South West Regional Coastal Monitoring Programme

Annual Survey Report
Hartland Point to Sand Point
2016

AR60
September 2016
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* Presented on the CD accompanying printed copies of this report distributed by the Plymouth Coastal Observatory.
Summary

This report contains changes to beach and wave conditions from measurements recorded by the South West Regional Coastal Monitoring Programme. Comparisons are made over the last year and from the beginning of the Programme in 2007.

Over the last year the percentage change of individual profiles across the region has been minimal with the majority of profiles increasing in cross-sectional area by between 5 – 15%. A number of cases exist where erosion has occurred, both up to and greater than 30%; however these are often isolated to single profiles and the trend is not replicated throughout the survey unit. By studying the individual cases it can be noted that these cases of percentage decrease often occur around dynamic features such as river outflows or on particularly short profiles.

In comparison, the values for actual change (m²) to cross-sectional area are much more varied with a greater range of change from more than 30m² of accretion to greater than 30m² of erosion. Focusing on the mouth of the River Taw and River Torridge the profiles have predominantly remained stable over the last year. On the northern side, between Crow Point and Saunton Sands, no profiles have exceeded a 4% change in cross-sectional area. On the southern side at Westward Ho! only three profiles have experienced a significant change, losing a maximum of 28% in cross-sectional area.

Longer term, the same pattern generally exists, with the majority of profiles remaining stable or experiencing low levels of accretion. In contrast to the year on year analysis a more distinct grouping exists between profiles experiencing greater levels of erosion of accretion. For example at the eastern end of 7dMINE6 (Blue Anchor) five profiles have all accreted by more than 10% and at 7eSANB1 (Sand Bay) there is a trend for a northerly movement of sediment.

Around the estuary of the rivers Taw and Torridge much of the same pattern exists with the northern side experiencing low levels of change as well as the sheltered bay by Northam Burrows. On the exposed coast, outside the estuary, much greater change has occurred particularly focused around the northern and southern ends where profiles have lost up to 50% in cross-sectional area.

The repeat baseline survey at 7cWEST2 (Westward Ho!) has shown a -0.5% decrease in beach volume over the last year. In the southern section, change has been concentrated on the barrier section, with a redistribution of material landward. In the north western corner of the unit the upper beach has predominantly undergone erosion with material accretion at the seaward extent. Accretion also dominates further into the estuary where sheltered conditions prevail. Since 2007 192,697m³ of material has been lost equating to a 3.4% decrease in volume. The most concentrated areas of erosion are on the north western corner of the unit and at the southern end of the unit.
From the repeat baseline survey it can be seen that 7cSAUN1 (Saunton Sands) has undergone a net volume increase of 1.1% over the last year. The changes have been patchy with the main feature being an increase in the dune height behind Crow Point. Since 2010 7cSAUN1 has experienced a net sediment loss of 1.4%. Again changes have been patchy with the area surrounding Crow Point being the most dynamic.

Since April 2015 there have been five storms recorded at the Bideford Bay Directional Waverider Buoy exceeding the 5m storm threshold. The predominant wave direction has been from the west.

Only four significant events were recorded at the Minehead Directional Waverider Bouy, since April 2015, that were larger than the 2.3m storm threshold. The predominant wave direction at this buoy is from the northwest although lesser components also approach from the northeast.

The storm threshold for Weston Bay Directional Waverider Bouy is set at 1.9m due to its sheltered location in the Severn Estuary. Since April 2015 five storm events occurred that were larger than this threshold. The predominant wave direction at this buoy ranges from the west to south west.
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016 – Hartland Point to Sand Point

Introduction

Analysis presented in this report provides an overview of beach changes and wave and tidal measurements since the commencement of the South West Regional Coastal Monitoring Programme. The first beach surveys took place during the spring of 2007 and changes are reported until spring 2016.

Data are presented at the following levels:

- **Process Cell**
  - Process cell summary of percentage and actual profile change from Spring 2015 to Spring 2016
  - Process cell summary of percentage and actual profile change from Baseline 2007 to Spring 2016

- **Survey Unit**
  - Detailed beach profile change from Spring 2015 to Spring 2016
  - Detailed beach profile change from Baseline 2007 to Spring 2016
  - Topographic difference model change from Repeat Baseline 2015 to Repeat Baseline 2016 (where available)
  - Topographic difference model change from Baseline 2007 to Repeat Baseline 2016 (where available)
  - Change in position of Mean High Water contour (where available)
  - Beach sediment distribution (where available)
  - Time series of beach profile graphs*
  - Trend analysis of beach cross-sectional area*

*Note that beach profile graphs and cross-sectional area charts are presented on the CD accompanying hard copies of this report distributed by the Plymouth Coastal Observatory.*

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.

Lines are colour coded based on actual change; percentage change is displayed in brackets following the profile name on each line. Please note that lines on the map have been extended for clarity and therefore may not represent the actual distance surveyed.

Difference models have been produced where there are at least two baseline surveys to compare. Where available, the most recent LiDAR data has been used to extract the level of
Mean High Water (MHW) for each survey unit, and where possible, sediment distribution maps are produced from the latest topographic baseline 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. 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 only the eighth report of a series and that changes identified are indicative only of short-term trends.
**Bideford Bay Directional Waverider Buoy**

<table>
<thead>
<tr>
<th>Location</th>
<th>240622 E 131189 N</th>
</tr>
</thead>
<tbody>
<tr>
<td>WGS84</td>
<td>Latitude: 51° 03.471' N Longitude: 04° 16.537' W</td>
</tr>
</tbody>
</table>

### Instrument type

- Datawell Directional Waverider Mk III
- Water depth: ~11m CD

**Buoy in situ in Bideford Bay. Photo courtesy of Fugro EMU Limited**

### Location of buoy (Google mapping)

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**Summary**

During this reporting period from April 2015 to March 2016, there was a relatively high frequency of storms with one of the largest individual events since the buoy was deployed. This event reached 6.60m Hs at 07:00 on 08 February 2016 just after High Water. However, between 09:30 and 18:30 waves were breaking over the buoy and, accordingly, the significant wave height may have exceeded 6.60m during this period. Additionally, while no storms occurred during December, the month had by far the largest average significant wave height since the deployment of the buoy.

---

**Data Quality**

<table>
<thead>
<tr>
<th>Recovery rate (%)</th>
<th>Sample interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

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**Monthly Averages – 2015/16**

*All times are GMT*

<table>
<thead>
<tr>
<th>Month</th>
<th>Hs (m)</th>
<th>Tp (s)</th>
<th>Tz (s)</th>
<th>Dir. (°)</th>
<th>SST (°C)</th>
<th>No. of days</th>
<th>Bimodal seas (%)</th>
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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>
<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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<td>HW -3</td>
<td>~6.6</td>
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</table>

Distribution plots

The distribution of wave parameters are shown in the accompanying graphs of:
- Monthly time series of Hs (red line is 5.0 m storm threshold)
- Incidence of storms during the reporting period for all previous years. Storm events are defined using the Peaks-over-Threshold method. The highest Hs of each storm event is shown
- Percentage of occurrence of Hs, Tp, Tz and Direction from April 2015 to March 2016
- Wave rose (percentage of occurrence of Direction vs. Hs) for all measured data

General

The buoy was first deployed on 17 June 2009.

Acknowledgements

The shore station is kindly hosted by Appledore RNLI station. 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.

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*Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Ilfracombe). The surge shown is the residual at the time of the highest Hs. The maximum tidal surge is the largest surge during the storm event.*
Offshore Wave Hs (m)
Bideford Bay WB: 17/06/2009 - 31/03/2016
Minehead Directional Waverider Buoy

**Location**

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<th>OS</th>
<th>297300 E 148700 N</th>
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| WGS84 | Latitude: 51° 13.693’ N  
Longitude: 03° 28.333’ W |

**Instrument type**

Datawell  
Directional Waverider Mk III

**Water depth**

~10m CD

Buoy in situ off Minehead beach. Photo courtesy of Fugro EMU Limited

Location of buoy (Google mapping)

### Summary

During this reporting period from April 2015 to March 2016, four storms of typical magnitude for the site exceeded the 2.3m storm threshold. The largest storm on 02 March 2016 reached 2.69m Hs at High Water.

### Data Quality

<table>
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<th>Recovery rate (%)</th>
<th>Sample interval</th>
</tr>
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<tbody>
<tr>
<td>99</td>
<td>30 minutes</td>
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### Monthly Averages – 2015/16

All times are GMT

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<thead>
<tr>
<th>Month</th>
<th>Hs (m)</th>
<th>Tp (s)</th>
<th>Tr (s)</th>
<th>Dir. (°)</th>
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Storm Analysis

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<th>T_p (s)</th>
<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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Distribution plots

The distribution of wave parameters are shown in the accompanying graphs of:
- Monthly time series of H_s (red line is 2.3 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
- Percentage of occurrence of H_s, T_p, T_z and Direction from April 2015 to March 2016
- Wave rose (percentage of occurrence of Direction vs. H_s) for all measured data

General

The buoy was first deployed on 19 December 2006, at which time the magnetic declination at the site was 3.4° west, changing by 0.15° east per year.

Acknowledgements

The shore station is kindly hosted by Minehead Harbormaster. 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.

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* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Ilfracombe). 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.
Annual Survey Report

Offshore Wave Hs (m)
Minehead WB: 19/12/2006 - 31/03/2016

- >= 0.00 < 0.50 (m)
- >= 0.50 < 1.00 (m)
- >= 1.00 < 1.50 (m)
- >= 1.50 < 2.00 (m)
- >= 2.00 < 2.50 (m)
- >= 2.50 < 3.00 (m)
- >= 3.00 < 3.50 (m)
- >= 3.50 < 4.00 (m)
- >= 4.00 < 4.50 (m)
- >= 4.50 < 5.00 (m)
- >= 5.00 < 5.50 (m)
- >= 5.50 < 6.00 (m)
- >= 6.00 < 998.00 (m)
Weston Bay Directional Waverider Buoy

Location

OS 329183 E 162109 N
WGS84
Latitude: 51° 21.217’ N
Longitude: 03° 01.101’ W

Instrument type
Datawell Directional Waverider Mk III

Water depth ~13m CD

Buoy in situ in Weston Bay. Photo courtesy of Fugro EMU Limited

Location of buoy (Google mapping)

Summary

During this reporting period from April 2015 to March 2016, eight distinct events exceeded the 1.9m storm threshold for the site. The largest event on 17 November 2015 reached 2.61m Hs at High Water and was the second largest recorded since the buoy’s deployment in 2009.

Data Quality

<table>
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<tr>
<th>Recovery rate (%)</th>
<th>Sample interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
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Monthly Averages – 2015/16  
All times are GMT

<table>
<thead>
<tr>
<th>Month</th>
<th>Hs (m)</th>
<th>Tp (s)</th>
<th>Tz (s)</th>
<th>Dir. (°)</th>
<th>SST (°C)</th>
<th>No. of days</th>
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Storm Analysis

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<tr>
<th>Date/Time</th>
<th>$H_s$ (m)</th>
<th>$T_p$ (s)</th>
<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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<td>-</td>
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<td>259</td>
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<td>4.7</td>
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<tr>
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<td>4.0</td>
<td>257</td>
<td>-</td>
<td>HW−1</td>
<td>8.9</td>
<td>0.35</td>
<td>0.55</td>
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</tbody>
</table>

Distribution plots

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

- Monthly time series of $H_s$ (red line is 1.9 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
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction from April 2015 to March 2016
- Wave rose (percentage of occurrence of Direction vs. $H_s$) for all measured data

General

The buoy was first deployed on 11 September 2009, at which time the magnetic declination at the site was 2.8° west, changing by 0.15° east per year. There is a notable tidal signature to significant wave heights at this location, given the water depth of the buoy (~13 m CD) and the spring tidal range (~10.9 m).

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.

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* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Hinkley Point). 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.
Annual Survey Report

Hartland Point to Sand Point 2016

Offshore Wave Hs (m)

[Graph showing offshore wave data with color codes for different wave height ranges]
**Topographic Survey Report**

**Profile Data**

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 the case of surveys conducted between Hartland Point and Sand Point, only a minority reach MLWS due to muddy conditions and therefore MLWS has been substituted by Mean Low Water Neaps (MLWN) or Mean Low Water (MLW) as appropriate. In cases where none of these levels can be reached the master profile is placed at the most appropriate level for the survey unit in question.

