South West Regional Coastal Monitoring Programme

ANNUAL SURVEY REPORT

Portland Bill to Exmouth

2013

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Portland Bill to Exmouth

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Project Name: South West Regional Coastal Monitoring Programme

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Approved By: N. Baglow
South West Strategic Regional Coastal Monitoring Programme

Annual Report 2013 – Portland Bill to Exmouth

1. Introduction

Analysis presented in this report provides an overview of beach changes and wave and tidal measurements since the commencement of the South West Strategic Regional Coastal Monitoring Programme. The first beach surveys took place during the spring of 2007 and changes are reported until the spring interim surveys of 2013. This provides a short time base over which beach changes have been monitored. Detailed interpretation and decision-making is not advisable on the basis of these short-term changes, since the changes may not be representative of longer-term trends.

Data are presented at several levels:
- Process cell summary of percentage and actual profile change from 2012 to 2013
- Process cell summary of percentage and actual profile change from 2007 to 2013
- Detailed beach profile change from 2012 to 2013
- Detailed beach profile change from 2007 to 2013
- Time series of beach profile graphs (on CD)
- Trend analysis of beach cross-sectional area (on CD)

The process cell summary maps provide an at-a-glance summary of the changes during the past year and over the longer term. It is recommended that the user should use the maps to identify areas of interest and then examine the individual profile plots and trends. Colour-coded lines highlight areas of maximum change and identify profiles which might need closer examination.

It must be noted that the colour coded lines are based on actual change as opposed to percentage change as is the case with similar reports published by the South East Regional Coastal Monitoring Programme. Percentage change is displayed in brackets following the profile name on each line.

Difference models have been produced where there are at least two baseline surveys to compare. In addition, the most recent LiDAR data has been used to extract the level of Mean High Water (MHW) from each survey unit and sediment distribution maps are produced from the latest survey information.

It must be appreciated that the accuracies of each measurement system must be taken into account when drawing conclusions, particularly from the difference models. In the case of topographic difference models from RTK GPS surveys, the accuracy of each data point is ±0.03m and therefore differences of ±0.06m can generally be considered as "real", whilst smaller changes may be an artefact of the measuring system, and are considered to be "No Change". Difference plots show changes >±0.25m, which should be indicative of areas of genuinely measurable change. Smaller changes may also be present but these are filtered from the analysis to provide clarity. This report displays difference models only where detailed analysis suggests that the changes are real but, nevertheless, the user should approach the results as indicative, unless reinforced overtime or with other information.
Where LiDAR has provided the source data sets, the modelling is less precise. Each LiDAR cell value has a plan position representative of a 1m$^2$ grid (with the exception of Chesil Beach which has a 0.5m$^2$ grid). It is not reasonable to expect to observe changes with positional accuracy of better than 1-2m therefore. Profiles of 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. cliffs, seawalls. Despite these limitations in accuracy the changes shown indicate an overview of profile change, but to a lower precision than the RTK data. The location of the regularly surveyed profiles superimposed on the difference plots indicates how representative these profiles might be of overall changes.

It must be emphasised that this is the fifth report of a series and that changes identified are indicative only of short-term trends. As the Programme progresses, more detailed and meaningful reporting will be possible and this report should be treated accordingly.

2. Hydrodynamic data

   a. Waves
      Directional WaveRider buoys were deployed at Chesil on the 1st January 2007 and West Bay on the 1st November 2006.

      The full wave reports are given at Annex A.

   b. Tides
      A WaveRadar Rex was installed at West Bay Harbour on 25th January 2008. This was replaced on 30th March 2011 by an Etrometa step gauge.

      The full tide report is given at Annex B.

3. Survey data – Topographic

Profiles show a mixture of accretion, no change and erosion over the past year. In percentage terms the majority of profiles have remained stable, with the most notable changes seen in the western section of Lyme Bay.

Over the longer term, analysis of actual change shows instances of strong accretion and erosion throughout Lyme Bay.

Dates of surveys are shown in Annex E and the detailed topographic survey report is given at Annex F.

4. Survey data – Bathymetric

The first baseline bathymetric survey of Lyme Bay was completed between June 2007 and October 2008. No further analysis will be carried out until after the next baseline survey.
Annex A  Chesil and West Bay Interim Wave Reports
Annex B  West Bay Harbour Tide Report
Annex C  N/A
Annex D  N/A
Annex E  High Level Report – field data collection (SDADCAG)
Annex F  Topographic Survey Report for Portland Bill to Exmouth
Annex G  N/A

Explanatory Notes
Chesil Directional Waverider Buoy

Location
OS: 363033E 78457N
WGS84: Latitude: 50° 36.279’ N Longitude: 02° 31.424’ W

Water Depth
10-12 m CD

Instrument Type
Datawell Directional Waverider Mk III

Data Quality

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<tr>
<th>Recovery rate (%)</th>
<th>Sample interval</th>
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Monthly Statistics – 2012/13

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Storm Analysis

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<th>$T_z$ (s)</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>
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*Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Weymouth). The surge shown is the residual at the time of the highest $H_s$. The maximum tidal surge is the largest surge during the storm event.
Distribution plots

The distribution of wave parameters are shown in the accompanying graphs of:

- Wave roses (Direction vs. $H_s$) from July 2012 to June 2013 (top) and for all measured data (bottom)
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction from July 2012 to June 2013
- Monthly time series of $H_s$ (red line is the 4.5 m storm threshold)
- Incidence of storms during the reporting period and for all previous years. Storm events are defined using the Peaks-over-Threshold method. The highest $H_s$ of each storm event is shown

Summary

This reporting period was relatively quiet, with no storms exceeding the 4.5m storm threshold although a few came close in the last quarter of 2012. The wave direction continued to predominate from the SW.

General

The wave buoy at Chesil was deployed on 22 December 2006.

Acknowledgements

The shore station is kindly hosted by the Weymouth & Portland National Sailing Academy. 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.
West Bay Directional Waverider Buoy

Location
OS: 347123E  88451N
WGS84: Latitude: 50° 41.597' N  Longitude: 02° 44.999' W

Water Depth
~10 m CD

Instrument Type
Datawell Directional Waverider Mk III

Data Quality

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Monthly Statistics – 2012/13  
All times are GMT

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Storm Analysis

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<th>Date/Time</th>
<th>Hs (m)</th>
<th>Tp (s)</th>
<th>Tz (s)</th>
<th>Dir. (°)</th>
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<th>Tidal range (m)</th>
<th>Tidal surge* (m)</th>
<th>Max. surge* (m)</th>
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* Tidal information is obtained from the nearest recording tide gauge (the step gauge at West Bay Harbour). 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 are shown in the accompanying graphs of:

- Wave roses (Direction vs. $H_s$) from July 2012 to June 2013 (top) and for all measured data (bottom)
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction from July 2012 to June 2013
- Monthly time series of $H_s$ (red line is 4.4 m storm threshold)
- Incidence of storms during the reporting period and for all previous years. Storm events are defined using the Peaks-over-Threshold method. The highest $H_s$ of each storm event is shown

Summary

This reporting period was unusually quiet with only one storm exceeding the 4.4m storm threshold in November, although some others came close in January. Wave direction continued to predominate from SWbS.

General

The buoy was first deployed on 19 November 2006.

