

The future evolution of Hurst Spit: An independent Expert Panel's assessment, should beach management be withdrawn

Please note that the Strategy will not be based upon outputs of this piece of work alone but will be combined with input from local expertise as well as further analysis to support any decisions made. The predictions and opinion presented in this report do not reflect the position of the strategy team, which is still to be determined.

1. Introduction

The Hurst Spit to Lymington Flood and Coastal Erosion Risk Management (FCERM) Strategy is seeking to identify a sustainable future for the coastal frontage between Hurst Spit and Lymington with consideration of climate change, habitats, wildlife, recreation, tourism and deteriorating coastal defences.

The first step in developing a strategy of this kind is to understand the need for change and to demonstrate why the current status quo is not sustainable in the long term. One of the ways this can be achieved is to assess the impacts of doing no further works to manage coastal risk. This is known as the Do-Nothing scenario. Through analysing historic records, it is anticipated that if the Do-Nothing scenario was applied to this stretch of coastline the following changes would be experienced:

- The frequency and magnitude of flood events to increase with time.
- A deterioration and potential failure of coastal defences in the future.
- A decline in the condition of the valued habitats supporting a diverse range of wildlife.

A Do-Nothing scenario would also need to consider the implications of stopping the ongoing beach management work on Hurst Spit that is currently undertaken by New Forest District Council. However, there remains an uncertainty of how Hurst Spit would evolve if beach management was withdrawn. This led to the formation of the expert panel to assess this matter further.

Why an expert panel for Hurst Spit?

Given the uncertainty and differing views associated with coastal processes, the strategy team convened an independent panel of expert coastal geomorphologists to interpret existing data and provide predictions for the following question:

“What is the range and most likely future development of Hurst Spit over the next 10, 50 and 100 years if maintenance and recycling are withdrawn now, and what impacts could this have on the wider Western Solent coasts?”

The panel consisted of six members with complementary backgrounds and expertise in studying barrier beaches similar to Hurst Spit. The experts came from academia and consultancy sectors to provide a balance of theoretical and practical considerations.

2. Terminology

Throughout the panel discussion several features were identified to support the discussions and the future changes to Hurst Spit. These features are shown in Figure 1. A glossary is provided below, defining key terms used throughout.

There is a high level of uncertainty associated with predicting natural change along the Hurst Spit coastline. This report therefore offers a structured way of assessing the likelihood of future change at Hurst Spit by use of an uncertainty table, (see Table 2-1) which is based on Kesselman’s List of Estimative Words describing quantified uncertainty.

Table 2-1: List of Estimative Words (Adapted from Kesselman, 2008)¹

Term	Likelihood of outcome
Certainty	100%
Almost Certain	86-99%
Highly Likely	71-85%
Likely	56-70%
About as likely as not	46-55%
Unlikely	31-45%
Highly Unlikely	16-30%
Remote	1-15%
Impossibility	0%

Note: Descriptive terms are outlined in bold text in next section



Figure 1: Key features of Hurst Spit and surrounding area

Some technical terms are required to describe future change on Hurst Spit, which have been defined below:

Table 2-2: Key technical terms used in this summary

Term	Definition
Accretion	Deposition of sediment at the coastline, by waves and tides. Accretion results in beaches increasing in height and width over time.
Barrier beach or barrier	Narrow, elongated beaches situated parallel to the coastline, providing calmer waters behind.
Breach	A lowering of the height of the barrier such that the barrier is submerged below the water at certain states of the tide. Results in a segmented barrier at certain states of the tide.
Erosion	Loss of sediment from the coastline through wave action. Erosion results in beaches narrowing and reducing height with time.

¹ Kesselman, R.F.2008. Verbal Probability Expressions in National Intelligence Estimates: A comprehensive analysis of trends from the fifties through Post 9/11, Department of Intelligence Studies, Mercyhurst College, Erie, Pennsylvania.

Term	Definition
Overwashing	Flow of water and sediment over the barrier beach during storm events, resulting in beach material being deposited on the landward side of the barrier (contributing to rollback).
Rollback	Landward movement of the barrier through time (as a result of over washing).

3. Outcomes

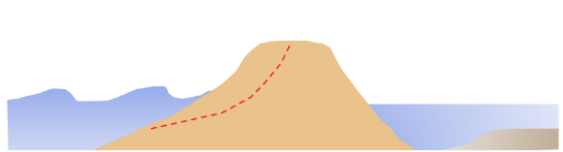

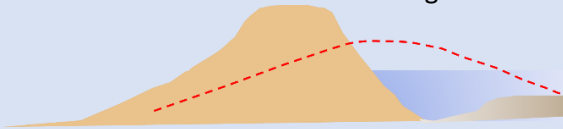
The panel have interpreted existing data and assessed the likelihood of a range of potential outcomes of the Do-Nothing scenario.

The outcomes are developed on a series of assumptions including a 1.0m increase in sea level over the next 100 years and a typical distribution of storm events within this time period. If sea level rise or storm frequency increases, the changes described here are likely to happen more quickly.

