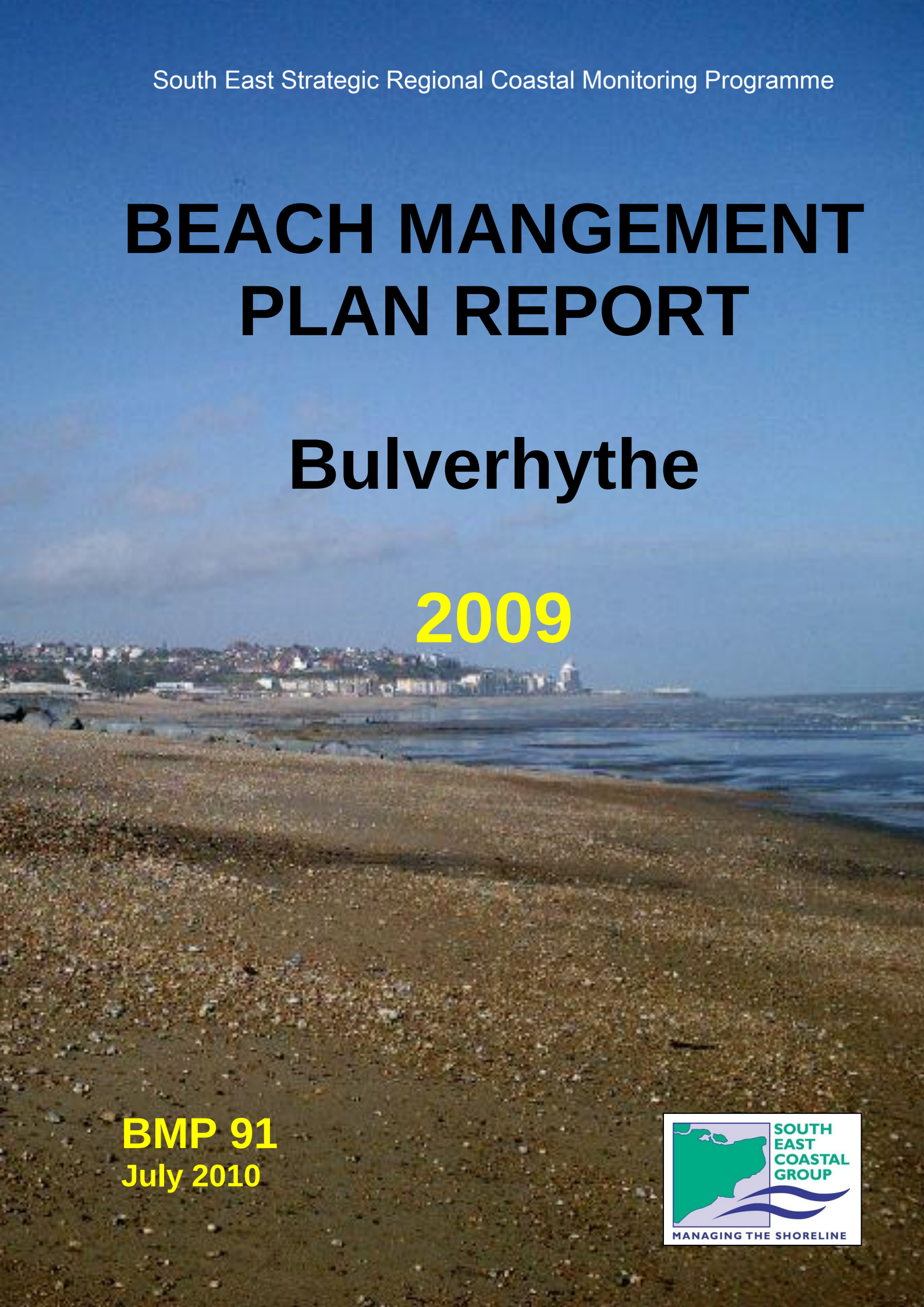
South East Strategic Regional Coastal Monitoring Programme

BEACH MANGEMENT PLAN REPORT

Bulverhythe

2009



BMP 91
July 2010

SOUTH EAST COASTAL GROUP
MANAGING THE SHORELINE

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Annual Report 2005	Dover Harbour to Beachy Head Annual Report – AR8		
BMP 2005	BMP15	**No Report**	BMP 16
Annual Report 2006	Dover Harbour to Beachy Head Annual Report – AR19		
BMP 2006	BMP34	**BMP43**	BMP 35
Annual Report 2007	Dover Harbour to Beachy Head Annual Report – AR31		
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BMP 2008	BMP70	**BMP78**	BMP 72
Annual Report 2009	Dover Harbour to Beachy Head Annual Report – AR51		
BMP 2009	BMP90	**BMP91**	BMP92

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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 a 12-month period from the BMP survey in August 2008 to the BMP survey in July 2009. The key findings are listed below:

- A net loss of 733m^3 was observed along the Bulverhythe frontage over the reporting period August 2008 to July 2009. This is an improvement from the greater net loss of 16,473m^3 recorded over the previous reporting period (2007-2008).
- The area between Cliftonville Way and Cinque Ports Way (Section 5) is the most erosive area with loses of 10,088m^3 over the last reporting year.
- The most accretive area over the last reporting year with gains of 11,706m^3 was the area between Abbey Drive and Cliftonville Way (Section 4).
- The influx of material from MU26 into MU25 is likely to continue, however 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, however, some areas appear to still lose significant amounts of sediment.
- There were five storm events during the reporting period that exceeded the storm threshold of 3m; however none of these required a post-storm survey to be carried out.

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 2009 and Spring 2010, 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 2010 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 94,500m³.

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 February 2008 post works survey and the most recent 2009 survey.

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

1.1 Coastal Processes & Management

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

Following the Environment Agency's Bulverhythe Sea Defences Scheme, the frontage is protected by a shingle beach held in place with a series of rock groynes, and two stretches of rock revetments. To the rear of the beach a concrete wall protects the slopes. The structures are designed to protect against breaching and overtopping by storms with a minimum return period of 1 in 200 years, for a period of 100 years.

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. The study area also includes the Combe Haven Site of Special Scientific Interest (SSSI).

On the large scale, the coastal landscape comprises moderately resistant chalk cliffs at Beachy Head, low-lying shingle and alluvial areas at Pevensey and Hooe Levels, as well as heavily faulted (and thus unstable) Cretaceous Ashdown Sands and Fairlight/Wadhurst Clay cliffs from the outskirts of Bexhill through to Cliff End. The geological background of the coastline shows the shingle foreland of Langney Point and the Crumbles, in Pevensey Bay to be developed upon a foundation of Gault and Wealden mudstones. It is a comparatively modern feature in geological terms (c.3,000BP), that probably originated as a bar or spit. Fine sand to grey clays has been accumulating in the lee of the coastal shingle barrier for thousands of years, to form tidal flats and saltmarsh deposits. Historically material from the Crumbles has been moved along the coast in an easterly direction, towards Hastings and Dungeness; the contemporary shingle store is therefore not as significant as it once was.

The 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. Anthropogenic constraints have greatly influenced coastal evolution, with the construction of groynes reducing, then finally halting erosion along the Beachy Head to Norman's Bay area of the coastline. 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 with the exception for occasional local erosion during the winter storms (Halcrow, 2000). Frontages between Bexhill and Hastings are heavily managed, with defences holding the plan position of the shoreline.

The MU25 coastline at Bulverhythe shows distinct annual trends, and although the cliffed sections of this section of coast are retreating at a reasonably consistent rate the intermittent low-lying areas are extremely dynamic and respond quite rapidly to changes in forcing factors. In essence this is not a static coastline; cliffs are eroding, low-lying areas are vulnerable to flooding and sediment is constantly being transported

alongshore, in an eastwards direction, despite the frontage being heavily defended and managed.

