South West Regional Coastal Monitoring Programme

Annual Survey Report
Lizard Point to Land’s End
2021

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November 2021
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Lizard Point to Land’s End

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### Checked By
J Saunders

## Revisions

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<th>Revision Reference</th>
<th>AR 98 Rev 1.0</th>
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Contents

Summary ............................................................................................................................. 1
Introduction ......................................................................................................................... 3
Methods ............................................................................................................................... 3
Wave Reports ...................................................................................................................... 9
  Porthleven Wave Buoy ..................................................................................................... 9
  Penzance Wave Buoy .................................................................................................... 19
Process Cell Summary Maps ............................................................................................ 29
Appendix A: Individual Survey Unit Reports ................................................................. 33
  6eSU3-2 - Mullion ........................................................................................................... 34
  6eSU3-4 - Poldhu ........................................................................................................... 39
  6eSU3-6 - Church Cove ................................................................................................ 47
  6eSU4-3 - Gunwalloe Cove ............................................................................................ 54
  6eSU4-4 - Loe Bar .......................................................................................................... 63
  6eSU4-5 - Porthleven Sands ......................................................................................... 78
  6eSU4-6 - Porthleven .................................................................................................... 86
  6eSU6-2 - Praa Sands ................................................................................................... 94
  6eSU8-2 - Perran Sands ............................................................................................... 114
  6eSU9-2 - Little London ............................................................................................... 121
  6eSU10-1 - Marazion .................................................................................................... 129
  6eSU10-2 - Mounts Bay ............................................................................................... 138
  6eSU11 - Newlyn ......................................................................................................... 163
Summary

This report contains changes to beach and wave conditions from measurements recorded by the South West Regional Coastal Monitoring Programme. Comparisons are made between the 2021 data with the 2020 Spring and 2007 baseline data.

Over the last year, the survey units in this report have experienced varied change in cross-sectional area, with the majority showing an overall gain in material. Survey units 6eSU3-2 (Mullion Cove), 6eSU3-6 (Church Cove), 6eSU4-5 (Porthleven Sands), 6eSU4-6 (Porthleven), 6eSU6-2 (Praa Sands), 6eSU8-2 (Perran Sands), 6eSU9-2 (Little London), 6eSU10-1 (Marazion) and 6eSU11 (Newlyn) experienced a gain in cross sectional area across all profiles by up to 147%. Survey units 6eSU3-4 (Poldhu), 6eSU4-4 (Loe Bar), 6eSU4-3 (Gunwalloe Cove) and 6eSU10-2 (Mounts Bay) all display net erosion, while 6eSU3-4 (Poldhu) and 6eSU4-3 (Gunwalloe Cove) displayed erosion across all interim survey lines.

In comparison to the 2007 baseline there has been a wide variability in both percentage change and actual change of cross-sectional area across the survey cell. Survey units 6eSU4-4 (Loe Bar) and 6eSU4-3 (Gunwalloe Cove) have shown a net loss in cross-sectional area. All the remaining survey units have comparatively shown an increase in cross-sectional area, gaining up to 42%, with survey units 6eSU3-2 (Mullion Cove), 6eSU3-6 (Church Cove), 6eSU4-6 (Porthleven), 6eSU8-2 (Perran Sands) and 6eSU11 (Newlyn) gaining material across all interim survey lines.

The repeat baseline survey site 6eSU4-4 (Loe Bar) indicated a net sediment gain of 1.6 % equating to the accretion of 14,870 m$^3$ in comparison to the 2020 baseline survey with accretion observed across the upper beach face. In comparison to the 2007 baseline, there has been a net sediment loss of 1.5 % equating to an erosion of 14,719 m$^3$ across the entire mid to low beach face, with minor accretion observed along the back of the bar.

The repeat baseline site 6eSU6-2 (Praa Sands) indicated a net sediment gain of 2.4 % equating to the accretion of 11,347 m$^3$ in comparison to the 2020 baseline survey with material being gained primarily from the landward side of the beach. Similarly to the 2007 baseline, there has been a gain in material (14,879 m$^3$ equating to ~4.1 %) predominantly towards the mid beach area.

Of the storms recorded by the Porthleven Directional Waverider (DWR) between January 2020 and April 2021, nine exceeded the 4.88 m storm threshold. The primary wave direction was from the south west. The largest storm recorded by the Porthleven DWR recorded a significant wave height of 6.36 m on 30 January 2021 at 17:30; high tide on the 30th was at 17:58 with a height of 5.07 m.

The Penzance DWR recorded twelve storms between January 2020 and April 2021 with waves exceeding the 3.12 m storm threshold. The primary wave direction was from the south. The largest storm recorded by the Penzance DWR recorded a
significant wave height of 3.87 m on 16 December 2020 at 04:30; high tide on the 16th was at 05:26 with a height of 5.74 m.
South West Regional Coastal Monitoring Programme

Annual Survey Report 2021 – Lizard Point to Land’s End

1.0 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 (SWRCMP). The first beach surveys took place during the Spring of 2007 and changes are reported until Summer 2021.

2.0 Methodology

2.1 Hydrodynamics

Wave and Tidal reports are presented, where applicable, for those wave buoys and tide gauges within the area (Lizard Point to Land’s End) showing analysis from January 2020 to April 2021. Reports are prepared and checked on behalf of the SWRCMP by the Channel Coastal Observatory; for all other hydrodynamic reports and information on their methodology please see here.

2.2 Topographic Survey

Profile Data

Each survey unit in this report consists of a select number of pre-determined cross-shore profiles which have remained constant throughout the programme. Analysis of cross-sectional area (CSA) change is conducted for each individual profile for each separate survey unit. Changes in CSA are measured relative to the Master Profile which is defined by a stable landward position and the Mean Low Water Springs (MLWS) level (Fig.1).

Figure 1 - Example Master Profile with CSA Calculated from the Surveyed GPS Profile
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.

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

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

whereby $\text{CSA}_1$ is the most recent Spring survey and $\text{CSA}_2$ is the Spring survey from the previous year. Therefore an annual change of $-14\%$ represents a loss of $14\%$ of the previous year's CSA.

**Interim Data**

As part of the Monitoring Programme specification, each survey unit receives at least a Spring interim survey every year (conducted between January and April), with more vulnerable sites also receiving an Autumn interim survey every year (conducted between September and December). An interim survey consists of a full profile survey of select profiles across the survey unit.

For the purpose of this report, Spring survey profiles from the current year are compared with the 2021 Spring interim and the initial baseline survey, predominantly conducted in 2007.

**Baseline Data**

As part of the Monitoring Programme specification, each survey unit receives a full topographic baseline survey once every six 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 5 m intervals and continuous spot height data collected at approximately 1 m intervals across the whole beach to the height 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 is processed into a Digital Terrain Model (DTM) and successive models are subtracted from one another to produce a difference model for the survey unit. In some cases, where there is no topographic baseline data collected, the information described above may be derived from LiDAR data.

Net sediment volume change ($m^3$) can be derived across each individual survey unit over time. The initial volumes are derived from the DTM made for consecutive baseline topographic
surveys. Both models are clipped to cover the same area, and a volume above the MLWS plane is calculated for each DTM. The net sediment change is calculated as:

\[ \text{Vol}_1 - \text{Vol}_2 \]

where \( \text{Vol}_1 \) = most recent DTM model volume and \( \text{Vol}_2 \) = earlier DTM model volume. Therefore a net change of \(-19,000 \text{ m}^3\) represents erosion since the earlier survey.

### 3.0 Data Analysis

Data are presented and calculated at the following levels:

#### 3.1 Hydrodynamic Reports

Wave Buoy reports, where applicable, include analysis on monthly averages from January 2020 to April 2021, incorporating the 2020/21 storm season along with monthly averages for all years for the following hydrodynamic parameters:

- \( H_S \) – Significant Wave Height (m)
- \( T_P \) – Peak Wave Period (s)
- \( T_Z \) – Average Wave Period (s)
- Dir. – Wave Direction (°)
- SST – Sea Surface Temperature (°C)
- Bimodal Seas (%)
- Storm Joint Return period

Additional analysis includes listing the statistics for the five most energetic storms alongside significant wave height return periods and parameter exceedance limits from January 2020 to April 2021.

Tide reports, where applicable, include analysis of extreme monthly maxima and minima, surge maxima and surge minima and mean levels for January 2020 to April 2021. Additional analysis includes annual extreme maxima and minima from each year since the devices installation.

#### 3.2 Process Cell Analysis

The Process Cell Summary maps contain an at-a-glance condition of each survey unit between Sand Point and Aust. Combined profile areas for each survey unit are compared and show actual profile change (m\(^2\)) and percentage change between the:

- 2020 Spring interim and the 2021 Spring interim
- 2007 Baseline and the 2021 Spring interim

Colour-coded circles highlight areas of accretion, no change or erosion for each survey unit and identify survey units which might need closer examination. It is recommended that the user should use the maps to identify areas of interest and then further examine the individual profile charts and time series.

