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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Explanatory Notes
Annex A - Rustington Wave Buoy Report 2009/10
Annex B - Seaford Wave Buoy Report 2009/10
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Annex F - Topographic Survey Report for the Coastal Sub Cell 4d Frontage
Annex G - N/A
1 Introduction

This Annual Report provides an analytical overview of beach changes and wave and tidal measurements since the commencement of the Southeast Strategic Regional Coastal Monitoring Programme in 2003.

Beach surveys have been undertaken since spring 2003 and changes are reported to spring 2010. This data provides a medium term view of changes occurring over this period of coastal monitoring. As more data becomes available, more detailed analysis will possible and trends may become evident. Further data collection will increase confidence in observed trends. Significant change is identified as being +/- 0.25m therefore commentary on data analysis is limited to the sites showing evidence of significant change (> +/- 0.25m).

As detailed in Figure 1.1 below, beach cross sectional areas above a ‘Master Profile’ or ‘Base Profile’ have been calculated for each surveyed beach profile. The Master Profile consists of a vertical line down from the historical start (i.e. most landward) point of the survey line, or where data coverage allows, vertically down from the backstop of the beach, and a horizontal line set at the height of Mean Low Water Neaps (MLWN) for the particular Management Unit (MU), extending seawards to intersect with the survey line. This gives a common section of beach profile for comparison and therefore accurate trends can be established.

Note: Words in *italics* are described in more detail in the Glossary of Coastal Terms in Section 5.2.

![Figure 1.1- 2009 Annual Report Master Profile](image)

Before Annual Reporting, each ‘Master Profile’ is checked (and refined where necessary) in order to provide as accurate an approximation of the beach cross sectional area as possible.
On this basis, the calculated data is presented at four levels:

- Process cell summary of aggregated change over one year and from the most recent survey to the baseline survey (seven years) carried out in 2003.
- Management Unit overviews for beach changes over one year and from the most recent survey to the baseline survey (seven years) carried out in 2003.
- Plotted time series of beach profiles
- Trend analysis of beach cross-section area

It is recommended that the user should firstly identify areas of interest on the MU overview maps before looking more closely at the individual profile plots and trends contained on the attached data CD. The MU overview provides a concise summary of changes during the past year, with colour-coded lines to highlight areas of maximum change and identify profiles that may require examination.

It must be emphasised that this is only the seventh of a series of Annual Reports that will be produced throughout the duration of the programme; therefore changes identified in this report are only indicative of medium-term trends. As the programme progresses, more data will become available enabling more detailed analysis to be carried out. Accordingly, this report should be considered a preliminary assessment.

However, the seven-year interval since reporting began has allowed an initial ‘medium-term’ difference model to be produced to record the overall change in beach levels between the Spring 2003 Aerial Survey and the most recent repeat baseline survey of the entire frontage, undertaken by LiDAR over the winter 2007/2008. This is detailed in the Frontage Review Report available from www.channelcoast.org/reports.
2 Hydrodynamic / Meteorological Data

2.1 Waves

Directional WaveRider buoys were deployed off Rustington and Seaford in July 2003 and January 2008 respectively. The wave buoy reports for 2009/10 can be found in Annex A and Annex B of this report. Near real-time data from the Directional WaveRider buoys are also available from the programme website at http://www.channelcoast.org.

The five most significant storm events recorded at Rustington during 2009/10, measured in terms of significant wave height (Hs) occurred on:

14\textsuperscript{th} November 2009, Hs 3.91m  
23\textsuperscript{rd} November 2009, Hs 3.72m  
25\textsuperscript{th} November 2009, Hs 3.61m  
29\textsuperscript{th} November 2009, Hs 3.31m  
07\textsuperscript{th} December 2009, Hs 3.13m

The five most significant storm events recorded at Seaford during 2009/10, measured in terms of significant wave height (Hs) occurred on:

14\textsuperscript{th} November 2009, Hs 4.56m  
31\textsuperscript{st} March 2010, Hs 4.03m  
25\textsuperscript{th} November 2009, Hs 3.71m  
18\textsuperscript{th} November 2009, Hs 3.69  
29\textsuperscript{th} November 2009, Hs 3.6m
2.2 Tides
A tide gauge was installed on the Arun platform, 5km offshore from Rustington, West Sussex during April 2008. The tide gauge report for 2009/10 can be found in Annex C of this report.

The five highest tides / surge events recorded at the Arun platform during 2009/10, occurred on:

<table>
<thead>
<tr>
<th>Surge Value (m)</th>
<th>Date</th>
<th>Time</th>
<th>Elevation (mOD) (surge component)</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.85</td>
<td>23-Jan-2009</td>
<td>08:00</td>
<td>3.40 (0.40)</td>
<td>09-Feb-2009</td>
<td>23:20</td>
</tr>
<tr>
<td>0.70</td>
<td>29-Nov-2009</td>
<td>15:40</td>
<td>3.23 (0.36)</td>
<td>04-Nov-2009</td>
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</tr>
<tr>
<td>0.69</td>
<td>23-Jan-2009</td>
<td>05:10</td>
<td>3.22 (-0.01)</td>
<td>20-Sep-2009</td>
<td>12:00</td>
</tr>
<tr>
<td>0.68</td>
<td>29-Nov-2009</td>
<td>18:40</td>
<td>3.21 (0.39)</td>
<td>16-Nov-2009</td>
<td>10:30</td>
</tr>
<tr>
<td>0.67</td>
<td>29-Nov-2009</td>
<td>03:10</td>
<td>3.19 (0.03)</td>
<td>12-Feb-2009</td>
<td>00:40</td>
</tr>
<tr>
<td>0.66</td>
<td>19-Jan-2009</td>
<td>06:40</td>
<td>3.18 (0.23)</td>
<td>10-Feb-2009</td>
<td>11:20</td>
</tr>
<tr>
<td>0.64</td>
<td>14-Nov-2009</td>
<td>01:00</td>
<td>3.17 (0.14)</td>
<td>13-Jan-2009</td>
<td>00:10</td>
</tr>
<tr>
<td>0.63</td>
<td>23-Nov-2009</td>
<td>20:00</td>
<td>3.15 (0.02)</td>
<td>11-Feb-2009</td>
<td>00:00</td>
</tr>
<tr>
<td>0.62</td>
<td>14-Nov-2009</td>
<td>13:10</td>
<td>3.15 (0.06)</td>
<td>14-Jan-2009</td>
<td>01:10</td>
</tr>
</tbody>
</table>

Table 2.2 – Extreme Tides and Surge Events at the Arun Platform in 2009

The tide data is available on the project website at http://www.channelcoast.org/data_management/real_time_data/charts/

2.3 Meteorological data
A meteorological station was deployed on 28th May 2008 on the Arun Platform, 5km offshore from Rustington, West Sussex.

Another meteorological station was deployed in July 2010 on Worthing Pier, West Sussex.

Weather data is for both of these stations available on the project website at http://www.channelcoast.org/data_management/real_time_data/charts/.
2.4 Email and Text Alerts

The facility to set up email and text message alerts is now available for any WaveRider Buoy, Meteorological station or Tide Gauge on the Channel Coast Observatory Website.

3 Survey Data - Topographic

Overall, the condition of coastal sub-cell 4d can be considered as stable.

Dates of all surveys that have been undertaken are given in Annex E and a detailed Topographic Survey Report is given in Annex F.

3.1 Data Availability

Survey data is currently available from:

Worthing Borough Council
Technical Services Section
Portland House
Richmond Road
Worthing
West Sussex
BN11 1HS

Tel: 01903 221376
E-mail mailto:strategic.monitoring@worthing.gov.uk

Data is also available via the project web site at http://www.channelcoast.org. The site is continually being uploaded with all new survey data.

4 Summary of Beach Surveys

4.1 Topographic Surveys

The surveys shown in Annex E were undertaken during the period covered by this report. Surveys completed between March 2003 and March 2007 were undertaken using Aerial Photography at a scale of 1:3000 and Photogrammetry techniques to obtain profile information, except the 7th May 2005 survey, which was undertaken using LIDAR.

From May 2007 onwards, accessible shingle beaches were surveyed using RTK GPS Survey Equipment. All other inaccessible (cliffed) areas are surveyed using LIDAR. To date these have been undertaken during the period between November 2007 & January 2008, December 2008 and also during December 2009.

