Cover photograph: View west across Telscombe treatment works, East Sussex, July 2010. Brighton Marina is just visible in the middle ground, Brighton seafront in the sunshine.

U. Dornbusch
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1.0 Introduction

The analysis within this annual report aims to provide an overview of beach performance and wave and tidal measurements for North Kent (Isle of Grain to North Foreland), from the strategic regional coastal monitoring project, utilising data collected during the last recording year. Topographic surveys are conducted at all viable sites using land based RTK GPS in the spring and autumn of each year, covering pre-determined designated profiles at intervals along the coast. This report looks specifically at the difference between the latest survey set (Spring 2010) and the comparable data from Spring 2009.

All profile data was imported into SANDS® for analysis. This enables cross sectional areas (CSA) to be calculated providing a representative beach between a landward point, master profile and beach toe location (Figure 1.1). Where available, seawalls are located spatially using a combination of design schematics and a sea defence survey conducted in 2003. Master profiles are set at the beach toe level or mean low water, whichever is deemed most appropriate. In some areas clay levels have also been established using the results from trial holes dug in beach, these have been incorporated to produce a more accurate master profile that calculates the actual beach area.

![Figure 1.1: Definition of Cross Sectional Area (CSA)](image)

Data is presented at a number of scales, from an overview of the average change in each management unit, to changes and trends for profiles that have exhibited a significant change. The topographic analysis section of the report highlights notable changes, and areas for concern, for each of the management units. While this provides an accurate portrayal of current beach conditions and changes over the preceding year it should be stressed that these are only short-term trends. In order to view the results in a meaningful light they should be compared to the full data set for each location. To put these into context total change is also shown from the baseline survey (2003/2004) to the most recent Spring survey (2010).

Those areas that are designated beach management plan sites (Figure 1.2) benefit from a high-resolution beach plan survey every summer. These are utilised to produce a much more comprehensive beach analysis report, as such this report should be viewed as an interim update for those sites.
Figure 1.2: Management Unit Overview
2.0 Condition of Management Units

To provide an overview of the annual change in each management unit the average change in beach profile CSA is calculated for each unit. These averages are expressed in terms of percentage difference and actual change (m²) and are presented in Table 2.1.

Table 2.1: Management Unit Beach Change Summary (Spring 2009 – Spring 2010)

<table>
<thead>
<tr>
<th>Management Unit</th>
<th>No. of Profiles</th>
<th>Average Change (%)</th>
<th>Average Change (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A (west)</td>
<td>8</td>
<td>-5</td>
<td>-0.75</td>
</tr>
<tr>
<td>1A (east)</td>
<td>11</td>
<td>-1.8</td>
<td>-1.9</td>
</tr>
<tr>
<td>1B</td>
<td>4</td>
<td>0.2</td>
<td>-0.4</td>
</tr>
<tr>
<td>1C</td>
<td>4</td>
<td>-5.2</td>
<td>-10.8</td>
</tr>
<tr>
<td>2A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2B</td>
<td>12</td>
<td>2.4</td>
<td>2.7</td>
</tr>
<tr>
<td>2C</td>
<td>2</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>3A</td>
<td>12</td>
<td>-0.5</td>
<td>2.8</td>
</tr>
<tr>
<td>3B</td>
<td>7</td>
<td>-1.3</td>
<td>-0.6</td>
</tr>
<tr>
<td>3C</td>
<td>4</td>
<td>-1.75</td>
<td>-0.5</td>
</tr>
<tr>
<td>4A</td>
<td>18</td>
<td>0.7</td>
<td>0</td>
</tr>
<tr>
<td>4B</td>
<td>31</td>
<td>-0.3</td>
<td>-0.4</td>
</tr>
<tr>
<td>5A</td>
<td>18</td>
<td>-0.25</td>
<td>0</td>
</tr>
<tr>
<td>5B</td>
<td>9</td>
<td>3.4</td>
<td>0.8</td>
</tr>
<tr>
<td>5C</td>
<td>23</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>5D</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>5E</td>
<td>23</td>
<td>-0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>6A</td>
<td>9</td>
<td>5.7</td>
<td>3.8</td>
</tr>
<tr>
<td>6B</td>
<td>13</td>
<td>0.1</td>
<td>-0.4</td>
</tr>
<tr>
<td>6C</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

These results are also illustrated as coloured thematic maps in Figures 2.1 & 2.2. As with the detailed profile maps, the colour scheme illustrates erosion (red), accretion (blue) and no significant change (grey).