#### 3.3 Survey Unit Analysis

Analysis has been conducted for those survey units where a minimum of three spring interim surveys have been recorded, with the following completed where applicable:

- Combined Profile Area Trend Analysis
• CSA Time Series
• Profile Extremes Analysis
• Topographic Change Maps:
  ▪ Detailed beach profile change from Spring 2020 to Spring 2021
  ▪ Detailed beach profile change from Baseline 2007 to Spring 2021
• Individual Profile Charts

Combined Profile Area Trend Analysis

The combined profile trend in CSA is presented as a graph for each survey unit (example shown in Fig.2). All interim profile areas are combined for each interim and baseline survey conducted to date to provide a survey unit with a single ‘beach area’ known hence forth as the Combined Profile Area (CPA) to compare using linear trend analysis over a temporal scale.

Where profiles have been missed from a particular survey, the average of all surveys is taken to ensure a consistent ‘beach area’, if fewer than 75% of surveys have been conducted for a particular profile, the profile is omitted.

Where repeat baseline surveys are present, surface volumes were extracted from a common area and plotted on the third axis of the CPA plot.

![Combined Profile Area Chart](image)

**Figure 2 - Example of trend analysis for CPA for each interim and baseline survey with a linear trend rate highlighted at 28.4 m² y⁻¹ equating to the increase of 0.56% of the average CPA per year.**

Profile Extremes Analysis

For each impacted survey unit, the cross-sectional area for individual interim profiles are discussed. Profile extremes analysis plots show the current cross-sectional area (m²) with the range of previous recordings represented as error bars. This plot displays the range of change for each individual profile along with where the most recent survey is represented. An example is given in Figure 3.
Cross-sectional area measurements (m²) for each interim profile at individual survey units are displayed on a separate plot for each interim and baseline survey conducted to date (example shown in Fig. 4).

Figure 4 - Example of a cross-sectional area plot showing each of the interim profiles recorded for every interim and baseline survey since the 2007 baseline.
Topographic Change Maps

Topographic change maps show the location of each interim profile, superimposed on an aerial photograph.

The lines for beach profile change maps 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. The annual change in cross-sectional area has been calculated from the 2021 Spring interim to the 2020 Spring interim and from the 2021 Spring interim to the original 2007 baseline.

Individual Profile Charts

Each interim profile is portrayed as a cross-sectional profile comparing the most recent Spring interim (blue), the previous Spring interim (green) and the original baseline (red). Profiles are displayed against the master profile (dotted red line).

4.0 Accuracy Statement

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 Real Time Kinematic (RTK) GPS surveys, the accuracy of each data point is ±0.03 m and therefore differences of ±0.06 m can generally be considered as "real", whilst smaller changes may be an artefact of the measuring system, and are considered to be "No Change".

Where LiDAR has been used to infill profile data, the accuracy is less precise as LiDAR data is delivered gridded to a 1 m horizontal resolution. However, the internal accuracy is higher and the vertical value will be accurate to ±0.04 m. LiDAR is poor at identifying sharp edges or steep slopes over short distances e.g. steep cliffs or seawalls, whereas a topographic survey will specifically pick up these changes in slope. However, LiDAR is excellent at providing a fuller picture over a wide surface which will 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.

5.0 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 12 weeks must elapse between successive interim surveys; 8 weeks must elapse between interim and repeat baseline surveys. The dates of individual surveys are given in the topographic survey record and with the analysis for each survey unit.

A full survey record including target and completion dates for all topographic surveys can be found on our website:

http://southwest.coastalmonitoring.org/topographic-survey-record-cell-6e/

For the most recent survey schedules for each survey unit please see:

http://southwest.coastalmonitoring.org/resources/survey-schedule/
Porthleven Directional Waverider Buoy

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Data Quality

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Monthly Averages – 2020/21

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All times are GMT
## Monthly Averages - All Years (October 2011 – December 2020)

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## Storm Analysis (5 highest storms)

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* Tidal information is obtained from the National Network gauge at Newlyn and/or estimated from the predicted tides (Admiralty Total Tide). 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.
Joint return periods

Joint return periods for water level and significant wave height are based on 0.5 hourly records and calculated using a copula function. For more details on the copula function, see Dhoop & Thompson 2021. The grey point cloud represents the measured joint wave heights and water levels at Porthleven and Newlyn respectively, plotted against one another.

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</table>
## Annual Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual $H_s$ exceedance** (m)</th>
<th>Annual Maximum $H_s$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.05%</td>
<td>0.5%</td>
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<tr>
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<td>4.37</td>
</tr>
<tr>
<td>2020</td>
<td>5.59</td>
<td>4.78</td>
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</tbody>
</table>

** i.e. 5% of the $H_s$ values measured in 2011 exceeded 3.40 m

*Note that waves were breaking at the buoy for several hours during this storm; where breaking waves were clearly present in the measured time series, the parameters have been omitted. Accordingly, there may have been short periods where measured significant wave heights exceeded this value.

*** The buoy was badly damaged at the height of the storms in early February 2014 and accordingly may have missed even higher wave conditions later that month.
**Significant wave height return periods**

Return periods for significant wave height can be calculated since the buoy has been deployed for more than 5 years. The return periods are based on 0.5 hourly records and are calculated for periods up to 10 times the record length using a peaks-over-threshold method and Generalised Pareto Distribution (GPD).

<table>
<thead>
<tr>
<th>Observation period</th>
<th>October 2011 to December 2020</th>
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</thead>
<tbody>
<tr>
<td>Return period (years)</td>
<td>Significant wave height (m)</td>
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<tr>
<td>0.25</td>
<td>4.88</td>
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<tr>
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<tr>
<td>100</td>
<td>7.91</td>
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</table>

**Distribution plots**

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

- Annual time series of $H_s$ (red line is 4.88 m storm alert threshold)
- Incidence of storms from January 2020 to April 2021 and all previous years. Storm events are defined using the Peaks-over-Threshold method. The highest $H_s$ of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction from January 2020 to April 2021
- Wave rose (percentage of occurrence of direction vs. $H_s$) for all measured data
- Joint distribution of all parameters for all measured data, given as percentage of occurrence

**General**

The buoy, owned by Teignbridge District Council, was first deployed on 17 October 2011, at which time the magnetic declination at the site was 3.2° west, changing by 0.15° east per year.

**Acknowledgements**

The shore station is kindly hosted by Penzance Harbourmaster.

Tidal data at Newlyn were provided by the British Oceanographic Data Centre from the UK national tide gauge network, owned and operated by the Environment Agency.
Wave Report

Porthleven - Significant Wave Height (Hs) during 2021

- January
- February
- March
- April

Storms at Porthleven during 2020/21

Storm alert threshold is Hs = 4.88

Storms at Porthleven - all years

Date
**Penzance Directional Waverider Buoy**

**Location**

<table>
<thead>
<tr>
<th>OS</th>
<th>149663 E 29692 N</th>
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</thead>
<tbody>
<tr>
<td>WGS84</td>
<td>Latitude: 50° 06.86' N&lt;br&gt;Longitude: 05° 30.18' W</td>
</tr>
</tbody>
</table>

**Instrument type**

Datawell Directional Waverider Mk III

**Water depth**

~10m CD

Buoy in situ in Mount’s Bay. Photo courtesy of Fugro GB Marine Limited

Location of buoy (Google mapping, image ©2016 TerraMetrics)

**Data Quality**

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

**Monthly Averages – 2020/21**

*All times are GMT*

<table>
<thead>
<tr>
<th>Month</th>
<th>$H_s$ (m)</th>
<th>$T_p$ (s)</th>
<th>$T_z$ (s)</th>
<th>Dir. (°)</th>
<th>SST (°C)</th>
<th>Bimodal seas (%)</th>
<th>No. of days</th>
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</thead>
<tbody>
<tr>
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<td>1.09</td>
<td>9.1</td>
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<td>4.5</td>
<td>176</td>
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<td>30</td>
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<td>3.8</td>
<td>161</td>
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<td>30</td>
</tr>
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</table>
Monthly Averages - All Years (April 2007 – December 2020)

<table>
<thead>
<tr>
<th>Month</th>
<th>$H_s$ (m)</th>
<th>$T_p$ (s)</th>
<th>$T_z$ (s)</th>
<th>Dir. (°)</th>
<th>SST (°C)</th>
<th>Bimodal seas (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>0.92</td>
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<td>4.9</td>
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<td>15.4</td>
<td>0</td>
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<tr>
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<td>3</td>
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<td>4.7</td>
<td>183</td>
<td>10.7</td>
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</table>

Storm Analysis (5 highest storms)

<table>
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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>
</tr>
</thead>
<tbody>
<tr>
<td>16-Dec-2020</td>
<td>3.87</td>
<td>10.0</td>
<td>6.9</td>
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<td>2.35</td>
<td>HW -1</td>
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<td>0.62</td>
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<td>7.7</td>
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<td>HW +5</td>
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</tr>
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*Tidal information is obtained from the National Network gauge at Newlyn and/or estimated from the predicted tides (Admiralty Total Tide). 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.*
Joint return periods

Joint return periods for water level and significant wave height are based on 0.5 hourly records and calculated using a copula function. For more details on the copula function, see Dhoop & Thompson 2021. The grey point cloud represents the measured joint wave heights and water levels at Penzance and Newlyn respectively, plotted against one another.