Surveys will continue to be completed in this way for at least the remainder of Phase 2 of the Programme.
5 Glossary

5.1 Data Application

This section aims to provide guidance on the accuracy and limitations of the Strategic Regional Coastal Monitoring Programme data, in order to inform its use and application. It must be appreciated that the accuracies of each measurement system must be taken into account when drawing conclusions from the data, particularly when interpreting difference models.

Topographic survey data

Topographic data points collected with RTK GPS can be considered accurate to ±0.03m for the baseline (spot height) surveys, which are used to generate both DTM's and difference models. Accordingly, differences of ±0.06m can generally be considered as "real", whilst smaller changes may be an artefact of the measuring system, and should be considered as "No Change". In practice, Regional Monitoring Programme analysis considers only differences in excess of ±0.25m, as indicative of genuinely measurable change. Smaller changes may also be present but these are filtered from the analysis to provide clarity. Nevertheless, even where detailed analysis of difference models suggests that the changes are real, the user should approach the results as indicative, unless reinforced over time or with other information.

Lidar data

Where lidar has provided the source data sets, the modelling is less precise. Each lidar cell value has a plan position representative of a 1m² grid (pre-2007 data is 2m² resolution). Changes with positional accuracy of better than 1-2m, therefore, cannot be observed. Profiles across steep slopes may suggest that the changes “bounce” back and forth. This is an artefact of the accuracy of the source data. Lidar is particularly ineffective at identifying sharp edges or steep slopes e.g. seawalls and cliffs where an effect known as ‘shadowing’ can occur (Figure 6.1).

Despite these limitations in accuracy, the changes will indicate an overview of change, but to a lower precision than the RTK data. Users should compare the differences with the adjacent topographic profiles to confirm how representative lidar difference models are of real change.

Figure 6.1- LIDAR ‘Shadowing’ Effect
**Ortho-photography**
All ortho-photography since 2002 uses a common ground control network, but care must be taken when comparing results with earlier photography. It is not unknown for instances of swimming pools to have "moved" up to 2m, due to a different control network.

5.2 Coastal Terms

*Beach Backstop*
This maybe defined as a seawall, promenade or any other structure at the back of a beach. If no backstop structure exists, for the purposes of master profile analysis this is the perceived landward boundary of any given active beach.

*Coastal Process Cell*
The coast of the UK has been divided into a series of Major Coastal Cells, many with sub-cells. These sub-cells represent a practical subdivision of the coastline into lengths that follow sediment cell principles while enabling suitably sized groups to be formed to consider coastal defence issues at the strategic level. This provides the necessary framework for Operating Authorities to prepare Shoreline Management Plans (SMP’s).

![Figure 7.1- Coastal Process Cells of Southeast UK](image)

**Cross-Sectional Area**
The cross-sectional area is the area between the survey profile and the master profile.

**Management Unit**
A Management Unit is a length of shoreline with coherent characteristics in terms of natural coastal processes, land use and coastal defence.
Master Profile
The Master Profile is the boundary or datum, which any given profile is measured against. Each profile has a unique Master Profile, with a lower boundary of Mean Low Water Neaps (MLWN), which allows only the active beach cross-section of each survey to be measured and compared against other surveys.

Profile
A profile is cross-section through a beach; normal to the shoreline, where repeatable topographic, hydrographic and LIDAR surveys can be undertaken in order for changes in beach level to be observed. In the 4d coastal sub cell, nearly 1500 profiles 1km in length exist at an average longshore spacing of 50m. Different types of profiles are surveyed at different times - interim profiles (those spaced at 200m) are surveyed in every survey, with baseline profiles (those spaced at 50m) surveyed only when a Beach Management Plan or repeat baseline survey is undertaken.

Note: Profile lines displayed in the Profile Change Summary maps are intended to indicate Profile locations and may be longer or shorter than the actual width of frontage covered.

South Downs Coastal Group
The former Coastal Group that was concerned with matters relating to the frontage between Beachy Head and Selsey Bill, or coastal sub-cell 4d. The SDCG has now been amalgamated with the Southeast Coastal Group, and now covers coastal cell 4 between the Thames Estuary and Selsey Bill.

All Coastal Groups are made up of Local Authority, County Council and other coastal stakeholders. For further information about the South Downs and Southeast Coastal Groups, please visit http://www.sdcg.org.uk/ and http://www.se-coastalgroup.org.uk/
Annex A - Rustington Wave Buoy Report 2009/10
Rustington Directional Waverider Buoy

Location
OS: 506331E 93784N
WGS84: Latitude: 50°44.0365'N  Longitude: 00°29.6765'W

Water Depth
9.9m CD

Instrument Type
Datawell Directional Waverider Buoy Mk III

Data Quality

<table>
<thead>
<tr>
<th>C1(%)</th>
<th>Sample interval</th>
</tr>
</thead>
<tbody>
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<td>30 minutes</td>
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</tbody>
</table>

Monthly Means

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<th>H_s</th>
<th>T_p</th>
<th>T_z</th>
<th>Direction</th>
<th>SST</th>
<th>No. of days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(m)</td>
<td>(s)</td>
<td>(s)</td>
<td>(°)</td>
<td>(°C)</td>
<td></td>
</tr>
<tr>
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<td>0.52</td>
<td>7.8</td>
<td>4.0</td>
<td>193</td>
<td>10.5</td>
<td>30</td>
</tr>
<tr>
<td>May</td>
<td>0.78</td>
<td>6.2</td>
<td>3.7</td>
<td>193</td>
<td>13.0</td>
<td>31</td>
</tr>
<tr>
<td>June</td>
<td>0.48</td>
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<td>3.3</td>
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</tr>
<tr>
<td>August</td>
<td>0.63</td>
<td>5.3</td>
<td>3.4</td>
<td>213</td>
<td>19.1</td>
<td>31</td>
</tr>
<tr>
<td>September</td>
<td>0.62</td>
<td>5.3</td>
<td>3.3</td>
<td>171</td>
<td>17.4</td>
<td>30</td>
</tr>
<tr>
<td>October</td>
<td>0.77</td>
<td>6.5</td>
<td>3.7</td>
<td>192</td>
<td>15.6</td>
<td>31</td>
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<tr>
<td>November</td>
<td>1.70</td>
<td>7.7</td>
<td>4.7</td>
<td>207</td>
<td>13.1</td>
<td>30</td>
</tr>
<tr>
<td>December</td>
<td>1.04</td>
<td>7.2</td>
<td>4.0</td>
<td>195</td>
<td>9.2</td>
<td>31</td>
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<tr>
<td>January</td>
<td>0.79</td>
<td>7.6</td>
<td>3.9</td>
<td>186</td>
<td>6.2</td>
<td>31</td>
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<tr>
<td>February</td>
<td>0.87</td>
<td>8.1</td>
<td>3.9</td>
<td>189</td>
<td>5.8</td>
<td>28</td>
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<tr>
<td>March</td>
<td>0.75</td>
<td>6.5</td>
<td>3.7</td>
<td>183</td>
<td>6.4</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.

5 Highest events in 2009/10

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>H_s</th>
<th>T_p</th>
<th>T_z</th>
<th>Dir.</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>
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<td>6.7</td>
<td>208</td>
<td>-0.11</td>
<td>HW +4</td>
<td>4.5</td>
<td>0.56</td>
<td>0.62</td>
</tr>
<tr>
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<td>6.5</td>
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<td>HW -2</td>
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<td>0.69</td>
</tr>
<tr>
<td>07-Dec-2009 15:30</td>
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<td>7.7</td>
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<td>HW +1</td>
<td>4.7</td>
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<td>0.47</td>
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</tbody>
</table>

* Tidal information is obtained from the nearest recording tide gauge (the Pressure Transducer at Arun Platform). 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:

- Wave roses (Direction vs. $H_s$) from April 2009 to March 2010 and all measured data, as percentage of occurrence.
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction 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 quiet with only one main period of storm activity between mid and late November. The highest event was recorded on the 14 November peaking at 3.91m $H_s$. This particular event was significant for many sites along the south coast including at Boscombe, Milford, Hayling Island and Pevensey Bay.