The results also reflect a short-term trend through just a snapshot in time, these figures can be viewed as a starting point, but individual profiles should be examined in those areas of interest. Crucially the significance of any results should be put in context with previous fluctuations in beach CSA since the start of the project in 2003, or even further back where reliable historic data exists.
Annual Change in Cross-Sectional Area (m²) (Spring 2009 - Spring 2010)

- **ACCRETION**
  - > 30%
  - 15 - 30%
  - 5 - 15%
  - Less Than 5%

- **EROSION**
  - 5 - 15%
  - 15 - 30%
  - > 30%

**Management Unit Boundaries**

**Annual Change in Cross-Sectional Area**

---

**Figure 2.1: Profile Summary**
Figure 2.2: Profile Summary
3.0 Profile Change Summary

Changes along individual profiles within each management unit are summarised in a series of thematic maps on the following pages. The maps show the location of each beach profile, superimposed on an aerial photograph (note the lines have been extended for clarity). Where possible the annual change in cross-sectional area (CSA) has been calculated from Spring 2009 to Spring 2010.

In order to put these changes in context thematic maps are also included illustrating the change from the first Spring survey in 2003/2004 and the most recent Spring survey (2010). These help to establish if recent changes in beach morphology are consistent with recent trends or an anomaly that has occurred in the past year.
Annual Change in Cross-Sectional Area (m²)
(Spring 2009 - Spring 2010)

- EROSION:
  - > 30%
  - 15 - 30%
  - 5 - 15%
  - Less Than 5%

- ACCRETION:
  - 5 - 15%
  - 15 - 30%
  - > 30%

CSA Change (m²)
Percentage Change -7% (-12)

Profile Name
Management Unit Boundaries

Profile Change Summary for Spring 2009 to Spring 2010 - 1 of 2
SECG - Grain Village
Annual Change in Cross-Sectional Area (m²)
(Spring 2009 - Spring 2010)

- 4a0001: -7% (-12)
- Management Unit Boundaries

Profile Name

Percentage Change

- Erosion:
  - > 30%
  - 15 - 30%
  - 5 - 15%
  - Less Than 5%
  - 5 - 15%
  - 15 - 30%
  - > 30%

- Accretion:
  - > 30%
  - 15 - 30%
  - 5 - 15%
  - Less Than 5%

- No Change

Profile Change Summary for Spring 2009 to Spring 2010 - 2 of 2

SECG - Whitstable
Profile Change Summary for Spring 2004 to Spring 2010 - 2 of 2

SECG - Grain Village
4.0 Hydrodynamic Data

Herne Bay Step Gauge

Location
OS: 616870E 169390N
WGS84: Latitude: 51° 22' 55.5"N  Longitude: 01° 06' 54.66"E

Water Depth
~0.5m CD

Instrument Type:
Etrometa Step Gauge

Data Quality

<table>
<thead>
<tr>
<th>C1(%)</th>
<th>Sample interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>20 minutes</td>
</tr>
</tbody>
</table>