Acknowledgements

TASK2000 tidal prediction software was kindly provided by the Permanent Service for Mean Sea Level, Proudman Oceanographic Laboratory.
Annex A

Interim Wave Report

West Bay 2012/13

Hs at West Bay Jul 2012 to Jun 2013

Day in month
Annex A

Interim Wave Report

West Bay

2012/13

Storms at West Bay from Jul 2012 to Jun 2013

Storm threshold is Hs = 4.4m

Storms at West Bay - all years

Date

Jan07 Jan08 Jan09 Jan10 Jan11 Jan12 Jan13
West Bay Harbour Tide Gauge

Location
OS: 346142.9E 90195.31N
WGS84: Latitude: 50° 42.532' N Longitude: 002° 45.846' E
Inner end of western breakwater

Instrument Type
Etrometa step gauge (from 30 March 2011)
Rosemount WaveRadar REX (from 25 January 2008 to 23 March 2011)

Benchmarks

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<th>Benchmark</th>
<th>Description</th>
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<tr>
<td>TGBM = 3.951m above Ordnance Datum Newlyn</td>
<td>Cross-headed bolt embedded into top of concrete seawall</td>
</tr>
<tr>
<td>Aux1 = 3.556m above Ordnance Datum Newlyn</td>
<td>Top of step gauge</td>
</tr>
<tr>
<td>TGZ = -2.425m above Ordnance Datum Newlyn</td>
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<tr>
<td>TGZ = -0.175m above Chart Datum</td>
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<tr>
<td>TGZ = 6.376m below TGBM</td>
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Datum
All data are to Ordnance Datum Newlyn. The height of Chart Datum relative to Ordnance Datum at Bridport is -2.25m (Admiralty Tide Tables, Supplementary Table III).

Survey information
The site was surveyed on 29 May 2008.

Site characteristics
The breakwater is on open coast but some wave reflection can occur around the breakwater and harbour entrance. Spring tidal range is approx.3.2m.

Data Quality

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<th>Recovery rate (%)</th>
<th>Sample interval</th>
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<tbody>
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<td>10 minutes</td>
</tr>
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Service history
The step gauge was last serviced in September 2012. No re-calibration of the instrument is required.

Measurements
Residuals and Elevations (OD and CD) for the whole year are shown in Figures 1 to 3 respectively.

Statistics

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<th>Month</th>
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<td>Elevation (OD)</td>
<td>Date/Time</td>
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### Highest values in 2012

<table>
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<tr>
<th>Extreme</th>
<th>Date/Time</th>
<th>Value (m)</th>
<th>Surge</th>
<th>Date/Time</th>
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<tr>
<td>2.79 (0.45)</td>
<td>17-Oct-2012 07:20</td>
<td>0.71</td>
<td>0.45</td>
<td>31-Oct-2012 17:40</td>
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<tr>
<td>2.70 (0.56)</td>
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<td>2.63 (0.36)</td>
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<tr>
<td>2.55 (0.30)</td>
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<td>---------------------</td>
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<tr>
<td></td>
<td>Elevation (OD)</td>
<td>Date/Time</td>
<td>Value (m)</td>
<td>Date/Time</td>
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<td>(Surge)</td>
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<td>2.79 (0.45)</td>
<td>17-Oct-2012 07:20</td>
<td>0.71</td>
<td>31-Oct-2012 17:40</td>
</tr>
</tbody>
</table>

¹ Due to the requirements of the Harbour owners, the tide gauge in 2008 was sited at a lower elevation than ideal. A combination of high surge, high spring tides and significant wave action caused the instrument to be swamped on 10 March 2008 and, accordingly, the elevations given in the table are likely to be an under-estimate of the actual tidal levels.

<table>
<thead>
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<th>Tidal levels</th>
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<tr>
<td>LAT</td>
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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 Z₀ is the value of Mean Sea Level derived by the harmonic analysis of the year’s data. These 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. Tide levels were produced by Fugro EMU Limited.
Figure 1: West Bay Harbour residuals for 2012
Figure 2: West Bay Harbour tidal elevations for 2012 relative to Ordnance Datum
Figure 3: West Bay Harbour tidal elevations for 2012 relative to Chart Datum
South West Regional Coastal Monitoring Programme  
Field Data Collection – SDADCAG  
Topographic Data

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<th>Survey Unit</th>
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<th>Post-Storm</th>
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<td>31/03/2013</td>
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</table>

Key
- Green: Completed on time and accepted
- Red: Completed late
- Orange: Surveyed but not submitted / Accepted
- Gray: Will not be surveyed

* Repeat baseline surveys were not carried out in 2012 as each survey unit received a baseline survey.
*Survey unit was surveyed despite not being required by the specification.
# Survey unit was surveyed but date of survey has not been submitted by the contractor.

For the most recent survey schedules for each survey unit please see
http://www.channelcoast.org/southwest/survey_programme_schedule/
Annex F – Topographic Survey Report for Portland Bill to Exmouth

1. Introduction

Analysis has been conducted for those sites where a minimum of three surveys have been recorded. In general, changes are measured relative to the Mean Low Water Springs (MLWS) level. In cases where this level cannot be reached the master profile is placed at the lowest level achieved by all profiles in the survey unit.

A full time series of plotted beach profiles are shown superimposed and relative to a Master Profile for each profile location (on the accompanying CD). The Master Profile provides the basis for calculation of beach cross-section area changes. Where possible, identical depth boundaries have been used for all profiles within a survey unit. However, even where this has not been possible, direct comparisons can be made for the beach cross-sectional area at one profile over time, since the master profile is constant for each profile (Figure 1). In some instances, raising the lower depth of the Master Profile may reduce the overall cross-sectional area of the profile. This may cause small changes in the beach profile to have a large impact on the percentage change. This effect has been taken into account in the analysis of change to beach profiles. The trend in cross-sectional area (CSA) is presented as a graph for each profile (Figure 2).

Figure 1: Example Master Profile with CSA calculated from the surveyed GPS Profile
As part of the Monitoring Programme specification, each survey unit receives a full topographic baseline survey once every 5 years, with the exception of repeat baseline sites which receive an annual baseline. Baseline surveys include a full profile survey at 50m intervals and continuous spot height data collected at approximately 1m intervals across the whole beach to the level of MLWS. This continuous data also includes a feature code for each spot height data point recorded.

Where there are at least two baseline surveys for a survey unit a topographic difference model has been produced based on the spot height elevations. The raw spot height data has been processed into a grid model and successive models have been subtracted from one another to produce a difference model for the survey unit. The spot height data from each survey has also been used to approximate the level of MHW (Mean High Water) and MLW along each survey unit. In some cases, where there is no topographic baseline data collected on foot, the information described above may be derived from LiDAR data.
2. **Condition of process sub-cell**

The Beach Change Summary maps contain an at-a-glance condition of the whole area between Portland Bill and Exmouth, with the lines representing the average accretion, no change or erosion for each survey unit where there is topographic data.

3. **Condition of individual survey units**

Changes within each survey unit are summarised on two maps: Beach change map (Spring to Spring) and beach change map (Baseline to Spring). Beach Change maps show the location of each beach profile, superimposed on an aerial photograph (note that the line has been extended for clarity). Where possible, the annual change in cross-sectional area has been calculated from baseline 2012 to spring 2013 and from baseline 2007 to spring 2013.

**6aSU2: Chesil**

**Baseline 2012 to Spring 2013**

The overall trend in this survey unit is for low level erosion over the past year. This is primarily concentrated at either end of the survey unit, with the mid-section remaining stable. Profile 6a00108B has shown the greatest percentage change (-13%), however this amounts to a loss of only 12m² in total.