Acknowledgements

TASK2000 tidal prediction software was kindly provided by the Permanent Service for Mean Sea Level (PSMSL), Proudman Oceanographic Laboratory.
Direction vs. $H_s$ for April 2009 to March 2010 (this reporting year)

Direction vs. $H_s$ for July 2003 to March 2010 (all measured data)
Annex B - Seaford Wave Buoy Report 2009/10
Seaford Directional Waverider Buoy

Location
OS: 535777E 98056N
WGS84: Latitude: 50° 45.972’N  Longitude: 000° 04.559’E

Water Depth
~12m CD

Instrument Type
Datawell Directional Waverider Buoy Mk III

Data Quality

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<td>30 minutes</td>
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Monthly Means

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<th>Tp (s)</th>
<th>Tz (s)</th>
<th>Direction</th>
<th>SST (°C)</th>
<th>No. of days</th>
</tr>
</thead>
<tbody>
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<td>April</td>
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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>Dir.</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>
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* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Newhaven). The surge shown is the residual at the time of the highest Hs. 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:
- Wave roses (Direction vs. $H_s$) for April 2009 to March 2010 (this reporting year) and all measured data
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction 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 marked by one very stormy period in November. In particular, on 14 of November a wave height of 4.56m was recorded which is the second largest since deployment of the buoy in January 2008. This event was significant at many sites along the Channel coast including at Boscombe, Hayling Island and Pevensey Bay.

Acknowledgements

Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.
Percentage of occurrence of Direction vs. $H_s$ for April 2009 to March 2010 (this reporting year)

Percentage of occurrence of Direction vs. $H_s$ for January 2008 to March 2010 (all measured data)
Hs at Seaford Apr 2009 to Mar 2010
Storms at Seaford from Apr 2009 to Mar 2010

Storm threshold is Hs ≥ 3.5m

Missing data

Storms at Seaford - all years

Date

Jan09
Jan10
Annex C – Arun Platform Tide Gauge Report 2009
Arun Platform Tide Gauge

Location
OS: 506423E 97778N
WGS84: Latitude: 50° 46' 11.3904"N Longitude: 00° 29' 31.7360"W

Instrument
Valeport 730 (Druck Pressure Transducer)

Benchmarks

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<td>10.334m OD</td>
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<tr>
<td>TGZ</td>
<td>Top of transducer pole</td>
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TGZ = -3.79m above Ordnance Datum
TGZ = 0.74m below Chart Datum
TGZ = 14.124m below TGBM

Datum information
All data are to Ordnance Datum Newlyn. The height of Chart Datum relative to Ordnance Datum at Littlehampton and Bognor Regis is -3.05m (Admiralty Tide Tables, Supplementary Table III).

Survey information
The site was surveyed on 09 October 2008.

Site characteristics
The Platform is approximately 3.7km offshore, with no other nearby structures. Spring tidal range is ~5m. The Platform leg is approximately 1.2m diameter and some wave reflection and other wave interference can occur.

Data Quality

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<th>C1 (%)</th>
<th>Sample interval</th>
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Residuals and Elevations
Residuals and Elevations (OD and CD) for the whole year are shown in Figures 1 to 3 respectively.

Service history
The gauge became operational on 01 August 2008.

Measurements
The pressure transducer samples at 2Hz. Tidal elevations are derived, every 10 minutes, as the 40 second average of the 2Hz readings. The time stamp is the start of the measuring burst. Although the time stamp is accurate, the instrument has to be started manually after servicing and it is not always possible to start exactly on a 10 minute integer. Measurements are interpolated to the hour and 10 minute intervals, if the original time series is not on the hour. Missing data exceeding 3 hours are not interpolated. All data measured prior to the gauge being fully surveyed were adjusted to the correct elevations.

Statistics

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### General

The time series of 10 minute tidal elevations for one year is quality-checked in accordance with ESEAS guidelines, flagged and archived. The archived time series is continuous and monotonic, with missing data given as 9999. The missing data shown are days where the entire 24 hours of data are missing.

Monthly extreme maxima/minima are the maximum and minimum water levels from all measured data for that month. Monthly surge maxima/minima (residuals) are calculated in a similar manner from the time series of residuals. Residuals are derived as the measured tidal elevation minus the predicted tidal elevation.

The monthly Mean Level is calculated as the average of all readings for the given month. The annual $Z_0$ is the value of Mean Sea Level derived by the harmonic analysis of the year's data. These average values should not be used for any purpose without consideration of the recovery rate.
Acknowledgements
Tidal predictions were produced using the TASK2000 software, kindly provided by the Permanent Service for Mean Sea Level (PSMSL), Proudman Oceanographic Laboratory.
Figure 1 Residuals for 2009
Figure 2  Tidal elevations relative to Ordnance Datum for 2009
Figure 3  Tidal elevations relative to Chart Datum for 2009
### Regional Coastal Monitoring - High Level Reporting - 2009/10 (Year 8)

#### Field data collection - SDCG

**Annex E**

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**Key:**
- **Completed**
- **Pending**
- **Overdue**
- **Not required**

**Notes:**
Completion date is the date of receipt of data by the Lead Authority
"Pending" refers to data which has been collected in the field, but is being processed

**Reasons for late/missing delivery:**
1.
2.

---

Field data - SDCG

Page 1 of 1

05/08/2010
### Regional Coastal Monitoring - High Level Reporting - 2008/9 (Year 7)

**Annex E**

**Field data collection - SDCG**

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**Key:**
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- **Not required**
- **Pending**
- **Overdue**

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**Reasons for late/missing delivery:**
1. 
2. 

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Page 1 of 1  Field data - SDCG  05/08/2010
## Field data collection - SDCG

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**Key:**
- **Completed**
- **Pending**
- **Overdue**
- **Not required**

**Notes:**
Completion date is the date of receipt of data by the Lead Authority

"Pending" refers to data which has been collected in the field, but is being processed

**Reasons for late/missing delivery:**
1. 
2. 

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Field data - SDCG 05/08/2010
### Regional Coastal Monitoring - High Level Reporting - 2006/7 (Year 5)

**Annex E**

**Field data collection - SDCG**

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**Key:**
- Completed
- Pending
- Overdue
- Not required

**Notes:**
- Completion date is the date of receipt of data by the Lead Authority
- "Pending" refers to data which has been collected in the field, but is being processed

**Reasons for late/missing delivery:**
1. Abandoned Due to Bad weather and / or unsuitable tide conditions
2. Only Contours still awaited

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Page 1 of 1 Field data - SDCG 05/08/2010
Annex F - Topographic Survey Report
Annex F - Topographic Survey Report

Background

Data collected since March 2003 has been collected in accordance with the National Specification for Surveying Services issued by the Environment Agency (EA) and adopted for all surveys undertaken as part of the Strategic Regional Coastal Monitoring Programme (SRCMP).

In Coastal Sub-Cell 4d for Phase 2 of the SRCMP (from May 2007) accessible shingle beaches (Management Units 4d-MU1 to 4d-MU10 and 4d-MU15B) have spring and autumn interim profile surveys undertaken using Real Time Kinematic (RTK) GPS survey equipment. Management Units that are actively managed also have an additional Beach Management Plan (BMP) or repeat baseline survey done in the summer months.

The EA, as part of their contribution to the programme, undertake annual winter LIDAR surveys of the inaccessible cliffed frontages (between 4d-MU12 and 4d-MU18B, excluding 4d-MU15B) and also to cover the Spring interim survey of Pagham Harbour (4d-MU2 and 4d-MU2A) to minimise any potential disruption to the Local Nature Reserve. The EA will continue to carry out the ABMS flight for the frontage in July or August each year, although no photogrammetry will be extracted, only aerial photography (non-rectified) will be collected.

During the early stages of Phase 1, the autumn aerial survey flight had proved to be difficult to achieve due to tidal, light and weather working windows not coinciding. However, since October 2005 the timing of this survey has been moved forward to September, which has since enabled this survey to be completed without problem.

Management Units 4d-MU2, 4d-MU2A, 4d-MU-3, 4d-MU-5, 4d-MU-6, 4d-MU8B, 4d-MU9A and 4d-MU9B (for 1km either side of Shoreham Harbour) and 4d-MU-15B are designated ‘Beach Management’ sites. In addition to the two profile surveys undertaken per year, these sites have an extra Beach Management Plan (BMP) survey undertaken, with the exception of Pagham Harbour (4d-MU2 and 4d-MU2A) for which the detailed EA Winter LIDAR survey data is utilised for both BMP Reporting and the Annual Report.

