

# Barrier beaches

Andy Owen

# Barrier beaches

- ▶ Barrier beaches are strips of land that are parallel to the shore - separated from the main coastline by a shallow lagoon of water.
- ▶ Some barrier beaches are joined to the main coastline, others are islands. Those joined at one end are termed **spits**. If joined at both ends they are termed **tombolos**.
- ▶ Barrier beaches are depositional features - formed of sands or gravels. The beach facing the ocean is a high energy environment. The lagoon behind the barrier is a low energy environment



**Figure 1** Loe Bar, Cornwall

# Dynamic equilibrium

Barrier beaches are in a state of **dynamic equilibrium** - changing constantly in relation to the tides and waves.

<https://earthobservatory.nasa.gov/world-of-change/CapeCod>

This page of the Earth Observatory NASA website contains satellite images of Cape Cod, USA, taken over 36 years. They clearly show how this dynamic coastal environment has changed over the years.

Figure 2 Cape Cod, Atlantic Coast, USA

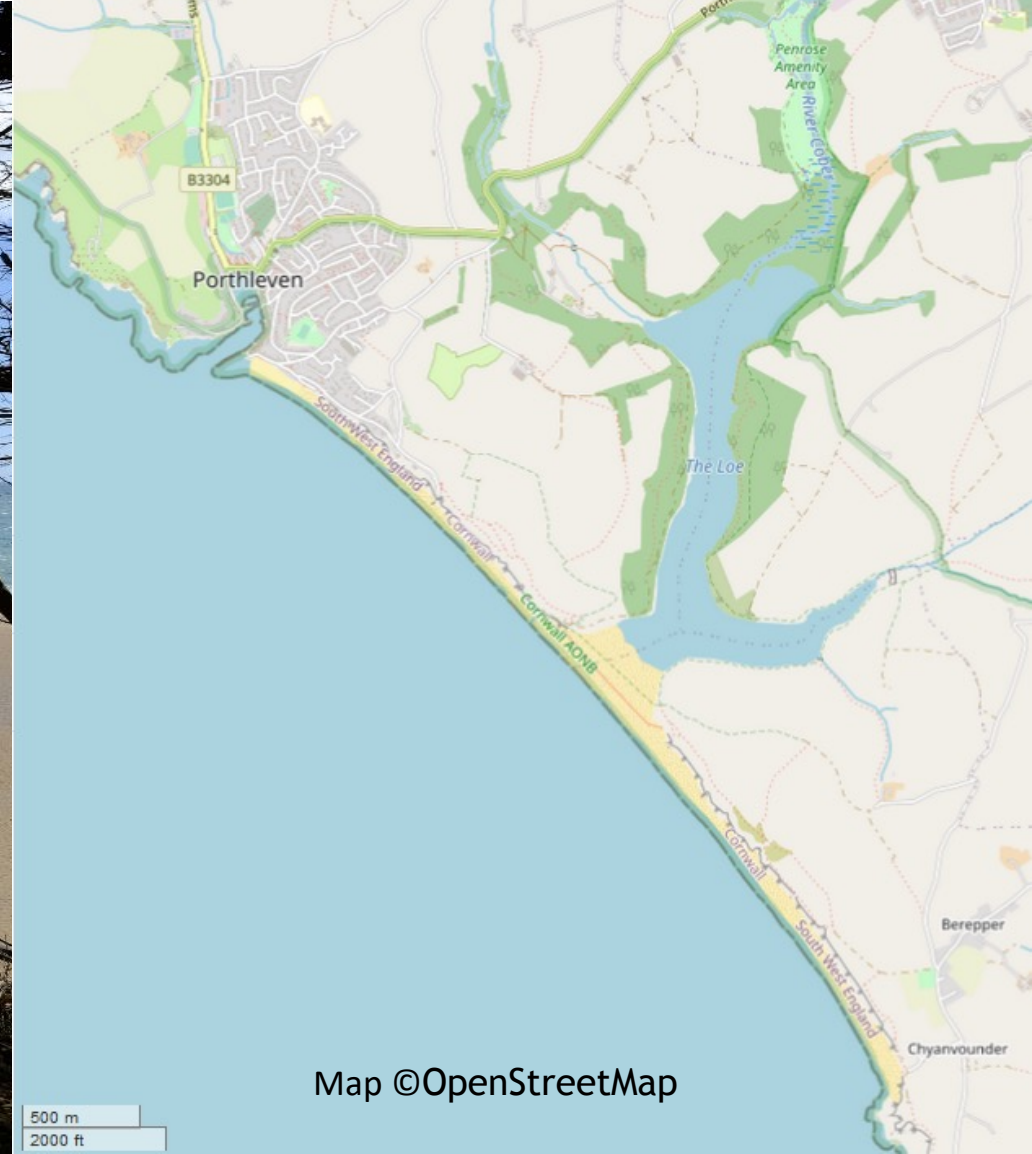


# Loe Bar, Cornwall

Figure 3 Photo of Loe Bar looking southeast



Figure 4 Map of Cornish coast showing Loe Bar



Map ©OpenStreetMap

500 m  
2000 ft

# How was Loe Bar formed?

- ▶ Loe Bar is a small scale example of a barrier beach. It is a shingle ridge which separates Loe Pool from the sea on the south coast of Cornwall.
- ▶ The ridge is composed predominantly of flints. These do not originate locally. The cliffs on either side of the shingle ridge are schist - a metamorphic rock.
- ▶ The most likely explanation for the formation of Loe Bar is that the shingle ridge originated as an offshore bar when sea levels were lower in the Ice Age.
- ▶ At the end of the Ice Age, as sea levels rose, the flints in the offshore bar were driven onshore and deposited as a beach by spilling and surging breakers. The position of this ridge migrated inland as sea levels rose.
- ▶ The larger barrier beaches at Slapton Ley and Chesil would have been formed in a similar way.
- ▶ As such, Loe Bar is a relict feature - formed by past processes and only modified by current processes.

# The barrier beaches of North Norfolk

- ▶ The most significant barrier beaches in the UK occur on the North Norfolk coast.
- ▶ Scolt Head Island and Blakeney Point are examples of barrier beaches.
- ▶ Like Loe Bar, these features were formed when sea levels rose after the Ice Age.

