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

Analysis in this annual report provides an overview of beach performance and wave and tidal measurements for East Kent (North Foreland to Dover Harbour), from the strategic regional coastal monitoring project, over the last year of data collection. 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 2007. Master profiles are set at the beach toe level or mean low water, which ever 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.

Data is presented at a number of scales, from an overview of the average change in each Management Unit (MU), to changes and trends for each individual profile. The topographic analysis section of the report highlights notable changes, and areas for concern, for each of the MUs. 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.

Those areas that are designated beach management plan sites (Management Units 8C & 9A) 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.
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 for the past year. An overview of all profiles surveyed and the changes on each profile is given in Figure 2.1.

<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>7A</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>7B</td>
<td>8</td>
<td>12</td>
<td>-12</td>
</tr>
<tr>
<td>8A</td>
<td>2</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>8B</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>8C</td>
<td>41</td>
<td>2</td>
<td>4.8</td>
</tr>
<tr>
<td>9A</td>
<td>39</td>
<td>-1.1</td>
<td>-3.3</td>
</tr>
<tr>
<td>9B</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>9C</td>
<td>3</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>01</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.
Figure 2.1
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 ortho-rectified aerial photography flown in 2008 (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.
Profile Change Summary for Spring 2009 to Spring 2010 - 1 of 2

SECG - Ramsgate Harbour
Profile Change Summary for Spring 2004 to Spring 2010 - 1 of 4
### 4.0 Hydrodynamic Data

**Location; Deal Pier Wave Radar**

OS: 638145E 152700N


**Water Depth**

N/A

**Instrument Type**

Rosemount WaveRadar Rex

**Data Quality**

<table>
<thead>
<tr>
<th>C1(%)</th>
<th>Sample interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>20 minutes</td>
</tr>
</tbody>
</table>

**Monthly Means**

All times GMT

<table>
<thead>
<tr>
<th>Month</th>
<th>Hs (m)</th>
<th>Tp (s)</th>
<th>Tz (s)</th>
<th>Direction (°)</th>
<th>SST (°C)</th>
<th>No. of days</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>0.33</td>
<td>8.6</td>
<td>3.5</td>
<td>-</td>
<td>-</td>
<td>29</td>
</tr>
<tr>
<td>May</td>
<td>0.41</td>
<td>8.2</td>
<td>3.7</td>
<td>-</td>
<td>-</td>
<td>28</td>
</tr>
<tr>
<td>June</td>
<td>0.36</td>
<td>8.0</td>
<td>3.8</td>
<td>-</td>
<td>-</td>
<td>29</td>
</tr>
<tr>
<td>July</td>
<td>0.33</td>
<td>8.0</td>
<td>3.7</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>August</td>
<td>0.27</td>
<td>8.5</td>
<td>3.5</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>September</td>
<td>0.47</td>
<td>8.2</td>
<td>3.8</td>
<td>-</td>
<td>-</td>
<td>27</td>
</tr>
<tr>
<td>October</td>
<td>0.45</td>
<td>7.9</td>
<td>3.9</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>November</td>
<td>0.65</td>
<td>8.2</td>
<td>4.5</td>
<td>-</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>December</td>
<td>0.59</td>
<td>8.0</td>
<td>4.1</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>January</td>
<td>0.52</td>
<td>8.3</td>
<td>4.0</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>February</td>
<td>0.54</td>
<td>8.5</td>
<td>4.1</td>
<td>-</td>
<td>-</td>
<td>28</td>
</tr>
<tr>
<td>March</td>
<td>0.43</td>
<td>8.3</td>
<td>3.8</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 (m)</th>
<th>Tp (s)</th>
<th>Tz (s)</th>
<th>Water level elevation (OD)</th>
<th>Tidal stage (hours re. HW)</th>
<th>Tidal range (m)</th>
<th>Tidal surge* (m)</th>
<th>Max. surge* (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-Jan-2010 18:00</td>
<td>2.13</td>
<td>9.3</td>
<td>5.0</td>
<td>-</td>
<td>1.28</td>
<td>HW +2</td>
<td>3.10</td>
<td>-0.25</td>
</tr>
<tr>
<td>12-May-2009 00:00</td>
<td>1.97</td>
<td>8.3</td>
<td>5.1</td>
<td>-</td>
<td>2.23</td>
<td>HW -1</td>
<td>4.58</td>
<td>-0.12</td>
</tr>
<tr>
<td>11-Feb-2010 09:20</td>
<td>1.89</td>
<td>8.7</td>
<td>5.2</td>
<td>-</td>
<td>1.97</td>
<td>HW</td>
<td>3.60</td>
<td>0.20</td>
</tr>
<tr>
<td>16-Sep-2009 20:20</td>
<td>1.68</td>
<td>7.8</td>
<td>4.9</td>
<td>-</td>
<td>2.15</td>
<td>HW -2</td>
<td>4.56</td>
<td>0.14</td>
</tr>
</tbody>
</table>

* Tidal information is obtained from the nearest recording tide gauge (the wave radar also provides tidal elevations). 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 characterised by a high frequency and magnitude of events over the 1.5m storm threshold. These spanned a large proportion of the year from September to March. In particular, the 2.13m $H_s$ measured on 09 January 2010 was the highest since deployment of the gauge in 2006.

General
This Rex was inoperable for several periods during this reporting year due to the major refurbishment of Deal Pier.