There is a shingle and sand foreshore with shore platform bedrock comprising Tunbridge Wells silts and sandstone, which frequently outcrop along this frontage. The outcrop, across the inter-tidal zone, acts as a natural groyne to the longshore transportation of material. Groynes punctuate the updrift frontages and extend as far westwards as Eastbourne. They include the marina breakwaters that reduce the transport of the limited available sediment to this frontage, necessitating the construction of similar defences that, in turn, deprive frontages further downdrift of sediment input.

Modeling has confirmed that there are high potential rates of movement along this section of the frontage, particularly in front of Hastings Cliffs, where potentially the net annual rate can be as low as 4,700m³/year (South Foreland to Beachy Head SMP, 1996) or up to 10,000m^3/year, which suggests that this stretch of the coastline is vulnerable to erosion (Halcrow, 2000). The eastern extremity comprises a shingle and sand foreshore that fronts the low-lying alluvial area of Combe Haven and the Bulverhythe Valley. 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 and despite recharge schemes; the shingle beach at Bulverhythe has suffered an overall loss of material since 1973. The significant landward movement of the Low Water Mark means that a steeper foreshore has developed.

The comparative lack of contemporary sediment input to this frontage has resulted in the diminishing stock of available foreshore sediments and a related reduction in the degree of natural foreshore protection afforded to the low cliffs. Geological controls exert an influence on localised sea cliff behavior, primarily due to the presence of clay within the cliffs.

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 Combe Haven inlet was blocked by drifting shingle in the 16th and 17th Century, since then the frontage has become recessional in response to sea level rise. At Bulverhythe erosion has occurred since the late 19th century, some of which may be due to large quantities of ballast being removed from the beach for industrial purposes.

It is likely that there will be a continued denudation of presently available foreshore sediments in response to sea level rise. This would result in progressively increased vulnerability of the backshore slope and low sea cliffs, leading to a tendency for episodic landsliding in the clayey layers of the low cliff; this will, however, yield only a relatively small volume in terms of fresh sediment input. Inundation of the low-lying valley of Bulverhythe will become a regular occurrence, which will result in a widening of the river mouth. If this were to occur then alongshore transport would be interrupted.

In the future it is likely that the foreshore would migrate landwards in response to rising sea levels with potential, due to the limited available sediment supply, for segmentation and ultimate breaching. Breaching of the foreshore would result in inundation of the Bulverhythe Valley and the re-formation of a tidal inlet.

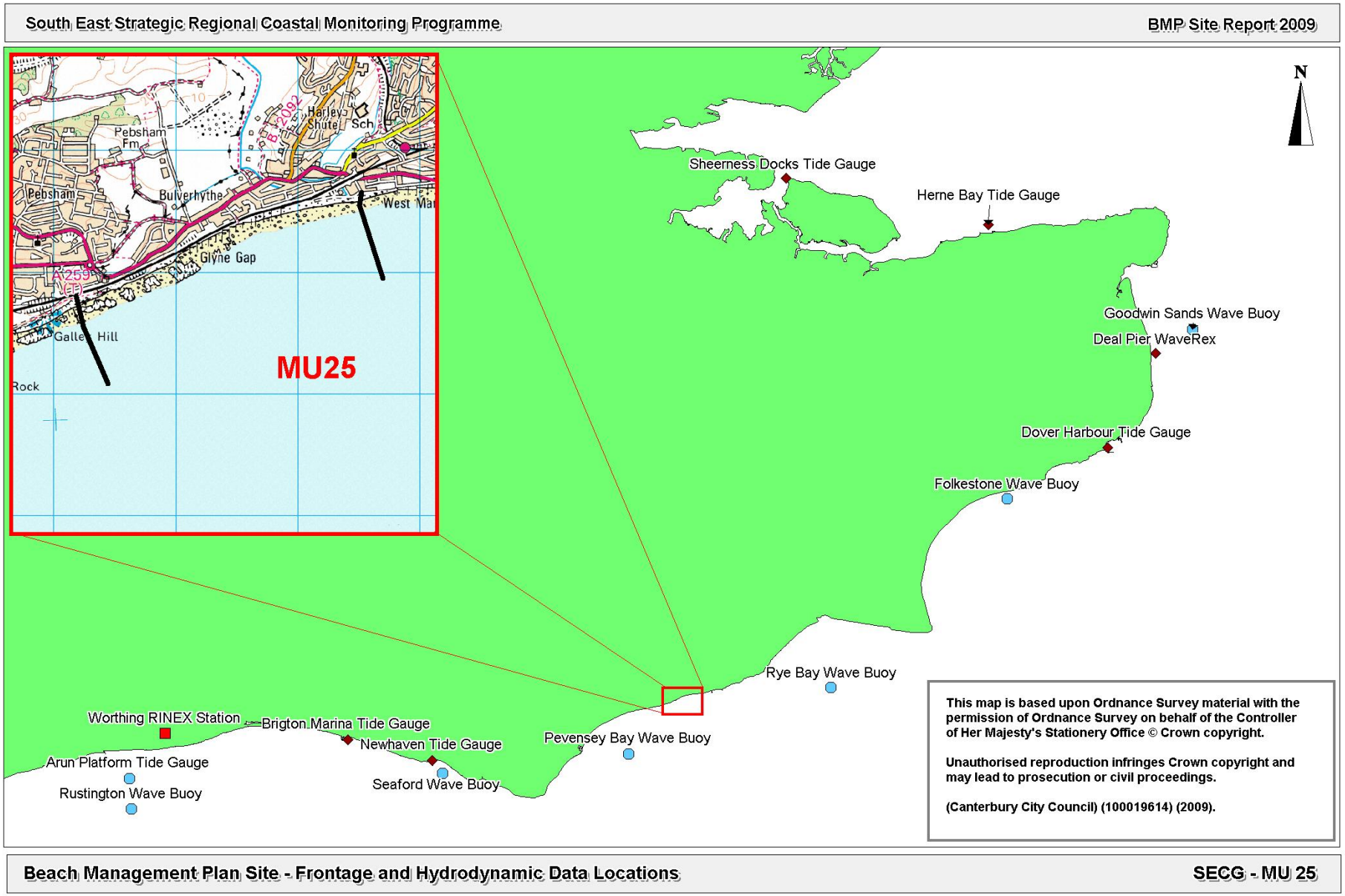


Figure 1.1: Site Location and Wave/Tide Gauges

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 Surveys

The schedule of completed surveys since the start of the Regional Monitoring Programme is given in Table 2.1. Digital Ground Models of the 2009 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

MU25		
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

MU25		
Profile	**Beach Plan**	**Post-storm**
03/08/2008	03/08/2008	
17/11/2008		
09/02/2009		
12/07/2009	12/07/2009	

** 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

MU25		
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 2009 BMP data set has been compiled, it is possible to overlay the results of the survey with BMP data from 2008. 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 2008 & 2009, 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 2009 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 Coastal Process Analysis

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 2008 and 2009 summer BMP surveys.

Table 3.1: MU25 - Summary of Erosion/Accretion for 2007-2009

Polygon	Area (m^2)	Error Estimate* (m^3)	Erosion/Accretion (2007 to 2008) (m^3)	Erosion/Accretion (2008 to 2009) (m^3)
1-2	23,136	*+/- 694*	-5,478	**2,539**
3-6	39,487	*+/- 1,185*	2,781	**-6,928**
7-8	24,698	*+/- 740*	8,488	**2,038**
9-16	35,599	*+/- 1,068*	-5,141	**11,706**
17-21	55,280	*+/- 1,658*	-17,116	**-10,088**
Net			-16,473	**-733**