**Figure 5** Map of the North Norfolk coast. The extent of the barrier coast is outlined in the green box.

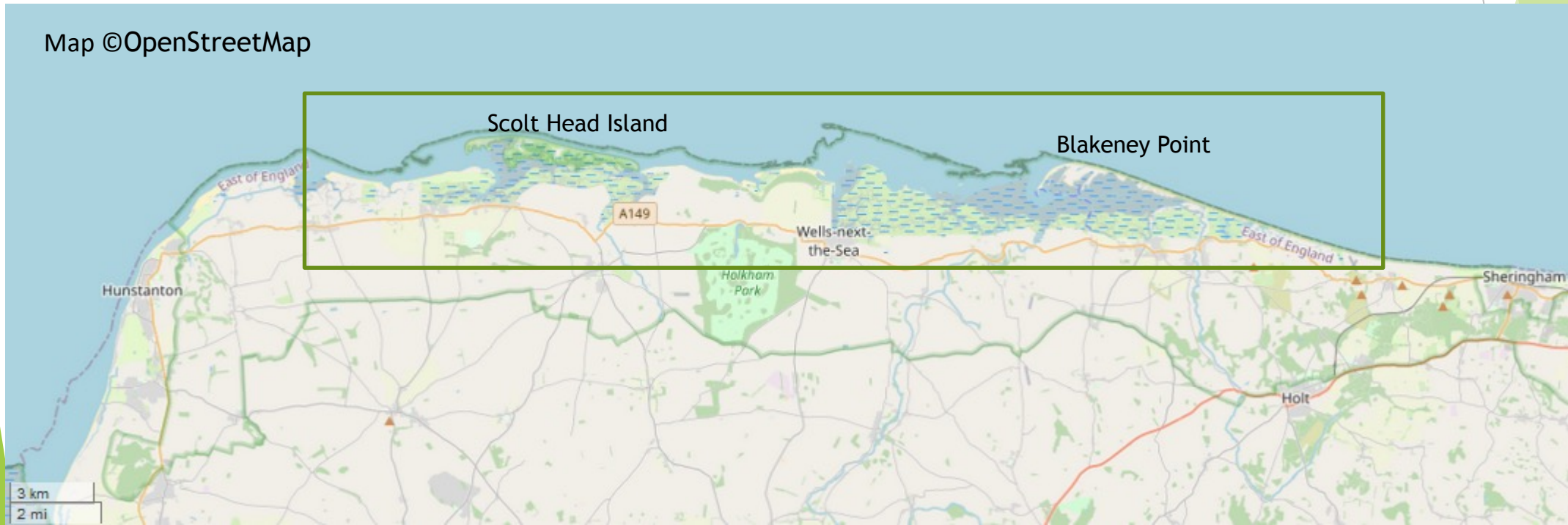


Figure 6 Photo of North Norfolk barrier coast at Burnham Overy Staithe

The area behind the barrier beach is a low energy environment of salt marsh and tidal creeks

The barrier beach at Scolt Head is formed by a long, low pebble ridge.



# North Norfolk - about 18,000 years ago

- ▶ About 22,000 years ago, an ice sheet in what is now the North Sea basin reached the current coastline of North Norfolk.