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Symbol</th>
<th>$H_s$ (m)</th>
<th>Water level elevation</th>
<th>Joint Return Period</th>
</tr>
</thead>
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<td>1 in 5 years</td>
</tr>
<tr>
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<td>3.82</td>
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<td>1.75</td>
<td>1 in 2 years</td>
</tr>
<tr>
<td>14-Jan-2020 17:30:00</td>
<td>3.80</td>
<td>1.51</td>
<td>4.56</td>
<td>1 in 5 years</td>
</tr>
<tr>
<td>16-Jan-2020 13:00:00</td>
<td>3.54</td>
<td>-0.05</td>
<td>3.00</td>
<td>1 in 2 years</td>
</tr>
<tr>
<td>14-Feb-2021 11:00:00</td>
<td>3.49</td>
<td>-1.05</td>
<td>2.00</td>
<td>1 in 2 years</td>
</tr>
</tbody>
</table>
## Annual Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual $H_s$ exceedance** (m)</th>
<th>Annual Maximum $H_s$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.05%</td>
<td>0.5%</td>
</tr>
<tr>
<td>2007</td>
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<td>2.75</td>
</tr>
<tr>
<td>2020</td>
<td>3.68</td>
<td>3.15</td>
</tr>
</tbody>
</table>

**i.e. 5% of the $H_s$ values measured in 2007 exceeded 1.34 m**

*Note that waves were breaking at the buoy for several hours during this storm; where breaking waves were clearly present in the measured time series, the parameters have been omitted. Accordingly, there may have been short periods where measured significant wave heights exceeded this value.
Significant wave height return periods

Return periods for significant wave height can be calculated since the buoy has been deployed for more than 5 years. The return periods are based on 0.5 hourly records and are calculated for periods up to 10 times the record length using a peaks-over-threshold method and Generalised Pareto Distribution (GPD).

<table>
<thead>
<tr>
<th>Observation period</th>
<th>April 2007 to December 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return period (years)</td>
<td>Significant wave height (m)</td>
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<tr>
<td>0.25</td>
<td>3.12</td>
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<td>1</td>
<td>4.03</td>
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<td>50</td>
<td>5.57</td>
</tr>
<tr>
<td>100</td>
<td>5.74</td>
</tr>
</tbody>
</table>

Distribution plots

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

- Annual time series of $H_s$ (red line is 3.12 m storm alert threshold)
- Incidence of storms from January 2020 to April 2021 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
- Wave height exceedance each year since deployment
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction from January 2020 to April 2021
- Wave rose (percentage of occurrence of direction vs. $H_s$) for all measured data
- Joint distribution of all parameters for all measured data, given as percentage of occurrence

General

The buoy, owned by Teignbridge District Council, was first deployed on 6 April 2007 at which time the magnetic declination at the site was 3.9° west, changing by 0.15° east per year.

Acknowledgements

The shore station is kindly hosted by Penzance Harbourmaster.

Tidal data at Newlyn were provided by the British Oceanographic Data Centre from the UK national tide gauge network, owned and operated by the Environment Agency.
Wave Report

Penzance - Significant Wave Height (Hs) during 2021

Storms at Penzance during 2020/21

Storm alert threshold is Hs = 3.12

Storms at Penzance - all years
Wave Report

Penzance 2007 to 2020 - Joint distribution (% of occurrence)

- Hs (m)
- Tp (s)
- Tz (s)

Direction (degrees)
Percentage Change in Cross-sectional Area (Spring 2020 to Spring 2021)

Survey Unit Boundary

Accretion
No Change
Erosion

Surveys:
- 6eSU10-2
- 6eSU10-1
- 6eSU9-2
- 6eSU8-2
- 6eSU6-2
- 6eSU4-6
- 6eSU4-5
- 6eSU4-4
- 6eSU3-6
- 6eSU3-4
- 6eSU3-2
- 6eSU11

Survey Unit Boundary

Legend:
- > 30%
- 15 - 30%
- 5 - 15%
- < 5%
- 15 - 30%
- > 30%

Survey Unit Boundary
Actual Change (m²) in Cross-sectional Area (Baseline 2007 to Spring 2021)

Survey Unit Boundary

Accretion

No Change

Erosion

km

0 3 6

Survey Unit Boundary

6eSU10-2
6eSU10-1
6eSU9-2
6eSU8-2
6eSU6-2
6eSU4-6
6eSU4-5
6eSU4-4
6eSU3-6
6eSU3-4
6eSU3-2
6eSU11

Beach Change Summary - Baseline 2007 to Spring 2021

CISCAG
Appendix A: Individual Survey Unit Reports
Background

Mullion Cove is a small, west facing pocket beach backed by a small hamlet and protected by two breakwaters to the western extent, leaving only a 15 m gap facing south of the cove. The beach has a cross-shore distance of 100 m and a longshore distance of 56 m with an average spring tidal range of 4.7 m. The predominant swell direction is from the southwest, however the beach is considerably protected by sea defences.

Survey Unit Analysis

Mullion has only one profile which has gradually accreted by 1.6 m² y⁻¹ equivalent to 1% of the average area per year. The profile saw its lowest area during the 2014 Spring interim (138.3 m²) however, the following autumn interim saw the profile recover with an accretion of 20 m² (equivalent to 13% of the average area); see Fig. 1. The highest area was recorded during the 2017 Autumn interim, 164 m² (Fig. 1).

Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU3-2, including every spring (red), summer (yellow) and autumn (green) survey completed between 2007 and 2021.

Survey Unit 6eSU3-2 Combined Profile Area Chart

Accretion Rate: 1.6 m² y⁻¹ equating to 1.08% of the Average CPA per year
Profile Analysis

**Spring – Spring**
(13/01/2020 – 01/03/2021)
Analysis of 2020 spring to 2021 spring data suggests profile 6e00202 has seen a 0.3 m² loss (Table 1), with material primarily lost from the top of the beach face before the slipway.

**Baseline - Spring**
(17/04/2007 – 01/03/2021)
When comparing the Spring survey to that of the 2007 baseline, profile 6e00202 has shown a 14% increase in cross-sectional area, equating to a 19.1 m² accretion in sediment, primarily across the upper beach face (Table 1).

Complete Data Comparison
(2007 – 2021)
Profile 6e00202 shows healthy cross sectional area levels compared to previous years (Fig. 2).

Additional Comments
N/A.

Table 1 - Cross-sectional area change in m² and percentage comparing spring to spring and baseline to spring analysis for all profiles in survey unit 6eSU3-2.

<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>13/01/2020 – 01/03/2021</td>
<td>17/04/2007 – 01/03/2021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
</tr>
<tr>
<td>6e00202</td>
<td>-0.3</td>
<td>0</td>
<td>19.1</td>
</tr>
</tbody>
</table>

Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.
Actual Change (m²) in Cross-sectional Area (Spring 2020 to Spring 2021)

Survey Unit Boundary

Accretion
No Change
Erosion

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

6e00202 (0%)
Actual Change ($m^2$) in Cross-sectional Area (Baseline 2007 to Spring 2021)

Survey Unit Boundary

<table>
<thead>
<tr>
<th>Change (m$^2$)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 30 m$^2$</td>
<td>14%</td>
</tr>
<tr>
<td>15 - 30 m$^2$</td>
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<tr>
<td>5 - 15 m$^2$</td>
<td>2</td>
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<tr>
<td>5 - 15 m$^2$</td>
<td>2</td>
</tr>
<tr>
<td>15 - 30 m$^2$</td>
<td>2</td>
</tr>
<tr>
<td>&gt; 30 m$^2$</td>
<td>2</td>
</tr>
</tbody>
</table>

6eSU3-2: Mullion - Beach Change

CISCAG: South Cornwall
Background

Poldhu is a west facing pocket beach comprised of sand and backed by a small dune system and through road
while confined to the north and south by rocky cliffs. The beach has a cross-shore length of ~330 m and longshore
length of ~150 m with an average tidal range of 4.7 m.

Survey Unit Analysis

Analysis of the CPA suggests Poldhu has remained relatively stable, having eroded by 0.8 m² y⁻¹ since 2007 which
is equivalent to 0.04% of the average CPA per year (Fig. 1). The combined area saw a loss of 435 m² (equivalent
to 22% loss of the average area) between the 2013 baseline and the 2014 Spring interim, the latter survey also
saw the lowest recorded area (1579 m²); see figure 1. The highest recorded combined area was during the 2019
Autumn interim (2161 m²).

Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU3-4, including every spring (red), summer
(yellow) and autumn (green) survey completed between 2007 and 2021.
Profile Analysis

Spring – Spring
(12/01/2020 – 01/03/2021)

Analysis of 2020 Spring to 2021 Spring data indicates all profiles have undergone erosion. Profile 6e00251 showed the smallest degree of change, showing a 1.2 m² loss of material with a predominant movement of sediment from the upper beach face to the lower (Table 1). Profile 6e00248 saw a 21% loss in cross-sectional area equating to a 38.4 m² loss in material from the lower beach face and profile 6e00251A saw a 6% loss in cross-sectional area equivalent to a 48.7 m² loss of material from the lower beach face (Table 1).

Baseline - Spring
(15/04/2007 – 01/03/2021)

When comparing the Spring data to that of the 2007 baseline, profile 6e00248 has seen a 42% increase in cross-sectional area across the entire profile, widening it by 40 m (Table 1). Profile 6e00251 has seen a 2% loss in cross-sectional area equating to a 14.7 m² loss in material primarily from the removal of a beach berm from the middle of the profile (Table 1). Profile 6e00251A has seen a 1% increase in cross-sectional area equating to a 9.7 m² gain in material primarily across the lower beach face, widening the profile by ~20 m (Table 1).

Complete Data
Comparison
(2007 – 2021)

All profiles have recorded unhealthy CSA levels compared to previous years (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset the majority of profiles show minor erosion (Fig. 3).

Additional Comments

N/A.

Table 1: Cross-sectional area change in m² and percentage comparing spring to spring and baseline to spring analysis for all profiles in survey unit 6eSU3-4.

<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>12/01/2020 – 01/03/2021</td>
<td>15/04/2007 – 01/03/2021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
</tr>
<tr>
<td>6e00248</td>
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<td>-21</td>
<td>43.5</td>
</tr>
<tr>
<td>6e00251</td>
<td>-1.2</td>
<td>0</td>
<td>-14.7</td>
</tr>
<tr>
<td>6e00251A</td>
<td>-48.7</td>
<td>-6</td>
<td>9.7</td>
</tr>
</tbody>
</table>
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
South West Regional Coastal Monitoring Programme

Annual Survey Report 2021

6eSU3-4: Poldhu - Beach Change

CISCAG: South Cornwall

Aerial Photography from 2018

Actual Change (m²) in Cross-sectional Area (Spring 2020 to Spring 2021)

- Survey Unit Boundary

- Accretion
- No Change
- Erosion

6e00251A (6%)
6e00251 (0%)
6e00248 (-21%)
Actual Change (m²) in Cross-sectional Area (Baseline 2007 to Spring 2021)

Survey Unit Boundary

Aerial Photography from 2018

Accretion
No Change
Erosion

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

Church Cove is a southwest facing pocket beach backed by a small dune system and confined by small rocky headlands to the northwest and southeast. The beach has a cross-shore distance of ~270 m and longshore distance of ~170 m with an average Springtidal range of 4.7 m.

Survey Unit Analysis

Analysis of the CPA suggests Church Cove has undergone sporadic accretion at a rate of 3.3 m$^2$ y$^{-1}$ (equivalent to 0.2% of the average area per year), however, it must be noted that no surveys were conducted between the 2007 baseline and the 2012 Springinterim (Fig. 1). The lowest recorded combined area was during the 2007 baseline at 1362 m$^2$ with the highest recorded during the 2017 Autumn interim at 1708 m$^2$ (Fig. 1).

Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU3-6, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.
Profile Analysis

Spring– Spring
(12/01/2020 – 01/03/2021)

Analysis of 2020 Spring to 2021 Spring data suggests the survey unit has undergone a mixture of erosion and accretion. Profile 6e00263A saw a 1% gain in cross-sectional area, equating to the accretion of 6.6 m² in material primarily from the upper beach (Table 1). Profile 6e00265A saw a 1% loss in cross-sectional area, equating to the erosion of 8.6 m² in material primarily from the MLWS mark (Table 1).

Baseline - Spring
(18/04/2007 – 01/03/2021)

When comparing Spring data to the 2007 baseline, both profiles have undergone considerable accretion. Profile 6e00263A has seen a 10% increase in cross-sectional area equating to a 70.8 m² gain in material across the entire profile length (Table 1). Profile 6e00265A saw a 5% increase in cross-sectional area equating to a 29.7 m² gain in material across the majority of the beach face (Table 1), with an observable increase in fore dune ridge height.

Complete Data Comparison
(2007 – 2021)

Both profiles have recorded unhealthy CSA levels compared to previous years (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset the profiles show steady accretion with a noticeable seasonal trend; high levels in Autumn and low in Spring (Fig. 3).

Additional Comments

N/A.

Table 1 - Cross-sectional area change in m² and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU3-6.

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12/01/2020 – 01/03/2021</td>
<td>18/04/2007 – 01/03/2021</td>
</tr>
<tr>
<td></td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
</tr>
<tr>
<td>6e00263A</td>
<td>6.6</td>
<td>1</td>
</tr>
<tr>
<td>6e00265A</td>
<td>-8.6</td>
<td>-1</td>
</tr>
</tbody>
</table>

Master Profile Level (m): -2.3
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Actual Change (m²) in Cross-sectional Area (Baseline 2007 to Spring 2021)

- Survey Unit Boundary

- Accretion
- No Change
- Erosion

6eSU3-6: Church Cove - Beach Change

CISCAG: South Cornwall
Background

Gunwalloe Cove is a southwest facing, reflective gravel beach backed by a steep cliff face leading onto fields with several houses atop and confined to the southeast by Baulk Head and to the northwest by Loe Bar. The beach has a cross-shore distance of 80 m and longshore distance of 1,800 m with an average Spring tidal range of 4.7 m. Gunwalloe Cove, alongside survey units 6eSU4-4, 6eSU4-5 and 6eSU4-6 undergo beach rotation dependant on the dominant wave (primary direction of south-westerly with a secondary direction of south-easterly).

Survey Unit Analysis

Analysis of the CPA suggests Gunwalloe Cove has been steadily accreting at a rate of 11.2 m$^2$ y$^{-1}$, equivalent to an increase of 0.99% of the average area per year (Fig. 1). The highest loss of 420 m$^2$ (equivalent to 33% of the average area) in area was recorded between the 2009 Autumn interim and the 2010 Spring interim, the latter recording the lowest combined area on record (849 m$^2$); see Fig. 1. The highest combined area was recorded during the 2018 Spring interim at 1508 m$^2$ which was considerably higher than all other surveys (Fig. 1).

Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU4-3, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.
Profile Analysis

**Spring – Spring**
(11/03/2020 – 02/03/2021)

Analysis of 2020 Spring to 2021 Spring data suggests all profiles have experienced erosion, with a significant decrease in cross-sectional area ranging from 14-33% (Table 1). Loss of material can be observed across the entire profile lengths. Profile 6e00315 saw the largest decrease, eroding by 33% which equates to a 134.8 m$^2$ loss of material (Table 1).

**Baseline - Spring**
(18/04/2007 – 02/03/2021)

In comparison to the 2007 baseline, profile 6e00315, 6e00319 and 6e00341 have seen a significant decrease in cross-sectional area, ranging from 11-36% with losses in material observed across the entire profile lengths (Table 1). Profile 6e00329 comparatively saw a 7% gain in cross-sectional area across the majority of the profile length and has gained roughly 1 m of material in front of the cliff face (Table 1).

**Complete Data Comparison**
(2007 – 2021)

Profile 6e00341 recorded its lowest CSA value to date during the most recent Spring interim, whilst the other profiles show unhealthy levels in comparison to previous years (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset the majority of profiles show steady erosion except for profile 6e00329 (Fig. 3).

**Additional Comments**
N/A.

---

**Table 1** - Cross-sectional area change in m$^2$ and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU4-3.

<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>11/03/2020 – 02/03/2021</td>
<td>18/04/2007 – 02/03/2021</td>
<td></td>
</tr>
<tr>
<td>6e00315</td>
<td>-134.8 m$^2$</td>
<td>-60.4 m$^2$</td>
<td>-2.19</td>
</tr>
<tr>
<td>6e00319</td>
<td>-111.4 m$^2$</td>
<td>-38.4 m$^2$</td>
<td>-2.19</td>
</tr>
<tr>
<td>6e00329</td>
<td>-41.6 m$^2$</td>
<td>16.2 m$^2$</td>
<td>-2.19</td>
</tr>
<tr>
<td>6e00341</td>
<td>-28.1 m$^2$</td>
<td>-42.4 m$^2$</td>
<td>-2.19</td>
</tr>
</tbody>
</table>
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
South West Regional Coastal Monitoring Programme

Annual Survey Report 2021

6eSU4-3: Gunwalloe Cove - Beach Change

CISCAG: South Cornwall

Survey Unit Boundary

Actual Change (m²) in Cross-sectional Area (Spring 2020 to Spring 2021)

Aerial Photography from 2018

Accretion

No Change

Erosion

Survey Unit Boundary

6e00341 (-27%)

6e00329 (-14%)

6e00319 (-26%)

6e00315 (-33%)

Survey Unit Boundary

6e00319 (-26%) 6e00341 (-27%) 6e00329 (-14%) 6e00315 (-33%)
Actual Change (m²) in Cross-sectional Area (Baseline 2007 to Spring 2021)

Survey Unit Boundary

Accretion

No Change

Erosion

> 30 m²

15 - 30 m²

< 5 m²

5 - 15 m²

15 - 30 m²

> 30 m²

6e00341 (-36%)  
6e00329 (7%)  
6e00319 (-11%)  
6e00315 (-18%)
**Background**

Loe Bar is a southwest facing, reflective gravel barrier, backed by the Loe which feeds up to the town of Helston, the survey unit is confined to the northwest by Porthleven Sands and to the southeast by Gunwalloe Cove. The beach has a cross-shore distance of 170 m and longshore length of 675 m with an average Spring tidal range of 4.7 m. Loe Bar, alongside survey units 6eSU4-3, 6eSU4-5 and 6eSU4-6 undergoes beach rotation dependant on the dominant wave (primary direction of south-westerly with a secondary direction of south-easterly).