A full time series of plotted beach profiles are shown superimposed and relative to a Master Profile for each profile location. The Master Profile provides the basis for calculation of beach cross-sectional 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).

![Cross-Sectional Area](image)

**Figure 1: Example Master Profile with CSA Calculated from the Surveyed GPS Profile**
Figure 2: Example of Beach Cross-Sectional Area Trend Analysis

**Baseline Data**

As part of the Monitoring Programme specification, each survey unit receives a full topographic baseline survey once every five years. In addition, highly managed sites, or those with a beach management plan, receive an annual baseline survey. 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, indicating the surface sediment type.

Where there are at least two baseline surveys for a survey unit, a topographic difference model is produced based on the spot height elevations. The raw spot height data has been processed into a grid model and successive models are 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 Mean High Water (MHW) 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.

**Process Cell**

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

Topographic changes within each survey unit are summarised on six maps where applicable:

- Beach change map (Spring to Spring)
- Beach change map (Baseline to Spring)
- Topographic difference model map (Phase 1 Baseline to 2016 Repeat Baseline)
- Topographic difference model map (Repeat Baseline 2015 to repeat Baseline 2016)
- Mean High Water line
- Sediment distribution map

Beach change maps show the location of each beach profile, superimposed on an aerial photograph (note that the line may be extended for clarity). Where possible, the annual change in cross-sectional area has been calculated from Spring 2015 to Spring 2016 and from Baseline 2007 to Spring 2016, or Baseline 2010 to Spring 2016 in the case of survey units in North Devon.

Survey Schedules

Spring interim surveys are conducted between January and March each year. Baseline and repeat baseline surveys are carried out between April and August. A minimum of 8 weeks must elapse between successive surveys. The dates of individual surveys are given in the topographic survey record and with the analysis for each survey unit.
Topographic Survey Record

The table below gives the target and completion dates for topographic surveys between spring 2015 and the repeat baseline surveys of 2016.

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<tr>
<th>Target</th>
<th>Completed</th>
<th>Post-Storm</th>
<th>Repeat Baseline 2015</th>
<th>Target</th>
<th>Completed</th>
<th>Autumn Interim Profile 2015</th>
<th>Target</th>
<th>Completed</th>
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<td>31/08/2016</td>
<td>07/07/2016</td>
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</table>
Key
- Completed on Time and Accepted
- Overdue
- Surveyed but Not Submitted / Accepted
- Survey Rejected
- Not Scheduled for Survey

For the most recent survey schedules for each survey unit please see http://southwest.coastalmonitoring.org/latest-updates/survey-schedule/
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.

\[
\frac{CSA_1 - CSA_2}{CSA_2} \times 100 \quad \text{eqn(1)}
\]

Where CSA\(_1\) = most recent spring survey and 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 and 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 \(-19730\text{m}^3\) represents erosion since the earlier survey.
% Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- 7cWEST2
- 7cSAUN1

- No Change
- Accretion
- Erosion

- Survey Unit Boundary

NDASCAG - North Devon
Actual Change in Cross-sectional Area (Baseline 2010 to Spring 2016)

Survey Unit Boundary

- No Change
- Accretion
- Erosion

NDASCAG - Somerset
% Change in Cross-sectional Area (Baseline 2010 to Spring 2016)

Survey Unit Boundary

- > 30%
- 15 - 30%
- 5 - 15%
- < 5%
- No Change
- Erosion

NDASCAG - Somerset
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

No Change
Accretion
Erosion

Accretion
Erosion
No Change

> 30 m²
15 - 30 m²
< 15 m²
5 - 15 m²
< 5 m²
15 - 30 m²
> 30 m²
% Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- Survey Unit Boundary

- < 5%
- 5 - 15%
- 15 - 30%
- > 30%

Accretion
No Change
Erosion
Note that profiles have been extracted from LiDAR data at 7dPORL1, 7dPORL2, 7dMINE1 and 7eWSM1 as these units were added to the Programme at the beginning of Phase 2. LiDAR data has also been used for additional profiles added to survey units 7dLILS2 and 7dPARR3 at the beginning of Phase 2.

Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion
No Change
Erosion

> 30 m²
15 - 30 m²
5 - 15 m²
< 5 m²
5 - 15 m²
> 30 m²
Note that profiles have been extracted from LiDAR data at 7dPORL1, 7dPORL2, 7dMINE1 and 7eWSM1 as these units were added to the Programme at the beginning of Phase 2. LiDAR data has also been used for additional profiles added to survey units 7dLILS2 and 7dPARR3 at the beginning of Phase 2.
### Survey Unit

**7cWEST2**

**Local Name** Westward Ho!

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<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
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<td>Spring-Spring</td>
<td>19/03/2015 - 09/05/2016</td>
<td>In contrast to the 2014/15 analysis a greater number of profiles have experienced erosion over the last year. This has mostly occurred at low levels, with percentage changes smaller than ±3%. Greater levels of change are visible at the northern extent of the unit surrounding the rock armour. Profile 7c00598, to the east of the defence, has lost 141.5m$^2$ of material, specifically from the seaward section of the beach. Profiles 7c00555 and 7c00556, to the west of the defence, have both lost 65m$^2$ of material, again from the seaward section of the beach but also the dune face, which has receded by approximately 10m on both profiles.</td>
</tr>
<tr>
<td>Baseline-Spring</td>
<td>26/07/2010 - 09/05/2016</td>
<td>Long term analysis reveals a clear split between the sheltered north eastern section of the unit, which has experienced low levels of accretion, and the exposed western side, which has experienced higher levels of erosion. As in the year on year analysis, the greatest changes are concentrated around the northern extent of the unit where profiles have lost up to 425m$^2$ of material. High levels of erosion are also noticeable at the southern end of the unit, on Profiles 7c005023A and 7c00507A, which have lost more than 100m$^2$ of material each, over the 10 year period.</td>
</tr>
<tr>
<td>Spring-Spring</td>
<td>15/08/2014 - 28/09/2015</td>
<td>Over the last year the survey unit has lost 36,396m$^3$ of material equating to a 0.5% decrease in volume. The spatial patterns of erosion and accretion are much the same as the baseline analysis albeit to a lesser extent. More accretion is visible on the mud flats on the north western corner and surrounding the headland at the eastern end.</td>
</tr>
<tr>
<td>Baseline-Spring</td>
<td>26/07/2010 - 28/09/2015</td>
<td>Since 2010 the survey unit has been dominated by erosion losing 192,697m$^3$ of material, equating to a 3.4% decrease in volume. The most significant areas of erosion are on the north western tip of the unit, at both the seaward end and on the dune face, and at the southern extent on the beach face. Areas of accretion are visible, most notably east of the rock armour at the north eastern end of the unit and in the middle of the beach on the western shore.</td>
</tr>
</tbody>
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### Comments
<table>
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<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile</th>
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<td>% Change</td>
<td>CSA Diff (m²)</td>
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<td>3</td>
<td>-424.5</td>
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<td>7c00610A</td>
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<td>19.11</td>
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<td>7c00610B</td>
<td>0.57</td>
<td>0</td>
<td>1.41</td>
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<tr>
<td>7c00610C</td>
<td>0.93</td>
<td>1</td>
<td>3.01</td>
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<td>7c00610D</td>
<td>3.48</td>
<td>1</td>
<td>7.53</td>
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<td>3.41</td>
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<td>19.45</td>
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<tr>
<td>7c00610F</td>
<td>2.58</td>
<td>0</td>
<td>10.32</td>
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</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- 7c00530 (-1%)
- 7c00524 (-1%)
- 7c00518 (0%)
- 7c00512A (0%)
- 7c00507A (2%)
- 7c00503A (5%)
- 7c00499A (0%)

Survey Unit Boundary

Aerial Photography from 2013

Accretion:
- > 30 m²
- 15 - 30 m²
- 5 - 15 m²

Erosion:
- < 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

No Change:
- < 5 m²

Survey Unit Boundary
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

Accretion
- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
No Change
- < 5 m²
Erosion
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

Survey Unit Boundary

Aerial Photography from 2013
Actual Change in Cross-sectional Area (Baseline 2010 to Spring 2016)

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

Survey Unit Boundaries:
- 7c00536 (-5%)
- 7c00542 (-7%)
- 7c00545 (-5%)
- 7c00546 (-7%)
- 7c00555 (-23%)
- 7c00556 (-23%)
- 7c00561 (-21%)
- 7c00575 (+20%)
- 7c00581 (+7%)
- 7c00587 (+7%)

Aerial Photography from 2013

Surveyed Areas:
- South West Regional Coastal Monitoring Programme
- Annual Survey Report 2016
- Westward Ho! - Beach Change (2 of 3)
- NDASCAG - North Devon

40
Actual Change in Cross-sectional Area (Baseline 2010 to Spring 2016)

Accretion
- > 30 m$^2$
- 15 - 30 m$^2$
- 5 - 15 m$^2$
No Change
- < 5 m$^2$
- 5 - 15 m$^2$
- 15 - 30 m$^2$
- > 30 m$^2$
Erosion
Survey Unit Boundary

Aerial Photography from 2013
Change in Elevation (m) between September 2015 and July 2016

<table>
<thead>
<tr>
<th>Change</th>
<th>Erosion</th>
<th>No Change</th>
<th>Accretion</th>
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<tbody>
<tr>
<td>&gt; 3</td>
<td>Red</td>
<td>Blue</td>
<td>Purple</td>
</tr>
<tr>
<td>2.5 - 3</td>
<td>Blue</td>
<td>Purple</td>
<td>Green</td>
</tr>
<tr>
<td>2 - 2.5</td>
<td>Blue</td>
<td>Purple</td>
<td>Green</td>
</tr>
<tr>
<td>1.5 - 2</td>
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<td>Purple</td>
<td>Green</td>
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<td>1 - 1.5</td>
<td>Blue</td>
<td>Purple</td>
<td>Green</td>
</tr>
<tr>
<td>0.5 - 1</td>
<td>Blue</td>
<td>Purple</td>
<td>Green</td>
</tr>
<tr>
<td>0 - 0.5</td>
<td>Blue</td>
<td>Purple</td>
<td>Green</td>
</tr>
<tr>
<td>&lt; -0.25</td>
<td>Green</td>
<td>Green</td>
<td>Yellow</td>
</tr>
<tr>
<td>&lt; -0.5</td>
<td>Green</td>
<td>Green</td>
<td>Yellow</td>
</tr>
<tr>
<td>&lt; -1</td>
<td>Green</td>
<td>Green</td>
<td>Yellow</td>
</tr>
<tr>
<td>&lt; -1.5</td>
<td>Green</td>
<td>Green</td>
<td>Yellow</td>
</tr>
<tr>
<td>&lt; -2</td>
<td>Green</td>
<td>Green</td>
<td>Yellow</td>
</tr>
<tr>
<td>&lt; -2.5</td>
<td>Green</td>
<td>Green</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

Model Extent

Aerial Photography from 2013

Elevation (m)

0 220 440 m
Change in Elevation (m) between September 2015 and July 2016

Aerial Photography from 2013

Elevation (m)

Model Extent
Change in Elevation (m) between July 2010 and July 2016

Elevation (m)  
-3 -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5 3

EROSION  NO CHANGE  ACCRETION

Model Extent

Aerial Photography from 2013

Elevation (m)  
0 220 440

NDASCAG - North Devon

7cWEST2: Westward Ho! - Topographic Difference Model (1 of 3)
Change in Elevation (m) between July 2010 and July 2016

Model Extent

Elevation (m)

EROSION
NO CHANGE
ACCRETION

Aerial Photography from 2013

7cWEST2: Westward Ho! - Topographic Difference Model (2 of 3)  NDASCAG - North Devon
Change in Elevation (m) between July 2010 and July 2016

Aerial Photography from 2013

<table>
<thead>
<tr>
<th>Elevation (m)</th>
<th>Erosion</th>
<th>No Change</th>
<th>Accretion</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 32.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 - 26.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.5 - 21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 - 16.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.5 - 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 - 7.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5 - 3.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5 - 0</td>
<td></td>
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</tr>
<tr>
<td>0 - -2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2.5 - -2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2 - -2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2.5 - -3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Model Extent
Sediment Type
- Gravel
- Gravel & Sand
- Sand
- Boulder
- Dune
- Dune Vegetated
- Grass
- Gravel & Mud
- Mud
- Mud & Sand
- Rock
- Saltmarsh
- Sea Defence
- Shell
- Water Body
- Mixture
- Obstruction

