

## SITE

**Name:** Marsland to Clovelly Coast

**Parish:** Hartland

**Local Authority:** Torridge

**National Grid Ref:** SS 212 174 - SS 315 254

**OS Sheets:** 1:50K 190 1:10K SS22 SE, NE, SW, NW, SS21 NW, NE, 32 NW, SW

**Locality Description:** Northwest Devon coast, running for approximately 19.5 km from Marsland Mouth to Clovelly. Two specific access points recommended: the area around Hartland Quay (Location 1) and Welcombe Mouth (Location 2).

**Nature and Status of Site:** Classic sequence of structurally deformed coastline with cliff and foreshore exposures and geomorphological features. Designated as [Site of Special Scientific Interest](#) (SSSI) for its wildlife and geological features.

**Summary of Geological / Geomorphological Interest:** The coastline shows unrivalled exposures through Upper Carboniferous rocks belonging to the Crackington and Bude formations. Very large folds are displayed and this area provides excellent demonstration of the nature of folds produced during the Variscan Orogeny near the northern margin of the Culm Synclinorium. This site also shows geomorphological relationships between coastal and fluvial features. It contains fine examples of hog's back cliffs and shore platforms and is noted for a remarkable set of former valleys which have truncated by retreat of the cliff-line so that their floors now lie well above present sea-level.

**Safety Considerations:** This coastline is potentially dangerous for geological study. All of the sections require some level of clambering near or around cliff edges or bases. On this basis, only two specific locations are recommended for educational groups. Hard hats should be worn at all times and awareness of tide times is essential. Due to the nature of the area, a lack of mobile phone signal can be experienced.

**Educational Age Groups:** Secondary, College/6<sup>th</sup> Form, University.

**Parking and Access:** Although access can be gained via the [South West Coast Path](#) at a number of points, three specific locations are recommended.

**Location 1:** Hartland Quay- Access attainable from the Hartland Quay Hotel car park or a larger car park slightly further up the cliffs.

**Location 2:** Welcombe Mouth - situated close to the hamlet of Welcombe approximately 13km north of Bude. Access to the bay is gained via an unmade track, which leaves the minor road between South Hole and Mead in a valley bottom by the Hermitage. Parking is at the end of this track just behind the bay.

**Location 3:** Hartland Point and Shipload Bay. The cliffs can be viewed from above at Hartland Point where parking is available. The beach can be accessed at Shipload Bay, where important sedimentological features can be examined, as steps have been provided by the National Trust. Due to their steepness, however, visits by groups with limited mobility is not recommended.

Other areas of the SSSI can be viewed along the coastal footpath, although access to beach level is only locally, safely possible and requires a low tide.

To reach Clovelly from further a field there are a number of bus services running from Barnstaple (which also has a main line train station) and Bude, for timetable details, visit [www.traveline.org.uk](http://www.traveline.org.uk).

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## References

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Thomas J. M. (1982). The Carboniferous Rocks. In Durrance E. M. and Laming D. J. C. (eds), *The Geology of Devon*. University of Exeter, 42-65.

## Online References:

North Devon Biosphere, (online) available at [www.northdevonbiosphere.org.uk](http://www.northdevonbiosphere.org.uk)

**Detailed Geology:** The major geological interest around Welcombe Mouth is the style of deformation represented by the flat lying chevron folds within the Crackington Formation. These folds were initially upright and have been subsequently modified to give progressively lower angle fold axes related to a period of backthrusting. This would seem to contradict the belief that thrust sheets generated by the Variscan

Orogeny moved northwards. This can be explained by a general northwards transport direction of nappes on deeper decolment surfaces associated with subsidiary deformation of the nappe pile by southerly directed backthrusts. The major slump horizons that are observed within the Bude Formation are thought to have been exploited by the deformation processes and formed decolment surfaces (region slip zones) within this backthrusting stacked nappe sequence.

