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## ELC\_29: Gullane Bents

### Site information

#### Location and summary description:

Gullane Bents is a 2km long stretch of sand dunes and beach located to the west of the town. It is of geomorphological interest as an applied case study of sand dune restoration following extensive disturbance.

#### National Grid reference:

Mid-point: [NT 47961 83605]

West-end: [NT 47349 83285]

East-end: [NT 48306 83907]

**Site type:** Natural landform

**Site ownership:** Crown, East Lothian Council

**Current use:** Open country; recreational land.

**Field surveyors:** John Gordon

**Current geological designations:** Firth of Forth SSSI

**Date visited:** 5 November 2014

**Other designations:** Firth of Forth SPA, Ramsar

### Site map

(Figure 34) Gullane Bents Map. The site boundary includes the sand flats of Gullane Bay, the Gullane Bents dune system and backing cliff. The site boundary for the adjacent Gullane Shore bedrock/Quaternary site ([ELC\\_13](#)) to the west is included ([ELC\\_30](#)) (transparent grey polygon). It should be noted that the westernmost extent of the sand flats at Gullane Bay is included within the adjacent Gullane Shore site ([ELC\\_13](#)) but is considered to be integral with the sand flat - dune system of Gullane Bents.

### Site description

#### Background

The site comprises an area of sand dunes and beach on the north-west side of Gullane. The dunes overlie a raised beach with a backing cliff inland (ELC\_29\_P1), (ELC\_29\_P2). Prior to World War 2, the area was heavily used for recreation and sand extraction. During the War, the beach and dunes were used for military exercises. Consequently, there was a high human impact, with extensive areas of bare sand and sand blowing landwards. During the 1960s, the Council implemented a rehabilitation plan that included the re-creation of the foredune ridge, use of fences to trap sand and planting of marram grass and sea buckthorn to stabilise bare sand areas and sources of blowing sand in the westernmost dunes. As part of the works, the foredune was bulldozed and re-profiled.

#### Quaternary deposits and landforms

A detailed description of the geomorphology of Gullane Bents is provided by Rose (1980). The central part of the bay is fronted by a single low foredune ridge with a duneslack behind, then an area of climbing dunes on the backing cliff. A zone of more complex high dunes occurs to the north-east (ELC\_29\_P3).

Sand dunes probably began to form along the East Lothian coast after the retreat of the last ice sheet in places where there was an abundance of sand derived from glacial sediments. This material has been reworked by wind and sea during the Holocene. As relative sea level rose during the early part of the Holocene, large quantities of sand moved shorewards. The sand was blown inland, forming climbing dunes on the rising topography. As relative sea level subsequently fell, the sand dune system extended seawards.

The Babbie Group ABP Research & Consultancy Ltd. (2002) report summarises the main changes over the last few centuries. Net erosion has generally exceeded accretion over the last hundred years as a result of human impacts and natural processes, accompanied by steepening of the beach.

Predominant wave directions from northeast and east result in westerly sand movement, reflected in accretion at the west end of the bay. Between 1907 and 1999, the Babbie Group ABP Research & Consultancy Ltd. (2002) estimated maximum coastal recession of 40 m from comparison of OS maps.

Along much of the length of the bay, apart from the western end, the coastal edge of the foredune ridge is currently undercut by the sea, particularly in winter, with collapse of sea buckthorn plants down the seaward face, a similar situation to that noted by Rose in 1980 (ELC\_29\_P4), (ELC\_29\_P5). Behind the dunes, a bare sand plain in 1980 has become stabilised. The foredune ridge is relatively low in places, with local washovers occurring during winter 2013–2014 (ELC\_29\_P5), (ELC\_29\_P6), and may be vulnerable to future breaching under a combination of sea-level rise and storm surge conditions.

The dunes formed under conditions of abundant sediment supply, conditions that no longer exist. Contemporary dune formation and maintenance are therefore limited by low sand supply. A likely future scenario under rising sea levels and increasing magnitude and/or frequency of storm events involves erosion and onshore migration of the coastal edge, washovers and possibly breaching of the foredune barrier and dune blowouts (Babbie, 2002).