Aerial Photography from 2013
Contours

MHW Elevation: 3.17OD
MLW Elevation: -2.28OD
Contours

MHW Elevation: 3.17OD
MLW Elevation: -2.28OD
Contours

MHW Elevation: 3.17OD
MLW Elevation: -2.28OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2009 - 09
- MHW 2009 - 04
- MHW 2008 - 04
- MHW 2007 - 02
- MLW 2016 - 02
**Survey Unit**: 7cSAUN1  
**Local Name**: Crow Point to Saunton Sands

## Survey Details

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring-Spring</td>
<td>21/03/2015 - 08/05/2016</td>
<td>Over the last year changes to the percentage cross-sectional area of all profiles has been minimal, with no changes greater than 4%. The largest volume change occurs on profile 7c00689D where 76m² of material has been gained at the estuary end of the profile with the formation of a new bar. The greatest loss of 51m² occurs on profile 7c00689P, where the estuary bar has been destroyed. These profiles are separated by approximately 600m with a wide range of erosion and accretion occurring on the neighbouring profiles along this section of beach.</td>
</tr>
<tr>
<td>Baseline-Spring</td>
<td>06/08/2010 - 08/05/2016</td>
<td>Since 2010 a similar pattern exists, with only minimal percentage change and a wide variation in the location of erosion or accretion. The two exceptions to this are profiles 7c00644 and 7c00690A where change is greater, however, it should be noted that these are considerably shorter profiles. Profile 7c00689A has accreted by 145m² whilst only 200m west Profile 7c00689F has eroded by 139m², a difference of 284m².</td>
</tr>
<tr>
<td>Spring-Spring</td>
<td>20/05/2015 - 08/06/2016</td>
<td>Over the last year the distribution of erosion and accretion has been patchy with the majority of the beach experiencing no significant change. The most distinct area of accretion occurs on the dune behind Crow Point, whilst the most substantial area of erosion occurs at the northern end of the unit on the seaward section of the beach. Net sediment balance above MLWS: 46,235m³, Net sediment change: 1.1%</td>
</tr>
<tr>
<td>Baseline-Spring</td>
<td>06/08/2010 - 08/06/2016</td>
<td>Since 2010 the majority of the survey unit has remained stable with no significant change occurring. At the furthest point into the estuary equal patches of erosion and accretion occur as the sediment is redistributed over time. The most dynamic area surrounds crow point where patterns of erosion and accretion surround the dune. The high levels of accretion on the dune itself are believed to be the growth of vegetation. Net sediment balance above MLWS: -54,598m³, Net sediment change: -1.4%</td>
</tr>
<tr>
<td>Profile</td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
</tr>
<tr>
<td>---------</td>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td>7c00637A</td>
<td>-13.45</td>
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<td>7c00644</td>
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<tr>
<td>7c00671A</td>
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<td>7c00674</td>
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<td>7c00676</td>
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<td>7c00679</td>
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<td>7c00682</td>
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<tr>
<td>7c00684</td>
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<tr>
<td>7c00689A</td>
<td>47.02</td>
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<td>7c00689D</td>
<td>75.63</td>
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<td>7c00689F</td>
<td>-19.69</td>
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<td>7c00689H</td>
<td>20.13</td>
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<td>7c00689J</td>
<td>67.97</td>
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<td>7c00689L</td>
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<td>7c00689N</td>
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<td>7c00689P</td>
<td>-51.18</td>
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<td>7c00689R</td>
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<td>7c00689C</td>
<td>-32.64</td>
<td>-3</td>
</tr>
</tbody>
</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

Accretion

Erosion

No Change

Aerial Photography from 2013

South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

7cSAUN1: Crow Point to Saunton Sands - Beach Change

NDASCAG - North Devon
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

Aerial Photography from 2013

Contours

MHW Elevation: 3.17OD
MLW Elevation: -2.28OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2009 - 09
- MHW 2009 - 04
- MHW 2008 - 04
- MHW 2007 - 02
- MLW 2016 - 02
Since last year all profiles have remained stable with less than a 1\% change in cross-sectional area, the exception being Profile 7d01058 which has gained 37m² of material equating to an 8\% increase in cross-sectional area. On this profile a redistribution of sediment seawards has occurred.

Longer term the profiles have again remained stable with changes to cross-sectional area at or below 3\%. Profile 7d01042 has lost 43.5m² of material but due to its longer length; this only translates to a 3\% decrease in cross-sectional area.

Note that this survey unit was added to the Programme at the beginning of Phase 2. Profiles have been forced through LiDAR flown in 2007 for a baseline comparison.
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- Survey Unit Boundary

- Accretion
- Erosion
- No Change

- > 30 m
- 15 - 30 m
- 5 - 15 m
- < 5 m

Aerial Photography from 2013

7dPORL1: Gore Point to Porlock Weir - Beach Change

NDASCAG - Somerset
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

<table>
<thead>
<tr>
<th>Change</th>
<th>Area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 30 m²</td>
<td>-2</td>
</tr>
<tr>
<td>15 - 30 m²</td>
<td>0</td>
</tr>
<tr>
<td>&lt; 5 m²</td>
<td>-3</td>
</tr>
<tr>
<td>5 - 15 m²</td>
<td>2</td>
</tr>
<tr>
<td>15 - 30 m²</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 30 m²</td>
<td>2</td>
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<tr>
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</tr>
<tr>
<td>5 - 15 m²</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 30 m²</td>
<td>2</td>
</tr>
</tbody>
</table>

7dPORL1: Gore Point to Porlock Weir - Beach Change

NDASCAG - Somerset
Contours

MHW Elevation: 3.7OD
MLW Elevation: -2.9OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2009 - 03
- MHW 2007 - 09
- MHW 2007 - 04
- MLW 2016 - 02
## Profile 7dPORL2

### Porlock Weir

**Survey Unit**
- **Local Name:** Porlock Weir

### Observations
- **Survey Type:** Beach Change
  - **Dates Surveyed:** 21/01/2015 - 10/04/2016
  - Over the last year there has been both erosion and accretion across the unit, however with no values exceeding a 2% change the profiles can be considered stable.

- **Survey Type:** Beach Change
  - **Dates Surveyed:** 20/04/2007 - 10/04/2016
  - The long term analysis maintains the trends seen in previous years with a slight redistribution of sediment towards the western end of the unit. Profiles 7d01063A and 7d01066A have lost 40.2m² and 32.1m² of material respectively which is marginally less than in previous long term analysis.

### Comments
- Note that this survey unit was added to the Programme at the beginning of Phase 2. Profiles have been forced through LiDAR flown in 2007 for a baseline comparison.

### Survey Results

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
</tr>
<tr>
<td>7d01062A</td>
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<td>0</td>
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<td>7d01062B</td>
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<td>7d01062C</td>
<td>-19.25</td>
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<tr>
<td>7d01063A</td>
<td>18.86</td>
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<td>-40.24</td>
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<td>7d01066A</td>
<td>5.06</td>
<td>1</td>
<td>-32.14</td>
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Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- **Survey Unit Boundary**

<table>
<thead>
<tr>
<th>Change in Cross-sectional Area</th>
<th>5 - 15 m²</th>
<th>15 - 30 m²</th>
<th>&gt; 30 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erosion</td>
<td></td>
<td></td>
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<tr>
<td>No Change</td>
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<td></td>
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</tr>
<tr>
<td>Accretion</td>
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Aerial Photography from 2013
Annual Survey Report 2016

South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

NDASCAG - Somerset

Aerial Photography from 2013

Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

7dPORL2: Porlock Weir - Beach Change

No Change

Accretion

Erosion

> 30 m²

15 - 30 m²

5 - 15 m²

5 - 15 m²

15 - 30 m²

> 30 m²

< 5 m

± 5 m

± 10 m

± 15 m

± 30 m

± 50 m
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

7dPORL2: Porlock Weir - MHW and MLW Contours

NDASCAG - Somerset

Aerial Photography from 2013

Contours

MHW Elevation: 3.7OD
MLW Elevation: -2.9OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2009 - 03
- MHW 2007 - 09
- MHW 2007 - 04
- MLW 2016 - 02
### Observations

Continuing the trend of the 2014/15 year on year analysis, all profiles have remained stable with no changes in cross-sectional area greater than ±2%. Profiles 7d01085 and 7d01091 have both experienced large volume changes; however this can be expected due to their position adjacent to the barrier breach. From a cross comparison of the profile volumes it can be considered that material is moving in the alongshore direction and not being lost from the system all together.

The long term analysis appears to show the unit being dominated by erosion, with twelve of the eighteen profiles losing material. Most of this material loss is, however, at low levels, particularly at the eastern end of the unit, and therefore can be considered stable. As with the year on year analysis the most dynamic profiles are those adjacent to the barrier breach and so fluctuations can be expected. Away from the breach, Profile 7d01076 has decreased in cross-sectional area by 5% with most of the material being lost from the sandy section in the middle of the profile. Profiles 7d01100 and 7d01103 have both gained more than 50m² of material.

### Survey Details

**Survey Unit**: 7dPORL3  
**Local Name**: Porlock Weir

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring - Spring</td>
<td>Beach Change</td>
<td>22/01/2015 - 06/05/2016</td>
</tr>
</tbody>
</table>

| Baseline - Spring | Beach Change | 19/04/2007 - 06/05/2016 |

---

### Profile

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
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<tbody>
<tr>
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<td>% Change</td>
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</tbody>
</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

- Accretion
- No Change
- Erosion

Aerial Photography from 2013

0 150 300 m
Actual Change in Cross-sectional Area
(Baseline 2007 to Spring 2016)

Survey Unit Boundary

Aerial Photography from 2013

Accretion
No Change
Erosion

0 150 300 m

Plymouth Coastal Observatory

South West Regional Coastal Monitoring Programme
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7dPORL3: Porlockford to Hurlstone Point - Beach Change (1 of 3)
NDASCAG - Somerset
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion  No Change  Erosion

> 30 m²  15 - 30 m²  < 5 m²  5 - 15 m²  15 - 30 m²  > 30 m²

Aerial Photography from 2013

0 150 300 m
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Aerial Photography from 2013

Accretion  No Change  Erosion

> 30 m²  15 - 30 m²  < 5 m²  5 - 15 m²  15 - 30 m²  > 20 m²

NDASCAG - Somerset
Contours

MHW Elevation: 3.7OD
MLW Elevation: -2.9OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2007 - 09
- MHW 2007 - 04
- MLW 2016 - 02

Aerial Photography from 2013
Contours

MHW Elevation: 3.7OD
MLW Elevation: -2.9OD

- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2007 - 09
- MHW 2007 - 04
- MHW 2016 - 2
- MLW 2016 - 02

Aerial Photography from 2013
Contours

MHW Elevation: 3.7OD
MLW Elevation: -2.9OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2007 - 09
- MHW 2007 - 04
- MLW 2016 - 02

Aerial Photography from 2013
Since last year there have been low levels of change to the percentage area of each profile, with the greatest change being a decrease of 3% on profile 7d01319A. Three of the five profiles now show a trend for low level erosion, which is in contrast to the year on year analysis from 2014/15 when all profiles experienced low levels of accretion.

Since the original baseline this unit has been dominated by erosion, with the percentage decrease becoming greater towards the unit boundaries. Profile 7d01312 in the middle of the unit has gained a small amount of material increasing its cross-sectional area by 1%.

Note that this survey unit was added to the Programme at the beginning of Phase 2. Profiles have been forced through LiDAR flown in 2007 for a baseline comparison.

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring (Jan 2015 – Apr 2016)</th>
<th>Baseline to Spring (Sept 2007 – Apr 2016)</th>
<th>Master Profile Level (m)</th>
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<tbody>
<tr>
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<td>CSA Diff (m²)</td>
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<td>7d01319A</td>
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<td>-3</td>
<td>-37.43</td>
</tr>
</tbody>
</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

Accretion | No Change | Erosion
---|---|---
> 30 m² | 15 - 30 m² | 5 - 15 m²
5 - 15 m² | > 30 m² | < 5 m²

7dMINE1: Culver Cliff to Minehead Harbour - Beach Change

South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

NDASCAG - Somerset
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion
No Change
Erosion

NDASCAG - Somerset

7dMINE1: Culver Cliff to Minehead Harbour - Beach Change
The year on year analysis shows that all profiles have experienced low levels of change with no trend in the spatial distribution of erosion or accretion. The greatest percentage change is only ±2% with these profiles occurring 200m apart.