** 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*

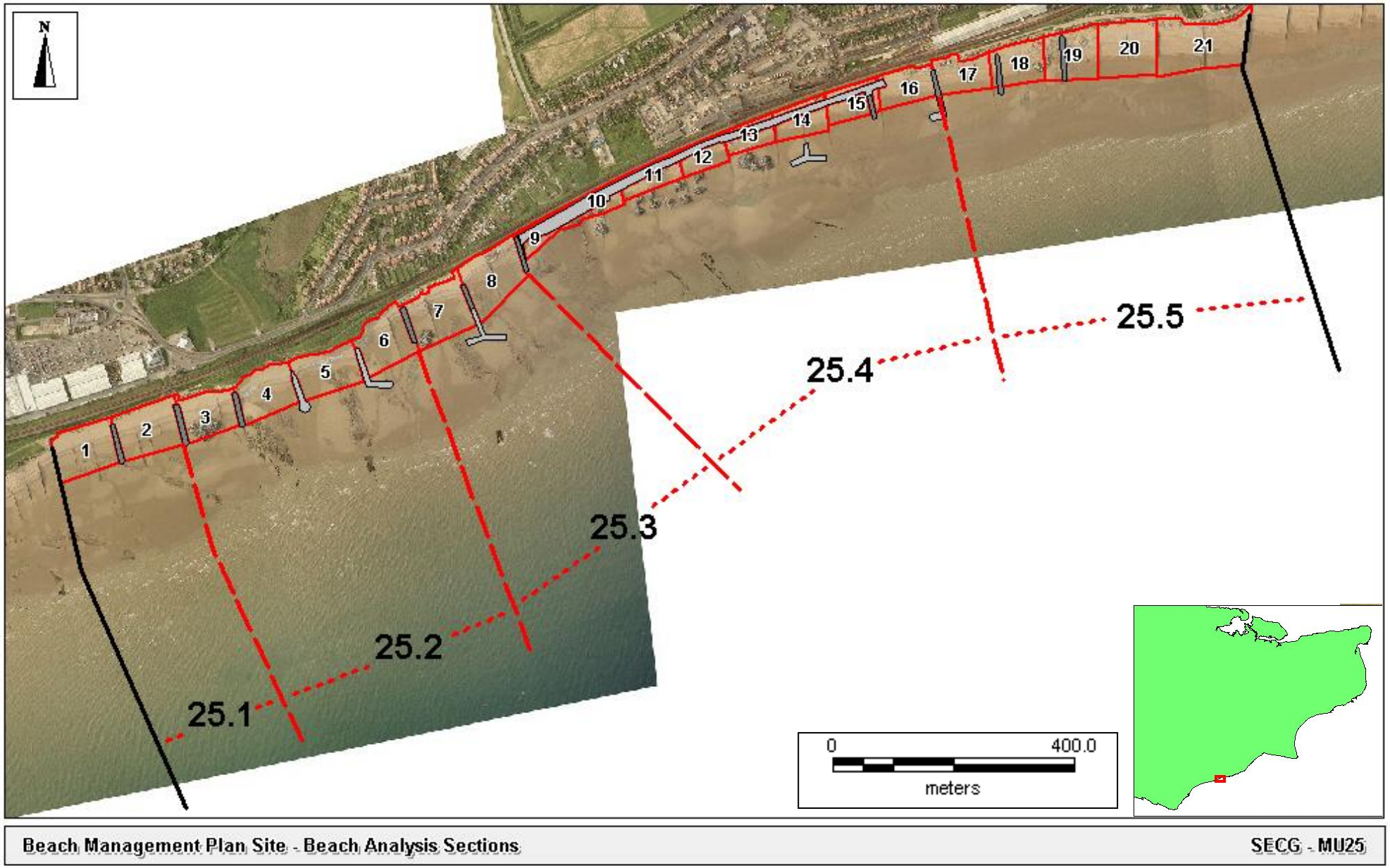
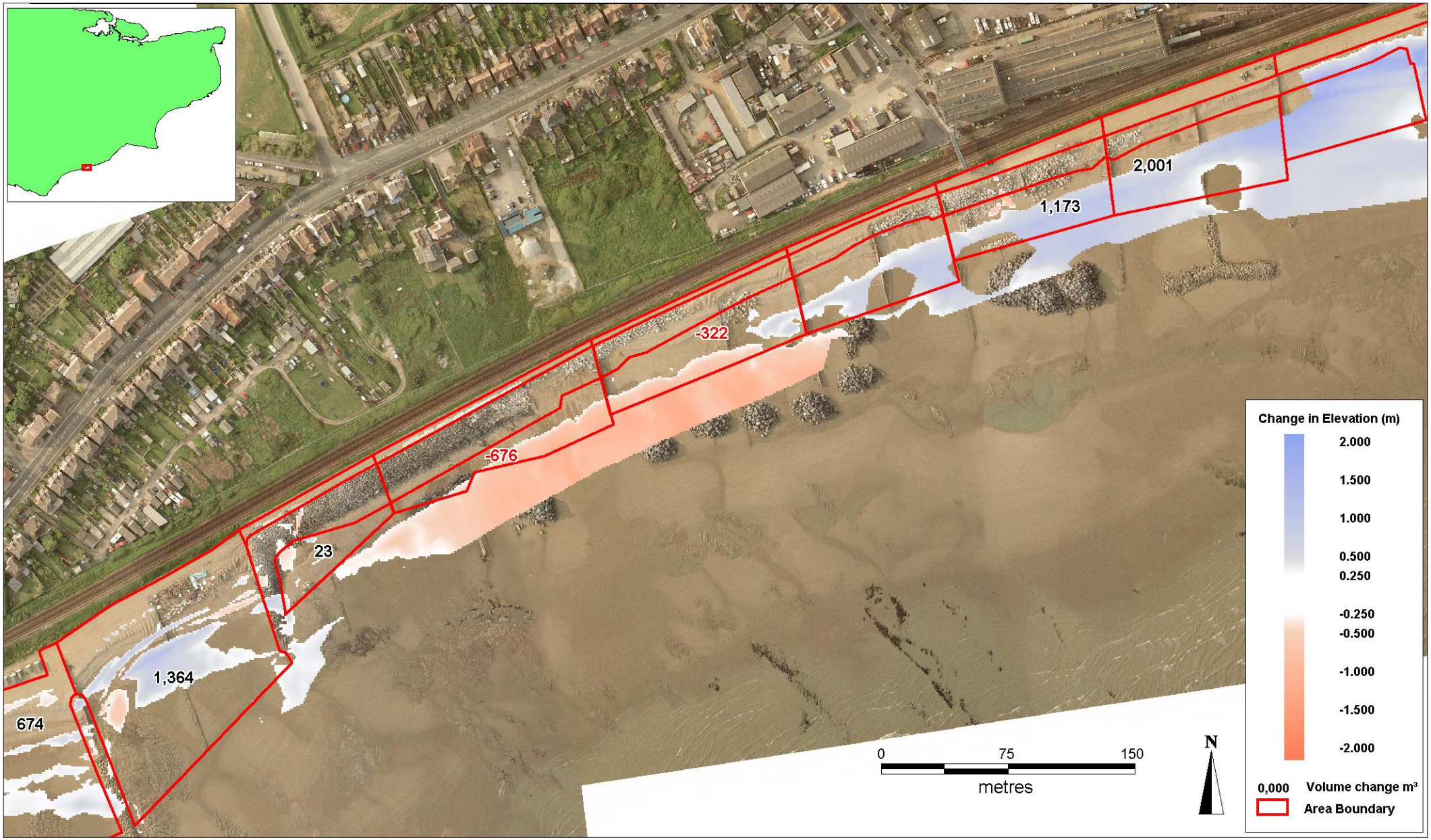


Figure 3.1: MU25 Beach Analysis Sections


3.1
1
2,538
-1,094
-871
-3,112
-1,851
674
0
75
150
metres
N
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


2,001
1,173
-322
-676
23
1,364
674
0
75
150
metres
N
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


4,975
-1,185
-2,662
-3,356
-123
-2,762
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

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 1 (Polygons 1-2 , Profiles 4c01523 – 4c01517)

Overall, Section 1 displays a total net gain in material of 2,539m^3 for the reporting period 2008-2009. Both polygons within this section show a gain in material, although the beach change observed at Polygon 1 is negligible (1m^3). Polygon 2 on the other hand experienced much greater beach volume change during the past reporting period, displaying an accretion of 2,538m^3 of beach material. Although material has been lost from the foreshore, gains across the entire beach face have been of a much greater magnitude, resulting in an overall build up of sediment in this polygon between 2008-2009. This addition of sediment is visible at Profile 4c01520 (Figure 3.2), where it can be seen that the crest has increased in height by up to 1.5m between 30m and 65m chainage.