Note that data from profile 6a00184 has been omitted from this year’s analysis as an obstruction prevented the profile from being surveyed during the spring 2013 survey.

**Baseline 2006 to Spring 2013**

As with the previous year’s analysis, there is a marked pattern of transport towards the east, with notable overall sediment build-up in the eastern section of the unit, towards Portland Bill. The mid-section has remained stable whilst some low level erosion can be seen at the western end of the survey unit.

**6aSU3-2: Abbotsbury & West Bexington (1 of 2, Abbotsbury)**

**Baseline 2011 to Spring 2013**

The cross-sectional area of both profiles has increased by 1% over the past year.

**Baseline 2006 to Spring 2013**

Neither of the profiles has shown significant change since 2006. Profile 6a00454 has remained stable whilst profile 6a00465 has lost 1% of its cross-sectional area.

**6aSU3-2: Abbotsbury & West Bexington (2 of 2, West Bexington)**

**Baseline 2012 to Spring 2013**

Both profiles in this unit have gained between 5m² and 15m² of material since the 2012 baseline survey. This equates to a maximum gain in cross-sectional area of 7%.

**Baseline 2006 to Spring 2013**

Previous analysis showed both profiles losing material over the longer term. Profile 6a00521 continues to show an overall loss, however the percentage change has decreased. Profile 6a00525 has stabilised and now shows an overall change of less than 5m².
6aSU3-3: The Hive

**Baseline 2012 to Spring 2013**
Profiles on the main beach show a percentage change of less than 5% over the past year. Profile 6a00616, in the far east of the survey unit has shown an 11% increase in cross-sectional area, amounting to an overall gain of 21m².

**Baseline 2006 to Spring 2013**
Previous baseline to spring analysis has shown all profiles losing significant amounts of material over the longer term. Profile 6a00616 has since stabilised and shows no change in this year’s analysis. The remaining two profiles continue to show similar levels of material loss, having lost upwards of 20m².

6aSU3-5: Burton Freshwater

**Baseline 2012 to Spring 2013**
The previous year on year analysis showed all three profiles in this survey unit gaining significant amounts of material. This year’s analysis shows a reversal in this trend, with all profiles having lost material since 2012.

**Baseline 2007 to Spring 2013**
As with previous baseline to spring analysis, all profiles in this survey unit have lost material. Losses have increased by between 1% and 5% in comparison to last year’s results.

**Topographic difference model changes 2007 – 2013**
A repeat baseline survey was carried out at this site as scheduled during the summer of 2013, however, as the data has yet to be submitted by the contractor no difference models, sediment distribution or mean high water level maps can been included in this report.

6aSU4: West Bay

**Baseline 2012 to Spring 2013**
This survey unit is split into three distinct sections. The profiles on East Beach have all lost material over the past year; however the amount lost is much less than that recorded in last year’s year on year analysis where all profiles lost over 30 m². The greatest loss of material on East Beach recorded in this year’s analysis is -17m² along profile 6a00688. The central section contains three profiles. Two of these profile have shown low level erosion, whilst the other has shown no change. The profiles in the western section of the survey unit have both shown low level accretion.

**Baseline 2006 to Spring 2013**
Previous baseline to spring analysis has shown very definite changes for each of the three sections. This remains to be the case, with the East Beach and the mid-section of the survey unit showing significant losses, whilst the western section of the unit has gained material. It must be noted that the profiles in the western section are short in comparison to the rest of the unit and this accounts for the larger percentage changes recorded here.
Topographic difference model changes 2007 – 2013
A repeat baseline survey was carried out at this site as scheduled during the summer of 2013, however, as the data has yet to be submitted by the contractor no difference models, sediment distribution or mean high water level maps can been included in this report.

6aSU5-2: Seatown

Baseline 2012 to Spring 2013
Two profiles are surveyed in this survey unit; the eastern profile as shown low level accretion, whilst the western profile has shown low level erosion over the past year.

Baseline 2007 to Spring 2013
Profile 6a00789 has remained stable over the longer time period, showing a gain of less than 5m$^2$ overall. Profile 6a00790 shows a net loss of material, losing 6% of its cross-sectional area since 2007.

6aSU5-4: Charmouth

Baseline 2012 to Spring 2013
The two most eastern profiles in the survey unit have experienced high levels of accretion over the past year, gaining 99m$^2$ and 88m$^2$ of material respectively. The remaining, profile has remained stable.

Baseline 2007 to Spring 2013
All three profiles have gained material since the initial survey in 2007. Profile 6a00904 shows the greatest increase in material, having gained 146m$^2$ overall.

6aSU6-1: Lyme Regis

Baseline 2012 to Spring 2013
All three of the profiles have remained stable over the past year.

Baseline 2007 to Spring 2013
Longer term the trend is for accretion. All three profiles in the survey unit have gained material, with profile 6a00947A showing the greatest increase.

6aSU6-2: Lyme Regis

Baseline 2012 to Spring 2013
Year on year analysis shows profiles at either end of the survey unit to have lost material, whilst the three central profiles have shown increases of between 3% and 8%.

Baseline 2007 to Spring 2013
The trend shown in the year on year analysis is echoed in the longer term analysis. Profiles at either end of the survey unit have lost material, whilst the central profiles, located on the shingle section of the beach, have gained material since 2007.
Annex F                  Portland Bill to Exmouth 2013

Topographic difference model changes 2007 – 2013
A repeat baseline survey was carried out at this site as scheduled during the summer of 2013, however, as the data has yet to be submitted by the contractor no difference models, sediment distribution or mean high water level maps can been included in this report.

6aSU7-1: The Cobb

Baseline 2012 to Spring 2013
Of the four profiles in the survey unit, only one has shown a change of greater than 5%. Profile 6a00984, to the west of the survey unit, has gained 19m² over the past year, equating to a cross-sectional area gain of 10%

Baseline 2007 to Spring 2013
The long term trend is for accretion at this survey unit. As with the spring to spring analysis the profile showing the greatest change is 6a00984, which has shown an increase in cross-sectional area of 20%

6aSU8-1: Seaton

Baseline 2012 to Spring 2013
Profiles show a mixture of accretion and erosion over the past year. The greatest percentage change can be seen along profile 6a01193, although this can be attributed to its comparatively short length.

Baseline 2007 to Spring 2013
Over the longer period, the majority of profiles have lost material. Again, percentage wise the greatest change can be seen along profile 6a01193, due to its short length. Profile 6a01157 shows the highest overall loss of material, 70m², although this may be due to its location at the entrance to Axmouth harbour.

6aSU10: Sidmouth

Baseline 2012 to Spring 2013
Overall the trend over the past year has been for erosion, with the notable exception of one profile. The most eastern profile in the survey unit, profile 6a01441, has shown a significant increase in cross sectional area, gaining 43m² of material; an overall increase of 105%

Baseline 2007 to Spring 2013
The results of the longer term analysis mirror the trend shown in the spring to spring analysis. Profile 6a01441 continues to show the greatest percentage change, gaining 89% in cross-sectional area since 2007.

Topographic difference model changes 2007 – 2013
A repeat baseline survey was carried out at this site as scheduled during the summer of 2013, however, as the data has yet to be submitted by the contractor no difference models, sediment distribution or mean high water level maps can been included in this report.
6aSU12: Budleigh Salterton

**Baseline 2012 to Spring 2013**
All profiles in the survey unit have gained material over the past year, with the exception of profile 6a01624 which has remained stable.