**Survey Unit Analysis**

Analysis of the CPA suggests the beach has gradually eroded at a rate of 13.9 m$^2$ y$^{-1}$, equivalent to a 0.17% loss in average area per year (Fig. 1). The highest loss in area (351 m$^2$ equivalent to a 4% loss in combined area) was observed between the 2017 Autumn interim and the 2018 Spring interim with the latter survey recording the lowest combined area on record (7927 m$^2$); see figure 1. The highest recorded combined area was observed on the 2013 Spring interim (8662 m$^2$; Fig. 1).

![Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU4-4, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021. Overlain, on the secondary axis, is beach volume (m$^3$) for 6eSU4-4 throughout the entire Programme time series.](image)

**Repeat Baseline Analysis**

Analysis of beach volume throughout the duration of the Programme has suggested a similar trend to that of the CPA; where volume and CPA decrease between 2007 and 2021 (Fig. 1). The lowest recorded volume (845,309 m$^3$) was during the 2018 baseline, whereas the highest was during the baseline survey in 2013 (883,098 m$^3$); see Fig. 1.
Topographic difference modelling between the May 2020 baseline and the May 2021 baseline suggests a gain of 14,870 m$^3$ (1.6%). The gain of material is primarily observed in patches towards the upper beach across the survey unit. Erosion is observed predominantly to the southeast of the survey unit with the largest loss of material occurring around profile 6e00350.

**Net sediment balance above MLWS** 14,870 m$^3$
**Net sediment change** 1.6%

Topographic difference modelling between the 2007 baseline and that of 2021 suggests a loss of 14,719 m$^3$ (1.5%). Considerable erosion is observed across the entire lower to mid beach face, with high level erosion occurring in pockets mid beach level. Accretion is observed on the back of the bar, attributable to over wash and vegetation growth.

**Net sediment balance above MLWS** -14,719 m$^3$
**Net sediment change** -1.5%

### Profile Analysis

**Spring – Spring**  
(11/03/2020 – 02/03/2021)
Analysis of 2020 Spring to 2021 Spring data indicates the westerly profiles have experienced accretion and the easterly profiles erosion. Profile 6e00350 saw a 13% decrease, equating to a 78 m$^2$ loss of material primarily across the lower beach face (Table 1). Profiles 6e00352 and 6e00354 lost 73.5 m$^2$ and 20.1 m$^2$ of material predominantly from the lower beach face (Table 1). Profiles 6e00356 and 6e00358 saw minimal change with minor gains of material on the leeward side of the crest and lower beach. Profile 6e00361 saw a 17% gain of material across the entire profile length (Table 1).

**Baseline - Spring**  
(17/04/2007 – 02/03/2021)
When comparing Spring data to that of the 2007 baseline all profiles, except 6e00356, have shown erosion. Profiles 6e00350 and 6e00361 have seen a 17% and 15% loss in cross-sectional area with material being lost from the entire profile length (Table 1). Profiles 6e00352, 6e00354 and 6e00358 have seen minimal loss in cross-sectional area, however there has been a considerable movement of material from the beach face, to beyond the upper crest of the barrier. The losses at profiles 6e00358 and 6e00361 could potentially be attributable to the work undertaken on the outfall. Profile 6e00356 has seen minimal gain in material (2.8 m$^2$) at the back of the beach crest (Table 1).

### Complete Data Comparison  
(2007 – 2021)
Profiles 6e00350 and 6e00352 recorded their lowest CSA value to date during the most recent Spring interim, whilst profile 6e00354 shows unhealthy levels in comparison to previous years and the remaining show healthy levels (Fig. 2). When comparing individual CSA values from the Spring 2021 interim to that of the entire dataset, the majority of profiles show steady erosion (Fig.3).

### Additional Comments
There has been significant improvement works to the outfall of Loe Bar, with a new temporary relief culvert being built while the tunnel is being repaired. This work will have a significant effect on sediment dynamics, affecting profiles 6e00358 and 6e00361 directly.
Table 1 - Cross-sectional area change in m² and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU4-4.

<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>11/03/2020 – 02/03/2021</td>
<td>17/04/2007 – 02/03/2021</td>
<td></td>
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<tr>
<td>6e00350</td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
</tr>
<tr>
<td></td>
<td>-78.0</td>
<td>-13</td>
<td>-111.9</td>
</tr>
<tr>
<td>6e00352</td>
<td>-73.5</td>
<td>-5</td>
<td>-95.9</td>
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<tr>
<td>6e00358</td>
<td>8.4</td>
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<td>-32.9</td>
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<tr>
<td>6e00361</td>
<td>43.8</td>
<td>17</td>
<td>-52.7</td>
</tr>
</tbody>
</table>

Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.
Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Actual Change ($m^2$) in Cross-sectional Area (Baseline 2007 to Spring 2021)

Survey Unit Boundary

6eSU4-4: Loe Bar - Beach Change

CISCAG: South Cornwall
Change in Elevation (m) Between May 2020 and May 2021

Model Extent

-3  -  -2
-1  -  -0.5
0  -  0.25
1  -  1.5
2  -  2.5
3  -  3

EROSION
NO CHANGE
ACCRETION

Aerial Photography from 2018

6eSU4-4: Loe Bar - Topographic Difference Model

CISCAG - Cornwall
Background

Porthleven Sands is a southwest facing, reflective gravel beach backed by a steep cliff face leading onto fields to the southeast and houses to the northwest and confined by Loe Bar and Porthleven town. The beach has a cross-shore distance of 80 m and longshore distance of 120 m with an average Spring tidal range of 4.7 m. Porthleven Sands, alongside survey units 6eSU4-3, 6eSU4-4 and 6eSU4-6 undergoes beach rotation dependant on the dominant wave (primary direction of south-westerly with a secondary direction of south-easterly).

Survey Unit Analysis

Analysis of the CPA suggests Porthleven Sands has undergone gradual erosion since the 2007 baseline, eroding at 7 m² y⁻¹ equivalent to a loss of 1.66% in combined area per year (Fig. 1). The lowest recorded combined area was during the 2018 Spring interim at 266 m² with the highest being recorded during the 2012 Autumn interim at 549 m² (Fig. 1). Despite the erosional trend, the 2021 Spring interim can be observed to have CPA values similar to the 2012 levels.

![Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU4-5, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.](image)
Profile Analysis

**Spring – Spring**
*(09/03/2020 – 01/03/2021)*

Unlike last year’s comparison, the survey unit has been dominated by accretion. Profiles 6e00378 and 6e00380 have gained 111 m$^2$ (62%) and 104.8 m$^2$ (147%) of material respectively across the entire length of the profile (Table 1). Profile 6e00385 gained 9.3 m$^2$ (14% gain in cross-sectional area) of material predominantly from the lower beach slope (Table 1).

**Baseline - Spring**
*(15/04/2007 – 01/03/2021)*

Unlike previous year on year analysis, accretion is dominant when comparing 2007 to 2021. Profiles 6e00378 and 6e00380 have seen a gain of 19% and 26% in cross-sectional area across the entire profile length (Table 1). Profile 6e00385 lost 20% (equating to a 19.1 m$^2$ loss in material) in cross sectional area across the entire profile length (Table 1).

**Complete Data Comparison**
*(2007 – 2021)*

Profiles 6e00378 and 6e00380 have recorded their highest CSA values to date during the most recent Spring interim, whilst profile 6e00385 shows healthy levels in comparison to previous years (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset, the majority of profiles show steady erosion (Fig. 3).