As with the year on year analysis, since 2007 there has only been low level change in the cross-sectional area of all profiles. Again there is little trend in spatial distribution apart from an increase in erosion at the eastern end of the beach (profiles: 7d01354, 7d01357 and 7d01361).

It should be noted that beach recycling takes place at six monthly intervals at the eastern end of the beach between Warren Point and The Strand. The build-up of windblown sand is removed from in front of the seawall and redistributed over the beach. This has not been accounted for in the analysis and the material is moved mainly cross-shore, rather than alongshore, but there remains some small effect on the analysis results.
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

- No Change
- Accretion
- Erosion

Aerial Photography from 2013
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion
Erosion
No Change

> 30 m²
15 - 30 m²
5 - 15 m²
< 5 m²
15 - 30 m²
> 30 m²

Aerial Photography from 2013

0 250 500 m

NDASCAG - Somerset

7dMINE2: Minehead Harbour to Warren Point - Beach Change
Contours

MHW Elevation: 3.85OD
MLW Elevation: -3.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MLW 2016 - 02
- MLW 2007 - 09
- MLW 2007 - 09
### Survey Unit
**Local Name**

**7dMINE3**
The Warren

### Survey Type
<table>
<thead>
<tr>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring -Spring</strong> Beach Change** 04/24/2015 - 07/04/2016</td>
<td>Over the last year all profiles in this unit have remained stable with no changes in cross-sectional area exceeding ±1%.</td>
</tr>
<tr>
<td><strong>Baseline -Spring</strong> Beach Change** 03/06/2007 - 07/04/2016</td>
<td>Since 2007 all profiles in the survey unit have undergone a net sediment loss, however, as in the year on year analysis it is only at low levels with a 6% decrease being the greatest change on profile 7d01366.</td>
</tr>
</tbody>
</table>

### Comments

### Profile Table

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
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</table>

Since 2007 all profiles in the survey unit have undergone a net sediment loss, however, as in the year on year analysis it is only at low levels with a 6% decrease being the greatest change on profile 7d01366.
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

-30 m²
-15 m²
-5 m²
5 m²
15-30 m²
>30 m²

Accretion
No Change
Erosion

No Change
Accretion
Erosion
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion  | Erosion  | No Change
---|---|---
> 30 m² | > 30 m² | > 30 m²
15 - 30 m² | 15 - 30 m² | 15 - 30 m²
5 - 15 m² | 5 - 15 m² | 5 - 15 m²
< 5 m² | < 5 m² | < 5 m²

Aerial Photography from 2013

7dMINE3: The Warren - Beach Change (1 of 2)

South West Regional Coastal Monitoring Programme
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NDASCAG - Somerset
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion  Erosion  No Change

<table>
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<tr>
<th>Change</th>
<th>5 - 15 m²</th>
<th>15 - 30 m²</th>
<th>&gt; 30 m²</th>
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<tbody>
<tr>
<td>&gt; 30 m²</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 - 30 m²</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 - 15 m²</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5 m²</td>
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</table>

Aerial Photography from 2013

Plymouth Coastal Observatory

South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

NDASCAG - Somerset

7dMINE3: The Warren - Beach Change (2 of 2)
Contours

MHW Elevation: 3.85OD
MLW Elevation: -3.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2007 - 09
- MLW 2016 - 02

Aerial Photography from 2013
Contours

MHW Elevation: 3.85OD
MLW Elevation: -3.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2007 - 09
- MLW 2016 - 02
## Annual Survey Report

### Survey Unit

**Survey Unit:** 7dMINE4  
**Local Name:** Dunster Beach Holiday Park

### Survey Type

<table>
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<tr>
<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
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</thead>
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<td>Beach Change</td>
<td>Jan 2015 – Mar 2016</td>
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<tr>
<td>7d01403</td>
<td>21/01/2015 - 23/03/2016</td>
<td>Over the last year all profiles have remained stable, with six of the seven profiles undergoing no percentage change in cross-sectional area. Profile 7d01403, at the western end of the unit has gained 25 m² of material, equating to a 1% increase in cross-sectional area.</td>
</tr>
<tr>
<td>7d01407</td>
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<tr>
<td>7d01411</td>
<td></td>
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<tr>
<td>7d01415</td>
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<td>7d01419</td>
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<td>7d01423</td>
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<tr>
<td>7d01427</td>
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<td><strong>Baseline - Spring</strong></td>
<td>Beach Change</td>
<td>May 2007 – Mar 2016</td>
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<tr>
<td>7d01403</td>
<td>22/05/2007 - 23/03/2016</td>
<td>Low levels of change are also present in the long term analysis with the greatest change occurring on profile 7d01427 where 59 m² of material has been lost; equating to a 2% decrease in cross-sectional area. Overall, profiles can be considered stable with no changes greater than 2%.</td>
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<td>7d01407</td>
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### Comments

Baseline to Spring Change

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<td>CSA Diff (m²)</td>
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<td>7d01411</td>
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<td>0</td>
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<tr>
<td>7d01427</td>
<td>-8.63</td>
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</tbody>
</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

Accretion | No Change | Erosion
---|---|---
> 30 m² | 15 - 30 m² | < 5 m²
5 - 15 m² | 5 - 15 m² | 15 - 30 m²
< 5 m² | > 30 m² | > 30 m²

Aerial Photography from 2013

0 175 350 m
Actual Change in Cross-sectional Area
(Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion
No Change
Erosion

Aerial Photography from 2013

0 175 350 m

7dMINE4: Dunster Beach Holiday Park - Beach Change
NDASCAG - Somerset
Over the last year all profiles have become dominated by erosion, albeit only at low levels, with the largest loss of material (6%) occurring on profile 7d01447. There does not appear to be any spatial pattern to the losses, with material being lost uniformly across the individual profiles lengths.

Long term analysis again shows that the beach is dominated by erosion, with the exception of two profiles: 7d01431 and 7d01459. These gains only equate to a 1% increase on each profile and when coupled with a maximum loss of 4% show the beach has remained stable since 2007.
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

- 5 - 15 m
- 15 - 30 m
- > 30 m

Accretion
No Change
Erosion

Aerial Photography from 2012

0 180 360 m
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

- Survey Unit Boundary

Aerial Photography from 2012
Annual Survey Report 2016

South West Regional Coastal Monitoring Programme

NDASCAG - Somerset
Aerial Photography from 2012

Actual Change in Cross-sectional Area
(Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion
No Change
Erosion

> 30 m²
15 - 30 m²
< 15 m²
< 5 m²
15 - 30 m²
> 30 m²

±0.103
Contours

MHW Elevation: 3.85OD
MLW Elevation: -3.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2008 - 05
- MHW 2007 - 03
- MLW 2016 - 02

±

0 100 200 m

Aerial Photography from 2013
Contours
MHW Elevation: 3.85OD
MLW Elevation: -3.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2008 - 05
- MHW 2007 - 03
- MLW 2016 - 02
### Survey Unit

**Local Name**

Blue Anchor

---

### Survey Type

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring -Spring</td>
<td>Beach Change 20/01/2015 - 24/02/2016</td>
<td>Over the last year, all profiles with the exception of 7d01471 have increased in cross-sectional area. The largest increase occurred on Profile 7d01491 where 13.7m² of material was gained, predominantly on the seaward hard of the profile, equating to a 12% increase in cross-sectional area. Both these trends are consistent with the previous year on year analysis from 2014/15.</td>
</tr>
<tr>
<td>Baseline -Spring</td>
<td>Beach Change 13/05/2007 - 24/02/2016</td>
<td>As in the year to year analysis, all profiles have undergone an increase in cross-sectional area with the exception of Profile 7d01471, which has decreased by 4%. As expected the increases are larger due to the cumulative effect of sustained year on year increases.</td>
</tr>
</tbody>
</table>

### Comments

---

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan 2015 – Feb 2016</td>
<td>May 2007 – Feb 2016</td>
<td>Level (m)</td>
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<td>% Change</td>
<td>CSA Diff (m²)</td>
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<td>30.68</td>
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</tbody>
</table>
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion
Erosion
No Change

Aerial Photography from 2013
Contours

MHW Elevation: 3.85OD
MLW Elevation: -3.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 10
- MHW 2008 - 05
- MHW 2007 - 03
- MLW 2016 - 02

Annual Survey Report 2016

South West Regional Coastal Monitoring Programme
NDASCAG - Somerset
Aerial Photography from 2013
Annual Survey Report

Survey Unit: 7dLILS2
Local Name: Lilstock

Survey Type | Dates Surveyed | Observations
---|---|---
Spring - Spring Beach Change | 24/03/2015 - 08/02/2016 | The overall trend for the last year is for low levels of erosion. This is in contrast to the 2014/15 analysis where low level accretion dominated.
Baseline - Spring Beach Change | 29/08/2007 - 08/02/2016 | Since 2007 there is, as in the year on year analysis, a trend for erosion across all the profiles. Although still minimal erosion levels are slightly greater with decreases in beach area of up to 4% occurring on profiles 7d01797 and 7d01804.

Comments:
Note that additional profiles were added to this survey unit at the beginning of Phase 2. These profiles have been forced through LiDAR flown in 2007 for a baseline comparison.

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring Mar 2015 – Feb 2016</th>
<th>Baseline to Spring Aug 2007 – Feb 2016</th>
<th>Master Profile Level (m)</th>
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<td>7d01797</td>
<td>CSA Diff (m²): -2.58</td>
<td>% Change: -1</td>
<td>CSA Diff (m²): -19.87</td>
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<tr>
<td>7d01801</td>
<td>CSA Diff (m²): -9.26</td>
<td>% Change: -2</td>
<td>CSA Diff (m²): -9.43</td>
</tr>
<tr>
<td>7d01804</td>
<td>CSA Diff (m²): -0.57</td>
<td>% Change: 0</td>
<td>CSA Diff (m²): -18.08</td>
</tr>
<tr>
<td>7d01807</td>
<td>CSA Diff (m²): -5.85</td>
<td>% Change: -1</td>
<td>CSA Diff (m²): -13.05</td>
</tr>
</tbody>
</table>
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion

No Change

Erosion

Survey Unit Boundary

7d01797 (-4%)

7d01801 (-2%)

7d01804 (-4%)

7d01807 (-2%)
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

Contours

MHW Elevation: 4.00OD
MLW Elevation: -3.30OD

MHW 2016 - 02
MHW 2014 - 06
MHW 2012 - 05
MHW 2011 - 03
MHW 2009 - 02
MHW 2007 - 03
MLW 2016 - 02

Aerial Photography from 2013

NDASCAG - Somerset

7dLILS2: Lilstock - MHW and MLW Contours
## Survey Unit

### Local Name

Hinkley Point to Stolford

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring -Spring</td>
<td>09/01/2015 - 11/02/2016</td>
<td>Although the percentage changes are as high as 22% it can be seen from the cross-sectional area that all profiles in this unit have remained stable, with the largest change being an increase of 7m². The majority of profiles have changed by less than 2m².</td>
</tr>
<tr>
<td>Baseline -Spring</td>
<td>26/06/2007 - 11/02/2016</td>
<td>Since 2007 the majority of profiles have stayed stable with changes of less than 4m² of sediment. The exceptions to this are profiles 7d01935 and 7d01939 in the east which have lost 7.7m² and 9.9m² respectively and 7d01906 in the west which has gained 14.8m² of material on the landward half of the profile.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
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<tr>
<td>7d01906</td>
<td>7.05</td>
<td>16</td>
<td>14.77</td>
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<tr>
<td>7d01910</td>
<td>-4.56</td>
<td>-19</td>
<td>3.88</td>
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<tr>
<td>7d01915</td>
<td>0.77</td>
<td>22</td>
<td>-0.16</td>
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<tr>
<td>7d01919</td>
<td>0.03</td>
<td>0</td>
<td>-2.23</td>
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<tr>
<td>7d01923</td>
<td>0.84</td>
<td>2</td>
<td>2.26</td>
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<tr>
<td>7d01927</td>
<td>0.41</td>
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<td>-0.34</td>
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<tr>
<td>7d01931</td>
<td>-0.55</td>
<td>0</td>
<td>-7.67</td>
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<tr>
<td>7d01935</td>
<td>-1.94</td>
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<td>1.89</td>
</tr>
<tr>
<td>7d01939</td>
<td>-1.05</td>
<td>0</td>
<td>-9.89</td>
</tr>
</tbody>
</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

Accretion Erosion

> 30 m²

15 - 30 m²

5 - 15 m²

< 5 m²

No Change

Aerial Photography from 2013

South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

NDASCAG - Somerset

7dPARR2: Hinkley Point to Stolford - Beach Change
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

PARR2: Hinkley Point to Stolford - Beach Change

NDASCAG - Somerset

Aerial Photography from 2013

Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

- 20 m²
- 15 - 30 m²
- 5 - 15 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²
- < 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²
- No Change
- Erosion
- Accretion
Contours

MHW Elevation: 4.27OD
MLW Elevation: -3.98OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 02
- MHW 2007 - 10
- MHW 2007 - 03
- MLW 2016 - 02
The majority of profiles in this survey unit have remained stable with changes of less than 5%. The two exceptions to this are profile 7d01966, which has decreased by 7%, and profile 7d01987 which has increased by 6%. The decrease on profile 7d01966 is predominantly due to the destruction of a berm feature whilst the increase on 7d01987 is due to the formation of two small ridges on the main beach face.