Monthly Means

All times GMT

<table>
<thead>
<tr>
<th>Month</th>
<th>Hs</th>
<th>Tp</th>
<th>Tz</th>
<th>Direction</th>
<th>SST</th>
<th>No. of days</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>0.16</td>
<td>6.5</td>
<td>2.9</td>
<td>-</td>
<td>-</td>
<td>29</td>
</tr>
<tr>
<td>May</td>
<td>0.21</td>
<td>3.3</td>
<td>2.8</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>June</td>
<td>0.20</td>
<td>3.2</td>
<td>2.8</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>July</td>
<td>0.14</td>
<td>2.7</td>
<td>2.6</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>August</td>
<td>0.12</td>
<td>2.6</td>
<td>2.5</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>September</td>
<td>0.27</td>
<td>3.1</td>
<td>2.8</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>October</td>
<td>0.20</td>
<td>3.4</td>
<td>2.8</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>November</td>
<td>0.17</td>
<td>2.9</td>
<td>2.7</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>December</td>
<td>0.27</td>
<td>3.4</td>
<td>2.8</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>January</td>
<td>0.27</td>
<td>5.0</td>
<td>3.0</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>February</td>
<td>0.28</td>
<td>4.7</td>
<td>3.0</td>
<td>-</td>
<td>-</td>
<td>27</td>
</tr>
<tr>
<td>March</td>
<td>0.21</td>
<td>3.3</td>
<td>2.7</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
</tbody>
</table>

Tables and plots of these values, together with the minimum and maximum values and the standard deviation are available on the website

Highest events in 2009/10

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Hs</th>
<th>Tp</th>
<th>Tz</th>
<th>Water level elevation (OD)</th>
<th>Tidal stage (hrs re: HW)</th>
<th>Tidal range (m)</th>
<th>Tidal surge* (m)</th>
<th>Max. surge* (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>07-Jan-2010 05:00</td>
<td>2.02</td>
<td>-</td>
<td>7.6</td>
<td>2.21</td>
<td>HW</td>
<td>5.66</td>
<td>-0.15</td>
<td>-0.45</td>
</tr>
<tr>
<td>09-Jan-2010 18:20</td>
<td>1.84</td>
<td>6.1</td>
<td>4.7</td>
<td>1.69</td>
<td>HW -1</td>
<td>3.23</td>
<td>-0.30</td>
<td>-0.42</td>
</tr>
</tbody>
</table>

* Tidal information is obtained from the nearest recording tide gauge (the Step Gauge also records tidal elevation). The surge shown is the residual at the time of the highest H_s. The maximum tidal surge is the largest positive surge during the storm event.
Distribution plots

The distribution of wave parameters is shown in the accompanying graphs of:
- Percentage of occurrence of $H_s$, $T_p$, and $T_z$ from April 2009 to March 2010
- Monthly time series of significant wave height (the red line is the storm threshold)
- Incidence of storms during the reporting period and all previous years. Storms are defined using the Peaks-over-Threshold method. The highest $H_s$ of each storm is shown.

Summary

This reporting year was relatively uneventful in terms of storm frequency, with only 2 events exceeding the 1.6m storm threshold. However the largest event of the year on 07 January 2010 was a significant storm since waves of 2.02m $H_s$ occurred around High Water.

General

The Step Gauge was deployed on 19 March 1996. The top section of the gauge was damaged during this reporting year. The intermittent fault is still under investigation.

Acknowledgements

TASK2000 tidal prediction software was kindly provided by the Permanent Service for Mean Sea Level (PSMSL), Proudman Oceanographic Laboratory.
Figure 4.1: Percentage of occurrence of Hs, Tp, Tz & Direction (April 2009 - March 2010)
Figure 4.2: Hs at Herne Bay April 2009 to March 2010
Figure 4.3: Storms at Herne Bay from April 2009 to March 2010
5.0 Topographic Analysis

This section describes any significant changes that have taken place in each unit, highlighting any areas of concern, and putting the results in context with previous surveys. Where appropriate, different survey plots are super-imposed to illustrate the changes described in the text.

5.1 Isle of Grain

5.1.1 MU1A West (Profiles Te09468 – Te09500)
This section has been monitored since spring 2008; therefore a long term analysis is unavailable. The short term trend is erosive; however the largest loss is 14% (2m²) at Profile Te09479. This is because the beach levels here are fairly low so a small loss equates to a significant percentage. The majority of the beach experienced little to no change.