The Crackington Formation in the area shows excellent sedimentary structures associated with turbidite formation. Several fossiliferous dark shale horizons are also present and provide important dating evidence, enabling connection with sequences of similar age in the Millstone Grit and Coal areas of northern England. These levels often contain hard carbonate concretions with fossil goniatites, especially species of *Gastrioceras*. The area includes one of the most complete sequences in Britain spanning the upper Namurian and lower part of the Westphalian regional series.

Hartland Quay is characterised by an impressive sequence of highly folded Crackington Formation sediments, which are excellently exposed in three dimensions. To the north of this area, large-scale antiformal folds are differentially eroded and form classic Hog's Back cliffs. This type of feature can be seen at a number of locations.

Hartland Point cliffs provide excellent exposures of fold structures produced within the Bude and Crackington Formations of the Late Carboniferous, Upper Culm succession. Between Hartland Point and Boscastle, the structures are dominated by chevron folds with a number of NW-SE dextral wrench faults or strike slip faults. Shipload Bay represents a highly deformed succession through the Late Carboniferous Bude Formation, similar to the underlying Crackington Formation.

The Bude succession, however, contains a number of sedimentological features which reveal the shallow water, deltaic to lacustrine nature of the palaeoenvironment. This change, and comparison in change between the Crackington and Bude formations, can be related to the changing nature of the Culm basin through time. The sedimentological features found within the Bude Formation include wedge-, cross-, and hummocky-cross stratification, tool and scour marks, wave-influenced ripple, slump horizons and sand volcanoes.

The coastline is also nationally important for its coastal geomorphological features including hanging valleys, landslip and other slope processes, rock platforms and features such as stacks and arches.

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### **Suggested Questions**

1. At Marsland Mouth, there are several geomorphological features. Identify and describe how these features are formed.
2. Contrast the different fold structures that exist in the different lithological units. Why does this occur?
3. What type of structural feature can be seen along this coast? Measure its plunge and azimuth.
4. Map an area of foreshore and interpret the geological structure present.