Over the longer term there is a wide variety of change from -19% on profile 7d02027 to +24% on profile 7d01984. There appears to be no trend in the spatial distribution of eroding or accreting profiles.

Note that the master profile for profile 7d01987 was adjusted slightly in 2013 and that the analysis for this profile is therefore only directly comparable to that found in reports from 2013 onwards.
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

Aerial Photography from 2013

NDASCAG - Somerset

Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

Erosion

Accretion

No Change

2 > 30 m$^2$

15 - 30 m$^2$

5 - 15 m$^2$

5 - 15 m$^2$

15 - 30 m$^2$

> 30 m$^2$

< 5 m$^2$

7d01957 (2%)

7d01984 (-1%)

7d01984 (6%)

7d01987 (-3%)

7d1986 (2%)

7d1937 (2%)

7d01987 (5%)

7d01987 (5%)
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

Accretion
No Change
Erosion

> 30 m²
15 - 30 m²
5 - 15 m²
< 5 m²
15 - 30 m²
> 30 m²
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

Survey Unit Boundary

Aerial Photography from 2013

Accretion
No Change
Erosion

> 30 m²
15 - 30 m²
< 15 m²
15 - 30 m²
> 30 m²
< 5 m²
5 - 15 m²
5 - 15 m²
> 30 m²

South West Regional Coastal Monitoring Programme
Annual Survey Report 2016

7dPARR3: Steart - Beach Change (3 of 3)
NDASCAG - Somerset
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion
No Change
Erosion

> 30 m²
15 - 30 m²
5 - 15 m²
< 5 m²
15 - 30 m²
> 30 m²

Aerial Photography from 2013

South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

7dPARR3: Steart - Beach Change (1 of 3)
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Survey Unit Boundary

Accretion
Erosion
No Change

Aerial Photography from 2013

0 310 620 m

South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

NDASCAG - Somerset
Contours

MHW Elevation: 4.27OD
MLW Elevation: -3.98OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 02
- MHW 2007 - 10
- MLW 2016 - 02
Contours

MHW Elevation: 4.27OD
MLW Elevation: -3.98OD

MLW 2016 - 02
MHW 2014 - 06
MHW 2012 - 05
MHW 2011 - 03
MHW 2009 - 02
MHW 2007 - 10
MLW 2016 - 02
Contours

MHW Elevation: 4.27OD
MLW Elevation: -3.98OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 02
- MHW 2007 - 10
- MLW 2016 - 02

Aerial Photography from 2013

±127 m

Elevation: 4.27OD
Elevation: -3.98OD
### Survey Unit
**7dBURN2**

<table>
<thead>
<tr>
<th>Local Name</th>
<th>Burnham-on-Sea</th>
</tr>
</thead>
</table>

### Survey Type

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring -Spring</strong></td>
<td><strong>Beach Change</strong></td>
<td>Over the last year the spatial distribution of eroding and accreting profiles has become more varied than in previous year on year analyses; There has also been a greater range of volume changes. The southernmost profiles (7d02114M – 7d02115C) show a trend for a redistribution of sediment seawards from directly in front of the seawall. The northern profiles (7c02115F – 7d02172) show sediment movement occurring over the length of the profile, with a trend towards a landward movement of the bar systems.</td>
</tr>
<tr>
<td><strong>Baseline -Spring</strong></td>
<td><strong>Beach Change</strong></td>
<td>Since the baseline survey all profiles, with the exception of 7d02115 and 7d02168, have experienced accretion. The greatest concentration of accretion occurs on profiles 7d02115U, 7d02115Y and 7d02159 where a total of 188m³ of sediment has been gained. On the very northern profiles the dune can be seen to be accreting, even on profile 7d02168 where a net loss has occurred the dune is still accreting westwards. Profile 7d02115, next to the slipway, is the only profile in the southern section which has experienced a net loss, losing 13.7m³ of sediment.</td>
</tr>
</tbody>
</table>

### Comments

Note that the relatively high percentage changes shown along profile 7d02114M are due to its short length in comparison to the remaining profiles in the survey unit.

### Profile Table

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
</tr>
<tr>
<td>7d02114M</td>
<td>-7.08</td>
<td>-25</td>
<td>11.89</td>
</tr>
<tr>
<td>7d02114R</td>
<td>4.82</td>
<td>5</td>
<td>16.08</td>
</tr>
<tr>
<td>7d02114V</td>
<td>-7.84</td>
<td>-28</td>
<td>0.48</td>
</tr>
<tr>
<td>7d02115</td>
<td>1.38</td>
<td>1</td>
<td>-13.79</td>
</tr>
<tr>
<td>7d02115C</td>
<td>-9.93</td>
<td>4</td>
<td>17.42</td>
</tr>
<tr>
<td>7d02115F</td>
<td>7.88</td>
<td>4</td>
<td>-13.93</td>
</tr>
<tr>
<td>7d02115K</td>
<td>-2.39</td>
<td>1</td>
<td>8.85</td>
</tr>
<tr>
<td>7d02115P</td>
<td>-5.61</td>
<td>-2</td>
<td>12.82</td>
</tr>
<tr>
<td>7d02115U</td>
<td>19.98</td>
<td>4</td>
<td>51.31</td>
</tr>
<tr>
<td>7d02115Y</td>
<td>35.08</td>
<td>8</td>
<td>56.85</td>
</tr>
<tr>
<td>7d02159</td>
<td>9.32</td>
<td>2</td>
<td>80.17</td>
</tr>
<tr>
<td>7d02163</td>
<td>-35.43</td>
<td>5</td>
<td>10.13</td>
</tr>
<tr>
<td>7d02168</td>
<td>-9.84</td>
<td>-2</td>
<td>-21.66</td>
</tr>
<tr>
<td>7d02172</td>
<td>7.41</td>
<td>1</td>
<td>40.39</td>
</tr>
</tbody>
</table>
Actual Change in Cross-sectional Area
(Spring 2015 to Spring 2016)

Survey Unit Boundary

Aerial Photography from 2013

Accretion
- > 30 m²
- 15 - 30 m²
- 5 - 15 m²
No Change
- < 5 m²
Erosion
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

7d02115K (-1%)
7d02115F (4%)
7d02115C (4%)
7d02115 (1%)
7d02114V (-28%)
7d02114R (5%)
7d02114M (-25%)
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **No Change**
  - < 5 m²
- **Erosion**
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²

Survey Unit Boundary

Aerial Photography from 2013

0 225 450 m

PLYMOUTH COASTAL OBSERVATORY

7dBURN2: Burnham-on-Sea - Beach Change (2 of 2)

NDASCAG - Somerset
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

- 7d02115K (4%)
- 7d02115F (4%)
- 7d02115C (8%)
- 7d02115 (8%)
- 7d02114V (2%)
- 7d02114R (21%)
- 7d02114M (129%)

Survey Unit Boundary

Aerial Photography from 2013

Survey Unit Boundary

No Change

Accretion

- > 30 m²
- 15 - 30 m²
- 5 - 15 m²

Erosion

- < 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

Actual Change in Cross-sectional Area
(Baseline 2007 to Spring 2016)

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

No Change
- < 5 m²

Erosion
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

Survey Unit Boundary

Aerial Photography from 2013

0 225 450 m

PLUMOUTH
COASTAL
OBSERVATORY

7dBURN2: Burnham-on-Sea - Beach Change (2 of 2)

NDASCAG - Somerset
Contours
MHW Elevation: 4.27OD
MLW Elevation: -3.98OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 02
- MHW 2008 - 02
- MHW 2007 - 03
- MLW 2016 - 02
Contours

MHW Elevation: 4.27OD
MLW Elevation: -3.98OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 02
- MHW 2008 - 02
- MHW 2007 - 03
- MLW 2016 - 02
### Survey Unit
**7dBURN3**
- **Local Name**: Berrow Dunes

### Survey Type: Spring - Spring Change (Beach Change)
- **Dates Surveyed**: 07/01/2015 - 12/04/2016
- **Observations**:
  - The trend over the last year is for accretion to occur in the southern profiles whilst erosion dominates the northern profiles with the exception of profile 7d02174 (the most southern profile) which has experienced a net loss of material. The northern profiles (7d02223 – 7d02296) are more uniform with losses occurring through a small reduction in beach elevation across the length of the profiles. The southern profiles (7d02174 – 7d02213) are more dynamic with greater redistribution of sediment across the profiles leading to net gains.

### Survey Type: Baseline - Spring Change (Beach Change)
- **Dates Surveyed**: 16/08/2007 - 12/04/2016
- **Observations**:
  - As in previous years, profiles 7d02182 and 7d02192 experience the greatest volume change, gaining 92.1m² and 159.5m² respectively. Consistent with the year on year analysis there is an increase in the amount of erosion on the northern profiles with profile 7d02264 losing 34.6m².

### Comments

### Table: CSA Diff (m²) and % Change

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
</tr>
<tr>
<td>7d02174</td>
<td>-10.69</td>
<td>-4</td>
<td>-9.91</td>
</tr>
<tr>
<td>7d02182</td>
<td>19.83</td>
<td>8</td>
<td>92.1</td>
</tr>
<tr>
<td>7d02192</td>
<td>34.44</td>
<td>5</td>
<td>159.53</td>
</tr>
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<td>7d02203</td>
<td>12.79</td>
<td>8</td>
<td>1.43</td>
</tr>
<tr>
<td>7d02213</td>
<td>18.2</td>
<td>3</td>
<td>17.89</td>
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<td>7d02223</td>
<td>-4.47</td>
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<td>16.48</td>
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<tr>
<td>7d02234</td>
<td>-14.82</td>
<td>-3</td>
<td>-38.12</td>
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<tr>
<td>7d02243</td>
<td>-8.1</td>
<td>-2</td>
<td>-2.95</td>
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<tr>
<td>7d02254</td>
<td>-24.99</td>
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<td>7d02264</td>
<td>-11.38</td>
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<td>7d02274</td>
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<td>7d02284</td>
<td>-11.51</td>
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<td>-5.71</td>
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<tr>
<td>7d02296</td>
<td>-3.93</td>
<td>-1</td>
<td>19.89</td>
</tr>
</tbody>
</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **Erosion**
  - < 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²
- **No Change**

Survey Unit Boundary

Aerial Photography from 2013

0 280 560 m

PLIMOUTH
COASTAL
OBsERVATORY

NDASCAG - Somerset

136
<table>
<thead>
<tr>
<th>Location</th>
<th>Change</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>7d02234</td>
<td>-3%</td>
<td></td>
</tr>
<tr>
<td>7d02254</td>
<td>-6%</td>
<td></td>
</tr>
<tr>
<td>7d02264</td>
<td>-3%</td>
<td></td>
</tr>
<tr>
<td>7d02243</td>
<td>-2%</td>
<td></td>
</tr>
<tr>
<td>7d02223</td>
<td>-1%</td>
<td></td>
</tr>
</tbody>
</table>

**Actual Change in Cross-sectional Area**

(Spring 2015 to Spring 2016)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **Erosion**
  - < 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²
- **No Change**