Condition of the Coastal Sub Cell 4d Frontage (Beachy Head to Selsey Bill)

Analysis of the data shows that between spring 2009 and spring 2010 there was a net gain across the entire 4d Coastal Sub-Cell in beach cross sectional area of 386m², equating to a 0.1% increase, or "No Change".

Between spring 2003 and spring 2010 there was a net gain across the entire 4d Coastal Cell in beach cross sectional area of 5956m², equating to a 3.4% increase, or "No Change".

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1 Pagham Harbour is designated as a ‘Local Nature Reserve’, a ‘Site of Special Scientific Interest’ (SSSI), a ‘Special Protection Area’, a ‘Natura 2000’ site and a ‘Ramsar Site’ as a wetland of international importance.
**Condition of Individual Management Units**

**General**

Analysis of the profiles has been carried out using the spring 2003 baseline survey and the spring surveys for each year between 2009 and 2010. In 2010 the spring survey was used for Management Units 4d-MU1, 4d-MU3 to 4d-MU10 and 4d-MU15B. The September LiDAR survey was used for management units 4d-MU16 – 4d-MU18B. The November LiDAR survey was used for management units 4d-MU12 – 4d-MU14 and the December 2009 LiDAR survey was used for Management Units 4d-MU2 & 2A. This analysis has generated the Beach Change Summary sub-cell and Management Unit maps, which are sorted by Management Unit then year in the pages following this report.

The cross-sectional area trends, calculations and beach profile plots for the analysed profiles can be found on the enclosed CD in the ‘Analysis \ Topo’ directory, under 'CSA_Charts', 'CSA_Data' and ‘Profile_Charts’ respectively for each Management Unit.

Blue text below highlights areas of accretion (>5%), whilst red text highlights areas of erosion (>5%). Less than 5% change is considered as “No Change”.

**Unit 1 - Selsey Bill to Church Norton**

Between March 2009 and February 2010, the most significant losses generally occurred at the southwestern end of Selsey Bill. The most stable profiles and those showing significant gains were generally confined to the eastern end of the Unit where the shoreline faces southeast.

During this period the Unit remained stable overall, with a net loss in beach cross sectional area of only 0.6%. The most significant loss was at profile 4d01476 where the cross sectional area decreased by 47.1% or 40m². The largest increase occurred at profile 4d01492, accreting 16.9% which equates to a gain of 15m² in cross-sectional area.

Between March 2003 and February 2010, the majority of losses occurred at the southern tip and the western side of Selsey Bill, the most notable being at profiles 4d01476, 4d01484, 4d01489 and 4d01492.

During this period the Unit remained stable overall, with a small net loss in beach cross sectional area of 4.7%. The most significant losses were at profiles 4d01476 and 4d001489 where the cross sectional area decreased by 49.7% (44m²) and 42.3% (126m²) respectively. The greatest gain was an increase of 46% or 26m² at profile 4d01423.

**Unit 2 - Church Norton to Pagham Harbour**

Between January 2009 and December 2009, as in the previous year, the majority of losses were located in the central to southwestern region of the Unit, with all significant gains occurring in the northeastern end.
During this period the Unit was stable with a slight loss in beach cross sectional area of 0.5%. The most significant gains were an increase of 10.2% or 15m$^2$ at profile 4d01414C and an increase of 6.8% equating to a gain of 16m$^2$ at 4d01404A. The most significant loss was a decrease of 15.2% or 40m$^2$ at profile 4d01413.

Between March 2003 and December 2009 the most significant gains occurred at the eastern end of the Management Unit, in the 400m leading up to the tip of the southern spit, while losses have occurred only in central and southwestern areas.

During this period the Unit accreted with a net gain in beach cross sectional area of 11.0%. The most significant gain was a relatively large increase of 328.8% or 196m$^2$ at profile 4d01404A. This increase is consistent with the emergence of an accretive lower foreshore spit at this location. The most significant losses were a decrease of 29.5% or 66m$^2$ at profile 4d01414C and a loss of 20.3% or 138m$^2$ at 4d01409.

**Unit 2A - Pagham Harbour to Pagham**

Between January 2009 and December 2009 losses and gains occurred throughout the Unit.

During this period the Unit remained stable overall, with a net loss in beach cross sectional area of only 0.5%. The greatest gain was an increase of 43.2% or 262m$^2$ at profile 4d01395 with the greatest loss being a decrease of 14.8% or 141m$^2$ at profile 4d01393A.

Between March 2003 and December 2009, as in the previous two years, most of the profiles recorded substantial gains. The most significant gains were those furthest west near the mouth of Pagham Harbour. Profiles showing significant loss are generally confined to the far east of the Unit.

During this period the Unit accreted with a net gain of beach cross sectional area of 9.5%; the greatest gain was an increase of 90.2% or 412m$^2$ at profile 4d01395. The greatest loss was a decrease of 28.0% or 114m$^2$ at profile 4d01382.

**Unit 3 - Pagham to West Bognor Regis**

Between April 2009 and February 2010 there were no losses recorded on the frontage. The most significant gains were scattered throughout the Unit.

During this period the Unit was generally stable with only a slight overall gain in beach cross sectional area of 1.4%. The greatest gain was an increase of 2.5% or 9m$^2$ at profile 4d01373.

Between March 2003 and February 2010, all material losses were confined to the far westerly quarter of the Unit, balanced by gains in the eastern half of the unit.

During this period the Unit was generally stable with only a slight net gain in beach cross sectional area of 1.9%. The highest gain was an increase of 10.9% or 41m$^2$ at profile 4d01360A with the greatest loss being a decrease of 11.7% or 39m$^2$ at profile 4d01379.
**Unit 4 - West Bognor Regis to Elmer**

Between April 2009 and April 2010 losses were generally scattered all along the frontage with the most significant gains recorded in the centre and at the western end.

During this period the Unit was stable with a slight net gain in beach cross sectional area of 1.4%. The greatest gain was an increase of 12.5% or 36m$^2$ at profile 4d01309. The most significant losses were a decrease of 9.0% or 1m$^2$ profile 4d01283 and a loss of 5.2% or 7m$^2$ at profile 4d01280.

Between March 2003 and April 2010 significant losses were mainly focused in the centre of the Unit, with gains at both ends, most significantly in the west.

During this period the Unit was generally stable with a net gain in beach cross sectional area of 1.6%. The greatest gain was an increase of 49.4% or 68m$^2$ at profile 4d01316 with the greatest loss being a decrease of 17.6% or 2m$^2$ at profile 4d01283 and a decrease of 11.8% equating to a loss of 24m$^2$ at profile 4d01257.

**Unit 5 - Elmer**

Between March 2009 and March 2010 both losses and gains were spread fairly uniformly across the Unit frontage.

During the period the Unit was generally stable with only a slight net loss in beach cross sectional area of 1.6%. The greatest gain was an increase of 9.8% or 13m$^2$ at profile 4d01168 with the greatest loss being a decrease of 12.7% or 67m$^2$ at profile 4d01209.

Between March 2003 and March 2010 virtually all profiles recorded losses in this Management Unit. The only gains were confined to the far eastern end of the Unit.

During the period the Unit eroded with a net loss in beach cross sectional area of 6.0%. The greatest gain was an increase of 6.8% or 20m$^2$ at profile 4d01158 with the greatest loss being a decrease of 31.3% or 113m$^2$ at profile 4d01162.

**Unit 6 - Elmer to Littlehampton Harbour Mouth**

Between March 2009 and April 2010 both losses and gains were spread fairly uniformly across the Unit frontage.

During the period the Unit was generally stable with only a slight net gain in beach cross sectional area of 1.2%. The greatest gain was an increase of 19.2% or 27m$^2$ at profile 4d01117. The greatest losses were a decrease of 9.4% or 17m$^2$ at profile 4d01129 and 5.7% or 24m$^2$ at profile 4d01084.

Between March 2003 and April 2010 gains were fairly evenly scattered across the Unit frontage, while losses were focussed in the centre and west.

During the period the Unit was generally stable with a slight net loss in beach cross sectional area of 1.4%. The greatest gain was an increase of 15.9% or 31m$^2$ at...
profile 4d01126 and 12.2% or 49m$^2$ at profile 4d01102 with the greatest loss being a decrease of 19.5% or 58m$^2$ at profile 4d01119.