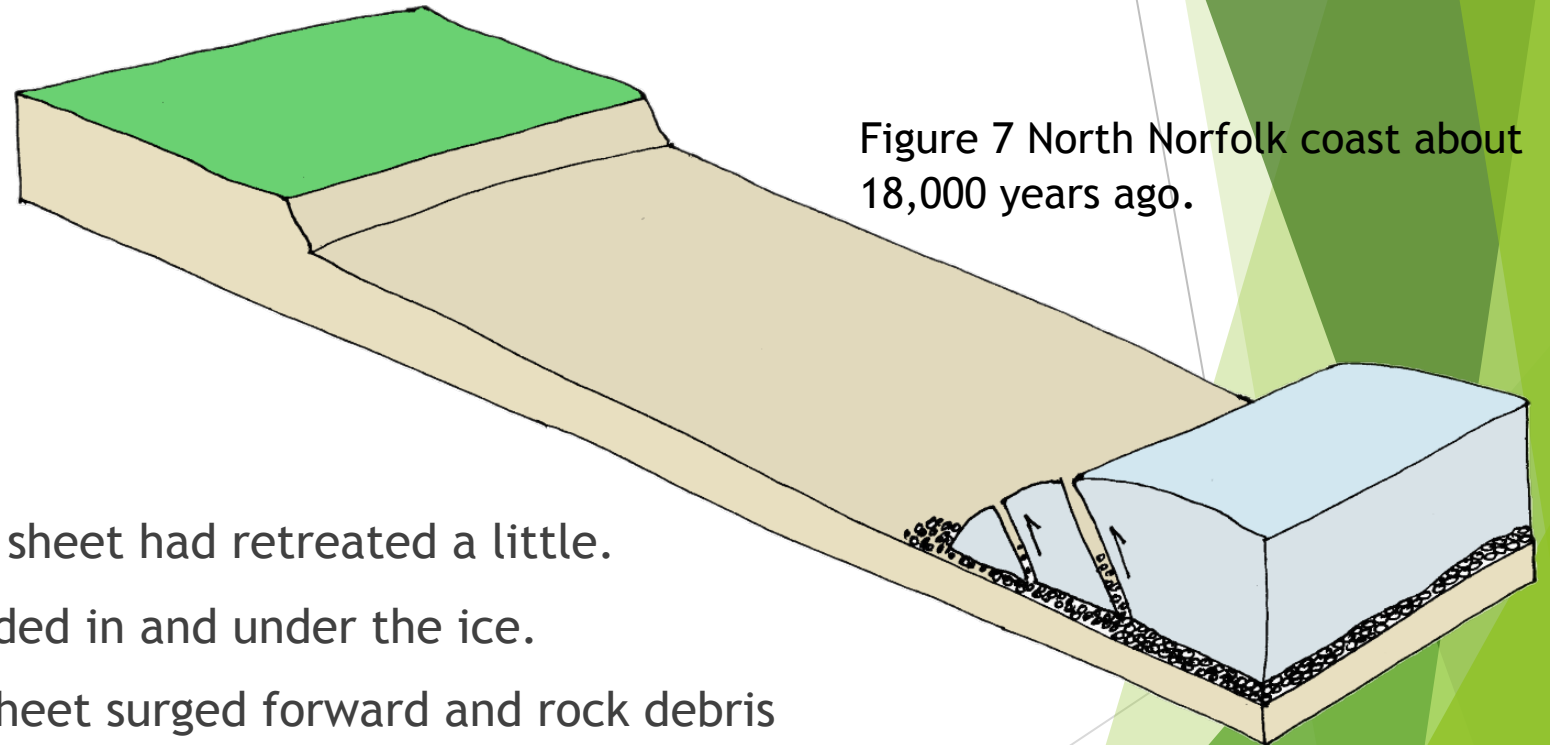


Figure 7 North Norfolk coast about 18,000 years ago.

- ▶ About 18,000 years ago, the ice sheet had retreated a little.
- ▶ Rock debris had become embedded in and under the ice.
- ▶ During colder episodes the ice sheet surged forward and rock debris was thrust up into the snout of the ice sheet.
- ▶ When the ice melted, this rock debris was deposited in a location that is offshore of the current North Norfolk coast.



# North Norfolk - about 12,000-7,000 years ago

- ▶ Sea levels steadily rose during the Flandrian Transgression.

