Cover photograph: South Foreland cliffs
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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 2014) and the comparable data from Spring 2013.

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.

![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 Survey Unit (SU), 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 (Survey Units 05 & 06) 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 Survey Units

To provide an overview of the annual change in each survey 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 (m$^2$) 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>Survey Unit</th>
<th>Designated Profiles</th>
<th>Average Change (%)</th>
<th>Average Change (m$^2$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4bSU01 – North Foreland</td>
<td>6</td>
<td>-0.66</td>
<td>5.66</td>
</tr>
<tr>
<td>4bSU02 – Broadstairs</td>
<td>16</td>
<td>58.38</td>
<td>-1.19</td>
</tr>
<tr>
<td>4bSU03 – Ramsgate</td>
<td>2</td>
<td>-6.5</td>
<td>-4.5</td>
</tr>
<tr>
<td>4bSU04 – Pegwell Bay</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>4bSU05 – Sandwich</td>
<td>42</td>
<td>1</td>
<td>2.91</td>
</tr>
<tr>
<td>4bSU06 – Deal &amp; Kingsdown</td>
<td>43</td>
<td>-7.86</td>
<td>-14.65</td>
</tr>
<tr>
<td>4bSU07 – Hope Point</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>4bSU08 – St Margaret’s Cliffe</td>
<td>3</td>
<td>34</td>
<td>22</td>
</tr>
</tbody>
</table>

These results are also illustrated as coloured thematic maps in Figures 2.1 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 2004, or even further back where reliable historic data exists.
Annual Change in Cross-Sectional Area (m²)
(Spring 2013 - Spring 2014)

ACCRETION

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

NO CHANGE

Annual Change in Cross-Sectional Area

CSA Change (m²)
Percentage Change

Survey Unit Boundaries

Profile Name

4a0001 -7% (-12)

4bSU01
4bSU02
4bSU03
4bSU04
4bSU05
4bSU06
4bSU07
4bSU08

0 2.5 5 kilometers

East Kent

South East Strategic Regional Coastal Monitoring Programme

Actual Profile Change Summary for Spring 2013 to Spring 2014 - 1 of 1
3.0 Short Term Profile Change Summary

Changes along individual profiles within each survey unit are summarised in a series of thematic maps on the following pages. The maps show the location of each beach profile, superimposed on aerial photography (note the lines have been extended for clarity). Where possible the annual change in cross-sectional area (CSA) has been calculated from Spring 2013 to Spring 2014.

In order to put these changes into context, thematic maps are also included illustrating the change from the first spring survey in 2004 and the most recent spring survey (2014). These help to establish if recent changes in beach morphology are consistent with medium-term trends or an anomaly that has occurred in the past year.
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 Thanet

5.1.1 4bSU01 North Foreland (Profile 4b00002A – 4b00014A)
Survey Unit 4bSU01 was surveyed for the first time in Summer 2012, and the first full year of results are now available for analysis. Long-term analysis will commence from the 2018 Annual Report onwards – until then yearly analysis will be carried out only.

The average actual change for this survey unit in 2013/14 was a 5.66m$^2$ gain, although the average percentage change was a 0.66% loss. This often occurs where there is a significant disparity between the percentage and actual changes on each individual profile i.e. a small actual change creates a large percentage change, or vice versa.

5.1.2 4bSU02 Broadstairs (4b00017 – 4b00077)
Broadstairs is split into two sections; the northern section surrounds Broadstairs harbour and an open beach adjacent to Ramsgate Harbour in the south. The northern section consists of a large sand amenity beach which is regularly re-profiled, with a storm bund created to increase the level of protection in the winter. The southern bay is much smaller and is primarily sand foreshore to the seawall. Six profiles were added to the northern section in summer 2012, and the first full year of results are now available for analysis. Long-term analysis will commence from the 2018 Annual Report onwards – the existing profiles will continue to be analysed as normal.

The average change figures for 2013/14 have been heavily skewed by the significant disparity between the percentage and actual changes in the southern section. For example, although Profile 4b00077 only experienced a 33% loss of CSA\(^1\), this is an actual loss of 153m$^2$. Conversely, Profile 4b00057 (Figure 5.1) gained only 27m$^2$, which equates to a 560% increase in CSA. The long term change is similarly large (24m$^2$, 246%), but despite this the crest is still below MHWS\(^2\), exposing the sea wall to direct wave action at high tide.

5.1.3 4bSU03 Ramsgate (4b00086 – 4b00093)
Ramsgate beach consists of a 300m stretch of groyned sandy beach immediately west of Ramsgate Port. The sand provides a fairly thin covering to a chalk platform which limits the amount of material available for movement within the unit; a negligible amount can enter or leave which is reflected in both the short and long term trends.

Over the past year 4bSU03 lost an average of 4.5m$^2$ (6.5%). Profile 4b00093 experienced the largest change, losing 9% of its CSA, although this is only equal to 3m$^2$. This in turn has increased the long-term loses for this profile to 15% (5m$^2$).

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\(^1\) Cross Section Area

\(^2\) Mean High Water Springs
5.2 **Pegwell Bay to South Foreland**

5.2.1 **4bSU04 Pegwell Bay**
This survey unit is not currently surveyed as part of the Strategic Regional Coastal Monitoring Programme’s Topographic Survey Programme. Data is collected instead using remote sensing techniques such as Lidar.

5.2.2 **4bSU05 Sandwich (Profiles 4b00122 – 4b00361)**
The coastline of 4bSU05 is an 8.5km length of open mixed shingle and sand beach with a sandy spit in the north. Recent construction works at the southern end have involved additional rock defences at Sandown Castle and extending a rock revetment of the castle.