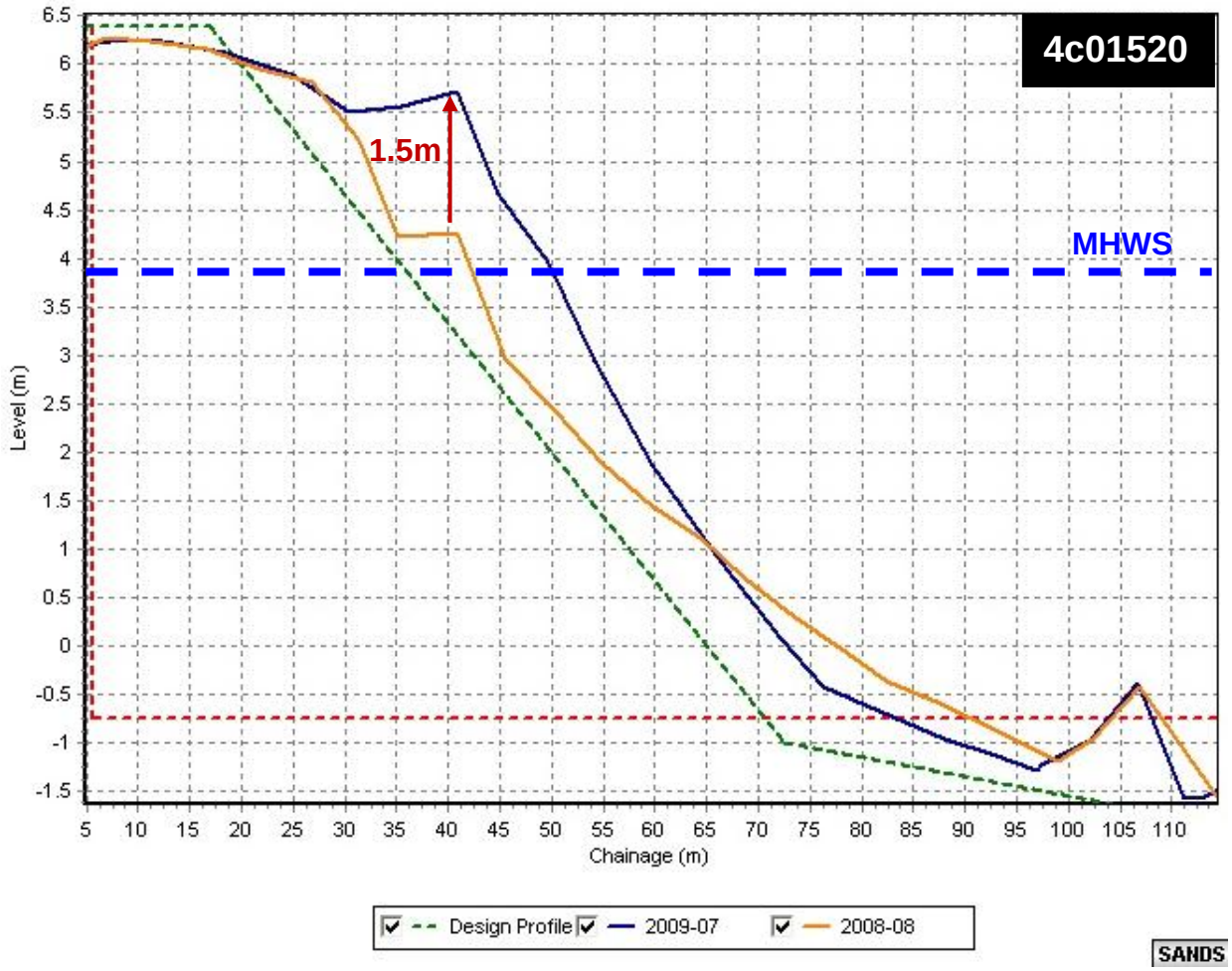


Figure 3.2: Profile 4c01520

3.3.2 Section 2 (Polygons 3-6, Profiles 4c01516A – 4c01504A)

Section 2 comprises of 480m of beach divided by rock groynes and backed by a rock revetment. During the reporting period 2008-2009, this area lost 6,928m^3. This erosion was particularly prevalent in the eastern polygons of the section (Polygons 5 and 6).

Polygons 3 and 4 show erosion of beach material, with a total loss of 1,094m³ and 871m³ respectively. A gain in sediment can be seen within Polygon 3 in an arc formation, and covers a high proportion of the beach berm, leaving a larger area of erosion at the beach toe and along the foreshore. The deposition of material behind areas of erosion is undoubtedly a result of material being pushed up the beach from the eroded beach face. 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.

Although most of Polygon 4 has been affected by erosion, it is also clear that erosion has been more damaging towards the west of this polygon, with slightly less erosion occurring in the east of the polygon. This trend is in accord with the easterly littoral drift, which is prevalent along this stretch of coastline.

Polygons 5 and 6 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 spread across most of the beach face. The amount of material lost within Polygons 5 and 6 was 3,112m³ and 1,851m³ respectively. Materials eroded have most likely been transported in the prevailing easterly drift, which occurs at this coastline.

3.3.3 Section 3 (Polygons 7-8, Profiles 4c01503A – 4c01498)

This section of coastline covers two analysis polygons, which over the past reporting period have shown a gain in sediment of 2,038m³. The majority of gains are found at the beach crest and lower beach face. Polygon 7 reported a gain of 674m^3 between 2008-2009. Small losses are also visible in this polygon; most notable is the linear pattern of erosion along the back beach in the east. Material eroded from here by storm waves has probably been one of the sources of the sediment that has been deposited on the beach face during the last year.

Polygon 8 is also characterised by accretion, gaining 1,364m^3 of beach material over the past year. This gain spread across a large area of beach face and the berm on either side of the rock groyne that divides this polygon. Polygon 8 also shows a small amount of loss, alongside the very top of the beach in the east and on the beach face to the west. This may be attributed to the rock structures on either side of the polygon defecting and restricting the influx of beach materials.

This section also benefits from material lost from the eastern end of the MU26 Bexhill frontage, with additional material likely to have been transported up from the foreshore and offshore sources. Figure 3.3 shows Profile 4c01498A, which is positioned in the centre of Polygon 8. This profile displays the small amount of erosion which has occurred at the top of the beach (up to 18m chainage) followed by the widespread accretion (20m - 67m chainage).