5.1.2 MU1A East / MU1B (Profiles 4a00001 – 4a00099)
Volumetric change within this section is minimal. This section lacks any influential sea defences so the beach behaviour illustrated is primarily the natural response to wave action. The short term trend indicates no significant change for this section with all profiles displaying a less than 5% change; subsequently, less than 5m² actual change. With the exception of one, all profiles indicated a net loss during 2009 – 2010. This management unit has fewer profiles that display change since 2003/04 as not all the profiles were surveyed until 2008. The profiles monitored over a longer time period indicate low volumetric changes, with one exception 4a00036 which lost 7% (10m²). Figure 5.1 illustrates the loss to be spread across the mid beach, whilst the main crest has moved up the beach face.

Figure 5.1: Profile 4a00036 Allhallows

MU1B lost material during 2009 – 2010 towards the north section of the management unit, and gained material south of the change in coastal orientation. The largest loss amounted to 14% (-4m²) at Profile 4a00065. The largest gain was calculated at Profile 4a00086 at 8% (2m²). These values are relatively small and not greatly significant.
5.1.3 MU1C (Profiles 4a00100 – 4a00141)
The short term trends for 2009-2010 indicate larger volumes of movement than have previously been experienced. The largest percentage change was 10% (7m²) at Profile 4a00114; however the largest actual change is a loss of 7% (21m²) located on Profile 4a00134, towards the south of the management unit, entering the Swale Estuary.

This local pattern is not reflected in the longer term trends, as the majority of profiles indicate no change. The only exception is Profile 4a00114 which maintained its short term trend, the largest loss, with 11% (8m²), during 2004 and 2010.

5.2 Isle of Sheppey

5.2.1 MU2A (n/a)
Sheerness Docks is the main feature within this management unit and as a result no topographic beach surveys are undertaken in this unit.

5.2.2 MU2B (Profiles 4a00142 – 4a00281) & MU2C (Profiles 4a00282 – 4a00295)
Most profiles along this frontage are typified by relatively low beach levels, with crest heights in the region of 1-3m ODN. Most of MU2C is composed of soft cliff, and is not part of the topographic survey programme. However, four profiles are surveyed within this unit.

During 2009-2010 management unit 2B has remained relatively stable with accretion being the dominant trend. The highest volume of accretion is seen at Profile 4a00153 (9m²/6%). Two adjacent profiles, central in the unit, indicated a loss of material. The long term pattern mirrors that of the short term, as all profiles bar three adjacent profiles have eroded, and the largest gain of material was measured, again, at Profile 4a00153 (32m²/37%). The western end of MU2B is characterised by groyne bays, explaining the trend of greater accretion in the west over both the past year and since 2004. Figure 5.2 indicates the growth of material for the most accretive profile in both the short and long term; accretion is visible across the majority of the cross section, however it indicates a slight loss towards the beach toe.

![Figure 5.2: Profile 4a00153 Sheerness](image)

MU2C displays no significant changes for either the short or long term trends.
5.2.3 MU3A (Profiles 4a00333 – 4a00431)

Along this section of coast a number of management structures are currently in place. The cliffed section of the Warden village has a toe defence structure, which limits but does not prevent erosion. The low-lying section of Warden is currently defended by a concrete seawall. At 'The Bay' there is a secondary defence (clay bund), whilst at Leysdown-on-Sea there is a concrete seawall and 25m spaced timber groynes.

Beach change in this unit is split by type of defence, as seen during the most recent recording year this management unit has become divided by very significant and those of lesser significant changes. The north-west section has experienced both large gains and losses, whereas the south-east section appears to have experienced minimal changes. This can be explained by the presence of groynes in the south-east and a lack of influential defence towards the north-east. The larger changes are located in longer stretches of beach. The largest loss and gains can be seen adjacent to each other. The largest percentage gain is at Profile 4a00345 (18%/3m²); however the largest actual gain was further along the coast at Profile 4a00362 (11%/47m²). The largest loss was experienced at Profile 4a00357 (35%/13m²). The less significant changes vary between no change and less than +/- 5m².

The long term changes (2004-2010) have indicated a more varied trend; the majority of the larger volume changes are located towards the north-east, however the losses such as 23%/11m² can be seen at Profile 4a00442. The main difference between the long and short term trends is found at Profile 4a00345, in the long term it experienced a 23%/6m² loss; however, as previously mentioned, the short term experienced a net gain. Figure 5.3 illustrates the beach profiles for the three years. 2010 appears incorrect, however scaling down the graph increases clarity of a 0.6m ridge formed at MHWS.