**Baseline 2007 to Spring 2013**
The longer term trend is for accretion, with profiles showing an increase of between 3% and 14% since 2007.

6aSU13: Budleigh Salterton

**Baseline 2012 to Spring 2013**
Profiles in this survey unit show a mixture of both low level accretion and low level erosion, although only three of the profiles show a change of greater than 5%

**Baseline 2007 to Spring 2013**
Consistent with previous analysis, over the longer time period the beach continues to show accretion in the east and erosion in the west.

6aSU16-1: Exmouth

**Baseline 2012 to Spring 2013**
Since last year the profiles in this survey unit have shown a mixture of accretion, erosion and stability. Profile 6a01812 shows the greatest change, increasing by 31%, although this is due to the comparatively short length of the profile. Profile 6a01816 is also comparatively short and this accounts for the 8% change representing a gain of only 1m².

**Baseline 2007 to Spring 2013**
Overall the long term trend is for erosion. This is especially notable in the mid-section of the survey unit where profiles have lost upwards of 30m² of material since 2007. The only notable accretion seen in the survey unit is shown along profile 6a01808, which has increased by 26% in total.

**Topographic difference model changes 2007 – 2013**
A repeat baseline survey was carried out at this site as scheduled during the summer of 2013, however, as the data has yet to be submitted by the contractor no difference models, sediment distribution or mean high water level maps can been included in this report.
EXPLANATORY NOTES

Change in Cross-sectional Area (CSA)

The annual change in cross-sectional area is calculated as the difference in CSA between two surveys, expressed as a percentage change compared to the earlier CSA.

\[
\frac{\text{CSA}_1 - \text{CSA}_2}{\text{CSA}_2} \times 100 \quad \text{eqn(1)}
\]

Where \(\text{CSA}_1\) = most recent springtime survey and \(\text{CSA}_2\) = spring survey previous year. Therefore an annual change of \(-14\%\) represents erosion during the last year of \(14\%\) of the area of last year’s survey.

Net Sediment Calculation

The value derived from this calculation represents the volume change in \(m^3\) across each individual survey unit over time. The initial volumes are derived from the Digital Terrain Models made for consecutive baseline topographic surveys. Both models are clipped to cover the same area, then a volume above the MLWS plane is calculated for each DTM. The net sediment change is calculated as

\[
\text{Vol}_1 - \text{Vol}_2 \quad \text{eqn(2)}
\]

Where \(\text{Vol}_1\) = most recent DTM model volume and \(\text{Vol}_2\) = earlier DTM model volume. Therefore a net change of \(-19730m^3\) represents erosion since the earlier survey.
Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

Accretion
- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
- Less than 5 m²

Erosion
- 15 - 30 m²
- > 30 m²

No Change
- 5 - 15 m²
- Less than 5 m²

Note that LiDAR data has been used for Phase 2 Baseline profiles at 6aSU3-2.
South West Regional Coastal Monitoring Programme

Beach Change Summary - Baseline 2012 to Spring 2013

Annual % Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

- **Accretion**
  - > 30%
  - 15 - 30%
  - 5 - 15%
  - Less than 5%

- **Erosion**
  - 5 - 15%
  - 15 - 30%
  - > 30%

Note that LiDAR data has been used for Phase 2 Baseline profiles at 6aSU3-2
### Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

<table>
<thead>
<tr>
<th>SU</th>
<th>Change in Cross-sectional Area (Baseline 2007 to Spring 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6aSU2</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td>6aSU3-2</td>
<td>15 - 30 m²</td>
</tr>
<tr>
<td>6aSU3-3</td>
<td>5 - 15 m²</td>
</tr>
<tr>
<td>6aSU4</td>
<td>No Change</td>
</tr>
<tr>
<td>6aSU5-4</td>
<td>Less than 5 m²</td>
</tr>
<tr>
<td>6aSU6-1</td>
<td>5 - 15 m²</td>
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<tr>
<td>6aSU6-2</td>
<td>15 - 30 m²</td>
</tr>
<tr>
<td>6aSU7-1</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td>6aSU8-1</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td>6aSU9-1</td>
<td>&gt; 30 m²</td>
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<tr>
<td>6aSU10</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td>6aSU12</td>
<td>&gt; 30 m²</td>
</tr>
</tbody>
</table>

Note that LiDAR data has been used for Phase 1 Baseline profiles at 6aSU2, 6aSU3-2, 6aSU3-3 and 6aSU4.
Note that LiDAR data has been used for Phase 1 Baseline profiles at 6aSU2, 6aSU3-2, 6aSU3-3 and 6aSU4.
## Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

<table>
<thead>
<tr>
<th>SU</th>
<th>Accretion</th>
<th>Erosion</th>
</tr>
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<tbody>
<tr>
<td>SU-2</td>
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</tr>
<tr>
<td>SU-1</td>
<td>15 - 30 m²</td>
<td></td>
</tr>
<tr>
<td>SU-3</td>
<td>5 - 15 m²</td>
<td></td>
</tr>
<tr>
<td>SU-4</td>
<td>5 - 15 m²</td>
<td></td>
</tr>
<tr>
<td>SU-5</td>
<td>15 - 30 m²</td>
<td></td>
</tr>
<tr>
<td>SU-6</td>
<td>&gt; 30 m²</td>
<td></td>
</tr>
<tr>
<td>SU-7</td>
<td>Less than 5 m²</td>
<td></td>
</tr>
<tr>
<td>SU-8</td>
<td>5 - 15 m²</td>
<td></td>
</tr>
<tr>
<td>SU-9</td>
<td>15 - 30 m²</td>
<td></td>
</tr>
<tr>
<td>SU-10</td>
<td>&gt; 30 m²</td>
<td></td>
</tr>
</tbody>
</table>

**SU boundary**

Aerial Photography from 2012

Annual Change in Cross-sectional Area (%)
Note that data from profile 6a00184 has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.
Note that data from profile 6a00184 has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.

Note that data from profile 6a00190 (3%) has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.

Note that data from profile 6a00184 has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.

Note that data from profile 6a00190 (3%) has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.

Note that data from profile 6a00184 has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.

Note that data from profile 6a00190 (3%) has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.

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Note that data from profile 6a00190 (3%) has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.

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Note that data from profile 6a00190 (3%) has been omitted from the analysis as the profile could not be surveyed during the spring 2013 survey due to an obstruction.
Note that Phase 2 baseline data for this Survey Unit was collected using LiDAR on 25/11/2011.
Actual Change in Cross-sectional Area (Baseline 2006 to Spring 2013)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **No Change**
  - Less than 5 m²
  - 5 - 15 m²
- **Erosion**
  - 15 - 30 m²
  - > 30 m²

Note that Phase 1 baseline data for this Survey Unit was collected using LiDAR on 03/11/2006.

Annual Change in Cross-sectional Area (%)
South West Regional Coastal Monitoring Programme

Annual Survey Report 2013

Aerial Photography from 2012

Note that Phase 2 baseline data for this Survey Unit was collected using LiDAR on 25/11/2011.