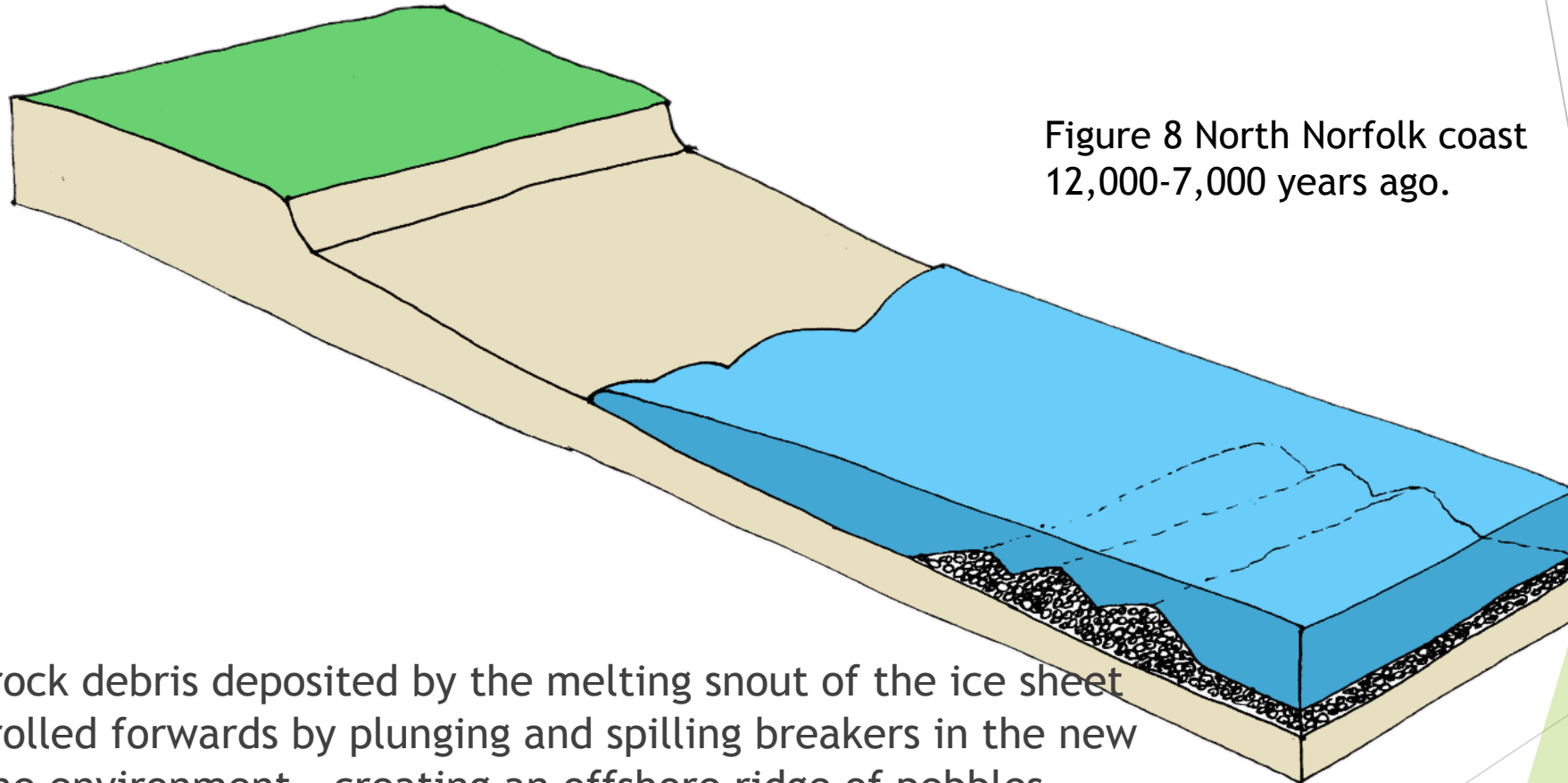


Figure 8 North Norfolk coast  
12,000-7,000 years ago.

- ▶ The rock debris deposited by the melting snout of the ice sheet was rolled forwards by plunging and spilling breakers in the new marine environment - creating an offshore ridge of pebbles.

# North Norfolk Today

- ▶ The barrier coast today is formed by a broken pebble ridge about 45 km long.
- ▶ The pebble ridge is roughly parallel to the coastline and lies between 1 km and 2.5 km to the north. It is separated from the coastline by a shallow lagoon and salt marsh.