Figure 5.3: Profile 4a00345 Warden Bay
5.2.4 MU3B (Profiles 4a00433 – 4a00491)
This management unit is fairly heavily groyne along its frontage, possibly accounting for the observations of slight volumetric change of less than +/-5m². The most significant change is located at Profile 4a00454 which lost 8% (4m²). During the most recent recording year the average actual change is -0.6m².

The long term trends demonstrate greater values which are predominantly erosive. Two profiles display change less than +/- 5m² and two displays a stronger accretive trend.

5.2.5 MU3C (Profiles 4a00493 – 4a00515)
MU3C is located on the end of the spit at Shellness, and as such is more dynamic than the previous management units. The volumetric change during 2009 to 2010 is accretive with one profile displaying erosive trends. The long term average trend for this section is also accretive; a trend dominated by one profile with a large gain. Profile 4a00514 gained 57% (43m²) since 2004. Of four profiles only one eroded in this unit.

Figure 5.4 demonstrates the extent of the accretion visible at Profile 4a00514. The main beach slope has closely maintained its gradient however advanced by 12m in parts since 2004. Within the last year the slope has advanced 1m in total. The foreshore has changed considerably over the long term however not so significantly in the short term.

Figure 5.4: Profile 4a00514 Harty Ferry
5.3 Canterbury District

5.3.1 MU4A (Profiles 4a00539 – 4a00677)
Seasalter beach is not a sediment rich beach, particularly towards the western half which is reflected in the annual volumetric change. Three profiles along this section have gained or lost more than 5% or 5m$^2$, suggesting beach behaviour is relatively stable. The largest gain for 2009-2010 is Profile 4a00562 which gained 19%, the actual CSA gain is 3m$^2$. The western section is predominantly accretive, partially due to the longshore drift direction being east to west.

The dominant trend for the east of the management unit is erosive. The largest loss is the most eastern profile which lost 20% (7m$^2$); the most likely explanation for this considers the east to west longshore drift as a concrete structure divides MU4A and MU4B, preventing material from entering the management unit.

The long term trend follows a similar pattern to the aforementioned, however the values are increased. The western section illustrates the largest actual gain is located at Profile 4a00554 at 47% (17m$^2$). The largest loss is located central to the management unit, Profile 4a00593; 25% (16m$^2$). Profile 4a00675 lost a similar value to that displayed in the short term (-21%, -7m$^2$). Figure 5.5 indicates the losses experienced at Profile 4a00675, the long term trend appears highly influenced by the short term trend as 2003 and 2009 have similar values which would have previously meant the long term trend here was stable. This area may be of interest next year to see if it recovers or loses further material.

Recharge is scheduled within this management unit for October 2010 aiming to deposit material in front of the houses on Faversham Road and the Sportsman public house.
5.3.2 MU4B (Profiles 4a00676 - 4a00801)
Whitstable beach is heavily groyned throughout in attempt to reduce littoral drift and maintain the beach levels and ability to defend the low lying coast behind. The short term trend indicates their continued success as not one profile lost or gained more than 4\(\text{m}^2\). Translated into percentage the largest loss is located at Profile 4a00743 (7\%/4\(\text{m}^2\)), which is explained by the introduction of the groyne (2006) used to trap sediment travelling east to west in this section. Before the groyne was added to this frontage the east side was heavily erosive and the west side was fairly stable due to the influx of material down drift. The groyne has seen a stabilisation of the eastern side of the groyne and a loss of material west of the groyne.

The knock on effect can be seen at Profile 4a00742 and 4a00743 as they are both down drift of the groyne; losing 17\% (12\(\text{m}^2\)) and 21\% (13\(\text{m}^2\)) respectively. Figure 5.6 illustrates the receding beach face since the works were completed in 2006. The loss of material is mirrored in the longer term trend. Due to the change in sediment dynamics and nature of the beach in this area, long-term comparisons and recommendations can only be made from Autumn 2006 to Spring 2010.