**Unit 7 - Littlehampton Harbour Mouth to Rustington**

Between April 2009 and February 2010 the majority of profiles were relatively stable with small losses spread throughout the Unit and gains concentrated at the western end.

During the period the Unit was stable with only a slight net gain in beach cross sectional area of 1.7%. The greatest gain was an increase of 10.9% or 35m$^2$ at profile 4d01070 with the greatest loss being a decrease of 3.5% or 11m$^2$ at profile 4d01050.

Between March 2003 and February 2010 the majority of profiles recorded loss or slight loss with slight gains confined to both ends of the Management Unit.

During the period the Unit was generally stable with a net loss in cross sectional area of 0.6%. The greatest losses were a decrease of 8.6% or 39m$^2$ at profile 4d01059 and a decrease of 8.0% or 27m$^2$ at 4d01073. The greatest gains were an increase of 8.2% or 18m$^2$ at profile 4d01039A, 6.0% or 24m$^2$ at 4d01077 and 6.3% or 21m$^2$ at profile 4d01031.

**Unit 8A - Rustington to Goring-by-Sea**

Between March 2009 and March 2010 both losses and gains occurred and were distributed fairly uniformly across the Unit frontage.

During the period the Unit was stable with only a slight net gain in beach cross sectional area of 0.7%. The greatest gains were an increase of 8.5% or 22m$^2$ at profile 4d01028 and 5.6% or 25m$^2$ at profile 4d00987A. The greatest loss recorded being a decrease of 6.9% or 22m$^2$ at profile 4d00965.

Between March 2003 and March 2010 losses generally occurred in the far west and central section of the Management Unit, with the material gains occurring at the centre and east end of the Unit.

During the period the Unit was generally stable with a net gain in beach cross sectional area of 4.0%. The greatest gains were a significant increase of 34.0% or 91m$^2$ at profile 4d00956A and 30.5% or 92m$^2$ at 4d00908, with the greatest loss being a decrease of 10.9% or 36m$^2$ at profile 4d00961.

**Unit 8B - Goring-by-Sea to Lancing**

Between April 2009 and April 2010 both losses and gains were distributed fairly uniformly across the frontage.

During the period the Unit was generally stable with a slight net loss in beach cross sectional area of 0.9%. The greatest gain was an increase of 9.9% or 30m$^2$ at profile 4d00813, with the greatest loss being a decrease of 8.5% or 34m$^2$ at profile 4d00833.
Between March 2003 and April 2009 both losses and gains were spread fairly uniformly across the Unit, although there were some significant gains toward the eastern boundary.

During the period the Unit was generally stable with a net gain in beach cross sectional area of 4.8%. The greatest gain was a significant increase of 48.5% or 128m² at profile 4d00768, with the greatest loss being a decrease of 22.6% or 71m² at profile 4d00800.

**Unit 9A - Lancing to Shoreham Harbour (Western Arm)**

Between April 2009 and April 2010 material loss was generally concentrated at the western end of the Management Unit, with accretion mainly in the extreme eastern part of the unit. Both losses and gains occurred (in less significant quantities) at the centre of the Unit.

During the period the Unit was stable with only a slight net loss of beach cross sectional area of 0.2%. The greatest gain was an increase of 16.7% or 81m² at profile 4d00648, with the greatest loss being a decrease of 7.6% or 25m² at profile 4d00742.

Between March 2003 and April 2010 all profiles in the Unit remained stable or accreted.

During the period the Unit accreted with a net gain of beach cross sectional area of 16.5%. The greatest gains were the significant increases of 69% or 152m² at profile 4d00736, 60.2% or 126m² at 44d00733 and 57.7% or 135m² at profile 4d00731. The only losses recorded were a slight decrease of 0.9% or 4m² at profile 4d00701 and 0.6% or 3m at profile 4d00698.

It should be noted that Phase 2 & 3 of the Shoreham to Lancing Scheme were completed in September 2004 & July 2005 respectively, hence the large increases in beach volumes along this frontage.

*Note: From the 2011 Annual Report (once 2No. spring surveys have been completed) this Unit will contain a number of new reoriented profiles due to issues created by the existing profiles crossing structures.*

**Unit 9B - Shoreham Harbour (Eastern Arm) to Aldrington**

Between April 2009 and March 2010 both losses and gains were distributed fairly uniformly across the frontage.

During the period the Unit was generally stable with only a slight net loss in beach cross sectional area of 1.8%. The greatest gains were increases of 16.4% or 36m² at profile 4d00614. The greatest loss was a decrease of 18.4% or 39m² at profile 4d00643.

Between March 2003 and March 2010 both losses and gains were again distributed fairly uniformly across the frontage.
During this period the Unit was generally stable with only a slight net loss of beach cross sectional area of 1.7%. The greatest gain was an increase of 10.1% or 16m² at profile 4d00643, with the greatest loss being a decrease of 10.6% or 31m² at profile 4d00632.

**Unit 10 - Aldrington to Brighton Marina (Western Arm)**

Between March 2009 and March 2010 both losses and gains were distributed across the frontage, with gains slightly more concentrated towards the western end of the Unit.

During the period the Unit was generally stable with a very slight net loss of beach cross sectional area of 2.1%. The greatest gain was an increase of 15.3% or 27m² at profile 4d00528 with the greatest loss being a decrease of 9.4% or 19m² at profile 4d00545.

Between March 2003 and March 2010 both significant gains and some minor losses were experienced across the frontage. Gains were generally more significant towards the eastern end of the Unit. The presence of Brighton Marina is likely to have been the cause of this accretion, effectively acting as a terminal groyne preventing material from being transported further east.

During the period the Unit accreted with a net gain of beach cross sectional area of 8.3%. The greatest gain was an increase of 40.0% or 174m² at profile 4d00451, with the greatest loss being a decrease of 9.0% or 18m² at profile 4d00545.

**Unit 12 - Brighton Marina (Eastern Arm) to Saltdean**

Between December 2008 and November 2009 the majority of losses that occurred were located at the western end of the frontage, with gains sparsely distributed around the centre of the Unit.

During the period the Unit was generally stable with only a slight net gain in beach cross sectional area of 0.1%. The greatest gain was an increase of 28.4% or 22m² at profile 4d00373, with the greatest loss being a decrease of 14.4% or 24m² at profile 4d00337.

Between March 2003 and November 2009 accretion was concentrated in the central and western regions of the Unit, while losses occurred mainly in the east. A major Sea Defence Works Scheme took place on this frontage between 2003 and 2004 consisting of sea wall and groyne renovation, but included no significant removal or importation of material. A descriptive leaflet of these works is included at the end of this report.

During the period the Unit was stable with a net gain in beach cross sectional area of 3.2%. The greatest gain was a significant increase of 60.8% or 92m² at profile 4d00391, with the greatest loss being a decrease of 27.2% or 24m² at profile 4d00376.
Unit 13A - Telscombe Cliffs
Between December 2008 and November 2009 losses occurred in the centre and at the western end of the unit, with gains mainly in the east.

During this period the Unit was generally stable with a very slight net loss of beach cross sectional area of 1.4%. The greatest gain was an increase of 3.9% or 7m² at profile 4d00322, with the greatest loss being a decrease of 12.9% or 27m² at profile 4d00317.

Between March 2003 and November 2009 both losses and gains were distributed fairly uniformly across the frontage, although more profiles recorded losses than gains within the unit.

During the period the Unit remained stable with a small net loss of beach cross sectional area of 1.1%. The greatest gain was an increase of 9.4% or 16m² at profile 4d00317, with the greatest loss being a decrease of 7.8% or 15m² at profile 4d00322.

Unit 13B - Telscombe to Peacehaven Heights
Between December 2008 and November 2009 losses and gains occurred throughout the Management Unit with more gains towards the western end of the frontage.

During this period the Unit was stable with a slight net gain in beach cross sectional area of 0.5%. The greatest gain was an increase of 3.1% or 2m² at profile 4d00281. The greatest loss was a decrease of 2.6% or 3m² at profile 4d00275.

Between March 2003 and November 2009 no losses were recorded. While every profile accreted, the most significant increases occurred at the centre of the unit.