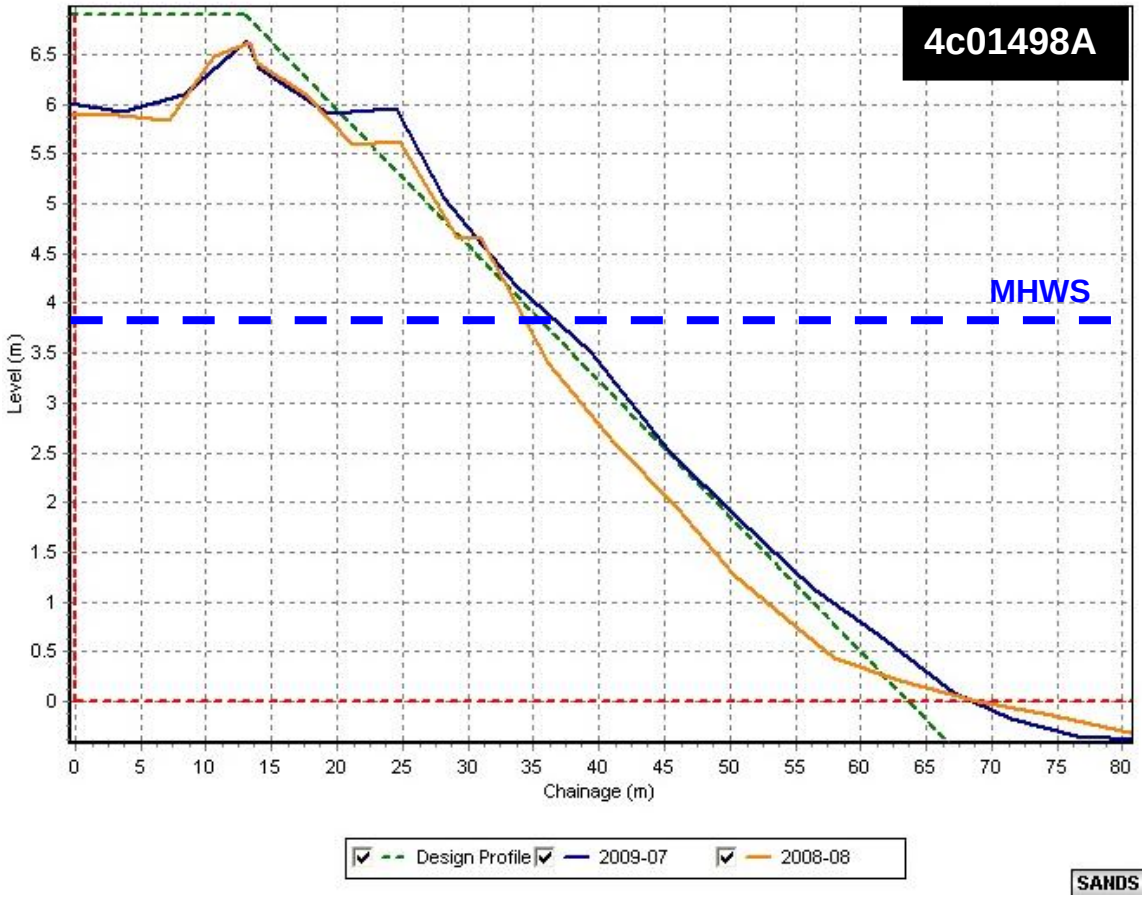


Figure 3.3: Profile 4c01498A

3.3.4 Section 4 (Polygons 9-16, Profiles 4c01497 – 4c01474A)

Section 4, which is broken up into 8 individual analysis polygons, has shown a marked gain in sediment over the reporting period 2008-2009 in the order of 11,706m³. Within this section there are patterns of both erosion and accretion, with an overriding trend of increasing erosion towards the western extent. The severity of both erosion and accretion throughout this section of beach relate to the protection afforded by the beach defences implemented.

Polygons 9, 10 and 11, as a whole, display a net loss for the 2008-2009 reporting period. This loss, totalling 975m³, has been from the beach face and to some extent from the berm. Scour on the foreshore is potentially a feature of high-energy waves interacting with this section of coast during storm events, causing major sediment losses.

Polygon 10 shows the greatest loss of sediment for Section 4, having lost 676m³ of beach material. The erosion here has involved the removal of material from the main beach slopes with a distinct linear pattern. Polygon 11 shows a similar pattern of events to Polygon 10, with a marked loss in sediment of 322m³. The greatest erosion within these polygons can be seen at Profile 4c01493, Polygon 10, where the foreshore level has reduced by up to 0.9m (Figure 3.4).

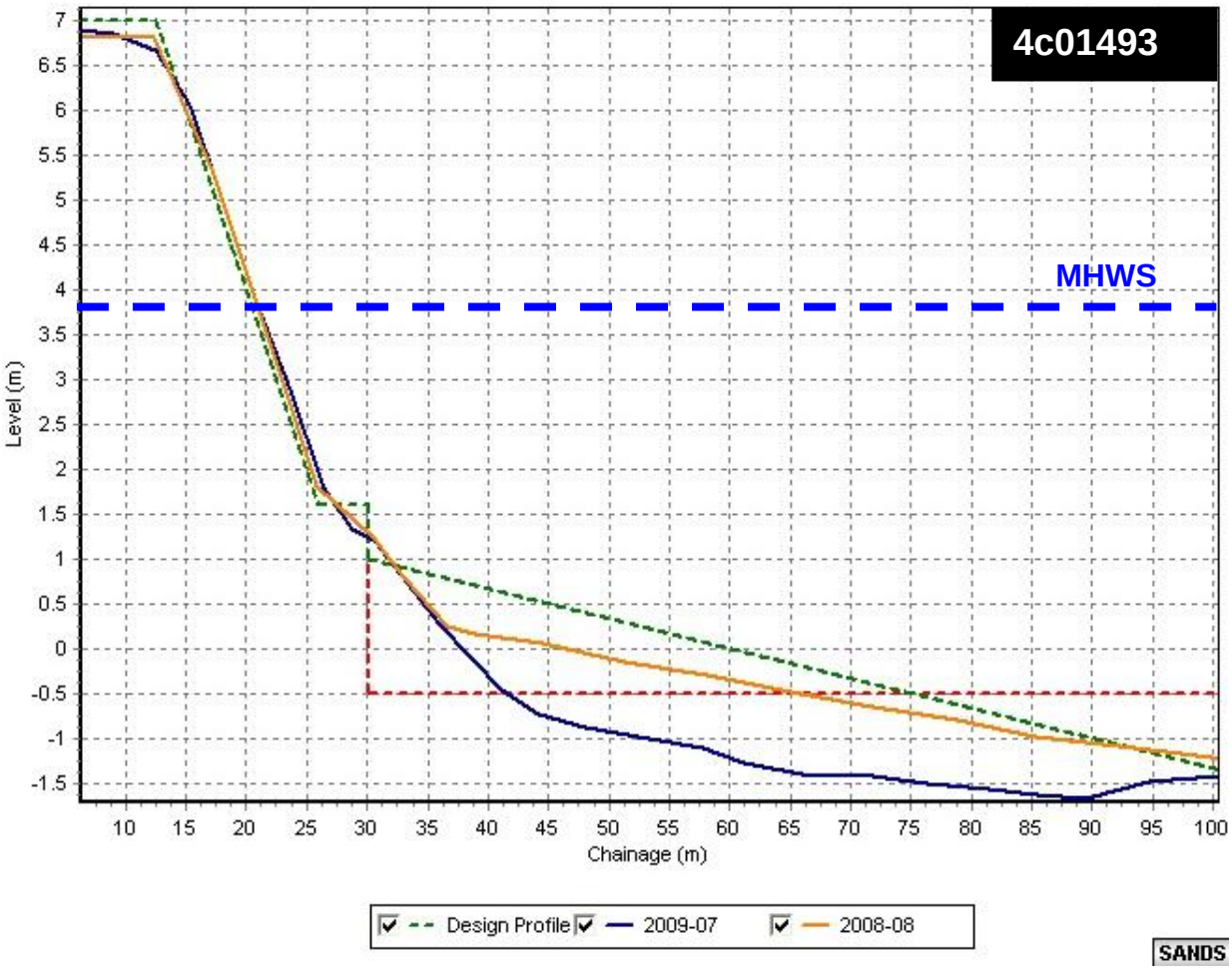


Figure 3.4: Profile 4c01493

Material has predominantly not been lost from Polygon 9, to the far west of Section 4, which has shown a small gain of 23m³ of beach material over the past year. This gain has been from the beach face and toe at the western end of the polygon. Erosion may have reduced at this point due to the positioning of the protruding rock groyne, affording protection to this area.

Polygons 12 to 16 display accretion of sediment over the reporting period 2008-2009. Between these five polygons, 12,681m³ of beach material has accreted in a linear pattern across much of the beach face. There is an obvious trend of increasing sediment deposition towards the east, growing from 935m³ of beach material at Polygon 12 to 4,975m³ at Polygon 16 at the eastern extent of the section. This pattern supports an easterly littoral drift direction, with the material deposited within these polygons having most likely originated from eroding polygons in the west.