![Graph showing beach profile with a 6m retreat](image)

Figure 5.6: Profile 4a00743 Whitstable

Profile 4a00744A to 4a00747A was previously a highly problematic area before 2006, but now demonstrates high stability as the majority of these profiles indicate no change. The longer term changes are varied within this section with some gaining and several losing material.

The most eastern section of the management unit has little to less than 1\% change since 2009, and in the longer term exhibits percentage change of +/-5\%. 
5.3.3 MU5A (Profiles 4a00802 – 4a00904)

There have been two sets of works carried out in MU5A since monitoring began in 2003. The third phase of the Tankerton coastal defence works, stretching from the sailing club to the mouth of Swalecliffe brook, was completed in the summer of 2004. In addition, as part of the 2006 Whitstable scheme, new groynes, a ramp and a small amount of recharge were carried out east of Whitstable harbour. Profile 4a00811A was subsequently introduced to replace 4a00811; and as a result uses data from 2006 onwards. It currently displays 0% loss and 0m². Similarly, profiles 4a00869 to 4a00884 were affected by the 2004 coastal works; leading the profiles to also display 0% change and 0m² change so have been removed from the longer time period trends.

During 2009 – 2010 the overall short term trend is an erosive one; however the average loss is only 0.25% and within the whole management unit the losses and gains average 0m² change. This suggests the beach behaviour is confined to the sub cell, partly due to the harbour wall to the west and the protruding headland at the east. The largest loss and gain are located at the west of the unit, Profile 4a00804 gained 12% (16m²) and Profile 4a00808 lost 6% (13m²). Figure 5.7 illustrates the gain of material across the majority of the cross section at the western-most profile.

![Figure 5.7: Profile 4a00804 Tankerton](image)

The majority of the profiles exhibited no large changes suggesting the groyne field, which covers most of the management unit is keeping the material in place.

The long term trend is fairly stable; however values are increased in relation to the short term. The largest gains and losses reach 10%, mostly located towards the western end. The largest gain is at Profile 4a00891 (17%/8m²) (Figure 5.8).
Coastal works are being undertaken in September 2010, which will remove three groynes west of the Swale Brook, excavate approximately 3,000m$^2$ from the mouth as it has silted up and transport the majority of this extracted material to neighbouring management unit 5B. Figure 5.8 illustrates the longer term trend for Profile 4a00891, a designated profile close to the mouth of the Swale Brook. This location is renowned for heavily accreting and is subject to regular recycling. As seen in the diagram the foreshore has risen significantly over the years, by up to 0.4m.

5.3.4 MU5B (Profiles 4a00905 – 4a00967)
This section runs between Hampton Pier and Long Rock, backed by a sea wall and dense groyne field. The dominant sediment flow is east to west; however the presence of Hampton Pier hinders this movement. The profiles within this section display a varied trend, with some profiles gaining 20% (Profile 4a00946). The largest loss is located at Profile 4a00929 (11%/8m$^2$). The long term trend indicates similar volumes of gains and losses.

5.3.5 MU5C (Profiles 4a00970 – 4a01148)
Extending from Hampton Pier to Bishopstone Cliffs, most of this unit encompasses the Herne Bay frontage. Regular recycling is conducted along this coastline, predominantly within the breakwater arm, with most material being placed by the pier and westwards of this point. The works also incorporate some recognition of the beach for aesthetic and recreational purposes; as a result this work is typically carried out in the spring prior to the summer season.
In comparison to previous years records 2009-2010 has been a fairly active year in terms of beach behaviour. The levels of erosion and accretion vary considerably across the frontage, Table 2.1 indicates an average gain of 1.5% and 2m², which does not convey the large changes that some of the profiles have undergone. Profile 4a00970 accreted 28% (32m²) in just one year; the largest of the unit (Figure 5.9). This profile is the most western profile in the unit and therefore in prime position to accrete material due to the presence of the terminal structure. The second largest accretion volume is seen at Profile 4a01036 which gained 22% (32m²). This is most likely due, again, to its positioning just east of a terminal structure which traps sediment travelling east to west.