During the period the Unit accreted with a net gain of beach cross sectional area of 7.3%. The greatest gains were increases of 19.2% or 12m² at profile 4d00281 and 12.2% or 24m² at 4d00287.

Unit 14 - Peacehaven Heights to Newhaven Harbour (Western Arm)
Between December 2008 and November 2009 losses occurred at both ends and the centre of the Unit.

During the period the Unit was stable with a small net loss of beach cross sectional area of 1.7%. The most significant losses were a decrease of 8.8% or 15m² at profile 4d00260 and 7.9% or 103m² at 4d00223. The greatest gain was 12.3% at profile 4d00236 which equates to an increase in beach cross sectional area of 13m².

Between March 2003 and November 2009 most profiles eroded, with accretion confined to the centre and the far eastern extent of the Unit.

During the period the Unit was stable with a small net loss of beach cross sectional area of 0.1%. The greatest loss was a decrease of 30.9% or 54m² at profile 4d00236. The greatest gain was 21.8% at profile 4d00223 which equates to a significant increase in beach cross sectional area of 216m².
**Unit 15A - Newhaven Harbour (Western Arm) to Tide Mills**

Between December 2008 and November 2009 no losses were recorded.

During the period the Unit accreted with a net gain of beach cross sectional area of 6.8%. The greatest gain was 9.2% at profile 4d00207 which equates to an increase in beach cross sectional area of 13m².

Between March 2003 and November 2009, conversely to the short term trend, no gains were recorded during the period.

The Unit eroded with a net loss of beach cross sectional area of 24.2%. The greatest loss was a decrease of 30.6% or 132m² at profile 4d00203.

**Unit 15B - Tide Mills to Seaford Head**

In the period from February 2009 February 2010 losses occurred almost exclusively in the eastern half of the unit with gains located in the centre and west.

During the period the Unit was generally stable with only a small net loss of beach cross sectional area of 0.6%. The greatest gain was an increase of 23.5% or 75m² at profile 4d00198, with the greatest loss being a decrease of 13.5% or 50m² at profile 4d00143.

Between March 2003 and February 2010 the majority of profiles recorded material gain, most significantly in the centre of the Unit, with occasional losses distributed across the whole Unit. The gains in the centre can most likely be attributed to biannual recycling operations at Seaford, where material is moved to the middle of the frontage from both ends.

During the period the Unit was stable with a net gain of beach cross sectional area of 4.4%. The greatest increases were 38.0% or 79m² at profile 4d00174, and 31.9% or 79m² at 4d00174. The greatest loss was a decrease of 11.6% or 51m² at profile 4d00129.

**Unit 16 - Seaford Head to Cuckmere Haven**

Between December 2008 and September 2009 there were no gains recorded.

During the period the Unit eroded with a net loss of beach cross sectional area of 12.0%. The greatest loss was a decrease of 53.8% or 6m² at profile 4d00121.

Between March 2003 and September 2009, as with the shorter term trend, there were no gains recorded.

During the period the Unit eroded with a net loss of beach cross sectional area of 21%. The greatest loss was a decrease of 71% or 13m² at profile 4d00121 and a decrease of 30 % or 45m² at profile 4d00090.

**Unit 17 - Cuckmere Haven**

Between December 2008 and September 2009 there were no gains recorded in the Unit.
During the period the Unit remained stable with a small net loss in beach cross sectional area of 0.8%. The greatest loss was a decrease of 10.1% or 18m² at profile 4d00053 and a decrease of 6.4% equating to a loss of 55m² at profile 4d00063.

Between March 2003 and December 2008 gains occurred at the centre of the Unit whilst losses occurred at both the western and eastern limits.

During the period the Unit was stable with a net loss in beach cross sectional area of 1.3%. The greatest gain was an increase of 16.8% or 44m² at profile 4d00067, while the greatest loss was a decrease of 12.6% or 73m² at profile 4d00060.

**Unit 18A - Cuckmere Haven (East) to Birling Gap**
Between December 2008 and September 2009 there were no gains recorded in the Unit.

During the period the Unit eroded with a net loss of beach cross sectional area of 10.6%. The greatest loss was a decrease of 18.6% or 42m² at profile 4d00035.

Between March 2003 and September 2009 losses occurred throughout the Unit, while the only gains recorded were at western extent.

During the period the Unit eroded with a net loss of beach cross sectional area of 5.4%. The greatest loss was a decrease of 14.8% or 32m² at profile 4d00035. The greatest gain was an increase of 5.4% or 5m² at profile 4d00050.

**Unit 18B - Birling Gap**
Between December 2008 and September 2009 losses occurred at the western end of the Management Unit with gains occurring at the centre and in the east of the unit.

During this period the Unit eroded with a net loss of beach cross sectional area of 5.9%. The greatest loss was a decrease of 70.2% or 3m² at profile 4d00017. The greatest gain was an increase of 1.7% or 1m² at profile 4d00013.

Between March 2007 and September 2009 losses occurred both at the eastern end and centre of the unit. The only gain recorded during this period was located at the western extent.

During the period the Unit eroded with a loss in beach material of 10%. The greatest loss was a decrease of 48% or 1m² at profile 4d00018 and 46% or 12m² at profile 4d00018. The only gain was an increase of 1.5% or 3m² at profile 4d00022.

*For Profiles 4d00017 & 4d00018 the Profile Change Plots show a change >30%. This is because the CSA above the Master Profile is very small, due to limited data covering only the rock platform prior to 2007. Therefore 2007 will be set as the baseline survey from the 2011 Annual Report to allow a much more comprehensive analysis of the whole profile to be undertaken.*
Brighton & Hove City Council would like to thank the following for their help and co-operation during the development of the scheme:

- Ovingdean Residents and Preservation Society
- Brighton Marina Company
- Rottingdean Parish Council
- Rottingdean Preservation Society
- St Dunstan's
- Roedean School
- Saltdean Residents Association
- Southern Water PLC
- English Nature

The scheme will cost £10.8 million, funded by the Department for Environment, Food and Rural Affairs (DEFRA - formerly MAFF) and the Department for Transport (DfT - formerly DTLR).

**Engineer to the contract:**
The Highways Manager, Brighton & Hove City Council, Telephone 01273 290000

**Engineering consultants:**
Posford Haskoning

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**History**

The original Undercliff Walk was built in the 1930's as a job creation scheme during the recession.

It was designed by the Borough Engineer David Edwards and cost £360,000. The Walk was formally opened on 4 July 1933 at Ovingdean Gap by the Minister of Health Sir Hilton Young.

The wall was made out of 150,000 flint faced concrete blocks, the space between the wall and the cliff was filled with chalk hacked from the cliff face, and the Walk itself with the splash wall at the foot of the cliffs, was laid over the top.

The groynes were built out of mass or reinforced concrete or flint faced blocks at various times since the 1870s.
The final phase between the Marina and Ovingdean is programmed to begin mid-January 2003 and will take approximately 18 months.

In order to ensure public safety during the construction period and to enable the contractor to proceed quickly, the Undercliff Walk will be closed from the access ramp above the Marina boatyard to the east side of Ovingdean for the duration of the work. There will also be closures of the section between Ovingdean and Rottingdean during work periods to allow vehicles to access the site via the ramp at Rottingdean. Access to the western end will be via the cliff path from the A259 at the Roedean Cafe.

Construction sites are dangerous places and the public is asked to keep away. Where possible, areas of the Undercliff Walk will be reopened temporarily during the construction period. Groups wishing to visit the site to view and discuss the work should contact the council.

Plans showing the detail of the scheme can be viewed at Ovingdean Village Hall, on Sundays between 12 and 2pm and Tuesdays and Fridays between 8pm and 10.30pm.

**The works will involve**
- new cafe, toilets and chalets at Ovingdean
- the encasement of the old seawall with precast flint-faced concrete blocks
- placement of granite boulders along the foot of the wall for protection
- renovation of three of the old groynes at Ovingdean and six next to the Marina
- maintenance of the beaches where the groynes are to be renovated
- reconstruction of the promenade and splash wall
- installation of measures to protect pedestrians from falls of chalk and flint

In order to minimise the number of lorry movements on to and off the site, it is hoped to bring the granite boulders to the site by sea and to crush the old concrete arising from the work for use as fill material.