Polygons 15 and 16 in particular have experienced notable accretion of sediment over the past reporting period, with a combined sediment gain of 8,572m³. Sediment here has been deposited over the full extent of the beach. The area of highest sedimentation was at Profile 4c01475A at the western extent of Polygon 16 (Figure 3.5). Here, the beach face has advanced seaward by as much as 10m over the past year, with up to 2.6m increase in beach elevation.

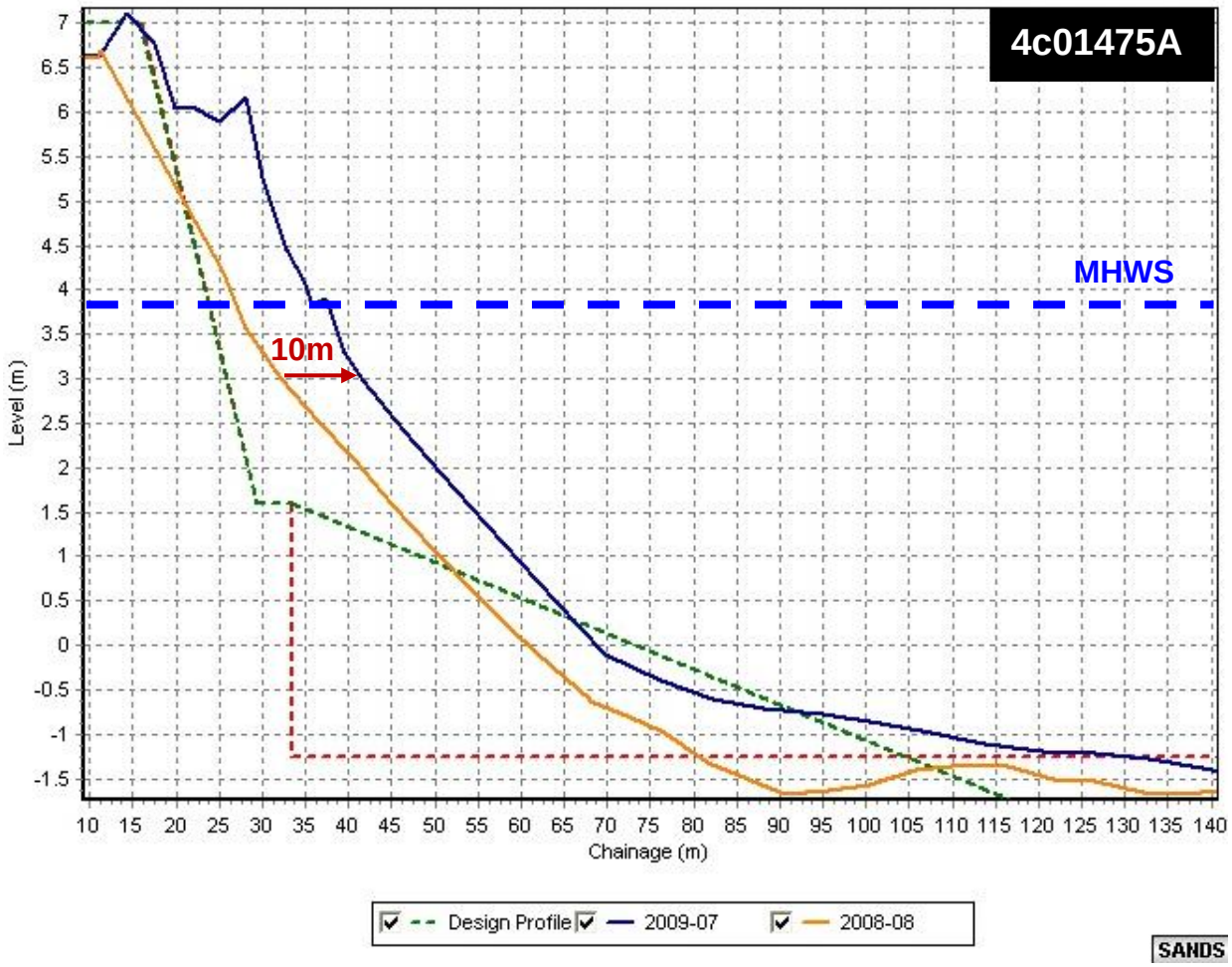


Figure 3.5: Profile 4c01475A

The observed pattern of decreasing erosion/increasing accretion towards the east of Section 4 suggests longshore drift is the main sediment transportation process occurring here. However, due to its exposed position, it is also possible that material deposited in the eastern polygons may potentially have been scoured from further offshore and have been deposited on the beach face during storm events. Either way, with the marked gain in sediment across these polygons, it is clear that the implemented rock groynes and extensive rock armour structures positioned around these polygons are having the desired effect on the dynamics of this section of coastline.

3.3.5 Section 5 (Polygons 17-21, Profiles 4c01473A – 4c01459)

This section consists of five analysis polygons, which, over the last reporting period have all experienced erosion, with significant losses in sediment from each polygon, and from the section on the whole. In the past year this section has lost 10,088m³ of sediment

Polygons 17 and 18 show significant erosion across the majority of the beach, with the loss of 1,185m³ and 2,662m³ of sediment respectively. Sediment has been lost from much of the berm, beach face and toe, with only a few small areas of accretion to the west of each polygon adjacent to the rock groynes. There has also been a linear pattern of accretion at the beach toe, which extends across the entire length of Section 5.

Polygon 19 has the highest erosion levels over the past year. Here, 3,336m³ of material have been removed, with most being eroded from the east and a notable amount from the western extent. Profile 4c01467 intersects the area of most significant erosion, and is shown in Figure 3.6. This cross section from Polygon 19 shows little change at the top of the beach; reduction in beach level of up to 1.1m (49m – 122m chainage), and then the linear deposition of sediment is visible at the toe.

Polygons 20 and 21 aren't dominated by material losses, with erosion extending only a third of the way into Polygon 20 and primarily limited to the eastern half of Polygon 21. There has also been a small amount of accretion, in a linear pattern, along the berm and top section of the beach in Polygons 20 and 21. This deposition of sediment appears to have been pushed up the beach in a linear fashion from the eroded beach face.

Polygon 21 is particularly exposed to prevailing waves, resulting in the depletion of material across the beach face and at the crest on the eastern side. The rock groyne in the centre of this polygon effectively shelters the western half of the beach from the predominant wave direction, resulting in only small amounts or no erosion in that section. A total of 2,763m^3 of beach material was lost from Polygon 21 during the past reporting period.