![Figure 5.9: Profile 4a00970 Herne Bay](image)

The largest losses are located at Profile 4a01040 and Profile 4a01089, 18%/21m² and 25%/22m² respectively. Both of these profiles are situated west of an effective section of groyne field. Although this frontage is all groyned, there are sections where the groynes are subject to overtopping as the majority of the groyne is buried in shingle.

The long term trend is different to that of the short term, for instance the long term indicates fairly active behaviour within the harbour arm, as neighbouring profiles lose and gain 10% and 8% respectively. This corresponds to the regular need for Spring-time recycling within the harbour arm.

The west section of the unit appears relatively stable, for a trend of 6 years. The eastern section displays large gains at Profile 4a01036 (25%/36m²), which mirrors the short term trend. However; Profile 4a01089, the highest loss in short term, is not so high in the long term; indicating natural fluctuation between accretion and erosion. The loss is displayed in Figure 5.10; emphasising the greater loss over the short term.
5.3.6 MU5D (Profiles 4a01149 – 4a01175)
This management unit is surveyed at the beginning of every phase; once in 2003 and 2007. A short term and long term analysis are unavailable.

5.3.7 MU5E (Profiles 4a01180 – 4a01298)
Stretching from the Reculver Towers to Minnis Bay, this section of coastline was heavily recharged in 1997, with the addition of a several large rock groynes at 200m intervals. Beach monitoring has been conducted since the scheme completion. A reoccurring feature within the western section of this management unit is cliffing. The shingle/sand composition has lead to the persistent erosion of the beach; highlighted in Figure 5.11, where the largest retreat is 7m.

During 2009 and 2010 the average actual volumetric change is 0.7m$^2$ however the percentage change is negative (0.7%), this is due to the larger negative % in relation to m$^2$ and the larger positive m$^2$ and which accounts for a low %. The largest loss is a Profile 4a01185 (34%/8m$^2$). The largest gain is at neighbouring Profile 4a01188 (29%/33m$^2$).

The long term trend is largely erosive at the western end of the management unit, with the largest loss being 40% (10m$^3$) at Profile 4a01185. The largest gain is located at the east of the management unit, totalling 46% (33m$^3$) at Profile 4a01265. The long term mirrors the short term, however total volumes are exacerbated. The pattern is fairly similar with the exception of a few profiles, which may have low positive values in the short term but switch to negative in the long term.
5.4 North Thanet

5.4.1 MU6A (Profiles 4a01299 – 4a01338)
Comprising Minnis Bay, and marking the Thanet district boundary, this management unit forms a transition to predominantly sand beaches. As a result, beach gradients are typically a lot shallower. Beach recycling is not necessary within this management unit due to the pocket beach characteristics; however regular regrading of the beach face occurs through the use of heavy machinery.

During 2009 and 2010 every profile accreted; bar one which demonstrated no change. The largest gain was the most western profile, which is most likely due to the terminal structure to the west.

The long term trend does not reflect the short term records, as the most accretive trend is seen to be the most eastern profile which accreted 24% (4m²). Two profiles towards the west of the management unit lost material; the highest loss was 15% (18m²) at Profile 4a01304.

5.4.2 MU6B (Profiles 4a01359 – 4a01441)
The two pocket beaches at Westgate-on-Sea, in the west of the unit, have relatively low beaches with the beach crest at the seawall typically below 2m ODN. Beach recycling is not necessary within this management unit due to the pocket beach characteristics; however regular regrading of the beach face occurs through the use of heavy machinery. During the most recent year 2009-2010 the average % gain is 0.1 and the average actual difference is a 0.4m² loss. The erosion and accretion values cancel each other out.
Both the short and long term trends suggest the west pocket beach to predominantly erode and the eastern pocket beach to predominantly accrete. No changes were of great significance.

The larger stretch of beach, to the east of the pocket beaches indicates a varied trend, with half the profiles gaining and half losing material. The longer trend indicates more stability, with the overall trend being accretive.

5.4.3 MU6C (n/a)
No topographic beach surveys are conducted in this unit.