## **Assessment of site: access and safety**

**Road access and parking** Access is along a minor road (Sandy Loan) in Gullane off the A198 coastal road east from Edinburgh. There is a public car park and toilets.

**Safety of access** No additional precautions beyond those normally associated with visiting a beach and dunes.

**Safety of exposure** No special precautions are required.

**Access** There is good access on footpaths from the public car park at Gullane Bents.

**Current condition** The condition is good.

**Current conflicting activities** None known.

**Restricting conditions** The cover of sea buckthorn restricts views of the inland dunes.

**Nature of exposure** Beach, coastal.

## **Assessment of site: culture, heritage & economic value**

**Historic, archaeological & literary associations** WWII – military exercises were undertaken in the area.

**Aesthetic landscape** Coastal landscape

**History of earth sciences** No known association

**Economic geology** Sand extraction prior to WWII.

### **Assessment of site: geoscientific merit**

	<b>Rarity</b>	<b>Quality</b>	<b>Literature/collections</b>	<b>Primary interest</b>
<b>Lithostratigraphy</b>				
<b>Sedimentology</b>				
<b>Igneous/mineral/metamorphic geology</b>				
<b>Structural geology</b>				
<b>Palaeontology</b>				
<b>Geomorphology</b>	Regional	Good/Excellent	Rose, 1980; Babbie Group ABP Research & X Consultancy Ltd.,	

### **Site geoscientific value**

Gullane Bents has been the subject of a major sand dune restoration programme. There is significant potential for education and public interpretation on coastal dynamics associated with human impacts and natural processes, particularly in a context of climate change. The large amount of documentary evidence makes it a particularly good case study of coastal changes under natural processes and human impacts.

Gullane Bents is a good example of sand dune restoration, with regional significance.

### **Assessment of site: current site usage**

**Community** The beach and dunes are heavily used for recreation.

**Education** There is significant potential for education and public interpretation on coastal dynamics associated with human impacts and natural processes.

### **Assessment of site: fragility and potential use of the site**

**Fragility** The site is vulnerable to heavy trampling, off-road vehicle use, tree planting, hard engineering responses to coastal erosion, waste tipping and potential development.

**Potential use** School education and public interpretation addressing coastal dynamics and living with a dynamic landscape in the context of climate change and sea-level rise.

### **Geodiversity summary**

The site is a good case study of sand dune restoration and there is potential for developing its educational value and public interpretation through promoting existing available information and historical material held by East Lothian Council.

### **Site photos**

(ELC\_29\_P1) Gullane Beach and Bents: view from the south-west, showing erosion of much of the coastal edge and a small area of accretion at the back of the beach in the foreground. © John Gordon.

(ELC\_29\_P2) Gullane Bents: view from the north-east showing the foredune ridge, dune slack and climbing dunes on the backing cliff © John Gordon.