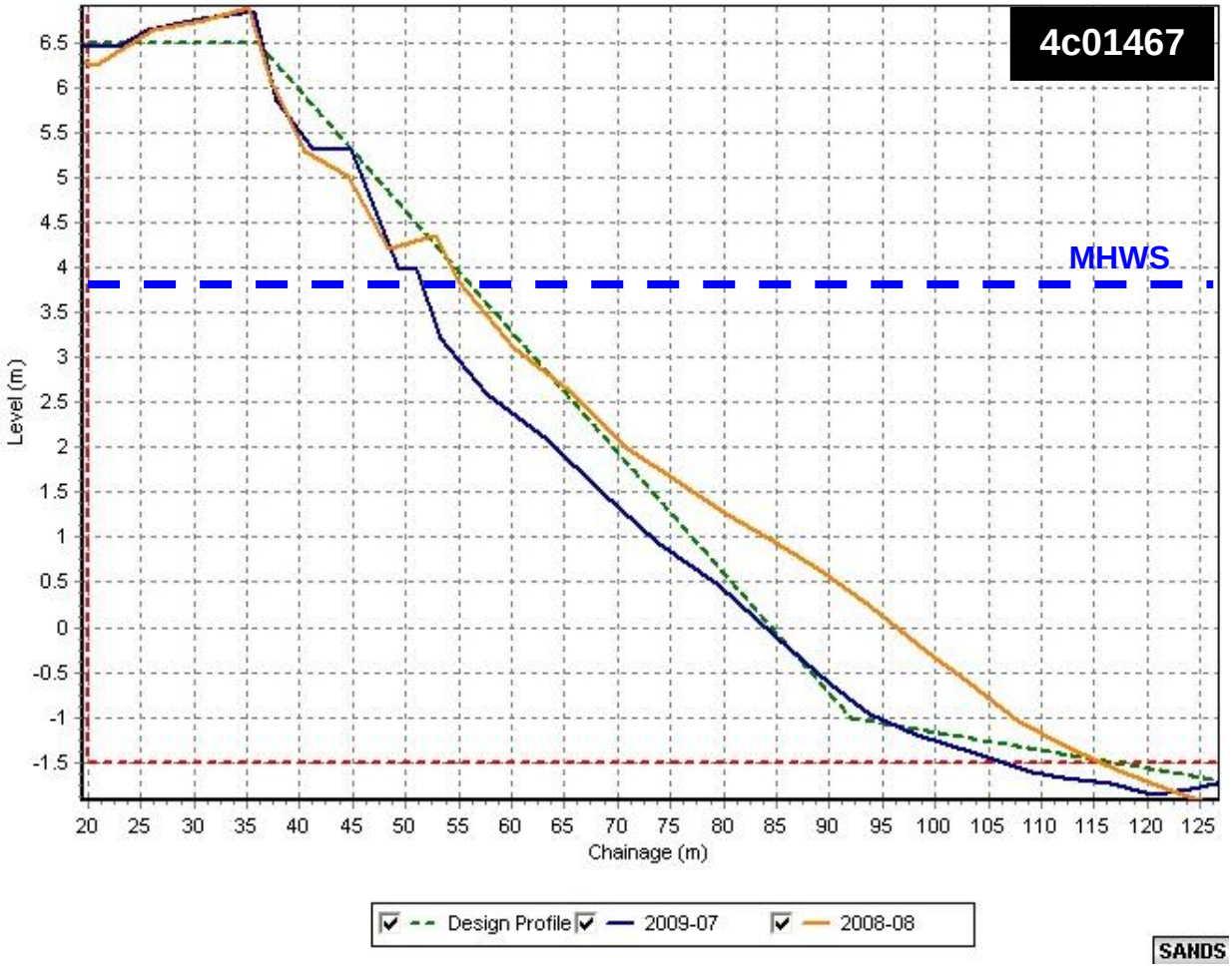


Figure 3.6: Profile 4c01467

3.4 Coastal Works

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 no large terminal structures, or areas that demonstrate consistent long-term accretion.

As part of the Bulverhythe Sea Defences project this management unit underwent a capital recharge of 94,500m³, and to our knowledge no further replenishment has taken place since the new baseline survey conducted in February 2006.

4.0 Long-Term Summary

There has been a net loss of over 733m³ (Table 4.1) across the management unit during the 2008-2009 reporting period. This is a relatively small volume when compared to the results of the previous survey where a net loss of 16,473m^3 was recorded, indicating that the beach may be returning to an equilibrium state.

Section 1 shows accretion; a reversal of the erosive trend observed in previous years, indicating that the beach volume in this area has stabilised behind the new Bulverhythe Sea Defences Project rock groynes. The increasing trend of loss in the adjacent MU26 Bexhill Section 6 (BMP53) has likely been a source of material for this accretion.

Section 2 has experienced both erosion and accretion since 2006, with a noteworthy comprehensive gain in material in the long-term. Contrary to this gain, the erosion observed in the most recent survey period (2008-2009) from the eastern extent of this section is extensive, and is of particular concern as beach volumes are already low. A substantial rock revetment along this section protects the coastline, however the beach performs an essential function in preventing the revetment for being undermined.

Section 3 has experienced gains in sediment; which is likely to be primarily driven by the losses in Section 2. Future beach volume in this section may stabilise or decrease if erosion in Section 2 is reduced or material reserves exhausted.

Section 4 is characterised by extensive erosion in the long-term, despite the accretion observed in the most recent reporting year. In total, this section has lost 17,643m^3 across eight polygons over the past three years,

Section 5 has experienced extreme erosion over the past reporting period, the losses that have occurred, though relatively high in comparison to the total beach volume, may be a result of the newly profiled beach adjusting to a natural equilibrium state. However, should loss continue to occur at the current rate, action will be required to safeguard the toe of the revetment.

The results and error estimates are summarised in Table 4.1. This table includes any replenishment that has been carried out since monitoring began.

Table 4.1: MU25 Long-Term Beach Volume Change Summary (2006 - 2009)

Polygon	Volume Change (m^3)			
	2006 - 2007	2007 - 2008	2008 - 2009	NET
1	-1,006	-4,433	1	-5,438
2	5,578	-1,045	2,538	7,071
3	7,497	-1,376	-1,094	5,027
4	2,639	-1,849	-871	-81
5	102	2,974	-3,112	-36
6	-164	3,032	-1,851	1,017
7	-3,187	5,034	674	2,521
8	-4,893	3,447	1,364	-82
9	-374	-59	23	-410
10	-1,048	845	-676	-879
11	-3,336	320	-322	-3,338
12	-4,062	-1,148	935	-4,275
13	-3,212	-1,475	1,173	-3,514
14	-6,634	-554	2,001	-5,187
15	-4,121	-543	3,597	-1,067
16	-1,421	-2,527	4,975	1,027
17	-121	-2,080	-1,185	-3,386
18	1,469	-2,231	-2,662	-3,424
19	4,659	-2,305	-3,356	-1,002
20	3,833	-3,942	-123	-232
21	10,903	-6,558	-2,762	1,583
NET	3,101m^3	-16,473	-733	-14,105

4.1 Performance Criteria

No performance criteria have been set for this management unit.

5.0 Wave Climate & Storm Events

The wave data is measured using a directional WareRider buoy in ~10mCD water depth in Pevensey Bay. This reporting year displayed a similar frequency and magnitude of storm events to the previous year. There were five storms that exceeded the 3m threshold during the reporting period, however none of these required a post-storm survey to be carried out.. Only one storm exceeded 3.5m, reaching a maximum Hs of 3.97m on 13 December 2008 (Figure 5.1). This was a significant event, not only at this location, but also at other sites further west along the Channel coast including at Hayling Island, Sandown Bay and Boscombe. Storm surges (at Newhaven) were negligible for the most part.

A detailed analysis of the wave climate for July 2008 to June 2009 is given in Annex C.