**Additional Comments**
N/A.

**Table 1 - Cross-sectional area change in m$^2$ and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU4-5.**

<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>09/03/2020 – 01/03/2021</td>
<td>15/04/2007 – 01/03/2021</td>
<td></td>
</tr>
<tr>
<td>CSA Diff (m$^2$)</td>
<td>% Change</td>
<td>CSA Diff (m$^2$)</td>
<td>% Change</td>
</tr>
<tr>
<td>6e00378</td>
<td>111.0</td>
<td>62</td>
<td>46.0</td>
</tr>
<tr>
<td>6e00380</td>
<td>104.8</td>
<td>147</td>
<td>36.8</td>
</tr>
<tr>
<td>6e00385</td>
<td>9.3</td>
<td>14</td>
<td>-19.1</td>
</tr>
</tbody>
</table>

[72x481]
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Actual Change (m²) in Cross-sectional Area (Spring 2020 to Spring 2021)

Survey Unit Boundary

Accretion  No Change  Erosion

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

Porthleven is a southwest facing, reflective gravel beach atop a rocky platform backed entirely by a sea wall which protects the town of Porthleven; the beach is confined to the southeast by Porthleven Sands and by a rocky platform and breakwater to the northwest. The beach has a cross-shore distance of ~80 m and longshore distance of ~120 m with an average Spring tidal range of 4.7 m.

Survey Unit Analysis

Analysis of the CPA suggests the beach has been undergoing gradual erosion since the 2007 baseline at a rate of $3.2 \text{ m}^3 \text{ y}^{-1}$, equivalent to a loss of 1.23% in average area per year (Fig. 1). The lowest combined area was recorded during the 2018 Spring interim, 201.5 m$^2$, while the highest was recorded during the 2011 Spring interim, 364 m$^2$ (Fig. 1).

![Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU4-6, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.](image-url)
Profile Analysis

**Spring – Spring**
(09/03/2020 – 01/03/2021)
Analysis of the 2020 Spring to 2021 Spring data suggests profile 6e00388 has seen a 1% loss in cross-sectional area equating to a loss of 0.7 m² primarily from the upper beach face (Table 1). In comparison profiles 6e00391 and 6e00394 saw a 38% (30.7 m²) and 45% (46.6 m²) increase in cross-sectional area respectively with accretion observed across the majority of the beach slope (Table 1).

**Baseline - Spring**
(31/07/2007 – 01/03/2021)
When comparing the Spring survey to that of the 2007 baseline, profile 6e00388 has seen minimal change. Profile 6e00391 has seen a 22% gain in cross-sectional area, with a loss of 20.2 m² from the entire beach face (Table 1). Profile 6e00394 has seen an 8% gain to cross-sectional area, equating to 11.6 m² of material being gained primarily from the upper beach face (Table 1).

**Complete Data Comparison**
(2007 – 2021)
All profiles show health cross-sectional area levels in comparison to previous years (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset, the profiles have shown steady accretion (Fig. 3).

**Additional Comments**
N/A.

Table 1 - Cross-sectional area change in m² and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU4-6.

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>09/03/2020 – 01/03/2021</th>
<th>% Change</th>
<th>Baseline to Spring</th>
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<td>20.2</td>
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<tr>
<td>6e00394</td>
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<td>45</td>
<td></td>
<td>11.6</td>
<td>8</td>
<td>-2.19</td>
<td></td>
</tr>
</tbody>
</table>
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Actual Change ($m^2$) in Cross-sectional Area (Spring 2020 to Spring 2021)

- Survey Unit Boundary

- Accretion
- Erosion
- No Change

6eSU4-6: Porthleven - Beach Change

CISCAG: South Cornwall
Actual Change ($m^2$) in Cross-sectional Area (Baseline 2007 to Spring 2021)

Survey Unit Boundary

- Accretion: > 30 m² (8%)
- No Change: 15 - 30 m² (22%)
- Erosion: < 5 m² (0%)

Aerial Photography from 2018
Background

Praa Sands is a southwest facing low tide bar-rip formation backed by a small glacial till cliff topped by a number of houses to the southeast, a small dune system at the centre and several sea defences to the northwest. The beach is confined by a hard rock headland to the northwest and southeast and has a cross-shore distance of ~150 m and longshore distance of ~1,700 m with an average Spring tidal range of 4.7 m.

Survey Unit Analysis

Analysis of the CPA suggests Praa Sands has undergone gradual erosion since the 2007 baseline at a rate of 13 m$^2$ y$^{-1}$, equivalent to a loss of 0.36% of the average area per year (Fig. 1). The largest loss of 1315 m$^2$ in combined area was observed between the 2013 Autumn interim and the 2014 Spring interim with the latter survey having the lowest recorded combined area (2769 m$^2$). The highest recorded combined area was during the 2011 Autumn interim (4203 m$^2$).

Repeat Baseline Analysis

Analysis of beach volume throughout the duration of the Programme has suggested a comparable trend to that of the CPA; where volume and CPA increase between 2007 and 2013, with a sharp decrease in 2014 after the 2013/14 winter storms (Fig. 1). The lowest recorded volume (323,550 m$^3$) was during the 2014 baseline, whereas the highest was during the baseline survey in 2013 (491,837 m$^3$); see Fig. 1.

Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU6-2, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021. Overlain, on the secondary axis, is beach volume (m$^3$) for 6eSU6-2 throughout the entire Programme time series.
Summer - Summer (25/05/2020 – 10/09/2021)
The topographic difference model between 2020 and 2021 baselines suggests a gain of 11,347 m³ (2.4%). There has been a significant erosion of material from the seaward extent of the beach whereas a significant accretion of material from the landward side of the beach across the entire survey unit. There is small erosion seen at the back of the beach between profiles 6e00517 and 6e00511.

Net sediment balance above MLWS 11,347 m³
Net sediment change 2.4%

Baseline - Summer (15/04/2007 – 10/09/2021)
The topographic difference model between the 2007 and 2021 baselines suggests significant accretion has occurred, with a gain of 14,879 m³ (4.1%). Unlike that observed in previous years, there has been significant gains in material across the entire survey unit, especially towards the middle of the unit. Small areas of erosion can be seen near profiles 6e0511, 6e00527 and between 6e00524 and 6e00521.

Net sediment balance above MLWS 14,879 m³
Net sediment change 4.1%

Profile Analysis

Spring – Spring (11/01/2020 – 16/01/2021)
Analysis of 2020 Spring to 2021 Spring data suggests all profiles have experienced accretion. Profiles 6e00511 to 6e00517 have seen a gain in cross-sectional area ranging from 5% to 11% with a movement of material from the lower beach to the upper beach face (Table 1). Profiles 6e00521 to 6e00536 also show a gain in cross-sectional area, ranging between 1% and 7% (Table 1), predominantly occurring towards the lower end of the beach.

Baseline - Spring (15/04/2007 – 16/01/2021)
When comparing the Spring survey to that of the 2007 baseline, there is a similar trend to that observed between the Spring to Spring analysis with movement of material from the upper beach face to the lower. All profiles, bar profile 6e00538, have undergone accretion. The north-westerly profiles from 6e00530 to 6e00536 have accreted by 15-28% with a movement of sediment from the upper beach face to the lower, widening the beach by up to 30-70 m (Table 1). Profile 6e00538 has seen a 1% loss in cross-sectional area with an erosion of material from the upper beach face (Table 1).

Complete Data Comparison (2007 – 2021)
All profiles show healthy cross-sectional area levels in comparison to previous years (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset, despite significant fluctuations, the majority of easterly profiles show steady erosion whilst the westerly profiles show steady accretion (Fig. 3).

Additional Comments N/A.
Table 1 - Cross-sectional area change in m² and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU6-2.

<table>
<thead>
<tr>
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<th>Spring to Spring</th>
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<td>11/01/2020 – 16/01/2021</td>
<td>15/04/2007 – 16/01/2021</td>
<td></td>
</tr>
<tr>
<td>CSA Diff (m²)</td>
<td>% Change</td>
<td>CSA Diff (m²)</td>
<td>% Change</td>
</tr>
<tr>
<td>6e00511</td>
<td>36.1</td>
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<td>6e00538</td>
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<td>0</td>
<td>-1.4</td>
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</table>

Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.
Figure 3a - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.

Figure 3b - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Actual Change ($m^2$) in Cross-sectional Area (Spring 2020 to Spring 2021)

Survey Unit Boundary

Accretion
Erosion
No Change

> 30 m$^2$
15 - 30 m$^2$
5 - 15 m$^2$
5 - 15 m$^2$
15 - 30 m$^2$
> 30 m$^2$

6eSU6-2: Praa Sands - Beach Change

CISCAG: South Cornwall

Aerial Photography from 2018
Change in Elevation (m) Between May 2020 and Sep 2021

- **ACCRETION**
  - > 0.5
- **EROSION**
  - < -0.5
- **NO CHANGE**
  - 0.5 ≤ |Elevation Change| ≤ 0.5

Model Extent

Aerial Photography from 2018
Profile Charts for Survey Unit 6eSU6-2

Profiles: 6e00532

Lizard Point to Land's End Annual Report 2021
Background

Perran Sands is a south facing low-tide terrace formation, backed by a small, eroding glacial till cliff and a ~80 m section of rock armour protecting the beach entrance and several properties. The beach is confined to the east and west by a rocky platform atop which lies the same glacial till formation. The beach has a cross-shore distance of 150 m and longshore distance of 940 m with an average Spring tidal range of 4.8 m.