Actual Change in Cross-sectional Area (Baseline 2011 to Spring 2013)

- Accretion
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- No Change
  - Less than 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
- Erosion
  - > 30 m²

Annual Change in Cross-sectional Area (%)

SU boundary

7d01323 (3 %)

SDADCAG - Dorset

6aSU3-2: Abbotsbury & West Bexington - Beach Change (2 of 2)
Aerial Photography from 2012

Note that Phase 1 baseline data for this Survey Unit was collected using LiDAR on 03/11/2006.
South West Regional Coastal Monitoring Programme

Annual Survey Report 2013

6aSU3-3: The Hive - Beach Change

Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

<table>
<thead>
<tr>
<th>Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>701323 (3 %)</td>
</tr>
<tr>
<td>SU boundary</td>
</tr>
</tbody>
</table>

Annual Change in Cross-sectional Area (%)

- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
- Less than 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

Aerial Photography from 2012

SDADCAG - Dorset

5aSU3-3: The Hive - Beach Change
Note that Phase 1 baseline data for this Survey Unit was collected using LiDAR on 03/11/2006.
Aerial Photography from 2012

Annual Change in Cross-sectional Area (%)

Accretion
- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
No Change
- Less than 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

- **Accretion**
  - > 30 m$^2$
  - 15 - 30 m$^2$
  - 5 - 15 m$^2$
- **Erosion**
  - Less than 5 m$^2$
  - 5 - 15 m$^2$
  - 15 - 30 m$^2$
  - > 30 m$^2$

**SU boundary**

Aerial Photography from 2012
Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

Accretion
- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
- Less than 5 m²

No Change
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

Erosion
- Less than 5 m²
- 5 - 15 m²
- > 30 m²

Aerial Photography from 2012
Note that LiDAR collected on 03/11/2006 was used as Phase 1 baseline data for this Survey Unit.

Aerial Photography from 2012
Aerial Photography from 2012

Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

Accretion
- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
No Change
- Less than 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

Erosion
- Less than 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

SU boundary

7d01323 (3 %)

Annual Change in Cross-sectional Area (%)
6aSU5-4: Charmouth - Beach Change

**Annual Survey Report 2013**

**Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)**

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **No Change**
  - Less than 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
- **Erosion**
  - > 30 m²

**SU boundary**

Annual Change in Cross-sectional Area (%)

Aerial Photography from 2012
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²

- **Erosion**
  - Less than 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²

**No Change**

**SU boundary**

Annual Change in Cross-sectional Area (%)
Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

<table>
<thead>
<tr>
<th>Type</th>
<th>&gt; 30 m²</th>
<th>15 - 30 m²</th>
<th>5 - 15 m²</th>
<th>Less than 5 m²</th>
<th>5 - 15 m²</th>
<th>15 - 30 m²</th>
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<tbody>
<tr>
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<td></td>
<td></td>
<td>2%</td>
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<tr>
<td>Erosion</td>
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<td></td>
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<td>2%</td>
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<td>No Change</td>
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<td>2%</td>
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Annual Change in Cross-sectional Area (%)

Aerial Photography from 2012
### Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

<table>
<thead>
<tr>
<th>Category</th>
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<tr>
<td>Accretion</td>
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<td></td>
<td>15 - 30 m²</td>
<td>23%</td>
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<tr>
<td></td>
<td>5 - 15 m²</td>
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<td>Less than 5 m²</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>5 - 15 m²</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>15 - 30 m²</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>&gt; 30 m²</td>
<td>2%</td>
</tr>
<tr>
<td>Erosion</td>
<td></td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2%</td>
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<td>7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7%</td>
</tr>
</tbody>
</table>

#### Annual Change in Cross-sectional Area (%)

- **7d01323 (3%)**

#### Aerial Photography from 2012
Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

<table>
<thead>
<tr>
<th>Category</th>
<th>Change in Cross-sectional Area (%)</th>
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</thead>
<tbody>
<tr>
<td>Accretion</td>
<td>7d01323 (3 %)</td>
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<tr>
<td>Erosion</td>
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<td>No Change</td>
<td></td>
</tr>
<tr>
<td>Less than 5 m²</td>
<td></td>
</tr>
<tr>
<td>5 - 15 m²</td>
<td></td>
</tr>
<tr>
<td>15 - 30 m²</td>
<td></td>
</tr>
<tr>
<td>&gt; 30 m²</td>
<td></td>
</tr>
</tbody>
</table>

Annual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)
**South West Regional Coastal Monitoring Programme**

**Annual Survey Report 2013**

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### Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

<table>
<thead>
<tr>
<th>Category</th>
<th>Change in Cross-sectional Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accretion</td>
<td></td>
</tr>
<tr>
<td>&gt; 30 m²</td>
<td></td>
</tr>
<tr>
<td>15 - 30 m²</td>
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<tr>
<td>5 - 15 m²</td>
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<tr>
<td>No Change</td>
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<tr>
<td>Less than 5 m²</td>
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<tr>
<td>5 - 15 m²</td>
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<tr>
<td>15 - 30 m²</td>
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</tr>
<tr>
<td>Erosion</td>
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</tr>
<tr>
<td>&gt; 30 m²</td>
<td></td>
</tr>
<tr>
<td>15 - 30 m²</td>
<td></td>
</tr>
<tr>
<td>5 - 15 m²</td>
<td></td>
</tr>
<tr>
<td>Less than 5 m²</td>
<td></td>
</tr>
</tbody>
</table>

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**6aSU6-2: Lyme Regis - Beach Change**

**Aerial Photography from 2012**

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**SDADCAG - Dorset**
### Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

<table>
<thead>
<tr>
<th>Type</th>
<th>&gt; 30 m²</th>
<th>15 - 30 m²</th>
<th>5 - 15 m²</th>
<th>≤ 5 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accretion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Change</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Annual Change in Cross-sectional Area (%)

- **SU boundary**
- **7d01323 (3 %)**

#### Aerial Photography from 2012

- **6aSU7: Lyme Regis, Monmouth Beach - Beach Change**
- **SDADCAG - Dorset**

---

- **E**
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **Erosion**
  - Less than 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²

**SU boundary**

**Annual Change in Cross-sectional Area (%)**

- 7d01323 (3 %)
- More data points are shown with corresponding changes in cross-sectional area.
South West Regional Coastal Monitoring Programme

Annual Survey Report 2013

6aSU8-1: Seaton - Beach Change

SDADCAG - South Devon

Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

<table>
<thead>
<tr>
<th>Accleration</th>
<th>&gt; 30 m²</th>
<th>15 - 30 m²</th>
<th>5 - 15 m²</th>
<th>Less than 5 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion</td>
<td></td>
<td>5 - 15 m²</td>
<td>15 - 30 m²</td>
<td>&gt; 30 m²</td>
</tr>
</tbody>
</table>

Aerial Photography from 2012
6aSU10: Sidmouth - Beach Change

Annual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
  - Less than 5 m²
- **Erosion**
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²

SU boundary

Aerial Photography from 2012

Annual Change in Cross-sectional Area (%)

- 7d01323 (3 %)

Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

<table>
<thead>
<tr>
<th>SU</th>
<th>Annual Change in Cross-sectional Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU10</td>
<td>7d01323 (3 %)</td>
</tr>
</tbody>
</table>

0 - 15 m
15 - 30 m
> 30 m
Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

- Accretion
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
  - Less than 5 m²
- No Change
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²
- Erosion

SU boundary

7d01323 (3 %)

Annual Change in Cross-sectional Area (%)
### Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

<table>
<thead>
<tr>
<th>Change Type</th>
<th>Area Range 1</th>
<th>Area Range 2</th>
<th>Area Range 3</th>
<th>Area Range 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accretion</td>
<td>&gt; 30 m²</td>
<td>15 - 30 m²</td>
<td>5 - 15 m²</td>
<td>Less than 5 m²</td>
</tr>
<tr>
<td>No Change</td>
<td>5 - 15 m²</td>
<td>15 - 30 m²</td>
<td>&gt; 30 m²</td>
<td></td>
</tr>
<tr>
<td>Erosion</td>
<td>Less than 5 m²</td>
<td>5 - 15 m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 - 30 m²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 30 m²</td>
<td></td>
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</tr>
</tbody>
</table>