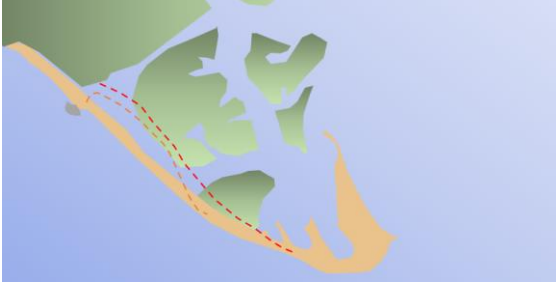
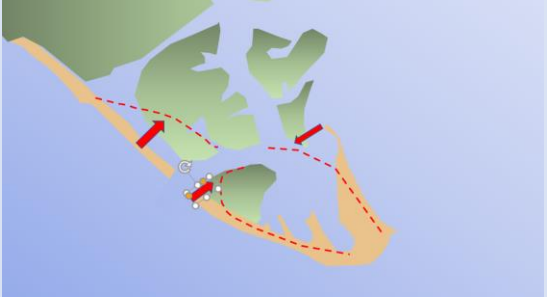

The key outcomes have been summarised in Table 3-1. For each scenario a drawing has been provided to help illustrate each of the predicted changes. **However, they are for illustration purposes only and do not form part of the predictions of future change.**

Non - Technical Summary


Table 3-1: Key impacts of Do-Nothing

No	Potential impact of Do-Nothing	Certainty of impact being realised
1	<p>Narrowing due to erosion of barrier from the seaward side</p> 	<p>This is almost certain to occur over the next 10 years if beach management is withdrawn. Erosion and narrowing of the barrier will increase the likelihood of the barrier rolling back (Scenario 2 below).</p>
2	<p>Over washing and roll-back of the position of the barrier</p> 	<p>This is likely to occur over the next 10 years. If rollback does occur it would likely be in the order of 20 to 50m. The barrier is almost certain to have rolled back by 50 to 100m in 50 years time and in excess of 100m in 100 years time. While the main barrier would rollback it is anticipated that the western extent would remain connected with the Castle headland. When rollback does occur, it is almost certain to infill Mounts Lake and affect the drainage out of Danes Stream.</p>
3	<p>Continuous barrier above normal high tides</p> 	<p>It is highly likely that, despite scenario 1 and 2 above, that the barrier will remain as a continuous barrier above normal tides for the next 10 years, meaning it is accessible during normal conditions. Scenario 1 and 2 will result in a lower crest level than the presently managed crest, that will be wider, with a more shallowly graded seaward slope. However, it is likely that as a result of a storm event, there may be temporary periods where the spit lowers below normal high tides as a result of a storm event. This would only be temporary and would recover during calmer periods of weather.</p> <p>Over the next 50 years, it is likely that the barrier will remain as a continuous barrier, although it is almost certain that there will be periods where access is lost as a result of storm events. The certainty of a continuous barrier over the 50 to 100 year period reduces to about as likely as not, due to the uncertainty surrounding impacts of sea level rise and sediment availability.</p>

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<p>4</p>	<p>Rollback leading to the barrier disconnecting from the Breakwater (at Saltgrass Lane)</p> 	<p>Over the next 10 years it is highly unlikely that the barrier will disconnect from the Breakwater, as the rock structures form an anchor point to the spit. Over the next 50 years, it is highly likely that the barrier will disconnect from the Breakwater due to the shoreline reorientation required to accommodate a 50 to 100m rollback distance (suggested in Scenario 2).</p>
<p>5</p>	<p>Permanent breach in the main part of the barrier, leaving the barrier impassable during all states of the tide</p> 	<p>Over the next 10 years, it is highly unlikely that any crest lowering will develop into a permanent breach that will remain open. Over the next 50 years, the likelihood increases, but still remains unlikely. Over the next 100 years it is about as likely as not that a permanent breach will form. If a breach does form, it is most likely to occur where Mounts Lake comes away from the barrier.</p>
<p>6</p>	<p>Permanent breach of the barrier immediately west of the Castle leading to Hurst Castle being left on an island</p> 	<p>There is a remote chance of a permanent breach forming to the west of the Castle over the next 10 years. This is because the eastern half of the barrier is typically more stable. Over the next 50 years, it is highly unlikely that a permanent breach will form. Over the next 100 years it remains unlikely that a breach will form to the west of the castle. The reduction in certainty over time is related to the uncertainty associated with impacts from climate change and sea level rise.</p>

Non - Technical Summary

<p>7</p>	<p>Extension of North Point in a north westerly direction</p>  A map showing a coastal area with green land and blue water. A yellow/orange line indicates the extension of North Point in a north westerly direction. A red and white striped buoy is visible in the water.	<p>It is very likely that North Point will accrete if beach management is stopped. This will lead to North Point extending further in a north westerly direction.</p> <p>It is about as likely as not that North Point will continue to accrete over the 10 to 50 year period due to a decrease in material being transported to North Point.</p>
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4. Summary

An independent expert panel was convened to provide predictions on the potential changes of Hurst Spit if beach management is stopped. The panel have assessed the likelihood of a range of potential impacts of the Do-Nothing scenario over the next 100 years. A high-level summary of the most likely impacts is provided below.

The barrier is **almost certain** to initially erode and narrow, as a response to storm conditions. This is **almost certain** to lead to over wash and barrier rollback over time. The rolled back barrier is **almost certain** to be more shallowly sloping, with a lower and wider crest than the present-day managed barrier. Further temporary over washing and crest lowering (below high tide) during storm conditions is **almost certain**, that will result in the barrier becoming impassable. However, it is **unlikely** that this will develop into a permanent tidal breach as it is **likely** to build back up during calmer periods of weather. If a breach does occur, it is most likely to occur towards the middle, where the Mount Lake Channel travels north.

5. Next steps

The Strategy team will use the outcomes of the expert panel discussion, along with local expertise and further data analysis to establish the Do-Nothing scenario for Hurst Spit. While this report describes the expert panels' predicted changes in Hurst Spit over the next 50 years, it does not assess the implications of the predicted changes on the people, property and environment. This will be a key next step in the development of the strategy undertaken by the strategy team. In addition, the expert panel recommended additional work to support the outcomes of this report, including supplementary wave modelling to assess the impacts of the predictions on flood risk and further data collection and analysis of the volumetric change of the spit.

The predictions and opinion presented in this report do not reflect the position of the strategy team, which are still to be determined.