Survey Unit Boundary

Aerial Photography from 2013

- 0 m
- 280 m
- 560 m

**NDASCAG - Somerset**
### Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

<table>
<thead>
<tr>
<th>Survey Unit Boundary</th>
<th>Accretion</th>
<th>Erosion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; 30 m²</td>
<td>&gt; 30 m²</td>
</tr>
<tr>
<td></td>
<td>15 - 30 m²</td>
<td>15 - 30 m²</td>
</tr>
<tr>
<td></td>
<td>5 - 15 m²</td>
<td>5 - 15 m²</td>
</tr>
<tr>
<td>No Change</td>
<td>&lt; 5 m²</td>
<td>&lt; 5 m²</td>
</tr>
<tr>
<td></td>
<td>5 - 15 m²</td>
<td>5 - 15 m²</td>
</tr>
<tr>
<td></td>
<td>15 - 30 m²</td>
<td>15 - 30 m²</td>
</tr>
<tr>
<td></td>
<td>&gt; 30 m²</td>
<td>&gt; 30 m²</td>
</tr>
</tbody>
</table>

Aerial Photography from 2013

Survey Unit Boundary
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

<table>
<thead>
<tr>
<th>Accretion</th>
<th>&gt; 30 m²</th>
<th>15 - 30 m²</th>
<th>5 - 15 m²</th>
<th>&lt; 5 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion</td>
<td>&lt; 5 m²</td>
<td>5 - 15 m²</td>
<td>15 - 30 m²</td>
<td>&gt; 30 m²</td>
</tr>
</tbody>
</table>

No Change

Survey Unit Boundary

Aerial Photography from 2013

0 280 560 m
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

<table>
<thead>
<tr>
<th>Change</th>
<th>&gt; 30 m²</th>
<th>15 - 30 m²</th>
<th>5 - 15 m²</th>
<th>&lt; 5 m²</th>
<th>5 - 15 m²</th>
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</tr>
<tr>
<td>Erosion</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Survey Unit Boundary

Aerial Photography from 2013
South West Regional Coastal Monitoring Programme
Annual Survey Report 2016

Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Aerial Photography from 2013

Survey Unit Boundary

PLUMOUTH COASTAL OBSERVATORY

7dBURN3: Berrow Dunes - Beach Change (3 of 3)
NDASCAG - Somerset

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

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

Erosion
< 5 m²
Contours

MHW Elevation: 4.27OD
MLW Elevation: -3.98OD
Survey Unit: 7dBURN4-A
Local Name: Brean Village (South)

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring - Spring</td>
<td>09/01/2015 - 23/02/2016</td>
<td>Over the last year neither profile has experienced a percentage increase or decrease in area. This is a slight change from the 2014/15 analysis when profile 7d02314 experienced a 1% increase in area.</td>
</tr>
<tr>
<td>Baseline - Spring</td>
<td>25/07/2007 - 23/02/2016</td>
<td>This survey unit consistently shows low level accretion, however, there is a slight increase from last year with profile 7d02314 increasing its cross-sectional area by 3%, predominantly on the landward half of the profile.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
</tr>
<tr>
<td>7d02304</td>
<td>3.41</td>
<td>0</td>
<td>14.05</td>
</tr>
<tr>
<td>7d02314</td>
<td>3.63</td>
<td>0</td>
<td>28.02</td>
</tr>
</tbody>
</table>

Comments: 145
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

7dBUR4-A: Brean Village (South) - Beach Change

Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- Accretion:
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²

- Erosion:
  - < 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²

No Change:
- < 5 m²
- 5 - 15 m²

Survey Unit Boundary

Aerial Photography from 2013

NDASCAG - Somerset
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **Erosion**
  - < 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²
- **No Change**

Survey Unit Boundary

Aerial Photography from 2013

0 190 380 m
### Survey Unit

<table>
<thead>
<tr>
<th>Local Name</th>
<th>Brean Village (North)</th>
</tr>
</thead>
</table>

### Observations

**Spring - Spring**

<table>
<thead>
<tr>
<th>Beach Change</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>09/01/2015 - 23/02/2016</td>
<td>Over the last year all profiles have experienced low levels of accretion with both percentage and actual change increasing towards the north. Accretion has occurred uniformly across the beach with no noticeable change to the dune face.</td>
</tr>
</tbody>
</table>

**Baseline - Spring**

<table>
<thead>
<tr>
<th>Beach Change</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20/07/2007 - 23/02/2016</td>
<td>As with the year on year analysis, all profiles have experienced accretion with the largest change of 12% occurring on 7d02345 at the very north of the beach.</td>
</tr>
</tbody>
</table>

### Profile Analysis

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
</tr>
<tr>
<td>7d02320</td>
<td>7.23</td>
<td>1</td>
<td>40.37</td>
</tr>
<tr>
<td>7d02330</td>
<td>6.71</td>
<td>1</td>
<td>11.5</td>
</tr>
<tr>
<td>7d02340</td>
<td>18.65</td>
<td>4</td>
<td>33.86</td>
</tr>
<tr>
<td>7d02345</td>
<td>24.36</td>
<td>5</td>
<td>50.66</td>
</tr>
</tbody>
</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- **Accretion**: > 30 m², 15 - 30 m², 5 - 15 m²
- **Erosion**: < 5 m², 5 - 15 m², 15 - 30 m², > 30 m²
- **No Change**

Survey Unit Boundary

Aerial Photography from 2013

Survey Unit Boundary

7d02345 (5%)
7d02340 (4%)
7d02330 (1%)
7d02320 (1%)
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

7dBURN4-B: Brean Village (North) - Beach Change

NDASCAG - Somerset

Aerial Photography from 2013

Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

Accretion

- > 30 m²
- 15 - 30 m²
- 5 - 15 m²

Erosion

No Change

- < 5 m²
- 5 - 15 m²
- 15 - 30 m²
- > 30 m²

Survey Unit Boundary

0 210 420 m
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

7dBURN4-B: Brean Village (North) - MHW and MLW Contours

NDASCAG - Somerset

Contours

MHW Elevation: 4.27OD
MLW Elevation: -3.98OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2009 - 01
- MHW 2008 - 02
- MHW 2007 - 03
- MLW 2016 - 02

Aerial Photography from 2013

Complete Survey Unit View
In contrast to the 2014/15 year on year analysis, more profiles have experienced erosion over the last year, albeit at relatively low levels, at or below 3%. The one exception to this is the most southerly profile, 7e00048, which has lost 6% of its cross-sectional area, however, this can be expected due to its proximity to the river outflow.

Longer term there is more variation in the levels of erosion and accretion with percentage changes of up to -8% on profile 7e00063. In general there is a trend for a movement of sediment to the north with the greatest increase in material on profiles 7e00075 and 7e0007. In the middle of the unit profiles 7e00063 and 7e00066 are characterised by low level erosion and flanked by profiles that have experienced low level accretion.
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

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

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

No Change

Survey Unit Boundary

Aerial Photography from 2014

NDASCAG - Somerset
South West Regional Coastal Monitoring Programme

Annual Survey Report 2016

Contours

MHW Elevation: 4.40OD
MLW Elevation: -4.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2010 - 02
- MHW 2009 - 05
- MHW 2007 - 04
- MLW 2016 - 02

Aerial Photography from 2014

0 100 200 m

Complete Survey Unit View
### Survey Type: Beach Change

#### Spring - Spring

Survey Unit: 7eWSM2  
Local Name: Weston-super-Mare

<table>
<thead>
<tr>
<th>Profile</th>
<th>CSA Diff (m²)</th>
<th>% Change</th>
<th>CSA Diff (m²)</th>
<th>% Change</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7e00081</td>
<td>6.18</td>
<td>1</td>
<td>30.28</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00084</td>
<td>12.79</td>
<td>2</td>
<td>31.47</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00087</td>
<td>8.94</td>
<td>2</td>
<td>23.95</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00090</td>
<td>2.82</td>
<td>1</td>
<td>13.83</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00093</td>
<td>-10.22</td>
<td>-3</td>
<td>-9.09</td>
<td>-3</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00096</td>
<td>-4.65</td>
<td>-1</td>
<td>28.96</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00099</td>
<td>-2.45</td>
<td>0</td>
<td>37.18</td>
<td>6</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00102</td>
<td>3.18</td>
<td>0</td>
<td>30.16</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00105</td>
<td>4.47</td>
<td>1</td>
<td>36.77</td>
<td>7</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00108</td>
<td>7.51</td>
<td>2</td>
<td>25.57</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00112</td>
<td>7.15</td>
<td>2</td>
<td>18.49</td>
<td>6</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00115</td>
<td>-3.49</td>
<td>-1</td>
<td>7.34</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00118</td>
<td>4.82</td>
<td>3</td>
<td>-4.69</td>
<td>-3</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00121</td>
<td>8.37</td>
<td>7</td>
<td>6.84</td>
<td>6</td>
<td>2.1</td>
</tr>
</tbody>
</table>

The general trend over the last year is for low levels of accretion, with no greater than a 3% increase in cross-sectional area. Three profiles contradict this by experiencing low levels of erosion. Profile 7e00121 has increased in cross-sectional area by 7%; however this may be due to its short length, the profile having gained only 8m² of material. All profiles can be considered stable given both the small percentage changes and fluctuations in area.

#### Baseline - Spring

<table>
<thead>
<tr>
<th>Profile</th>
<th>CSA Diff (m²)</th>
<th>% Change</th>
<th>CSA Diff (m²)</th>
<th>% Change</th>
<th>Master Profile Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7e00081</td>
<td>6.18</td>
<td>1</td>
<td>30.28</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00084</td>
<td>12.79</td>
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<td>31.47</td>
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</tr>
<tr>
<td>7e00087</td>
<td>8.94</td>
<td>2</td>
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<td>4</td>
<td>2.1</td>
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<tr>
<td>7e00090</td>
<td>2.82</td>
<td>1</td>
<td>13.83</td>
<td>3</td>
<td>2.1</td>
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<tr>
<td>7e00093</td>
<td>-10.22</td>
<td>-3</td>
<td>-9.09</td>
<td>-3</td>
<td>2.1</td>
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<tr>
<td>7e00096</td>
<td>-4.65</td>
<td>-1</td>
<td>28.96</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00099</td>
<td>-2.45</td>
<td>0</td>
<td>37.18</td>
<td>6</td>
<td>2.1</td>
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<tr>
<td>7e00102</td>
<td>3.18</td>
<td>0</td>
<td>30.16</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00105</td>
<td>4.47</td>
<td>1</td>
<td>36.77</td>
<td>7</td>
<td>2.1</td>
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<tr>
<td>7e00108</td>
<td>7.51</td>
<td>2</td>
<td>25.57</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00112</td>
<td>7.15</td>
<td>2</td>
<td>18.49</td>
<td>6</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00115</td>
<td>-3.49</td>
<td>-1</td>
<td>7.34</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>7e00118</td>
<td>4.82</td>
<td>3</td>
<td>-4.69</td>
<td>-3</td>
<td>2.1</td>
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<tr>
<td>7e00121</td>
<td>8.37</td>
<td>7</td>
<td>6.84</td>
<td>6</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Consistent with the year on year analysis, the general trend is for accretion across all but two profiles. Both the percentage change and actual change are greater than the year on year analysis, however, are consistent with cumulative annual additions of material. In general the trend is for the addition of material at the landward end of the profiles in front of the structures.
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

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

Survey Unit Boundary

Aerial Photography from 2014
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

- Accretion:
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- Erosion:
  - < 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²
- No Change:

Survey Unit Boundary

Aerial Photography from 2014
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

<table>
<thead>
<tr>
<th>Accretion</th>
<th>&gt; 30 m²</th>
<th>15 - 30 m²</th>
<th>5 - 15 m²</th>
<th>&lt; 5 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 30 m²</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>15 - 30 m²</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5 - 15 m²</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>&lt; 5 m²</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>No Change</td>
<td>161</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Aerial Photography from 2016
Contours

MHW Elevation: 4.40OD
MLW Elevation: -4.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2010 - 02
- MHW 2008 - 05
- MHW 2007 - 04
- MLW 2016 - 02
Contours

MHW Elevation: 4.40OD
MLW Elevation: -4.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2010 - 02
- MHW 2008 - 05
- MHW 2007 - 04
- MLW 2016 - 02
## Survey Unit

| Local Name | Sand Bay |

### Survey Type

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>Dates Surveyed</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring - Spring Beach Change</td>
<td>05/01/2015 - 13/01/2016</td>
<td>Overall the profiles in this survey unit have remained stable, losing or gaining only small amounts of material. The largest change has been an increase of 9m² on profile 7e00222 with material accumulating at the toe of the beach and on the dunes at the landward extent of the profile.</td>
</tr>
<tr>
<td>Baseline - Spring Beach Change</td>
<td>09/05/2007 - 13/01/2016</td>
<td>In contrast to the 2014/15 long term analysis, only one profile has experienced a net loss of material since 2007; profile 7e00188 at the southern end of the unit. Generally the levels of accretion increase towards the northern end of the unit, however, the percentage increase can be deceiving given the relative length of the profiles. Profiles 7e00227, 7e00232 and 7e00239 have all gained more than 30m² of material.</td>
</tr>
</tbody>
</table>

### Comments

Note that the relatively high percentage changes shown along profile 7e00245 are due to its short length in comparison to the remaining profiles in the survey unit.