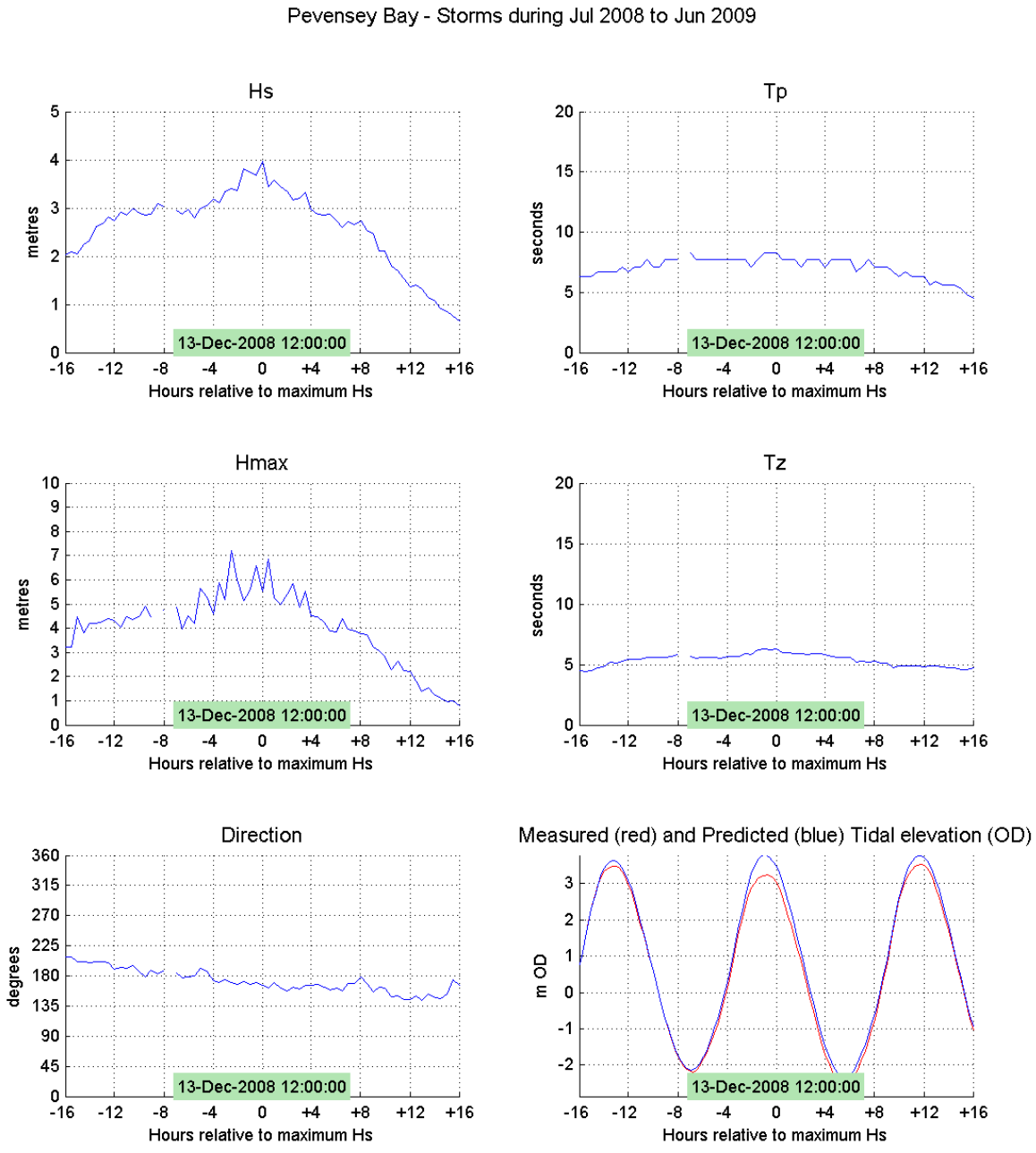


Figure 5.1: Pevensey Bay storm event 13/12/2008

Figure 5.2 shows the monthly time series of Hs for the months during which the storm threshold (shown in red) was exceeded.

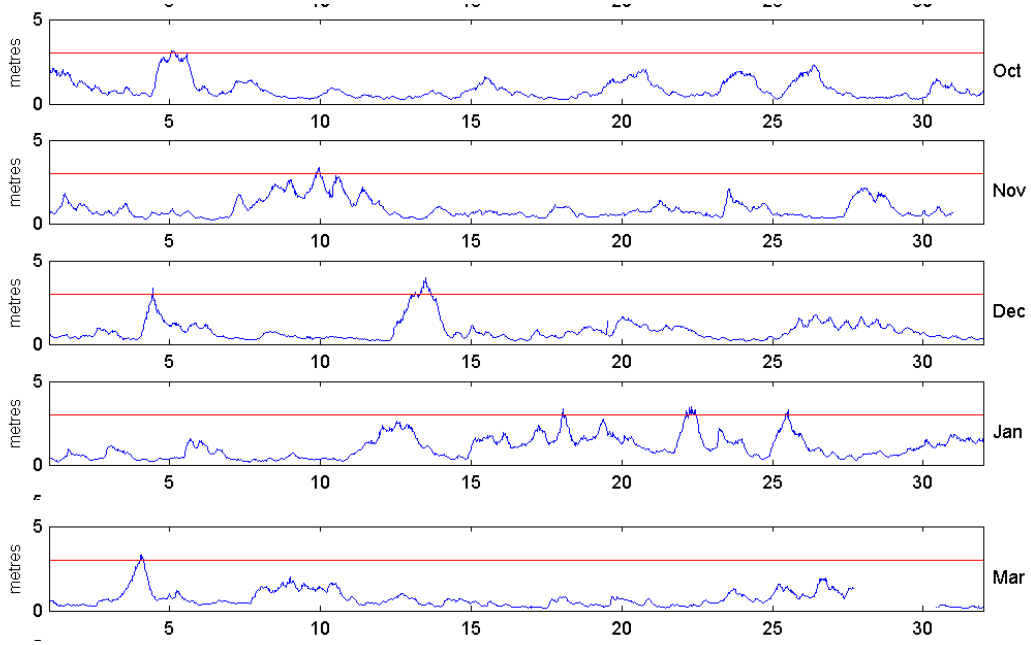


Figure 5.2: Monthly time series of Hs at Pevensey Bay

Blue Line – Significant wave Height (Hs)
Red Line – Storm Threshold (3.5m)
Green Line – Post-storm survey

The highest storm of the reporting period occurred on the 13th of December 2008. This storm was generated by a deep, complex, low pressure system (973 hPa) centred over the North Atlantic (Figure 5.3). The peak of the storm coincided with a spring tide High Water and was accompanied by a small negative surge (at Newhaven).

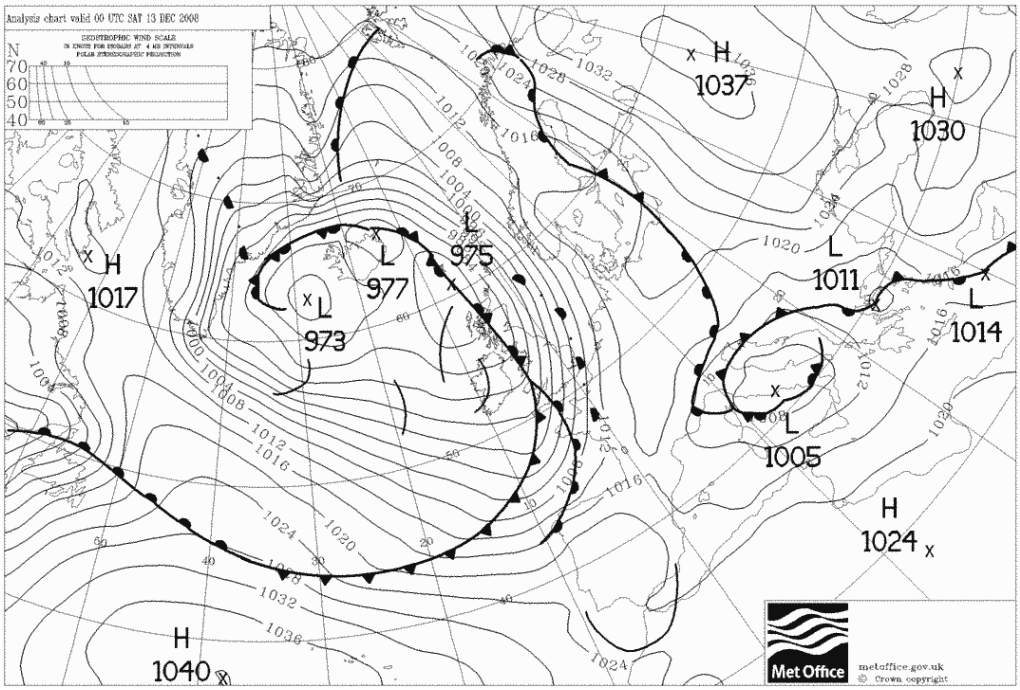


Figure 5.3: Surface Pressure chart on 13 December 2008 at 0001Z

6.0 Conclusion

The Bulverhythe coastline has lost 733m³ in the reporting period (2008 - 2009), with high levels of erosion and internal material redistribution between survey polygons.

The influx of material from MU26 (Bexhill) into MU25 (Bulverhythe) is likely to continue; however 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.

This reporting year displayed a similar frequency and magnitude of storm events to the previous year. There were five storm events during the reporting period that exceeded the storm threshold of 3m. However, none of these required a post-storm survey to be carried out.

Following the Bulverhythe Sea Defences Project the baseline for the Bulverhythe area has been re-set. 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 2009 and Spring 2010, 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 2010 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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Designated Profile Line
Intermediate Profile Line