Survey Unit Analysis

Analysis of the CPA suggests Perran Sands has remained relatively stable having eroded at 3.5 m² y⁻¹ since the 2007 baseline (Fig. 1). The largest loss of material was recorded between the 2013 Autumn interim and the 2014 Spring interim, having lost 300 m² (equivalent to a loss of 56% of the area), the latter survey also saw the lowest recorded combined area (388 m²); see Fig. 1. The highest recorded combined area was during the 2012 baseline; 750 m² (Fig. 1).

Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU8-2, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.
Profile Analysis

Spring – Spring
(09/03/2020 – 01/03/2021)
Analysis of 2019 Spring to 2020 Spring data suggests both profiles have undergone accretion. Profile 6e00645 saw a 1% gain in cross-sectional area equating to 1.9 m$^2$ being gained primarily from the low tide terrace and low tide mark, however, the beach narrowed by ~10 m (Table 1). Profile 6e00648 saw a 2% gain in cross-sectional area, equating to a gain of 4 m$^2$ primarily from the low-tide terrace (Table 1).

Baseline - Spring
(19/04/2007 – 01/03/2021)
When comparing the Spring survey to the 2007 baseline, both profiles have undergone accretion. Profile 6e00645 saw a 15% increase in cross-sectional area, equating to 38.3 m$^2$ being gained primarily across the low-tide terrace; despite this the upper beach face has lost ~0.5 m in height (Table 1). Profile 6e00648 saw a 5% increase in cross-sectional area; again primarily across the low-tide terrace with losses observed from the beach face (Table 1).

Complete Data Comparison
(2007 – 2021)
Profile 6e00645 shows healthy cross-sectional area levels in comparison to previous years whilst profile 6e00648 shows the opposite (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset, the profiles show a slight accretion (Fig. 3).

Table 1 - Cross-sectional area change in m$^2$ and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU8-2.

<table>
<thead>
<tr>
<th>Profile</th>
<th>CSA Diff (m$^2$)</th>
<th>% Change</th>
<th>CSA Diff (m$^2$)</th>
<th>% Change</th>
<th>Master Profile Level (m)</th>
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</thead>
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<tr>
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<td>09/03/2020 – 01/03/2021</td>
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<td>11.8</td>
<td>5</td>
<td>-2.25</td>
</tr>
</tbody>
</table>
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Background

Little London is a southeast facing beach backed by eroding superficial sand and gravel deposits and confined to the east by a rocky platform and to the west by a rocky platform and the breakwater connecting St Michael’s Mount. The beach has a cross-shore distance of ~170 m and longshore distance of 940 m with an average tidal range of 4.8 m.

Survey Unit Analysis

Analysis of the CPA suggests Little London has remained relatively stable having accreted at a rate of 2.2 m² y⁻¹, equating to 0.19% of the average CPA per year (Fig. 1). The highest recorded combined area was recorded on the 2020 Autumn interim; 1260 m², whereas the lowest recorded was during the 2014 Spring interim; 1101 m² (Fig. 1).

![Survey Unit 6eSU9-2 Combined Profile Area Chart](image)

**Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU9-2, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.**
Profile Analysis

Spring – Spring (11/01/2020 - 13/01/2021)
Analysis of 2020 Spring to 2021 Spring data indicates profile 6e00698 has seen a loss of 1% in cross-sectional area with material moving from the low tide terrace to the upper beach face (Table 1). Both profiles 6e00693 and 6e00709 have seen a 4% and 5% gain in cross-sectional area, equating to 9.3 m² and 31.3 m², gaining material across the low tide terrace and upper beach face (Table 1).

Baseline - Spring (17/07/2007 – 13/01/2021)
When comparing the Spring survey to the 2007 baseline, profile 6e00698 has seen a 5% loss in cross-sectional area, equating to the erosion of 14.5 m², primarily across the lower beach face (Table 1). Both profiles 6e00693 and 6e00709 saw a 14% and 2% gain in cross-sectional area respectively predominantly from the bottom half of the profile.

Complete Data Comparison (2007 – 2021)
All profiles show healthy cross-sectional area levels in comparison to previous years (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset, profile 6e00698 shows steady erosion whilst the remaining profiles show steady accretion (Fig. 3).

Additional Comments
N/A.

Table 1 - Cross-sectional area change in m² and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU9-2.

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<th>Profile</th>
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<td>6e00709</td>
<td>31.3</td>
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<td>14.4</td>
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</table>
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Actual Change (m²) in Cross-sectional Area (Spring 2020 to Spring 2021)

- 6e00709 (5%)
- 6e00693 (4%)
- 6e00698 (-1%)

Survey Unit Boundary

Accretion: 0 - 5 m²
Erosion: > 30 m²
No Change: 5 - 15 m², 15 - 30 m²

Aerial Photography from 2018
Actual Change (m$^2$) in Cross-sectional Area
(Baseline 2007 to Spring 2021)

Survey Unit Boundary

Accretion
No Change
Erosion

> 30 m$^2$  
15 - 30 m$^2$  
5 - 15 m$^2$  
5 - 15 m$^2$  
> 30 m$^2$  

6eSU9-2: Little London - Beach Change  
CISCAG: South Cornwall
Background

Marazion is a southwest facing low tide terrace formation, forming the eastern extent of Mount’s Bay, backed by a series of sea defences and a small dune system to the northwest. The beach is confined by St. Michael’s Mount to the southeast and by Mounts Bay beach to the northwest and has a cross-shore distance of 270 m and longshore distance of 860 m with an average Spring tidal range of 4.8 m.

Survey Unit Analysis

Analysis of the CPA suggests the beach has remained relatively stable, eroding at a rate of $2.8 \text{ m}^2 \text{ y}^{-1}$ (Fig. 1). The largest loss in combined area was observed between the 2013 Autumn interim and the 2014 Spring interim, having lost 88.8 m$^2$ (Fig. 1), equivalent to a 4% loss in area. The lowest recorded combined area was during the 2020 Autumn interim (2040 m$^2$) with the highest recorded during the 2018 Spring interim (2201 m$^2$); see Fig. 1.

Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU10-1, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.
Profile Analysis

**Spring – Spring**
(11/01/2020 - 13/01/2021)

Analysis of Spring to Spring surveys suggests profile 6e00734 saw a 1% loss in cross-sectional area, equating to the erosion of 2 m$^2$ almost entirely from directly below the sea wall and low tide terrace (Table 1). Profiles 6e00739 and 6e00743 saw a 2% gain in cross-sectional area, equating to the 11.7 m$^2$ and 9.3 m$^2$ of material respectively from the mid and lower beach (Table 1). Profile 6e00747 lost 0.51 m$^2$ of material being eroded primarily from the low tide terrace (Table 1), despite accretion occurring across the beach face.

**Baseline - Spring**
(18/04/2007 – 13/01/2021)

When comparing the Spring data to that of the 2007 baseline, profile 6e00739 saw the largest change, losing 6% in cross-sectional area, equating to the erosion of 37.9 m$^2$ from across the entire beach face (Table 1). Profile 6e00747 saw the largest comparative increase, accreting in cross-sectional area by 5%, equivalent to a 38.1 m$^2$ gain, primarily through the raising of the berm crest and lower beach face (Table 1).

**Complete Data Comparison**
(2007 – 2021)

The three most easterly profiles show unhealthy cross-sectional area levels in comparison to previous years, whilst profile 6e00747 shows healthy levels (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset, profile 6e00739 shows erosion whilst the remaining profiles show slight accretion (Fig. 3).

**Additional Comments**
N/A.

Table 1 - Cross-sectional area change in m$^2$ and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU10-1.

<table>
<thead>
<tr>
<th>Profile</th>
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<th>Baseline to Spring</th>
<th>Master Profile Level (m)</th>
</tr>
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<tbody>
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</table>
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
6eSU10-1: Marazion - Beach Change

Actual Change ($m^2$) in Cross-sectional Area (Spring 2020 to Spring 2021)

- 6e00747 (0%)
- 6e00743 (2%)
- 6e00739 (2%)
- 6e00734 (-1%)

Survey Unit Boundary

Aerial Photography from 2018

South West Regional Coastal Monitoring Programme

Annual Survey Report 2021

CISCAG: South Cornwall
**6eSU10-1: Marazion - Beach Change**

### Actual Change ($m^2$) in Cross-sectional Area (Baseline 2007 to Spring 2021)

- Survey Unit Boundary

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

**Areas of Actual Change**:

- **6e00747** (5%)
- **6e00739** (-6%)
- **6e00743** (3%)
- **6e00734** (1%)
Background

Mounts Bay is a large low-tide terrace formation facing southeast backed by a series of sea defences protecting the southwest rail line; the beach is confined to the southwest by Penzance Harbour breakwater and to the northeast by Marazion dunes. The beach has a cross-shore distance of ~200 m and a longshore distance of ~3,700 m with an average Spring tidal range of 4.8 m.