### Profile Data

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
<th>Master Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
</tr>
<tr>
<td>7e00180</td>
<td>4.15 3</td>
<td>1.46 1</td>
<td>3</td>
</tr>
<tr>
<td>7e00188</td>
<td>-2.13 -1</td>
<td>-48.27 -13</td>
<td>-13</td>
</tr>
<tr>
<td>7e00192</td>
<td>3.36 1</td>
<td>0.42 0</td>
<td>3</td>
</tr>
<tr>
<td>7e00202</td>
<td>5.51 2</td>
<td>10.72 3</td>
<td>3</td>
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<tr>
<td>7e00207</td>
<td>0.42 0</td>
<td>26.31 10</td>
<td>10</td>
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<td>7e00212</td>
<td>-3.16 -1</td>
<td>19.06 8</td>
<td>8</td>
</tr>
<tr>
<td>7e00217</td>
<td>7.14 3</td>
<td>16.08 8</td>
<td>8</td>
</tr>
<tr>
<td>7e00222</td>
<td>9.04 3</td>
<td>20.44 7</td>
<td>7</td>
</tr>
<tr>
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<td>6.65 2</td>
<td>31.53 12</td>
<td>12</td>
</tr>
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<td>7e00232</td>
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<td>17</td>
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<td>32.55 21</td>
<td>21</td>
</tr>
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<td>7e00245</td>
<td>-2.13 -4</td>
<td>13.51 35</td>
<td>35</td>
</tr>
</tbody>
</table>
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

- **Accretion**
  - > 30 m²
  - 15 - 30 m²
  - 5 - 15 m²
- **Erosion**
  - < 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²
- **No Change**

Survey Unit Boundary

Aerial Photography from 2014

0 190 380 m
Actual Change in Cross-sectional Area (Spring 2015 to Spring 2016)

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

- **Erosion**
  - < 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²

- **No Change**
  - < 5 m²

Survey Unit Boundary

Aerial Photography from 2014
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

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

Aerial Photography from 2014

Survey Unit Boundary

7eSANB1: Sand Bay - Beach Change (1 of 2)

NDASCAG - Somerset

Annual Survey Report 2016
Actual Change in Cross-sectional Area (Baseline 2007 to Spring 2016)

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

- **Erosion**
  - < 5 m²
  - 5 - 15 m²
  - 15 - 30 m²
  - > 30 m²

- No Change

Survey Unit Boundary

Aerial Photography from 2014
Contours

MHW Elevation: 4.40OD
MLW Elevation: -4.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2010 - 02
- MHW 2008 - 05
- MHW 2007 - 04
- MLW 2016 - 02
Contours

MHW Elevation: 4.40OD
MLW Elevation: -4.10OD

- MHW 2016 - 02
- MHW 2014 - 06
- MHW 2012 - 05
- MHW 2011 - 03
- MHW 2010 - 02
- MHW 2008 - 05
- MHW 2007 - 04
- MLW 2016 - 02
Profile Charts for Survey Unit 7cWEST2
Cross Sectional Area above MP Trend for Location: 7c00503A and Reference Profile Set

Area Above MP Trend: Eroding at -30.857 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00507A and Reference Profile Set

Area Above MP Trend: Eroding at -22.358 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00512A and Reference Profile Set

Area Above MP Trend: Eroding at -15.506 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00518 and Reference Profile Set

Area Above MP Trend: Eroding at -2.804 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00524 and Reference Profile Set

Area Above MP Trend: Accreting at 0.302 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00530 and Reference Profile Set

Area Above MP Trend: Eroding at -5.203 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00536 and Reference Profile Set

Area Above MP Trend: Eroding at -0.544 m²/Year
Survey Unit for 7cWEST2

Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 7c00542 and Reference Profile Set

Area Above MP Trend: Eroding at -21.968 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00545 and Reference Profile Set

Area Above MP Trend: Eroding at -26.028 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00546 and Reference Profile Set

Area Above MP Trend: Eroding at -39.020 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00549 and Reference Profile Set

Area Above MP Trend: Eroding at -88.524 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00556 and Reference Profile Set

Area Above MP Trend: Eroding at -10.145 m²/Year

Survey Date:
- 14/08/2010
- 12/02/2011
- 13/08/2011
- 11/02/2012
- 11/08/2012
- 09/02/2013
- 10/08/2013
- 08/02/2014
- 09/08/2014
- 07/02/2015
- 08/08/2015
- 06/02/2016

Area (m²): 2,400, 2,300, 2,200, 2,100, 2,000, 1,900, 1,800, 1,700, 1,600, 1,500, 1,400, 1,300, 1,200, 1,100, 1,000, 900, 800, 700, 600, 500, 400, 300, 200, 100, 0
Cross Sectional Area above MP Trend for Location: 7c00575 and Reference Profile Set

Area Above MP Trend: Eroding at -10.920 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00597 and Reference Profile Set

Area Above MP Trend: Erodiong at -11.074 m²/Year

Survey Date

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

SANDS
Cross Sectional Area above MP Trend for Location: 7c00601 and Reference Profile Set

Area Above MP Trend: Accreting at 0.314 m²/Year

Survey Date


Area (m²)
Cross Sectional Area above MP Trend for Location: 7c00602 and Reference Profile Set

Area Above MP Trend: Accreting at 4.272 m²/Year

Survey Date

Area (m²)


Recycling Event, Area Above MP, Area Trend
Cross Sectional Area above MP Trend for Location: 7c00610 and Reference Profile Set

Area Above MP Trend: Accretion at 0.987 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00610A and Reference Profile Set

Area Above MP Trend: Accreting at 3.965 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00610B and Reference Profile Set

Area Above MP Trend: Accreting at 0.238 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00610C and Reference Profile Set

Area Above MP Trend: Eroding at -0.987 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00610D and Reference Profile Set

Area Above MP Trend: Accreting at 1.252 m²/Year

Survey Date

- Recycling Event
- Area Above MP
- Area Trend

SANDS
Cross Sectional Area above MP Trend for Location: 7c00610E and Reference Profile Set

Area Above MP Trend: Accreting at 2.750 m²/Year
Cross Sectional Area above MP Trend for Location: 7c00610F and Reference Profile Set

Area Above MP Trend: Accreting at 1.763 m²/Year

Survey Date


Area (m²)

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400

☑ Recycling Event ☑ Area Above MP ☑ Area Trend

SANDS
Profile Charts for Survey Unit 7cSAUN1
Profile Charts for Survey Unit 7cSAUN1
Profiles: 7c06389H

Profile Charts for Survey Unit 7cSAUN1
Cross-Sectional Area above MP Trend for Location: 7d01058 and Reference Profile Set

Area Above MP Trend: Eroding at -0.433 m²/Year
Profile Charts for Survey Unit 7dPORL2
Cross Sectional Area above MP Trend for Location: 7d01062B and Reference Profile Set

Area Above MP Trend: Accreting at 0.394 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)
Cross Sectional Area above MP Trend for Location: 7d01063A and Reference Profile Set

Area Above MP Trend: Eroding at -7.085 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Survey Unit for 7dPORL2
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 7d01066A and Reference Profile Set

Area Above MP Trend: Eroding at -4.059 m²/Year

Survey Date
Profile Charts for Survey Unit 7dPORL3
Profile Charts for Survey Unit 7dPORL3
Cross Sectional Area above MP Trend for Location: 7d01072 and Reference Profile Set

Area Above MP Trend: Eroding at -4.373 m²/Year
Survey Unit for 7dPORL3
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 7d01076 and Reference Profile Set

Area Above MP Trend: Eroding at -7.913 m²/Year

Survey Date

Area (m²)

Recycling Event, Area Above MP, Area Trend

SANDS
Cross Sectional Area above MP Trend for Location: 7d01080 and Reference Profile Set

Area Above MP Trend: Eroding at -3.747 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01084 and Reference Profile Set

Area Above MP Trend: Eroding at -0.018 m2/Year
Cross Sectional Area above MP Trend for Location: 7d01085 and Reference Profile Set

Area Above MP Trend: Eroding at -8.037 m²/Year

Survey Date:
- 04/12/2007
- 03/12/2008
- 03/12/2009
- 03/12/2010
- 03/12/2011
- 02/12/2012
- 02/12/2013
- 02/12/2014
- 02/12/2015

Area (m²):
- 2,600
- 2,500
- 2,400
- 2,300
- 2,200
- 2,100
- 2,000
- 1,900
- 1,800
- 1,700
- 1,600
- 1,500
- 1,400
- 1,300
- 1,200
- 1,100
- 1,000
- 900
- 800
- 700
- 600
- 500
- 400
- 300
- 200
- 100
- 0

Legend:
- ✓ Recycling Event
- ● Area Above MP
- ➕ Area Trend

SANDS
Cross Sectional Area above MP Trend for Location: 7d01091 and Reference Profile Set

Area Above MP Trend: Eroding at -0.256 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01096 and Reference Profile Set

Area Above MP Trend: Eroding at -3.171 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01100 and Reference Profile Set

Area Above MP Trend: Accrering at 0.146 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01103 and Reference Profile Set

Area Above MP Trend: Accreting at 3.480 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01112 and Reference Profile Set

Area Above MP Trend: Eroding at -1.590 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01119 and Reference Profile Set

Area Above MP Trend: Eroding at -1.505 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01128 and Reference Profile Set

Area Above MP Trend: Accreting at 1.007 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01134 and Reference Profile Set

Area Above MP Trend: Accreting at 0.974 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01149 and Reference Profile Set

Area Above MP Trend: Eroding at -2.074 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 100 200 300 400 500 600 700 800 900 1,000 1,100 1,200 1,300 1,400 1,500 1,600 1,700 1,800 1,900 2,000 2,100 2,200 2,300 2,400 2,500 2,600

Survey Unit for 7dPORL3
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 7d01304 and Reference Profile Set

Area Above MP Trend: Eroding at -11.714 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01308 and Reference Profile Set

Area Above MP Trend: Eroding at -1.978 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01312 and Reference Profile Set

Area Above MP Trend: Accreting at 0.212 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01316 and Reference Profile Set

Area Above MP Trend: Eroding at -3.847 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01319A and Reference Profile Set

Area Above MP Trend: Eroding at -3.482 m²/Year
Profile Charts for Survey Unit 7dMINE2
Profile Charts for Survey Unit 7dMINE2
Cross Sectional Area above MP Trend for Location: 7d01323 and Reference Profile Set

Area Above MP Trend: Accreting at 0.850 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01325 and Reference Profile Set

Area Above MP Trend: Eroding at -1.508 m2/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Survey Unit for 7dMINE2
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 7d01328 and Reference Profile Set

Area Above MP Trend: Eroding at -1.297 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01331 and Reference Profile Set

Area Above MP Trend: Eroding at -4.234 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01335 and Reference Profile Set

Area Above MP Trend: Eroding at -1.700 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100

Survey Unit for 7dMINE2
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 7d01340 and Reference Profile Set

Area Above MP Trend: Eroding at -2.685 m2/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015
Cross Sectional Area above MP Trend for Location: 7d01343 and Reference Profile Set

Area Above MP Trend: Accreting at 0.183 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01346 and Reference Profile Set

Area Above MP Trend: Eroding at -1.698 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01350 and Reference Profile Set

Area Above MP Trend: Eroding at -2.277 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01354 and Reference Profile Set

Area Above MP Trend: Eroding at -5.955 m²/Year

Survey Date: 04/12/2007 to 02/12/2015

Survey Unit for 7dMINE2
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 7d01361 and Reference Profile Set

Area Above MP Trend: Eroding at -1.079 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01366 and Reference Profile Set

Area Above MP Trend: Eroding at -7.928 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01372 and Reference Profile Set

Area Above MP Trend: Eroding at -5.675 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01376 and Reference Profile Set

Area Above MP Trend: Eroding at -0.673 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01381 and Reference Profile Set

Area Above MP Trend: Accreting at 1.078 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01400 and Reference Profile Set

Area Above MP Trend: Eroding at -4.004 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01407 and Reference Profile Set

Area Above MP Trend: Eroding at -0.535 m²/Year
Survey Unit for 7dMINE4
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 7d01411 and Reference Profile Set

Area Above MP Trend: Accreting at 0.184 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01419 and Reference Profile Set

Area Above MP Trend: Accreting at 0.461 m²/Year
Survey Unit for 7dMINE4
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 7d01423 and Reference Profile Set

Area Above MP Trend: Eroding at -7.588 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01427 and Reference Profile Set

Area Above MP Trend: Eroding at -0.812 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01431 and Reference Profile Set

Area Above MP Trend: Accreting at 2.760 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750

- Recycling Event
- Area Above MP
- Area Trend

SANDS
Cross-sectional area above MP trend for Location: 7d01439 and Reference Profile Set.