5. Log a sequence in the Crackington or Bude formation and interpret the sedimentary environment represented.

## LOCATION PLAN

### **MARSLAND TO CLOVELLY COAST, SSSI HARTLAND/CLOVELLEY, TORRIDGE**

**National Grid Ref: SS 212 174 - 315 254**



Scale 1: 90,000

Site locality and extent

#### **Parking and Access**

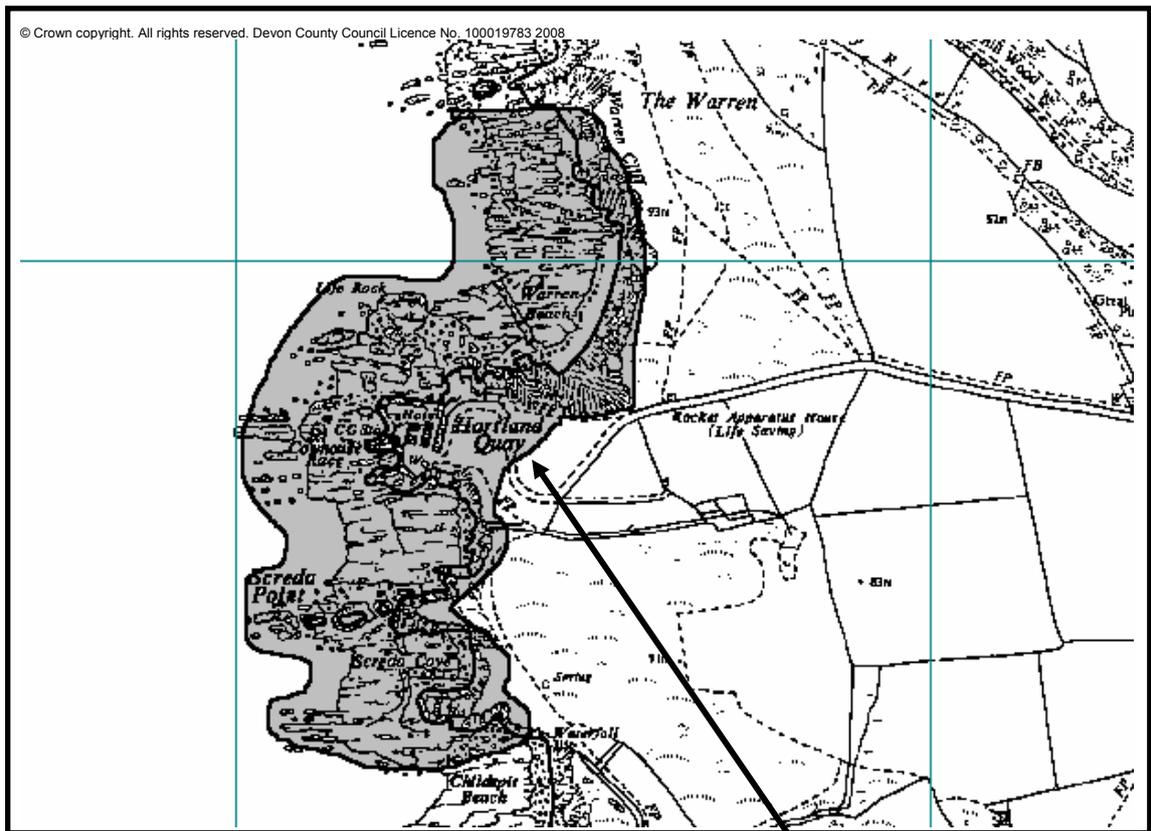
- This large site encompasses two important and accessible geological localities at Hartland Quay and Welcombe Mouth (refer to accompanying sheet for detail).
- Elsewhere, access can be gained via the South West Coast Path.

## SITE PLAN

# MARSLAND TO CLOVELLY COAST HARTLAND, TORRIDGE

## Location 1

National Grid Ref: SS 223 247



Scale 1:10,000



Key Focal Point

Car Park located above  
Hartland Bay Hotel.

### Main Points of Interest:

- An impressive sequence of highly folded sediments which are externally exposed in three dimensions.
- Fine examples of hog's back cliffs (especially in the north) and shore platforms.
- Relationship between coastal and fluvial processes seen in truncated valleys and waterfalls.

## SITE PLAN

# MARSLAND TO CLOVELLY COAST HARTLAND/CLOVELLY, TORRIDGE

## Location 2

National Grid Ref: SS 212 181



Key Focal Point

Scale 1: 10,000

Small car park located at  
Welcombe Mouth.

### Main Points of Interest:

- Outstanding examples of fold formations in the sandstones and mudstones belonging to the upper part of the Crackington Formation.
- Remarkable set of former river valleys which have been truncated by retreat of the cliff-line, so that their floors now lie well above the present sea level.

# HARTLAND QUAY

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Chevron folds in Upper Carboniferous Crackington Formation shales and sandstones in the cliffs north of Hartland Quay.

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View of Crackington Formation turbidite sandstones adjacent to the slipway at Hartland Quay. Note Quaternary downslope curving of sandstone bands in low cliff above and behind fisherman.



Crackington Formation in high cliffs near Hartland Quay. Note significant mudrock content of the sequence.



© Kevin Page

Folded Bude Formation sandstones East of Hartland Point.

© Kevin Page



Blackchurch Rock, North West of Clovelly – a large and well developed arch-stack feature in sandstone-dominated Crackington Formation.

© Kevin Page



Core of major anticlinal structure in Crackington Formation sandstones close to Blackchurch Rock.



The Embury Shale or 'Gastrioceras subcrenatum Marine Band' in the cliffs N of Welcombe Mouth. Note ferruginous nodules in lower part up to around 30cm across.