**The quantities of materials to be used are estimated to be:**
- 19,000 cubic metres of concrete
- 400 flint-faced concrete panels
- 1,400 tons of reinforcing steel
- 9,000 cubic metres of concrete removed from the existing defences, crushed and re-used
- 27,000 tons of granite boulders imported by sea, probably from Norway

**The contractor**
Harbour and General Works Ltd were formed in 1934 and are one of the leading maritime civil engineering contractors. In recent years they have completed schemes at Lancing, Reculver, Herne Bay, Deal, Kingsdown, and Bonchurch on the Isle of Wight. They have a large pool of experienced engineers and an excellent safety record.

The contractor will be moving site accommodation in before the work is due to start. Site offices will be located on the cliff top opposite the Roedean Cafe and there will be a site compound in the field opposite St Dunstan’s.

**The consultants**
Posford Haskoning are part of the Dutch Royal Haskoning group and, as Posford Duvivier and before that Lewis & Duvivier, have worked for the council since the mid-1960’s. On this scheme, they have prepared the design and will provide the site staff to supervise the contractor.

Also employed on this scheme has been geotechnical consultant High-Point Rendel, who contributed to the design of the rockfall protection measures - they were also the principle consultants on the cliff stabilisation scheme recently completed above the Marina.
% Change in X-Sectional Area (Spring 2003 to Spring 2010)

- > 30% (3)
- 15 - 30% (6)
- 5 - 15% (2)
- Less than 5% (1)
- 5 - 15% (2)
- 15 - 30% (1)
- > 30% (4)

No Change
Beach Change Summary - Baseline 2003 to Spring 2010 (2 of 3)

SDCG - Goring-by-Sea to Brighton Marina

Southeast Strategic Regional Coastal Monitoring Programme

Annual Report 2010

% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

- > 30% (3)
- 15 - 30% (6)
- 5 - 15% (2)
- Less than 5% (1)
- 5 - 15% (2)
- 15 - 30% (1)
- > 30% (4)

No Change

Accretion

Erosion

0 2.5km 5km
### Beach Change Summary - Baseline 2003 to Spring 2010 (3 of 3)

**SDCG - Brighton Marina to Birling Gap**

<table>
<thead>
<tr>
<th>% Change in X-Sectional Area</th>
<th>(Spring 2003 to Spring 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accretion</strong></td>
<td></td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>(3)</td>
</tr>
<tr>
<td>15 - 30%</td>
<td>(6)</td>
</tr>
<tr>
<td>5 - 15%</td>
<td>(2)</td>
</tr>
<tr>
<td>Less than 5%</td>
<td>(1)</td>
</tr>
<tr>
<td><strong>Erosion</strong></td>
<td></td>
</tr>
<tr>
<td>15 - 30%</td>
<td>(1)</td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>(4)</td>
</tr>
<tr>
<td><strong>No Change</strong></td>
<td></td>
</tr>
</tbody>
</table>
% Change in X-Sectional Area
(Spring 2009 to Winter 2009)

Accretion
- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (4)
- Less than 5% (12)

Erosion
- 5 - 15% (3)
- 15 - 30% (1)
- > 30% (0)
Southeast Strategic Regional Coastal Monitoring Programme

Annual Report 2010

4d-MU2 Profile Change Summary for Baseline 2003 to Winter 2009 (1 of 3)

SDCG - Church Norton to Pagham Harbour

% Change in X-Sectional Area
(Spring 2003 to Winter 2009)

- Accretion
  - > 30% (7)
  - 15 - 30% (1)
  - 5 - 15% (1)
  - Less than 5% (6)
  - 5 - 15% (2)
  - 15 - 30% (3)
  - > 30% (0)

- Erosion

0 200 400m

(2008 Aerial Photography)
4d-MU2 Profile Change Summary for Baseline 2003 to Winter 2009 (2 of 3)  

SDCG - Church Norton to Pagham Harbour

**% Change in X-Sectional Area**
(Spring 2003 to Winter 2009)

- **Accretion**
  - > 30% (7)
  - 15 - 30% (1)
  - 5 - 15% (1)
  - Less than 5% (6)
- **Erosion**
  - 5 - 15% (2)
  - 15 - 30% (3)
  - > 30% (0)
Accretion Erosion

Less than 5%  (79)

% Change in X-Sectional Area
(Spring 2009 to Spring 2010)

Accretion

> 30%  (0)
15 - 30%  (0)
5 - 15%  (10)

No Change

5 - 15%  (2)
Less than 5%  (79)

Erosion

15 - 30%  (0)
> 30%  (0)
% Change in X-Sectional Area
(Spring 2009 to Spring 2010)

- > 30%  (0)
- 15 - 30%  (1)
- 5 - 15%  (4)
- Less than 5%  (24)
- 5 - 15%  (2)
- 15 - 30%  (0)
- > 30%  (0)

4d-MU6 Profile Change Summary for Spring 2009 to Spring 2010 (1 of 2)
SDCG - Elmer to Littlehampton Harbour Mouth
Southeast Strategic Regional Coastal Monitoring Programme

(2008 Aerial Photography)

% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

- > 30% (0)
- 15 - 30% (1)
- 5 - 15% (5)
- Less than 5% (16)
- 5 - 15% (7)
- 15 - 30% (2)
- > 30% (0)

Actual m2 Change in Cross-Sectional Area
Southeast Strategic Regional Coastal Monitoring Programme

Annual Report 2010

4d-MU7 Profile Change Summary for Spring 2009 to Spring 2010 (2 of 2)
SDCG - Littlehampton Harbour Mouth to Rustington

% Change in X-Sectional Area
(Spring 2009 to Spring 2010)

- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (4)
- Less than 5% (13)
- No Change (0)
- Erosion
  - 5 - 15% (0)
  - 15 - 30% (0)
  - > 30% (0)

 MU Boundary

Actual m2 Change in Cross-Sectional Area

(2008 Aerial Photography)
% Change in X-Sectional Area
(Spring 2009 to Spring 2010)

- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (6)
- No Change (41)
- Less than 5% (1)
- 5 - 15% (1)
- 15 - 30% (0)
- > 30% (0)

No Change
4d-MU8A Profile Change Summary for Baseline 2003 to Spring 2010 (3 of 4)
4d-MU8A Profile Change Summary for Baseline 2003 to Spring 2010 (4 of 4)

Southeast Strategic Regional Coastal Monitoring Programme
Annual Report 2010

Actual m2 Change in Cross-Sectional Area

% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

Accretion
- > 30% (3)
- 15 - 30% (1)
- 5 - 15% (10)
- Less than 5% (30)

Erosion
- 5 - 15% (4)
- 15 - 30% (0)
- > 30% (0)

No Change
Southeast Strategic Regional Coastal Monitoring Programme

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4d-MU8B Profile Change Summary for Baseline 2003 to Spring 2010 (1 of 4)

SDCG - Goring-by-Sea to Lancing

% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

- > 30%   (3)
- 15 - 30%   (3)
- 5 - 15%   (17)
- No Change   (18)
- Less than 5%   (4)
- 5 - 15%   (7)
- 15 - 30%   (1)
- > 30%   (0)

Actual m2 Change in Cross-Sectional Area

MU Boundary
% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

- > 30% (3)
- 15 - 30% (3)
- 5 - 15% (17)
- No Change (18)
- Less than 5% (18)
- 5 - 15% (7)
- 15 - 30% (1)
- > 30% (0)

MU Boundary
Actual m2 Change in Cross-Sectional Area

4d00864 (13)
4d00850 (29)
4d00864A (37)
4d00841 (21)
4d00841A (10)
4d00850A (22)
4d00833 (22)
4d00833 (37)
4d00838 (21)
4d00841A (47)
4d00841A (8)
4d00841A (36)
4d-MU8B Profile Change Summary for Baseline 2003 to Spring 2010 (2 of 4)
% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

- < 5% (18)
- 5 - 15% (7)
- 15 - 30% (1)
- > 30% (0)

Accretion
- > 30% (3)
- 15 - 30% (3)
- 5 - 15% (17)

No Change
- Less than 5% (18)
Southeast Strategic Regional Coastal Monitoring Programme

Annual Report 2010

4d-MU8B Profile Change Summary for Baseline 2003 to Spring 2010 (4 of 4)