Acknowledgements
TASK2000 tidal prediction software was kindly provided by the Permanent Service for Mean Sea Level (PSMSL), Proudman Oceanographic Laboratory.
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 plots of different surveys are overlaid and included to illustrate the changes described in the text.

5.1 East Thanet

5.1.1 MU7A

No topographic beach surveys are conducted in this unit.

5.1.2 MU7B (Profiles 4b00027 – 4b00073)

Two pocket beaches are monitored within this unit, Viking Bay towards the north, and Ramsgate Sands in the south. Profiles along the Viking Bay frontage have mixed results for the last year of monitoring. Two profiles exhibit a gain of beach material, with Profile 4b00038 showing the highest percentage increase (271%, 9m², Figure 5.1). This is significant as although only 9m² was gained; this is nearly three times the total Cross-Sectional Area (CSA) of the profile. However, the longer term trend illustrates a 74% (5m²) gain suggesting this is a short term observation. The most significant erosion and accretion trends occurred in the southern half of the bay, possibly because they are more exposed than the northern half of the bay.

![Figure 5.1: Profile 4b00038](image)

Ramsgate Sands is characterised by erosive trends, which increase in magnitude towards the north of this section, although they decrease in magnitude with respect to CSA changes. Profile 4b00061 experienced the greatest Cross – Sectional Area (CSA) change (-24m²), whilst Profile 4b00057 saw the largest percentage loss (-72%).
Since monitoring began in 2004, half of the designated profiles in MU7B displayed accretionary trends, and the other half experienced erosion. There is a clear north/south divide in these trends, with Viking Bay accreting and Ramsgate Sands eroding. Profile 4b000057 (Figure 5.2) gained material between 2004 & 2009, but over the past year has lost more material than had been gained since 2004, and is now up to 0.2m lower than the original beach elevation.

![Figure 5.2: Profile 4b000057](image)

### 5.1.3 MU8A (Profiles 4b00086 – 4b00093)
Two profiles are monitored along the small beach west of Ramsgate Harbour; both showing a very small reduction in material over the past year of <2% (<3m³). Over the past five years, the trend is mixed, as the eastern profile gained material, (3%, 5m³) and the western profile lost material (-5%, -5m³). However, no significant changes in profile CSA occurred.

### 5.1.4 MU8B
No topographic beach surveys are conducted in this unit.

### 5.2 Pegwell Bay to Dover Harbour

#### 5.2.1 MU8C (Profiles 4b00122 – 4b00361)
This unit covers an 8.5km length of undefended frontage. Over the past year, the majority of profiles exhibited a change lower than +/-5%, which is within the bounds of seasonal variation. However, there are some exceptions, including Profiles 4b00358, 4b00360 and 4b00361, fronting Sandown Castle at the southern end of the unit, that have gained 6% (9m³), 17% (37m³) and 29% (45m³) respectively. Figure 5.3 illustrates that Profile 4b00361 gained material over the entire beach face, although the current profile elevation is still lower than the 2004 profile elevation.
Since the first baseline survey in 2004, there has been a greater degree of change in beach levels along MU8C. The predominant beach pattern here is one of accretion, as all bar a handful of profiles have gained material since 2004. The largest gains are experienced within the northern extents of the Management Unit, especially on Profiles 4b00139 (35%, 92m³) and 4b00147 (38%, 88m³). Figures 5.4 & 5.5 indicate the spatial pattern of change, with gains occurring in linear bands along the beach face. These gains are consistent with the dominant drift direction and the location of the profiles, on an actively prograding spit.
5.2.2 MU9A (Profiles 4b00362 – 4b00540)
In 2009-2010, there has been little significant change, with most profiles experiencing movement of \(<\pm 5\%\). The main area of short-term change is in Oldstairs Bay, at the southern end of MU9A. Both significant accretion and erosion occur, although accretion is more prevalent, especially on Profile 4b00539 (39\%, 17m²).

However, since monitoring began in 2004, significant change in profile CSA has become more widespread. This has characterised isolated profiles in the north of MU9A, although it is again the southern part of the management unit where the most significant changes have occurred. Oldstairs Bay is characterised by accretion, which is most noticeable on Profile 4b00539 (Figure 5.6). Most of the accretion on this profiles has occurred on the lower beach face and foreshore, with levels generally higher than those in 2004.

The section of coastline immediately north of Oldstairs Bay, from Profiles 4b00499 – 4b00516 is characterised by extensive erosion, as typified by Profile 4b00514 (Figure 5.7). Material has been lost from the upper beach face, where the berm has been flattened. Beach levels continue to be up to 1m lower than in 2004. The reason for the concentration of erosion in this area may be due to a change in shoreline orientation, as this area extends further seawards than the coastline to the north and south of Kingsdown.
Figure 5.6: Profile 4b00539

Figure 5.7: Profile 4b00514
5.2.3 MU9B

No topographic beach surveys are conducted in this unit.

5.2.4 MU9C (Profiles 4b00563 – 4b00475)

Of the three designated profiles in MU9C, the two northern profiles lost material during 2009-2010, and the southern profile gained beach material, a pattern repeated from the previous year. However, the long-term trend indicates that the northern and southern profiles accreted, whilst the central profile experienced erosion. The magnitude of change in MU9C is not especially significant, with percentage changes of <9%.

5.2.3 MU01

No topographic beach surveys are conducted in this unit.