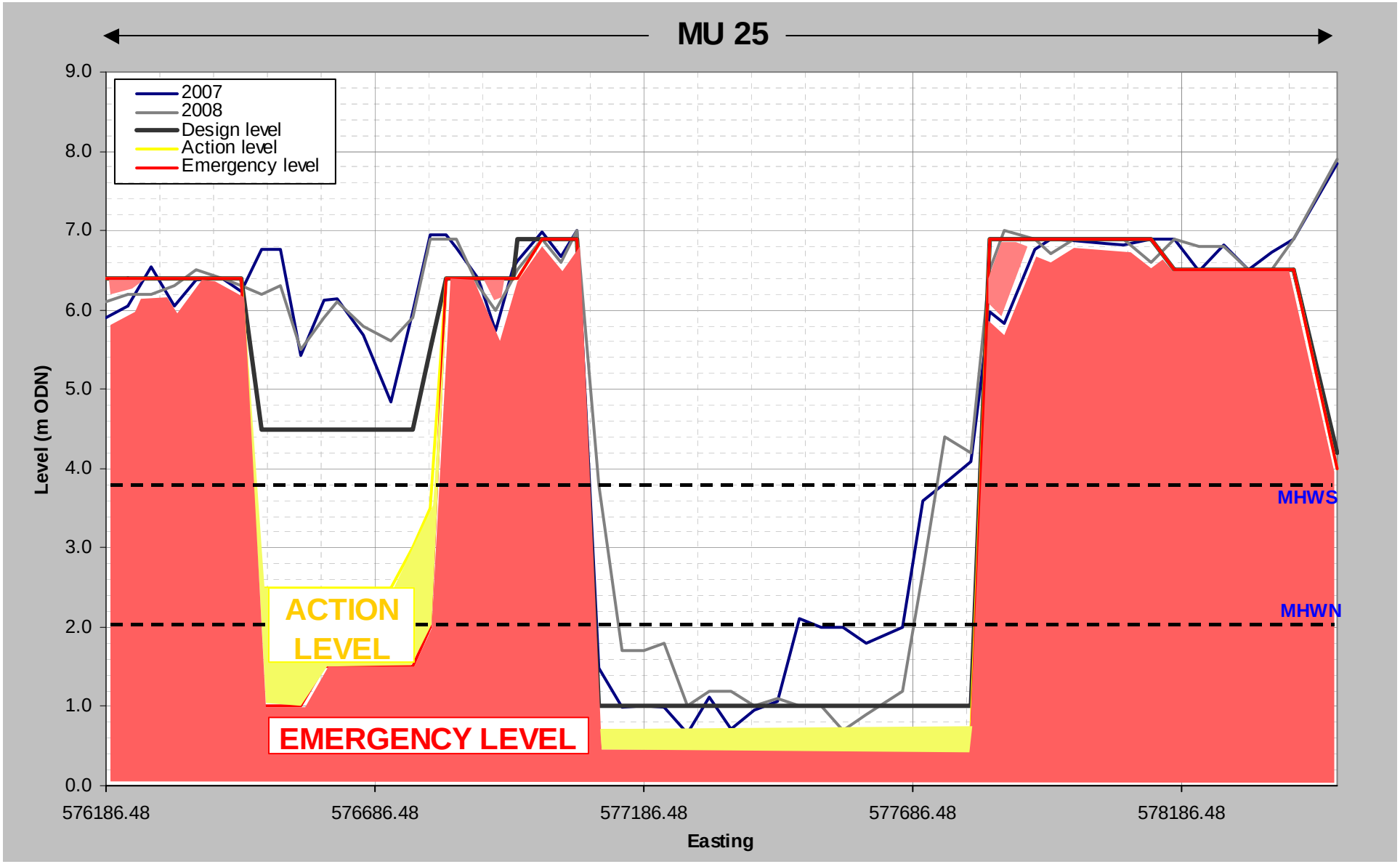


Figure 6.1: Comparison of current and proposed beach berm widths and levels

8.0 Conclusion

The Bulverhythe coastline has lost 16,473m^3 in the reporting period (2007 - 2008), with high levels of erosion and internal material redistribution between survey cells. The influx of material from MU26 (Bexhill) into MU25 (Bulverhythe) is likely to continue, although the distribution of material within the management unit is likely to remain uneven. It appears that new material is entering the unit, with some becoming trapped by the new rock groynes; however, much is lost. Overall crest levels are generally good but lack of significant berm width in places could become an issue in some areas.

There were five storm events during the reporting period that exceeded the storm threshold of 3m. Based on beach profiles from the reporting period, and although no post storm surveys were carried out, analysis of the spring 2008 profiles does show significant depletion of material across the beach face and at the crest, although the summer 2008 profiles suggest the frontage recovers quickly.

Following the Bulverhythe Sea Defences Project, the baseline for the Bulverhythe area has been reset. The new defence structure layout has altered the littoral transport regime, and as a result trends cannot necessarily be predicted until a longer-term dataset has been collected due to inconsistencies in short-term trends.

It is important to recognise the potential inconsistency in short-term trends. As with many coastal areas a lot of annual variability is expected. Thus, drawing conclusions with increased confidence will become possible as more data is collected, with regard to annual losses, net sediment drift and erosion/accretion trends in section sub-units.

Scheduled future monitoring includes profile surveys in Autumn 2008 and Spring 2009, and in addition post-storm surveys may be carried out if any event is deemed to have significantly affected the frontage. An interim report will be issued on completion of the spring profile survey, with the next BMP report scheduled to be issued after completion of the Summer 2009 beach plan survey. All historic monitoring data is accessible online (www.channelcoast.org), and future surveys will be available after satisfying quality assurance procedures.

Profile Location Diagrams

Profile Locations