Area Above MP Trend: Eroding at -3.907 m²/Year.
Cross Sectional Area above MP Trend for Location: 7d01443 and Reference Profile Set

Area Above MP Trend: Eroding at -0.004 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01447 and Reference Profile Set

Area Above MP Trend: Eroding at -0.428 m^2/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m^2)

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1,000 1,050 1,100 1,150 1,200 1,250 1,300 1,350 1,400 1,450 1,500 1,550 1,600 1,650 1,700 1,750
Cross Sectional Area above MP Trend for Location: 7d01451 and Reference Profile Set

Area Above MP Trend: Eroding at -0.654 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750

Recycling Event Area Above MP Area Trend
Cross Sectional Area above MP Trend for Location: 7d01455 and Reference Profile Set

Area Above MP Trend: Eroding at -0.451 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01459 and Reference Profile Set

Area Above MP Trend: Eroding at -0.543 m²/Year

Survey Date:
- 04/12/2007
- 03/12/2008
- 03/12/2009
- 03/12/2010
- 03/12/2011
- 02/12/2012
- 02/12/2013
- 02/12/2014
- 02/12/2015

Survey Unit for 7dMINE5
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 7d01463 and Reference Profile Set

Area Above MP Trend: Eroding at -1.235 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01467 and Reference Profile Set

Area Above MP Trend: Eroding at -0.681 m²/Year

Survey Date

Survey Unit for 7dMINE5
Cross-Sectional Area Charts
Profile Charts for Survey Unit 7dMINE6
Cross Sectional Area above MP Trend for Location: 7d01471 and Reference Profile Set

Area Above MP Trend: Accreting at 0.241 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01475 and Reference Profile Set

Area Above MP Trend: Accreting at 1.531 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01479 and Reference Profile Set

Area Above MP Trend: Accreting at 2.536 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01483 and Reference Profile Set

Area Above MP Trend: Accreting at 2.438 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)
Cross Sectional Area above MP Trend for Location: 7d01491 and Reference Profile Set

Area Above MP Trend: Accreting at 1.530 m²/Year

Survey Date:
- 04/12/2007 to 02/12/2015

Legend:
- Recycling Event
- Area Above MP
- Area Trend

Survey Unit for 7dMINE6
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 7d01797 and Reference Profile Set

Area Above MP Trend: Eroding at -0.870 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01801 and Reference Profile Set

Area Above MP Trend: Accreting at 0.142 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01807 and Reference Profile Set

Area Above MP Trend: Eroding at -1.097 m2/Year
Profile Charts for Survey Unit 7dPARR2
Cross Sectional Area above MP Trend for Location: 7d01906 and Reference Profile Set

Area Above MP Trend: Accreting at 1.039 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01910 and Reference Profile Set

Area Above MP Trend: Accreting at 0.773 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01919 and Reference Profile Set

Area Above MP Trend: Eroding at -0.409 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01927 and Reference Profile Set

Area Above MP Trend: Accreting at 0.023 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01935 and Reference Profile Set

Area Above MP Trend: Accreting at 0.491 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400

✓ Recycling Event ✓ Area Above MP ✓ Area Trend
Cross Sectional Area above MP Trend for Location: 7d01939 and Reference Profile Set

Area Above MP Trend: Eroding at -1.255 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 03/12/2012 03/12/2013 03/12/2014 03/12/2015

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400

Area (m²)
Cross Sectional Area above MP Trend for Location: 7d01957 and Reference Profile Set

Area Above MP Trend: Accreting at 0.651 m²/Year
Cross-sectional Area above MP Trend for Location: 7d01966 and Reference Profile Set

Area Above MP Trend: Eroding at -2.071 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1,000 1,050 1,100 1,150 1,200 1,250 1,300 1,350

Survey Unit for 7dPARR3
Cross-Sectional Area Charts
Cross Sectional Area above MP Trend for Location: 7d01977 and Reference Profile Set

Area Above MP Trend: Eroding at -0.643 m²/Year
Cross Sectional Area above MP Trend for Location: 7d01984 and Reference Profile Set

Area Above MP Trend: Accreting at 2.188 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)
Cross Sectional Area above MP Trend for Location: 7d01987 and Reference Profile Set

Area Above MP Trend: Eroding at -2.433 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02001A and Reference Profile Set

Area Above MP Trend: Accreting at 1.691 m²/Year
Survey Unit for 7dPARR3
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 7d02007 and Reference Profile Set

Area Above MP Trend: Eroding at -1.372 m²/Year

Survey Date

Area (m²)

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1,000 1,050 1,100 1,150 1,200 1,250 1,300 1,350
Cross Sectional Area above MP Trend for Location: 7d02012 and Reference Profile Set

Area Above MP Trend: Eroding at -1.504 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02027 and Reference Profile Set

Area Above MP Trend: Eroding at -10.875 m²/Year

Survey Date

04/12/2007  03/12/2008  03/12/2009  03/12/2010  03/12/2011  03/12/2012  02/12/2013  02/12/2014  02/12/2015

Area (m²)

50  100  150  200  250  300  350  400  450  500  550  600  650  700  750  800  850  900  950  1000  1050  1100  1150  1200  1250  1300  1350
Cross Sectional Area above MP Trend for Location: 7d02036 and Reference Profile Set

Area Above MP Trend: Accreting at 0.581 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02114R and Reference Profile Set

Area Above MP Trend: Accreting at 1.089 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700

SANDS
Cross Sectional Area above MP Trend for Location: 7d02114V and Reference Profile Set

Area Above MP Trend: Accreting at 0.029 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02115 and Reference Profile Set

Area Above MP Trend: Eroding at -1.751 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02115C and Reference Profile Set

Area Above MP Trend: Accreting at 0.234 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02115K and Reference Profile Set

Area Above MP Trend: Accreting at 1.255 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700

Recycling Event ✓ Area Above MP ✓ Area Trend
Cross Sectional Area above MP Trend for Location: 7d02115P and Reference Profile Set

Area Above MP Trend: Accreting at 1.736 m²/Year
Survey Unit for 7dBURN2

Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 7d02115U and Reference Profile Set

Area Above MP Trend: Accreting at 3.612 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700

Recycling Event ✔️ Area Above MP ✔️ Area Trend
Cross Sectional Area above MP Trend for Location: 7d02115Y and Reference Profile Set

Area Above MP Trend: Accreting at 3.144 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02159 and Reference Profile Set

Area Above MP Trend: Accreting at 6.475 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02163 and Reference Profile Set

Area Above MP Trend: Accreting at 1.105 m²/Year
Survey Unit for 7dBURN2
Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 7d02168 and Reference Profile Set

Area Above MP Trend: Eroding at -5.906 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02182 and Reference Profile Set

Area Above MP Trend: Accreting at 9.944 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02192 and Reference Profile Set

Area Above MP Trend: Accreting at 13.395 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 60 120 180 240 300 360 420 480 540 600 660

Recycling Event  Area Above MP  Area Trend

SANDS
Cross Sectional Area above MP Trend for Location: 7d02203 and Reference Profile Set

Area Above MP Trend: Eroding at -0.146 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02223 and Reference Profile Set

Area Above MP Trend: Accreting at 2.358 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02243 and Reference Profile Set

Area Above MP Trend: Accreting at 1.160 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)

0 40 80 120 160 200 240 280 320 360 400 440 480 520 560 600 640

SANDS
Cross Sectional Area above MP Trend for Location: 7d02254 and Reference Profile Set

Area Above MP Trend: Eroding at -2.411 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02274 and Reference Profile Set

Area Above MP Trend: Accreting at 0.735 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02304 and Reference Profile Set

Area Above MP Trend: Accreting at 4.231 m²/Year

Survey Date

04/12/2007  03/12/2008  03/12/2009  03/12/2010  03/12/2011  02/12/2012  02/12/2013  02/12/2014  02/12/2015

Area (m²)
Cross Sectional Area above MP Trend for Location: 7d02314 and Reference Profile Set

Area Above MP Trend: Accreting at 4.757 m²/Year

Survey Date

04/12/2007  03/12/2008  03/12/2009  03/12/2010  03/12/2011  02/12/2012  02/12/2013  02/12/2014  02/12/2015

Area (m²)
Cross Sectional Area above MP Trend for Location: 7d02330 and Reference Profile Set

Area Above MP Trend: Accreting at 2.147 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02340 and Reference Profile Set

Area Above MP Trend: Accreting at 4.574 m²/Year
Cross Sectional Area above MP Trend for Location: 7d02345 and Reference Profile Set

Area Above MP Trend: Accreting at 6.141 m²/Year
Profile Charts for Survey Unit 7dWSM1
Profile Charts for Survey Unit 7dWSM1
Cross Sectional Area above MP Trend for Location: 7e00048 and Reference Profile Set

Area Above MP Trend: Accreting at 1.651 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00051 and Reference Profile Set

Area Above MP Trend: Eroding at -0.876 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00054 and Reference Profile Set
Area Above MP Trend: Accreting at 0.987 m²/Year

Survey Date
04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)
1,300
1,250
1,200
1,150
1,100
1,050
1,000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0

☑ Recycling Event ☐ Area Above MP ☐ Area Trend

SANDS
Cross Sectional Area above MP Trend for Location: 7e00057 and Reference Profile Set

Area Above MP Trend: Accreting at 1.199 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00060 and Reference Profile Set

Area Above MP Trend: Accreting at 1.516 m²/Year

Survey Date:
- 04/12/2007
- 03/12/2008
- 03/12/2009
- 03/12/2010
- 03/12/2011
- 02/12/2012
- 02/12/2013
- 02/12/2014
- 02/12/2015

Area (m²):
- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
- 400
- 450
- 500
- 550
- 600
- 650
- 700
- 750
- 800
- 850
- 900
- 950
- 1000
- 1050
- 1100
- 1150
- 1200
- 1250
- 1300

SANDS
Cross Sectional Area above MP Trend for Location: 7e00063 and Reference Profile Set

Area Above MP Trend: Eroding at -3.638 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00066 and Reference Profile Set

Area Above MP Trend: Accreting at 1.124 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00072 and Reference Profile Set

Area Above MP Trend: Accreting at 1.785 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00075 and Reference Profile Set

Area Above MP Trend: Accreting at 3.412 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00078 and Reference Profile Set

Area Above MP Trend: Accreting at 4.445 m²/Year

Survey Date

04/12/2007 03/12/2008 03/12/2009 03/12/2010 03/12/2011 02/12/2012 02/12/2013 02/12/2014 02/12/2015

Area (m²)
Cross Sectional Area above MP Trend for Location: 7e00081 and Reference Profile Set

Area Above MP Trend: Accreting at 1.051 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00084 and Reference Profile Set

Area Above MP Trend: Accreting at 2.340 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00090 and Reference Profile Set

Area Above MP Trend: Eroding at -0.272 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00093 and Reference Profile Set

Area Above MP Trend: Eroding at -1.499 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00096 and Reference Profile Set

Area Above MP Trend: Accreting at 1.696 m²/Year
Survey Unit for 7eWSM2

Cross-Sectional Area Charts

Cross Sectional Area above MP Trend for Location: 7e00099 and Reference Profile Set

Area Above MP Trend: Accreting at 2.128 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00102 and Reference Profile Set

Area Above MP Trend: Accreting at 1.864 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00105 and Reference Profile Set

Area Above MP Trend: Accreting at 1.595 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00112 and Reference Profile Set

Area Above MP Trend: Accreting at 0.332 m²/Year
Cross Sectional Area above MP Trend for Location: 7e00121 and Reference Profile Set

Area Above MP Trend: Accreting at 0.968 m²/Year
Profile Charts for Survey Unit 7dWSM2