Over the past year there have been low levels of change, with only six profiles exceeding +/−5%. The average change was a gain of 1% (2.91m²). However, the longer term changes are more significant. The trend remains accretive, particularly at the northern end where the spit is advancing northwards. This is typified by Profile 4b00139 (Figure 5.2), which since 2004 has gained 99m² (56%). The beach face has moved 40m seawards, although the profile has steepened over the past year, possibly due the high frequency of winter storms in 2013/14.

![Figure 5.1 – Profile 4b00057](image-url)
Further south the majority of beach has accreted although the levels vary; no recycling works have been undertaken along this frontage so all gains are a result of material coming through Deal or fines along the foreshore.

### 5.2.3 4bSU06 Deal (Profiles 4b00362 – 4b00540)

Deal beach is a mix of open and groyned stretches of coast where the majority of sediment is coarse shingle. It should also be noted that the beach north of the pier is inaccessible due to the on-going beach sieving works.

The largest single accretion along the frontage was located south of the Pier at Profile 4b00416 where it gained 38% on the 2013 beach profile. This equates to 97m$^2$. Further south the majority of beach fluctuates at -4 to -6%.

Kingsdown village and Oldstairs Bay are the worst affected stretches of coastline along East Kent. During the January/February 2014 storms the beach lost vast volumes of shingle from which it did not fully recover. The rock revetment at Oldstairs ensures some level of protection without the need for a replenished beach. It would be recommended to reinstate the beach as soon as possible as the level of protection is reduced without the beach. Just north of Kingsdown village required 12,000m$^3$ emergency recycling to reinstate the crest width; although this restored the beach close to its pre-storm condition the beach has since lost more material, illustrated by Figure 5.3 (Profile 4b00504) which lost 13% or 113m$^2$.

As a result of the large losses at Oldstairs Bay, Kingsdown village gained a large volume of material. Recent groyne repairs have enabled the groynes to retain the material which has improved standard of protection and now protects a stretch of the seawall toe from undermining; illustrated in Figure 5.4 (Profile 4b00520).

This trend is mostly replicated in the longer-term, as illustrated by Figure 5.5 as the erosion in Oldstairs Bay has altered the profiles. Over the past year, Profile 4b00537 lost 66m$^2$ (66%) and the crest level has dropped by 4m, exposing the rock revetment to direct wave action.
Figure 5.3 – Profile 4b00504

Figure 5.4 – Profile 4b00520
5.2.4 4bSU07 Hope Point
This survey unit is not currently surveyed as part of the Strategic Regional Coastal Monitoring Programme’s Topographic Survey Programme. Data is collected instead using remote sensing techniques such as Lidar.

5.2.5 4bSU08 St Margaret’s at Cliffe (Profiles 4b00563 – 4b00475)
St Margaret’s at Cliffe is a 540m stretch of timber groyned shingle beach monitored through three designated profiles. During 2013 to 2014 two profiles accreted (53m$^2$ and 34m$^2$) and the third lost 21m$^2$. Profile 4b00565 (Figure 5.6) experienced the largest gains, as illustrated by the figure below. Since 2013 the crest height has increased by 3m, and now protects the seawall from direct wave action at high tide. It is unclear why the accretion has occurred, but may be material moving from the opposite end of the beach.

Figure 5.5 – Profile 4b00537

Figure 5.6 – Profile 4b00565
6. Storm Report
Storm report for Goodwin Sands, Kent

Wave conditions are measured with a buoy moored about 6 km off Deal, in about 10m CD water depth. The buoy has been in place for 5 years.

In an average year, there are usually 3 or 4 storms which have some impact on the beach; these are indicated in the graph below. The red line shows the wave height which a storm is likely to reach once a year, in an average year i.e. the 1 year Return Period.

Since 2008, 9 individual storms have exceeded the 1 year Return Period. 7 of those storms (78 %) occurred between October 2013 and February 2014.

Storm calendar for Goodwin Sands. Each dot on the graph represents the highest significant wave height (Hs) of the individual storm.
The individual storms since 2008 are ranked in the table below, together with the Return Period (this season’s storms are shaded pink). The Return Period statistics were last calculated for the period 2008 to 2012.

<table>
<thead>
<tr>
<th>Date</th>
<th>Wave height (metres)</th>
<th>Return Period</th>
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<tr>
<td>24/12/2013</td>
<td>3.69</td>
<td>Greater than 1 in 30 years</td>
</tr>
<tr>
<td>28/10/2013</td>
<td>3.38</td>
<td>&gt; 1 in 5 years</td>
</tr>
<tr>
<td>27/12/2013</td>
<td>3.18</td>
<td>&gt; 1 in 5 years</td>
</tr>
<tr>
<td>13/12/2011</td>
<td>3.16</td>
<td>&gt; 1 in 3 years</td>
</tr>
<tr>
<td>06/01/2014</td>
<td>3.01</td>
<td>&gt; 1 in 2 years</td>
</tr>
<tr>
<td>03/01/2012</td>
<td>3.00</td>
<td>&gt; 1 in 2 years</td>
</tr>
<tr>
<td>08/02/2014</td>
<td>3.00</td>
<td>&gt; 1 in 2 years</td>
</tr>
<tr>
<td>21/12/2013</td>
<td>2.98</td>
<td>&gt; 1 in 1 year</td>
</tr>
<tr>
<td>15/02/2014</td>
<td>2.92</td>
<td>&gt; 1 in 1 year</td>
</tr>
</tbody>
</table>

Storms exceeding 1 year Return Period at Goodwin Sands since deployment in 2008. Those occurring during the storm season October 2013 to February 2014 are shaded pink.