Survey Unit Analysis

Mounts Bay has a combined profile area accretion rate of 6.9 m² y⁻¹, equating to 0.12% of the average CPA per year (Fig. 1). The largest loss of combined area was between the 2013 Autumn interim and the 2014 Spring interim, having lost 377 m² (equivalent to a 6% loss in area), the latter survey saw the lowest recorded combined area (5524 m²); see figure 1. The highest recorded combined area was during the 2020 Spring interim survey (6003 m²; Fig. 1).

Figure 1 - The Combined Profile Area (CPA) for survey unit 6eSU10-2, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.
Profile Analysis

Spring – Spring
(11/01/2020 – 13/01/2021) Analysis of 2020 Spring to 2021 Spring data suggests the majority of profiles have either remained relatively stable, in both shape and cross-sectional area or have shown minor erosion. Profiles 6e00764 to 6e00776 showed a loss of 1-4% with material being lost from the beach face and low tide terrace (Table 1). Profiles 6e00802 to 6e00822 also showed erosion with a loss of 1-14% from the lower beach (Table 1). Profile 6e00751 saw an 8% gain in cross-sectional area with a large movement of material from the lower beach face to the upper (Table 1). Profiles 6e00756, 6e00760, 6e00780 and 6e00792 saw an increase in cross-sectional area, ranging from 2-5% with material gains observed across the low-tide terrace (Table 1).

Baseline - Spring
(15/04/2007 – 13/01/2021) When comparing the Spring survey to that of the 2007 baseline, nearly all profiles have undergone accretion. Profiles 6e00751 to 6e00764 saw a cross-sectional area gain of between 3% and 27%, with all displaying material accretion across the low tide terrace; with the location of the low-tide terrace having advanced by ~10 m for each profile (Table 1). The only profiles to have undergone erosion were 6e00784 and 6e00818, losing between 1% and 9% of cross-sectional area (Table 1). The highest observed increase in cross-sectional area was observed for profile 6e00751, accreting by 27% (76.2 m$^2$) with material gains across the entire profile (Table 1).

Complete Data Comparison
(2007 – 2021) Profiles 6e00751 and 6e00756 recorded their highest CSA value to date during the most recent Spring interim, whilst the majority of westerly profiles recorded healthy levels (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset, all profiles except 6e00818, show steady accretion (Fig. 3).

Additional Comments N/A.

Table 1 - Cross-sectional area change in m² and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU10-2.
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<td>-1</td>
<td>23.61</td>
<td>6</td>
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<tr>
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<td>29.22</td>
<td>15</td>
</tr>
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<td>6e00814</td>
<td>-5.07</td>
<td>-4</td>
<td>5.01</td>
<td>4</td>
</tr>
<tr>
<td>6e00818</td>
<td>-13.85</td>
<td>-14</td>
<td>-8.17</td>
<td>-9</td>
</tr>
<tr>
<td>6e00822</td>
<td>-3.7</td>
<td>-9</td>
<td>3.74</td>
<td>12</td>
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</table>

**Figure 2** - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.
Figure 3a - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.

Figure 3b - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Figure 3c - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.

Figure 3d - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
Actual Change (m$^2$) in Cross-sectional Area (Spring 2020 to Spring 2021)

Survey Unit Boundary

Accretion | No Change | Erosion
---|---|---
> 30 m$^2$ | 15 - 30 m$^2$ | < 5 m$^2$
5 - 15 m$^2$ | 5 - 15 m$^2$ | 5 - 15 m$^2$
> 30 m$^2$ | > 30 m$^2$ | > 30 m$^2$

6eSU10-2: Mounts Bay - Beach Change

CISCAG: South Cornwall
Actual Change (m²) in Cross-sectional Area (Baseline 2007 to Spring 2021)

Survey Unit Boundary

Accretion  No Change  Erosion

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

Aerial Photography from 2018
Profile Charts for Survey Unit 6eSU10-2

Profiles: 6e00818

Lizard Point to Land's End Annual Report 2021

Profile Envelope

Master Profile

2021-01-13

2020-01-11

2007-04-15
Background

Newlyn is a southeast facing low tide terrace formation restricted to the rear by numerous sea walls, protecting infrastructure and housing, the beach is confined to the northeast by a rocky outcrop atop of which is a bathing Lido and to the southwest by the Newlyn harbour breakwater. The beach has a cross-shore distance of ~50 m and a longshore distance of ~1,370 m with an average tidal range of 4.8 m.

Survey Unit Analysis

Analysis of the CPA for Newlyn suggests the beach has remained relatively stable, accreting at 1 m$^2$ y$^{-1}$ since the 2007 baseline, equating to 0.13% of the average CPA per year (Fig. 1). The lowest recorded combined area was during the 2016 Spring interim; 743.7 m$^2$, while the highest was recorded during the 2017 baseline; 825 m$^2$ (Fig. 1).

![Survey Unit 6eSU11 Combined Profile Area Chart](image)

**Figure 1** - The Combined Profile Area (CPA) for survey unit 6eSU11, including every Spring (red), summer (yellow) and Autumn (green) survey completed between 2007 and 2021.
Profile Analysis

**Spring – Spring**

(09/01/2020 – 16/01/2021)

Analysis of 2020 Spring to 2021 Spring data suggested the majority of profiles have remained stable, changing little in cross-sectional area or morphology. Profile 6e00861 is the only exception to the above statement, having accreted by 16.5 m$^2$, equating to a 14% gain in cross-sectional area, primarily from the upper beach face, directly beneath the sea wall (Table 1).

**Baseline - Spring**

(19/04/2007 – 16/01/2021)

When comparing the Spring survey to that of the 2007 baseline, profile 6e00852 has seen a gain of 9% in cross-sectional area equating to 4.3 m$^2$ in material accreted predominantly across the mid beach (Table 1). The remaining profiles all experienced accretion, gaining between 1% and 5% in cross-section area (equating to 1.2 m$^2$ and 5.7 m$^2$) along the lower end of the profile (Table 1).

**Complete Data Comparison**

(2007 – 2021)

Profiles 6e00859 and 6e00865 recorded their highest CSA value to date during the most recent Spring interim (Fig. 2). Profiles 6e00868 and 6e00874 recorded healthy levels and the remaining unhealthy levels in comparison to previous years (Fig. 2). When comparing individual CSA values from the 2021 Spring interim to that of the entire dataset, the profiles show accretion (Fig. 3a).

**Additional Comments**

Profile 6e00852 was not surveyed during the 2020 Spring interim due to construction works.

Table 1 - Cross-sectional area change in m$^2$ and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU11.

<table>
<thead>
<tr>
<th>Profile</th>
<th>Spring to Spring</th>
<th>Baseline to Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>09/01/2020 – 16/01/2021</td>
<td>19/04/2007 – 16/01/2021</td>
</tr>
<tr>
<td>CSA Diff (m$^2$)</td>
<td>% Change</td>
<td>CSA Diff (m$^2$)</td>
</tr>
<tr>
<td>6e00852</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>6e00859</td>
<td>16.6</td>
<td>14</td>
</tr>
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<td>6e00861</td>
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<td>1</td>
</tr>
<tr>
<td>6e00868</td>
<td>-3.6</td>
<td>-2</td>
</tr>
<tr>
<td>6e00874</td>
<td>1.8</td>
<td>3</td>
</tr>
</tbody>
</table>

*Table 1: Cross-sectional area change in m$^2$ and percentage comparing Spring to Spring and baseline to Spring analysis for all profiles in survey unit 6eSU11.*
Figure 2 - Cross-sectional area of each interim profile, comparing the current area of the profile (green dot), with the maximum and minimum values (red error bar) recorded between 2007 and 2021.

Figure 3 - Cross-sectional area of each interim profile, comparing the values recorded during each interim and baseline survey between 2007 and 2021.
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Annual Survey Report 2021

6eSU11: Newlyn - Beach Change

Actual Change (m^2) in Cross-sectional Area (Spring 2020 to Spring 2021)

Survey Unit Boundary

Accretion
No Change
Erosion

> 30 m^2
15 - 30 m^2
5 - 15 m^2
5 - 15 m^2
15 - 30 m^2
> 30 m^2

6e00874 (3%)
6e00865 (1%)
6e00852 (0%)
6e00868 (-2%)
6e00861 (-7%)
6e00859 (14%)

Aerial Photography from 2018

CISCAG: South Cornwall
Actual Change (m²) in Cross-sectional Area (Baseline 2007 to Spring 2021)

- No Change
- Accretion
- Erosion

Survey Unit Boundary

Aerial Photography from 2018

Survey Unit Boundary

No Change
Accretion
Erosion

6eSU11: Newlyn - Beach Change
CISCAG: South Cornwall

0 325 650

PLIMOUTH COASTAL OBSERVATORY

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