#### Annual Change in Cross-sectional Area (%)

- 7d01323 (3%)

#### Aerial Photography from 2012

[Map showing beach change with markers indicating change areas]
Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **No Change**
  - Less than 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
- **Erosion**
  - > 30 m²
  - Less than 5 m²

**Annual Change in Cross-sectional Area (%)**
- 7d01323 (3%)

**Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)**

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **No Change**
  - Less than 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
- **Erosion**
  - > 30 m²
  - Less than 5 m²

**Annual Change in Cross-sectional Area (%)**
- 7d01323 (3%)

**Aerial Photography from 2012**
**Actual Change in Cross-sectional Area (Baseline 2012 to Spring 2013)**

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
  - Less than 5 m²
- **Erosion**
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²

**SU boundary**

**Annual Change in Cross-sectional Area (%)**

- 7d01323 (3%)
- 6a01766 (4%)
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

<table>
<thead>
<tr>
<th>SU</th>
<th>Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SU boundary</td>
</tr>
<tr>
<td></td>
<td>7d01323 (3 %)</td>
</tr>
<tr>
<td>7d</td>
<td>Less than 5 m²</td>
</tr>
<tr>
<td>6a1770</td>
<td>5 - 15 m²</td>
</tr>
<tr>
<td>6a1772</td>
<td>15 - 30 m²</td>
</tr>
<tr>
<td>6a1774</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td>6a1776</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td>6a1782</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td>6a1780</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td>6a1784</td>
<td>&gt; 30 m²</td>
</tr>
</tbody>
</table>

Accretion

- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
- Less than 5 m²

No Change

- 5 - 15 m²
- Less than 5 m²

Erosion

- 15 - 30 m²
- > 30 m²
- 5 - 15 m²
Annual Change in Cross-sectional Area (%)

- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
- Less than 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

Erosion
- Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

- Annual Change in Cross-sectional Area (Baseline 2007 to Spring 2013)

[Map with aerial photography and beach change data]
Cross Sectional Area above MP Trend for Location: 6a001088 and Reference Profile Set

Area Above MP Trend: Accreting at 2.657 m²/Year

Survey Date


Beach Area (m²)

68  69  70  71  72  73  74  75  76  77  78  79  80  81  82  83  84  85  86  87  88  89  90  91  92

Survey Unit 6aSU2
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 6aU0109A and Reference Profile Set

Area Above MP Trend: Accreting at 5.391 m²/Year

Survey Date

Beach Area (m²)
Cross Sectional Area above MP Trend for Location: 6a00110 and Reference Profile Set

Area Above MP Trend: Accreting at 5.275 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00113 and Reference Profile Set

Area Above MP Trend: Accreting at 5.327 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00115 and Reference Profile Set

Area Above MP Trend: Accreting at 3.553 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00119 and Reference Profile Set

Area Above MP Trend: Accreting at 6.221 m²/Year

Survey Date:

Beach Area (m²):
732  734  736  738  740  742  744  746  748  750  752  754  756  758  760  762  764  766  768  770  772  774  776  778  780  782  784  786  788  790  792

Legend:
- Yellow: Recycling Event
- Green: Area Above MP
- Green: Area Trend
- Blue: Area Between MP & DP

Survey Unit 6aSU2
Cross-Sectional Area Charts
Survey Unit 6aSU2
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 6a00124 and Reference Profile Set

Area Above MP Trend: Accreting at 6.829 m²/Year

Survey Date

Recycling Event
Area Above MP
Area Trend
Area Between MP & DP
Cross-sectional Area above MP Trend for Location: 6a00131 and Reference Profile Set

Area Above MP Trend: Accreting at 5.643 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00136 and Reference Profile Set

Area Above MP Trend: Accreting at 4.514 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00138 and Reference Profile Set

Area Above MP Trend: Accreting at 3.011 m²/Year

Survey Date

Survey Unit 6aSU2
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 6a00140 and Reference Profile Set

Area Above MP Trend: Accreting at 0.856 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00144 and Reference Profile Set

Area Above MP Trend: Accreting at 0.009 m²/Year

1.3792
1.379
1.3788
1.3786
1.3784
1.3782
1.378
1.3778
1.3776
1.3774
1.3772
1.377
1.3768
1.3766
1.3764
1.3762
1.376
1.3758
1.3756
1.3754
1.3752
1.375
1.3748
1.3746
1.3744
1.3742
1.374
1.3738
1.3736
1.3734
1.3732
1.373
1.3728
1.3726
1.3724
1.3722
1.372
1.3718
1.3716
1.3714
1.3712
1.371
1.3708
1.3706
1.3704
1.3702
1.370

Survey Date

- Yellow: Recycling Event
- Green: Area Above MP
- Green: Area Trend
- Blue: Area Between MP & DP

SAIDS
Cross Sectional Area above MP Trend for Location: 6a00161 and Reference Profile Set

Area Above MP Trend Eroding at -3220 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00172 and Reference Profile Set

Area Above MP Trend Eroding at -1.724 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00197 and Reference Profile Set.

Area Above MP Trend: Accreting at 2.235 m²/Year.
Cross Sectional Area above MP Trend for Location: 6a00454 and Reference Profile Set

Area Above MP Trend: Accreting at 1.032 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00465 and Reference Profile Set

Area Above MP Trend: Accreting at 1.713 m²/Year

Survey Date:

Beach Area (m²):
751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800

Legend:
- Yellow: Recycling Event
- Green: Area Above MP
- Light Green: Area Trend
- Blue: Area Between MP & DP
Cross Sectional Area above MP Trend for Location: 6a00620 and Reference Profile Set

Area Above MP Trend: Accreting at 0.450 m²/Year

Survey Date:
- 17/02/2007
- 18/08/2007
- 15/02/2008
- 16/08/2008
- 14/02/2009
- 15/08/2009
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012
- 09/02/2013

Beach Area (m²): 390 to 490

Legend:
- Recycling Event
- Area Above MP
- Area Trend
- Area Between MP & DP
Cross Sectional Area above MP Trend for Location: 6a00621 and Reference Profile Set

Area Above MP Trend Eroding at -6.657 m²/Year

Survey Date: 17/03/2007 to 09/02/2013

Legend:
- Yellow: Recycling Event
- Red: Area Above MP
- Green: Area Trend
- Blue: Area Between MP & DP
Cross Sectional Area above MP Trend for Location: 6a00682A and Reference Profile Set

Area Above MP Trend: Eroding at -0.332 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00688 and Reference Profile Set

Area Above MP Trend: Accreting at 5.424 m²/Year

Survey Date:
- 17/02/2007
- 18/03/2007
- 16/02/2008
- 16/05/2008
- 14/02/2009
- 15/08/2009
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012

Survey Unit 6aSU4
Cross-Sectional Area Charts
Survey Unit 6aSU4
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 6a00/06 and Reference Profile Set

Area Above MP Trend: Accreting at 1.852 m²/Year

Survey Date:
- 17/02/2007
- 18/08/2007
- 16/02/2008
- 16/08/2008
- 14/02/2009
- 15/08/2009
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012

