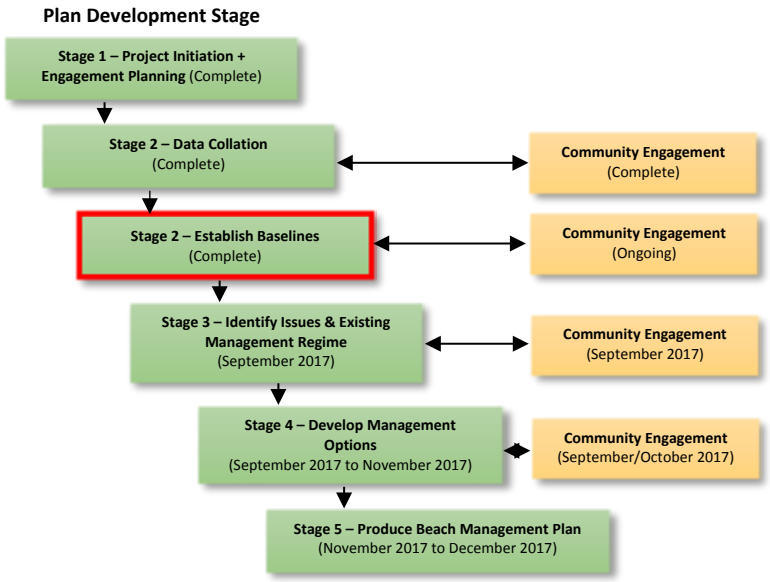
Seaton Beach Management Plan (BMP)
Non–Technical Summary – Coastal Processes Baseline

Background

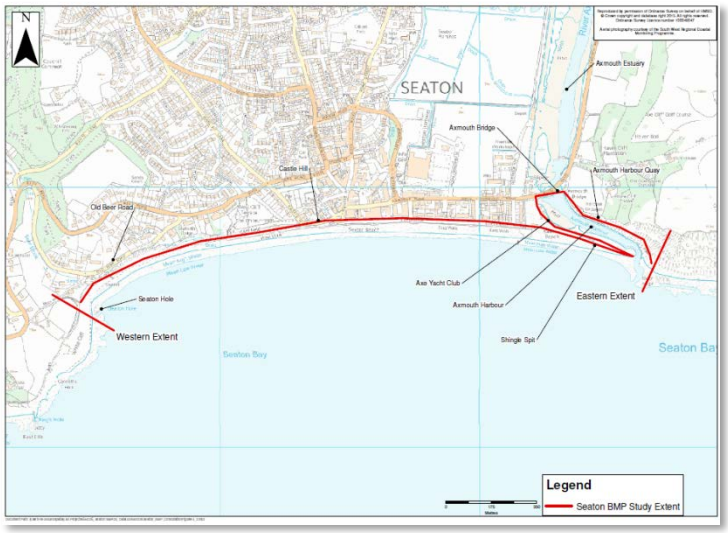
East Devon District Council, working in partnership with the Environment Agency, are developing a Beach Management Plan (BMP) for Seaton, from Seaton Hole in the west to Harbour Wall on the East side of the River Axe and the Axe River up to the Axe Bridge.

In support of the BMP development, four baseline studies have been completed; this non-technical summary covers the: **Coastal Processes Baseline**.



Purpose of the Coastal Processes Baseline Report

The report provides details of the coastal processes operating along the Seaton coastline and beyond, and aims to address key issues relating to flood and coastal erosion risk, including sediment linkages, fluctuating beach levels and dredging/disposal within the Axe Harbour. The report has been prepared to make use of available existing literature and data and some new analysis of beach profile data.



What the Coastal Processes Baseline Includes

- An overview of the physical setting of the BMP study area, including;
    - a description of the geology of the coastline and how it has changed over the Holocene to form the coastline present today;
    - Contemporary hydrodynamic influences on the shoreline; and
    - The sedimentary regime operating along the coastline.
- Detailed shoreline appraisal of the BMP study area, including the coastline at Beer, Seaton Hole, West Seaton to Seaton Spit, the Axe Estuary and Haven Cliffs.
- A review of existing beach monitoring reports and new analysis of the data, including post-storm analysis.
- A review of the dredging practices and disposal of dredge material within Seaton Spit.
- A review of projections of future change.
- Summary of key flood and coastal erosion issues, currently uncertainties in understanding and recommendations for future work.

Geological Setting

At a large scale, the BMP coastline is controlled by the geology and geomorphology features. Varying geology laid down over time, major geological earth movements and subsequent changes in sea level have given rise to differential erosion

and the emergence of a series of headlands and bays. To the west, this is by the more resistant sandstone, limestone and chalk deposits that make up Beer Head and White Cliff, east of there, the less resistant mudstone cliffs between Seaton Hole and West Seaton, to the centre, the low-lying Axe Valley and to the east, the Axe Estuary and Haven Cliffs.

The beach is defined by a gravel/shingle barrier and sandy substrate that extends virtually along the entire length of the BMP study area. The barrier is thought to be derived predominately from Holocene deposits transported onshore as sea levels rose, added to over the years with material derived from erosion of the cliffs to the west and east.

Waves and Storms and Impact on the Shoreline

Wave data for Seaton indicate that the predominant wave direction is from the south and south-south-west, with less frequent waves approaching from the south and south-south-east. The wave climate directly influences sediment transport along the coast, so that sediment transport is predominantly from west to east. During storms, the beach is particularly dynamic, when the gravel/shingle ridge can be pushed up the beach; or drawn-down to the nearshore/offshore. It is thought that the behaviour of the beach can depend on its geographical location within Seaton Bay.

Sediment Linkages with Beer

A sediment pathway is understood to exist between Beer and Seaton, with the rock platforms facilitating that movement. It is evident from aerial photography and LiDAR that sediment has built -up in the lee of the groyne, and given the above, it is possible that that material would have otherwise been transported eastwards. The extent to which this has impacted on the overall sediment budget to the east at Seaton Hole and Seaton remains unclear.

Fluctuating Beach Levels

Significant beach depletion occurred during the 1989/1990, 1992 and 1993 storms. The beach between Seaton Hole and Seaton has since built back-up again and over the period 2007 to 2017 (period covered by beach monitoring data).

At Seaton Hole, beach profile data suggests that the beach is accreting, however, this conclusion needs to be treated with caution since there are potential errors in the data. Beach levels there will determine the extent to which the cliff toe is exposed to marine erosion, however, cliff erosion from the top down is dependent on weathering processes. To the east, the beach is generally stable, however, in places, it is very dynamic and the beach volume fluctuates above MLWS over time. In front of the seawall, beach levels fluctuate, particularly along the Check House Seawall/West Walk Promenade, and along the western and central sections of the seawall/esplanade, but are not observed to reach the height of the seawall. This is the opposite to the east, where beach levels fluctuate and reach the height of the esplanade.

Dredging Operations and Influence on the Shoreline

Ongoing dredging over the years prevents siltation of the harbour, but disposal of the dredge material within trenches dug into the spit and beach have changed the composition of the beach and is likely to have affected its permeability, potentially increasing the rate of erosion and potentially threatening the ability of the spit to respond naturally to storms. The distal end of the spit has experienced significant cut-back in the past, particularly between November 2016 and February 2017, and although made some recovery, the upper beach is defined by steep cliff face and compacted interstitial sand and silts are exposed on the foreshore.

Recommendations for Further Work

Uncertainties relating to beach change could be clarified with improved monitoring data and expanding the current monitoring programme to include Beer.