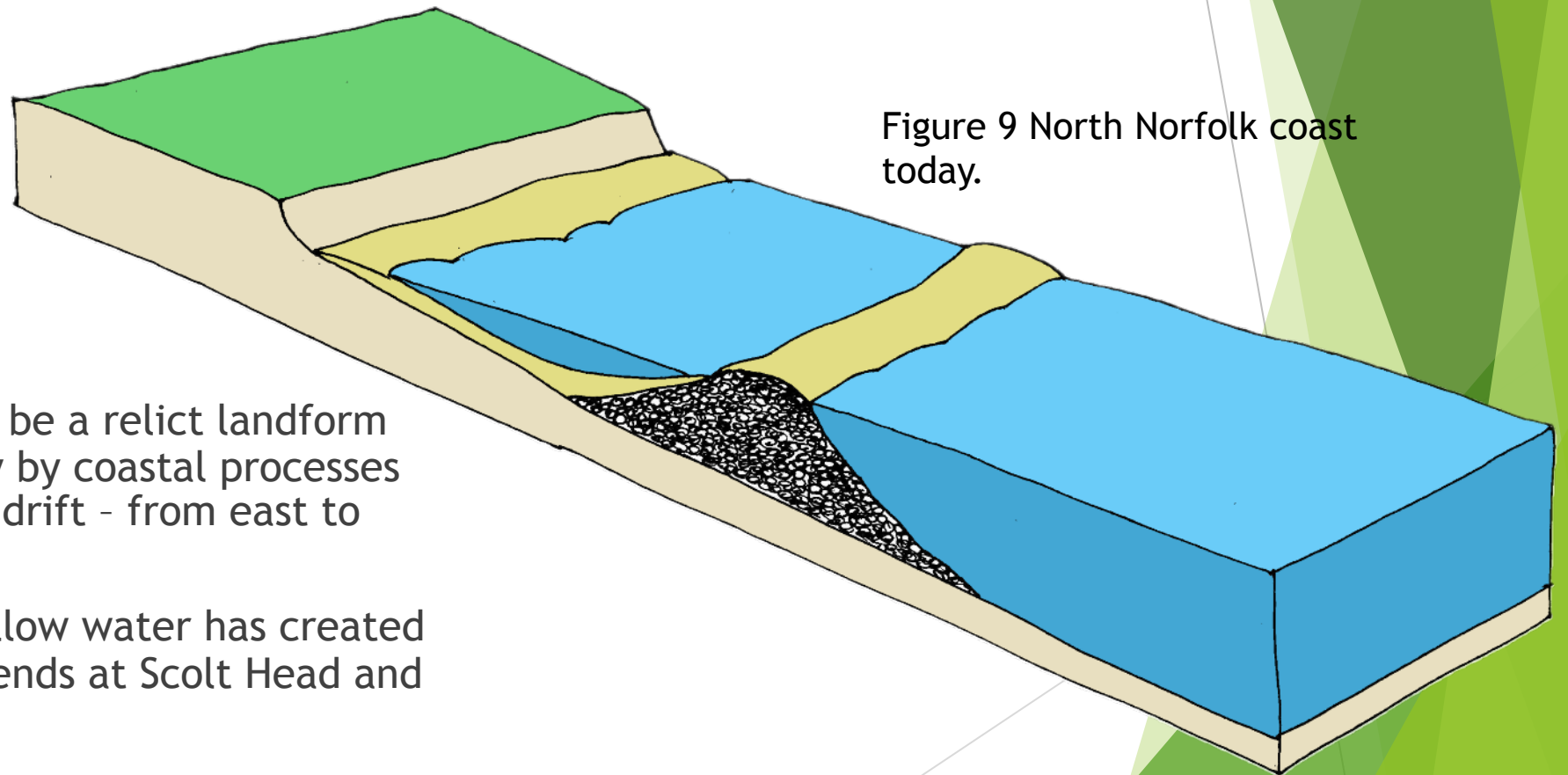
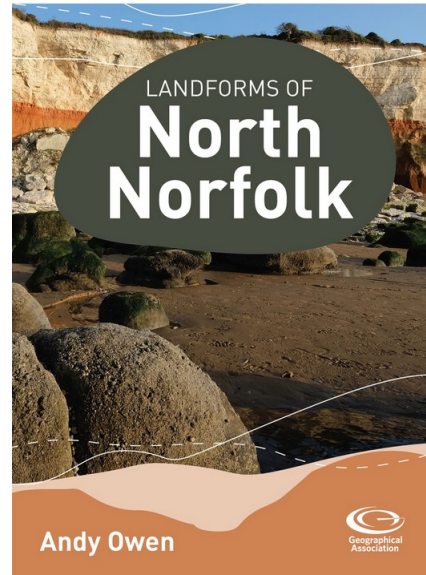
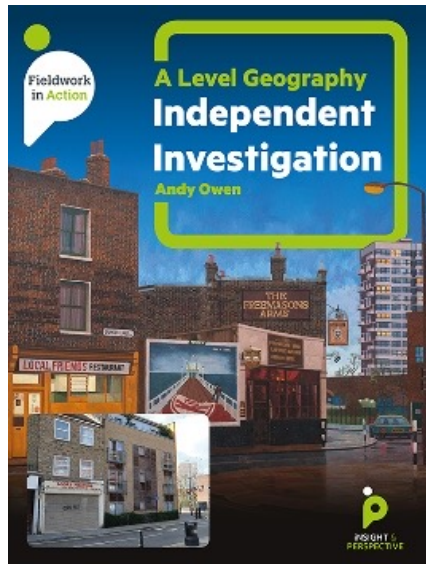


Figure 9 North Norfolk coast today.

- ▶ The barrier beach may be a relict landform but it is affected today by coastal processes that include longshore drift - from east to west.
- ▶ Wave refraction in shallow water has created a number of recurved ends at Scolt Head and Blakeney Point.

# About the author

- ▶ Andy Owen is a teacher, author and consultant to the GA.
- ▶ Andy has extensive experience of question setting and moderation.
- ▶ The GA have recently published two books to support the understanding of landform processes. These books include suggestions for classroom learning and fieldwork activities.
- ▶ ‘*A level Geography Independent Investigation*’ published by Insight & Perspective Ltd supports geography students as they work through their NEA.



<https://insightandperspective.co.uk/publications/a-level-geography-independent-investigation-a-practical-guide>

<https://www.geography.org.uk/Shop/Recently-added/New-products--2/Landforms-of-North-Norfolk/9781843775256>

# Acknowledgements

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