Beach Area (m²):
- 30
- 31
- 32
- 33
- 34
- 35
- 36
- 37
- 38
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- 40
- 41
- 42
- 43
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Survey Unit 6aSU4
Cross-Sectional Area Charts
Survey Unit 6aSU5-2
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 6a00789 and Reference Profile Set
Area Above MP Trend: Accreting at 0.127 m²/Year

Area Above MP Trend: 180, 179.5, 179, 178.5, 178, 177.5, 177, 176.5, 176, 175.5, 175, 174.5, 174, 173.5, 173, 172.5, 172, 171.5, 171, 170.5, 170, 169.5, 169, 168.5, 168, 167.5, 167, 166.5, 166, 165.5, 165, 164.5, 164, 163.5, 163, 162.5, 162, 161.5, 161


Legend:
- Recycling Event
- Area Above MP
- Area Trend
- Area Between MP & DP

SAHGS
Survey Unit 6aSU5-4
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 6a00906A and Reference Profile Set

Area Above MP Trend: Accreting at 3.574 m²/Year
Cross Sectional Area above MP Trend for Location: 6a00947A and Reference Profile Set

Area Above MP Trend: Accrting at 2.861 m²/Year

Survey Date

\[ \begin{align*}
&72.5, 73, 73.5, 74, 74.5, 75, 75.5, 76, 76.5, 77, 77.5, 78, 78.5, 79, 79.5, 80, 80.5, 81, 81.5, 82, 82.5, 83, 83.5, 84, 84.5, 85, 85.5, 86, 86.5, 87, 87.5, 88, 88.5, 89, 89.5, 90
\end{align*} \]
Cross Sectional Area above MP Trend for Location: 6a00951A and Reference Profile Set

Area Above MP Trend: Accreting at 0.384 m²/Year
Survey Unit 6aSU6-1
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location : 6aSU6-1A and Reference Profile Set

Area Above MP Trend: Accreting at 0.166 m²/Year

Survey Date

Beach Area (m²)
177.5 178.5 179 179.5 180 180.5 181 181.5 182 182.5 183 183.5 184 184.5 185 185.5 186 186.5 187 187.5

Recycling Event
Area Above MP
Area Trend
Area Between MP & DP
Cross Sectional Area above MP Trend for Location: 6a00955 and Reference Profile Set

Area Above MP Trend Eroding at -0.371 m²/Year
Cross Sectional Area above MP Trend for Location: 6aU0962A and Reference Profile Set

Area Above MP Trend Eroding at -0.236 m²/Year

Survey Date: 18/08/2007 to 09/02/2013

Legend:
- Yellow Square: Recycling Event
- Green Line: Area Above MP
- Green Line: Area Trend
- Blue Line: Area Between MP & DP
Cross Sectional Area above MP Trend for Location: 6a00966A and Reference Profile Set

Area Above MP Trend: Accreting at 1.805 m²/Year

Survey Date:
- 18/06/2007
- 16/02/2008
- 16/08/2008
- 14/02/2009
- 15/08/2009
- 14/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012
- 09/02/2013

Beach Area (m²):
- 211
- 212
- 214
- 215
- 216
- 217
- 218
- 219
- 220
- 221
- 222
- 223
- 224
- 225
- 226
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- 236
- 237
- 238
- 239
- 240

Legend:
- Yellow: Recycling Event
- Green: Area Between MP & DP
- Dark Green: Area Above MP
- Gray: Area Trend
Cross Sectional Area above MP Trend for Location: 6a00967A and Reference Profile Set

Area Above MP Trend: Accreting at 1.033 m²/Year

Survey Date


Survey Unit 6aSU6-2

Cross-Sectional Area Charts

Recycling Event  Area Above MP  Area Trend  Area Between MP & DP

SAIDS
Cross Sectional Area above MP Trend for Location: 6a00969A and Reference Profile Set

Area Above MP Trend Eroding at -4.27 m²/Year

- Survey Date
- Beach Area (m²)

- Survey Date: 18/08/2007 to 09/02/2013
- Beach Area (m²): 0 to 300

Legend:
- Yellow: Recycling Event
- Green: Area Above MP
- Green: Area Trend
- Black: Area Between MP & DP

SAIDS
Cross Sectional Area above MP Trend for Location: 6a00973A and Reference Profile Set

Area Above MP Trend: Eroding at -5.124 m²/Year
Cross Sectional Area above MF Trend for Location: 6a00975 and Reference Profile Set

Area Above MF Trend: Accreting at 1.245 m²/Year

Survey Date


Beach Area (m²)

268  270  272  274  276  278  280  282  284  286  288  290  292  294  296  298  300  302

The chart shows the trend of beach area above the Mean High Water (MF) over time, indicating an accreting trend at a rate of 1.245 m² per year.
Cross Sectional Area above MP Trend for Location: 6a00978 and Reference Profile Set

Area Above MP Trend: Accreting at 1.769 m²/Year
Cross-Sectional Area above MP Trend for Location: 6a00981 and Reference Profile Set

Area Above MP Trend: Accreting at 4.225 m²/Year
Cross Sectional Area above MF Trend for Location: 6a00984 and Reference Profile Set

Area Above MF Trend: Accreting at 3.717 m²/Year
Cross Sectional Area above MP Trend for Location: 6a01157 and Reference Profile Set

Area Above MP Trend Eroding at -6.123 m²/Year

Survey Date:
- 18/08/2007
- 16/08/2008
- 18/08/2008
- 14/02/2009
- 15/08/2009
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012

Beach Area (m²):
- 200
- 220
- 240
- 260
- 280
- 300

Legend:
- Yellow: Recycling Event
- Green Dash: Area Above MP
- Green Solid: Area Trend
- Blue: Area Between MP & DP
Cross-Sectional Area above MP Trend for Location: 6a01165 and Reference Profile Set

Area Above MP Trend Eroding at -3.685 m²/Year

Survey Date:
- 18/08/2007
- 16/02/2008
- 18/08/2008
- 14/02/2009
- 15/08/2009
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012

Beach Area (m²):
- 383
- 382
- 381
- 380
- 379
- 378
- 377
- 376
- 375
- 374
- 373
- 372
- 371
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- 365
- 364
- 363
- 362
- 361
- 360
- 359
- 358

Legend:
- Recycling Event
- Area Above MP
- Area Trend
- Area Between MP & DP

SAIDS
Cross Sectional Area above MP Trend for Location: 6a01169 and Reference Profile Set

Area Above MP Trend: Eroding at -1.188 m²/Year

Survey Date

Survey Unit 6aSU8-1
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 6a01177 and Reference Profile Set

Area Above MP Trend Eroding at -0.213 m²/Year

Survey Unit 6aSU8-1
Cross-Sectional Area Charts
Cross sectional area above MF trend for Location: 6a01193 and Reference Profile Set

Area Above MF Trend: Accreting at 1.706 m²/Year
Cross Sectional Area above MP Trend for Location: 6a01197 and Reference Profile Set

Area Above MP Trend: Accreting at 1.160 m²/Year
Cross Sectional Area above MP Trend for Location: 6a01441 and Reference Profile Set

Area Above MP Trend: Accreting at 2.496 m²/Year
Cross Sectional Area above MP Trend for Location: 6a01446 and Reference Profile Set

Area Above MP Trend: Accreting at 0.258 m²/Year

Survey Unit 6aSU10
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 6a01453A and Reference Profile Set

Area above MP Trend Eroding at -0.944 m²/Year

Survey Date:
- 15/06/2008
- 18/08/2008
- 14/02/2009
- 15/06/2009
- 13/02/2010
- 14/06/2010
- 12/02/2011
- 13/08/2011
- 11/06/2012
- 11/06/2012
- 09/02/2013