SDCG - Goring-by-Sea to Lancing

% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

- > 30%  (3)
- 15 - 30%  (3)
- 5 - 15%  (17)
- No Change
- Less than 5%  (18)
- 5 - 15%  (7)
- 15 - 30%  (1)
- > 30%  (0)

MU Boundary

Actual m2 Change in Cross-Sectional Area

(North)
Southeast Strategic Regional Coastal Monitoring Programme

Annual Report 2010

4d-MU9A Profile Change Summary for Spring 2009 to Spring 2010 (4 of 4)

SDCG - Lancing to Shoreham Harbour Arm (West)

% Change in X-Sectional Area
(Spring 2009 to Spring 2010)

- > 30% (0)
- 15 - 30% (1)
- 5 - 15% (2)
- Less than 5% (31)
- No Change
- 5 - 15% (1)
- 15 - 30% (0)
- > 30% (0)

Actual m2 Change in Cross-Sectional Area
% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

Accretion
- > 30% (7)
- 15 - 30% (11)
- 5 - 15% (11)

No Change
- Less than 5% (6)

Erosion
- 5 - 15% (0)
- 15 - 30% (0)
- > 30% (0)
% Change in X-Sectional Area
(Spring 2003 to Spring 2010)

<table>
<thead>
<tr>
<th>% Change</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 30%</td>
<td>7</td>
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<tr>
<td>15 - 30%</td>
<td>11</td>
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<td>6</td>
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<tr>
<td>15 - 30%</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>0</td>
</tr>
</tbody>
</table>

Accretion:

- > 30%: 7
- 15 - 30%: 11
- 5 - 15%: 11
- Less than 5%: 6

Erosion:

- 5 - 15%: 0
- 15 - 30%: 0
- > 30%: 0

Actual m² Change in Cross-Sectional Area

0 200 400m
**Southeast Strategic Regional Coastal Monitoring Programme**

**Annual Report 2010**

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**4d-MU9B Profile Change Summary for Baseline 2003 to Spring 2010 (1 of 2)**

*SDCG - Shoreham Harbour Arm (East) to Aldrington*

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**% Change in X-Sectional Area**

(Spring 2003 to Spring 2010)

- **> 30%** (0)
- **15 - 30%** (0)
- **5 - 15%** (4)
- **Less than 5%** (12)
- **5 - 15%** (5)
- **15 - 30%** (0)
- **> 30%** (0)

---

*Accretion*

- **MU Boundary**

*Erosion*

- **Actual m2 Change in Cross-Sectional Area**

---

(2008 Aerial Photography)
% Change in X-Sectional Area
(Spring 2009 to Spring 2010)

- Accretion:
  - > 30%: (0)
  - 15 - 30%: (1)
  - 5 - 15%: (8)
  - Less than 5%: (25)

- Erosion:
  - 5 - 15%: (1)
  - 15 - 30%: (5)
  - > 30%: (0)

SDCG - Aldrington to Brighton Marina (Western Arm)
# Southeast Strategic Regional Coastal Monitoring Programme

**Annual Report 2010**

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**4d-MU10 Profile Change Summary for Baseline 2003 to Spring 2010 (4 of 4)**

<table>
<thead>
<tr>
<th>% Change in X-Sectional Area</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Accretion</strong></td>
<td></td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>(1)</td>
</tr>
<tr>
<td>15 - 30%</td>
<td>(5)</td>
</tr>
<tr>
<td>5 - 15%</td>
<td>(16)</td>
</tr>
<tr>
<td>Less than 5%</td>
<td>(12)</td>
</tr>
<tr>
<td><strong>Erosion</strong></td>
<td></td>
</tr>
<tr>
<td>5 - 15%</td>
<td>(1)</td>
</tr>
<tr>
<td>15 - 30%</td>
<td>(0)</td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>(0)</td>
</tr>
</tbody>
</table>

---

**SDCG - Aldrington to Brighton Marina (Western Arm)**

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(2008 Aerial Photography)
% Change in X-Sectional Area
(Winter 2008 to Winter 2009)

- **Accretion**
  - > 30% (0)
  - 15 - 30% (1)
  - 5 - 15% (3)
  - Less than 5% (21)
- **Erosion**
  - 5 - 15% (1)
  - 15 - 30% (0)
  - > 30% (0)

SDCG - Brighton Marina (Eastern Arm) to Saltdean

4d-MU12 Profile Change Summary for Winter 2008 to Winter 2009 (3 of 3)
### % Change in X-Sectional Area
(Winter 2008 to Winter 2009)

<table>
<thead>
<tr>
<th>Erosion</th>
<th>&lt; 5%</th>
<th>5 - 15%</th>
<th>Less than 5%</th>
<th>15 - 30%</th>
<th>&gt; 30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Change</td>
<td>(9)</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
<td>(0)</td>
</tr>
<tr>
<td>Accretion</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
<td>(2)</td>
</tr>
</tbody>
</table>

### Actual m2 Change in Cross-Sectional Area

- **(2008 Aerial Photography)**
- **4d-MU13B Profile Change Summary for Winter 2008 to Winter 2009 (2 of 2)**
- **SDCG - Telscombe to Peacehaven Heights**
Southeast Strategic Regional Coastal Monitoring Programme
Annual Report 2010

% Change in X-Sectional Area
(Winter 2008 to Winter 2009)

Accretion
- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (1)
- Less than 5% (6)
- 5 - 15% (3)
- 15 - 30% (0)
- > 30% (0)

Erosion
- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (1)
- Less than 5% (6)
- 5 - 15% (3)
- 15 - 30% (0)
- > 30% (0)

MU Boundary
(3) 4d-MU14 Profile Change Summary for Winter 2008 to Winter 2009 (1 of 2) SDCG - Peacehaven Heights to Newhaven Harbour

(2008 Aerial Photography)
Southeast Strategic Regional Coastal Monitoring Programme

% Change in X-Sectional Area
(Winter 2008 to Winter 2009)

- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (2)
- Less than 5% (1)
- 5 - 15% (0)
- 15 - 30% (0)
- > 30% (0)

Actual m2 Change in Cross-Sectional Area

MU Boundary

(2008 Aerial Photography)
% Change in X-Sectional Area
(Spring 2003 to Winter 2009)

- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (0)
- Less than 5% (0)
- 5 - 15% (1)
- 15 - 30% (1)
- > 30% (1)

No Change (3)

Actual m2 Change in Cross-Sectional Area

MU Boundary

(2008 Aerial Photography)
<table>
<thead>
<tr>
<th>% Change in X-Sectional Area</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>15 - 30%</td>
<td>1</td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>2</td>
</tr>
</tbody>
</table>

(2008 Aerial Photography)

4d-MU16 Profile Change Summary for Baseline 2003 to Winter 2009 (2 of 2)

SDCG - Seaford Head to Cuckmere Haven

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Southeast Strategic Regional Coastal Monitoring Programme
Southeast Strategic Regional Coastal Monitoring Programme

Annual Report 2010

4d-MU17 Profile Change Summary for Baseline 2003 to Winter 2009 (1 of 1)

SDCG - Cuckmere Haven

% Change in X-Sectional Area
(Spring 2003 to Winter 2009)

Accretion
- > 30% (0)
- 15 - 30% (1)
- 5 - 15% (1)
- Less than 5% (4)

Erosion
- 5 - 15% (2)
- 15 - 30% (0)
- > 30% (0)

MU Boundary

Actual m2 Change in Cross-Sectional Area

0 200 400m

(2008 Aerial Photography)
Southeast Strategic Regional Coastal Monitoring Programme

Annual Report 2010

4d-MU18A Profile Change Summary for Baseline 2003 to Winter 2009 (1 of 2)

SDCG - Cuckmere Haven (East) to Birling Gap

% Change in X-Sectional Area
(Spring 2003 to Winter 2009)

Accretion
- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (1)
- Less than 5% (2)

Erosion
- 5 - 15% (4)
- 15 - 30% (3)
- > 30% (0)

* MU Boundary

* Actual m2 Change in Cross-Sectional Area

(2008 Aerial Photography)
% Change in X-Sectional Area

- > 30% (0)
- 15 - 30% (0)
- 5 - 15% (0)
- Less than 5% (4)
- 5 - 15% (3)
- 15 - 30% (0)
- > 30% (2)
Photograph: Dawn patrol
J. Moon