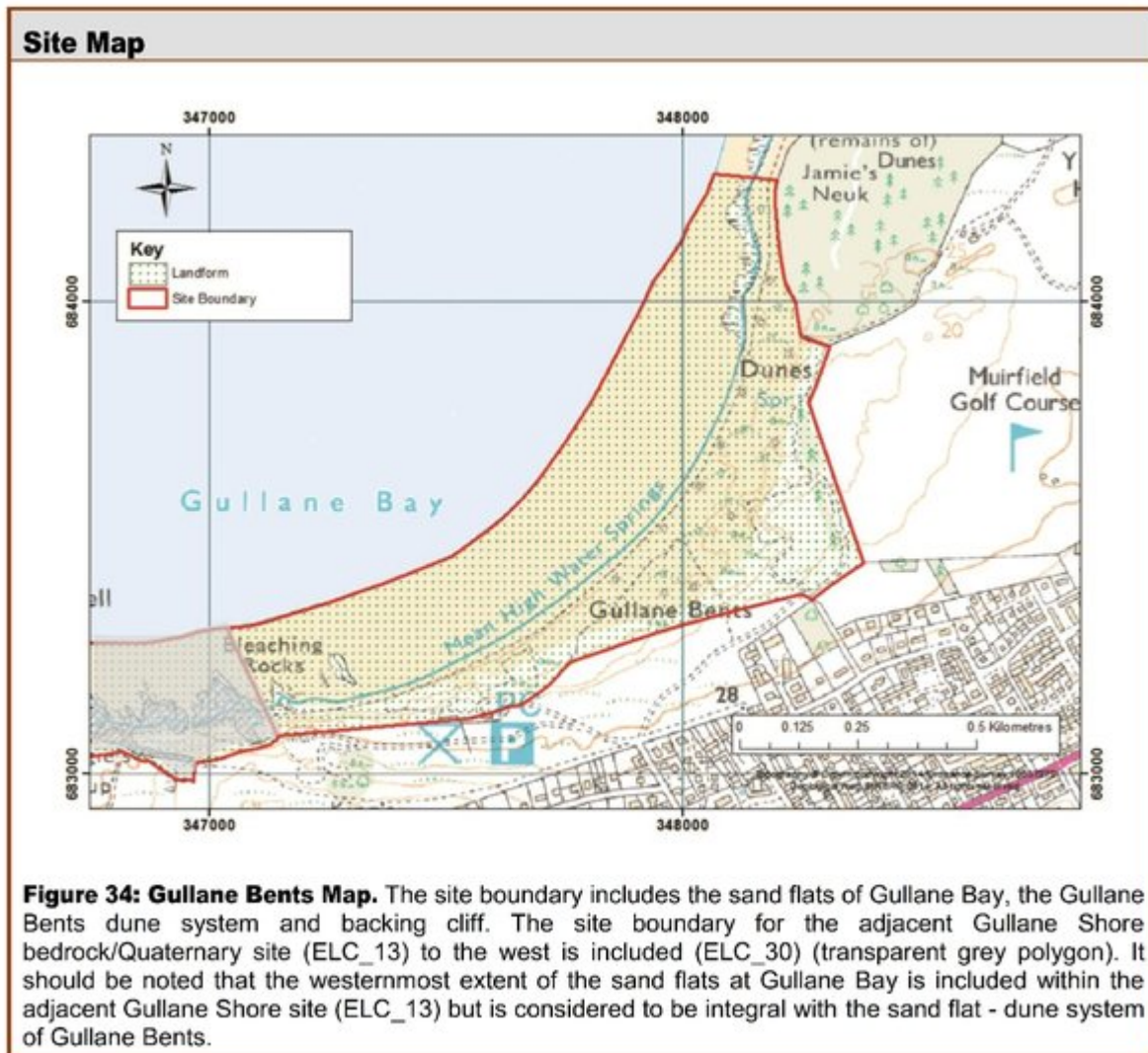
(ELC\_29\_P3) Gullane Bents: view from the car park, showing the foredune ridge, dune slack and area of high dunes to the north-east. © John Gordon.

(ELC\_29\_P4) Eroding coastal edge. © John Gordon.

(ELC\_29\_P5) Washover of the foredune ridge. © John Gordon.

(ELC\_29\_P6) Washover areas along the foredune ridge. © John Gordon.

## [References](#)



(Figure 34) Gullane Bents Map. The site boundary includes the sand flats of Gullane Bay, the Gullane Bents dune system and backing cliff. The site boundary for the adjacent Gullane Shore bedrock/Quaternary site (ELC\_13) to the west is included (ELC\_30) (transparent grey polygon). It should be noted that the westernmost extent of the sand flats at Gullane Bay is included within the adjacent Gullane Shore site (ELC\_13) but is considered to be integral with the sand flat - dune system of Gullane Bents.





*(ELC\_29\_P1) Gullane Beach and Bents: view from the south-west, showing erosion of much of the coastal edge and a small area of accretion at the back of the beach in the foreground. © John Gordon.*



*(ELC\_29\_P2) Gullane Bents: view from the north-east showing the foredune ridge, dune slack and climbing dunes on the backing cliff © John Gordon.*





*(ELC\_29\_P3) Gullane Bents: view from the car park, showing the foredune ridge, dune slack and area of high dunes to the north-east. © John Gordon.*



*(ELC\_29\_P4) Eroding coastal edge. © John Gordon.*





*(ELC\_29\_P5) Washover of the foredune ridge. © John Gordon.*



*(ELC\_29\_P6) Washover areas along the foredune ridge. © John Gordon.*