Beach Area (m²):
- 338
- 337
- 336
- 335
- 334
- 333
- 332
- 331
- 330
- 329
- 328
- 327
- 326
- 325
- 324
- 323
- 322
- 321
- 320
- 319
- 318
- 317
- 316
- 315
- 314
- 313
- 312
- 311
- 310
- 309
- 308
- 307
- 306
- 305
- 304

Legend:
- Yellow: Recycling Event
- Green: Area Above MP
- Green: Area Trend
- Blue: Area Between MP & DP
Cross Sectional Area above MP Trend for Location: 6a01463 and Reference Profile Set

Area Above MP Trend: Accreting at 2.008 m²/Year
Cross Sectional Area above MP Trend for Location: 6a01621 and Reference Profile Set

Area Above MP Trend: Accreting at 0.159 m^2/Year

Survey Date - Beach Area (m^2)
- 18/08/2007
- 15/02/2008
- 15/08/2008
- 14/02/2009
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012

Legend:
- Yellow: Recycling Event
- Green: Area Above MP
- Black: Area Trend
- Purple: Area Between MP & DP
Cross Sectional Area above MP Trend for Location: 6a01624 and Reference Profile Set

Area Above MP Trend: Accreting at 7.750 m²/Year
Cross-Sectional Area above MP Trend for Location: 6a01627 and Reference Profile Set

Area Above MP Trend: Accreting at 8.045 m²/Year
Survey Unit 6aSU13
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 6a01635 and Reference Profile Set
Area Above MP Trend: Accreting at 5.710 m²/Year
Survey Unit 6aSU13

Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 6a01639 and Reference Profile Set

Area Above MP Trend: Accreting at 4.916 m²/Year

Survey Date


Beach Area (m²)

373
372
371
370
369
368
367
366
365
364
363
362
361
360
359
358
357
356
355
354
353
352
351
350
349
348
347
346
345
344
343


Survey Date


Beach Area (m²)

373
372
371
370
369
368
367
366
365
364
363
362
361
360
359
358
357
356
355
354
353
352
351
350
349
348
347
346
345
344


Survey Date


Beach Area (m²)

373
372
371
370
369
368
367
366
365
364
363
362
361
360
359
358
357
356
355
354
353
352
351
350
349
348
347
346
345
344


Survey Date


Beach Area (m²)

373
372
371
370
369
368
367
366
365
364
363
362
361
360
359
358
357
356
355
354
353
352
351
350
349
348
347
346
345
344


Survey Date


Beach Area (m²)

373
372
371
370
369
368
367
366
365
364
363
362
361
360
359
358
357
356
355
354
353
352
351
350
349
348
347
346
345
344


Survey Date


Beach Area (m²)
Cross Sectional Area above MF Trend for Location: 6a01651 and Reference Profile Set

Area Above MF Trend Eroding at -0.385 m²/Year

Survey Unit 6aSU13
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 6a01655 and Reference Profile Set

Area Above MP Trend Eroding at -2.914 m²/Year
Cross Sectional Area above MP Trend for Location: 6a01659 and Reference Profile Set

Area Above MP Trend Eroding at -1.173 m²/Year

Survey Date


Beach Area (m²)

115.0  114.0  113.0  112.0  111.0  110.0  109.0  108.0  107.0  106.0  105.0  104.0  103.0  102.0  101.5

Survey Unit 6aSU13
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 6a01767 and Reference Profile Set.

Area Above MP Trend: Accreting at 4.710 m²/Year.
Cross Sectional Area above MP Trend for Location: 6a01776 and Reference Profile Set.

Area Above MP Trend: Accreting at 1.526 m²/Year.

Survey Date: 16/08/2007 to 11/08/2012.
Cross Sectional Area above MP Trend for Location: 6a01780 and Reference Profile Set.

Area Above MP Trend Eroding at -5229 m²/Year.
Cross Sectional Area above MP Trend for Location: 6a01792 and Reference Profile Set

Area Above MP Trend: Eroding at -12.392 m²/Year

Survey Date:
- 18/08/2007
- 16/02/2008
- 16/08/2008
- 14/02/2009
- 15/08/2009
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012

Beach Area (m²):
- 425
- 420
- 415
- 410
- 405
- 400
- 395
- 390
- 385
- 380
- 375
- 370
- 365
- 360
- 355
- 350
- 345
- 340

Legend:
- Recycling Event
- Area Above MP
- Area Trend
- Area Between MP & DP
Cross Sectional Area above MP Trend for Location: 6a01804 and Reference Profile Set

Area Above MP Trend: Accreting at 3.203 m²/Year

Survey Date:
- 16/08/2007
- 16/02/2008
- 16/08/2008
- 14/02/2008
- 15/08/2008
- 14/08/2009
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012

Survey Unit 6aSU16-1
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 6a01808 and Reference Profile Set

Area Above MP Trend: Accreting at 5.539 m²/Year

Survey Date
- 16/02/2008
- 14/02/2008
- 15/08/2008
- 13/02/2010
- 14/08/2010
- 12/02/2011
- 13/06/2011
- 11/08/2012

Beach Area (m²)
- 122
- 128
- 132
- 134
- 136
- 138
- 140
- 142
- 144
- 146
- 148
- 150
- 152
- 154
- 156
- 158
- 160
- 162
- 164
Cross Sectional Area above MP Trend for Location: 6a01812 and Reference Profile Set

Area Above MP Trend: Eroding at -1.577 m²/Year

Survey Date


Beach Area (m²)

45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74
Cross Sectional Area above MP Trend for Location: 6a01816 and Reference Profile Set

Area Above MP Trend: Accreting at 0.013 m²/Year

Survey Date


Beach Area (m²)

4.2  4.4  4.6  4.8  5.0  5.2  5.4  5.6  5.8  6.0  6.2  6.4  6.6  6.8  7.0  7.2  7.4  7.6  7.8  8.0  8.2  8.4  8.6

Survey Unit 6aSU16-1
Cross-Sectional Area Charts
Profile Charts for Survey Unit 6aSU2

Profiles: 6a00115

Chainage (m) vs. Level (m) chart with various lines representing different years and profiles.
Profile Charts for Survey Unit 6aSU2
Profile Charts for Survey Unit 6aSU4
Profile Charts for Survey Unit 6aSU4
Profile Charts for Survey Unit 6aSU4

Profiles: 6a00701

Legend:
- 2013-01
- 2012-08
- 2012-03
- 2012-01
- 2011-11
- 2011-03
- 2010-10
- 2010-06
- 2009-11
- 2009-06
- 2009-04
- 2008-10
- 2008-06
- 2007-09
- 2007-07
- 2007-03
- 2006-11-03
- Design Profile
- Master Profile
Profile Charts for Survey Unit 6aSU5-2

Profiles: 6a00790

- Chainage (m)
- Level (m)
Profile Charts for Survey Unit 6aSU7-1

Profiles: 6a00981

Chainage (m) vs. Level (m) chart showing various surveys from different years.
Profile Charts for Survey Unit 6aSU8-1

Profiles: 6a01189

Chainage (m) vs Level (m) chart showing multiple profiles from different years. The profiles are color-coded and labeled from 2013-01 to 2007-03, with a Design Profile and Master Profile indicated. The chart ranges from 60 to 120 chainage and from -2.2 to 6.0 level.
Profiles: 6a01639

Chainage (m)

Level (m)