
ELC_14: Kilspindie Shore

Site information

Location and summary description:

The site comprises a 2.2 km section of coastline located to the north-west of the town of Aberlady between Aberlady Point and Green Craig. This coastal section exposes the boundary between the Clackmannan Group and the Strathclyde Group of the Dinantian age (early Carboniferous). Limestones from both groups are exposed along this coastal section. The Gosford Sill, a younger intrusive igneous rock is also exposed at the western section of the site.

National Grid reference:

Mid-point: [NT 44707 80205]

South-west end: [NT 44694 79255]

East-end: [NT 45723 80493]

Site type: Natural section/exposure; Natural landform; Natural view

Site ownership: Crown

Current use: Open Country, edge of golf courses

Field surveyors: Rachael Ellen and Eileen Callaghan

Current geological designations: Part of Firth of Forth SSSI

Date visited: 26th August 2014

Other designations: Firth of Forth SPA and Ramsar, Aberlady Bay Local Nature Reserve

Site map

(Figure 19) Kilspindie Shore Location Map. The site boundary is drawn to include access along the edge of Kilspindie Golf course, as well as encapsulating local landforms (e.g. beaches) and the key rock exposures. This site is immediately adjacent to the geomorphological Aberlady Bay Site ([ELC_30](#)). The local extent of Aberlady Site is shown above as a transparent grey polygon.

Site description

Background

The Kilspindie Shore site encompasses the western part of Aberlady Bay and the northern area of Gosford Bay. The site is located to the north-west of the town of Aberlady. The 2.2 km section contains limestones of the Clackmannan Group: the Hurllet, the Blackhall and the Inchinnan, as well as the Blackbyre Limestone belonging to the Strathclyde Group. The Gosford Bay Sill which is exposed at the western end of the site is younger in age and is composed of analcime gabbro (dolerite). These exposures are best seen at low tide.

Sedimentary rocks

The oldest rocks exposed on the Kilspindie Shore site belong to the Strathclyde Group, and are found to the west of the site. These strata comprise siliciclastic rocks of the Aberlady Formation; interbedded pale cream sandstone, siltstones and mudstones with subordinate coal, seatrock, limestones and ironstone. These strata were deposited in a variable environment characterised by fluvial deposition and development of shallow marine conditions. Exposed within the sequences is the Blackbyre Limestone, a pale grey crinoidal argillaceous limestone indicative of a transition to a deeper marine sedimentary environment.

The majority of the sedimentary rocks exposed on the shore at Kilspindie form the lower part of Lower Limestone Formation (Clackmannan Group). The Lower Limestone Formation comprises a cyclic sequence of calcareous mudstones, limestones, sandstones and siltstones containing thin coal seams and some seatearths. The Hurllet Limestone, seen on both the eastern and western part of this shore section marks the boundary between the Clackmannan Group and the underlying Strathclyde Group. The Hurllet Limestone forms a prominent 1–5 m bed across the site (ELC_14_P1), with a rubbly, brown weathered top surface. In the eastern part of its exposure, just before Craigielaw Point, the Hurllet Limestone is underlain by a shale bed sitting above a 20 cm thick band of coal (ELC_14_P2). The limestones of the Lower Limestone Formation are fossiliferous, containing crinoids, corals, and brachiopods (ELC_14_P3), (ELC_14_P4). At the far west of the site is an exposure of the massive Blackhall Limestone, stratigraphically younger than the Hurllet Limestone. The Blackhall Limestone is up to 8 m thick, massive, and contains crinoid fragments and productid brachiopods (ELC_14_P5), (ELC_14_P6). The limestones contain mineral lined vugs of orange/brown calcite 'teeth', representing reprecipitated carbonates from dissolution of the limestone.

The cyclic sequences between the limestones are composed of sandstone, siltstone, mudstone and subordinate limestone. The sandstone is quartz-rich, fine to medium grained, with organic patches throughout. There is an indication of bioturbation and rippled features on bedding planes (ELC_14_P7). The siltstones are black/grey, occasionally fossiliferous, very finely bedded and are interbedded with yellowish/brown limestone. The sandstone and interbedded shale is well exposed at a low cliff below a red-tiled hut owned by the Kilspindie Golf Club in the midpoint of the site.

Volcanic rocks

The Lower Limestone Formation is intruded by the Gosford Bay Sill, an olivine-analcime-gabbro. Exposure of the sill is accessible at high tide, adjacent to the concrete tank blockades sit on the shore (ELC_14_P8).

Quaternary deposits and landforms

The shore of the section is littered with glacial erratics of igneous origin, with mafic (dolerite or gabbroic) erratics displaying onion skin weathering (ELC_14_P9). An outlier of sandstone resting on shale forms a sea stack to the north of the site, known as the King's Kist (ELC_14_P10). Intertidal marine beach deposits form expanses of sand flat that are included within the adjacent Aberlady Bay geomorphological site ([ELC_30](#)).

Access and additional information

There is good access along the coast line at high tide for most of the site, with access along the side of Kilspindie and Craigielaw golf club possible where the tide is too high. The site is best visited at low tide when one can walk on the shore and see most of the exposures. Parking is advised in Aberlady itself as the car parks near the section belong to Kilspindie Golf Club. The East Lothian Ranger service do not encourage large numbers of visitors along this section of coast due to the diverse bird life along this stretch of shore.

Stratigraphy and rock types

Age: Dinantian

Formation: Lower Limestone Formation

Rock type: Calcareous mudstones, limestones, sandstones, siltstones, coal and ironstone

Age: Dinantian

Formation: Aberlady Formation (Strathclyde Group)

Rock type: Sandstone, siltstone, mudstone with minor ironstone, seatearths, coal and limestone

Age: Carboniferous to Permian

Formation: Gosford Bay Sill

Rock type: Analcime-Gabbro

Assessment of site: access and safety

Road access and parking There is good access to the site. Street parking is available in Aberlady, then following signs on foot to Kilspindie Golf Club or taking a path near the church to Kilspindie Castle. Access to the site can also be made from a parking area at Longniddry Bents (only at low tide) approximately 2 km south west of the western edge of the site. Following the John Muir Way for part of the route.

Safety of access Faint footpaths provide good access along the edge of the golf course at high or low tide and there are rock exposures above the high-tide level at some points. Access to some sections is restricted at high tide. Visitors should be aware of tide times and access routes when visiting the site.

Safety of exposure The cliffs appear generally stable, but care should always be taken beneath cliffs, particularly in over-hanging areas. Rocky coastal platforms and boulder-strewn areas can be hazardous and care should be taken in accessing these areas.

Access Access via the shore and footpaths.

Current condition Many rock exposures are clean and free of vegetation. However, in the intertidal zone the sedimentary rocks in particular, may be largely covered by barnacles and algae.

Current conflicting activities There are two golf courses located adjacent to parts of the site. The main access paths skirt the edges of the golf course areas. The area is part of the Aberlady Nature Reserve which may object to encouraging visitors especially during the nesting season.

Restricting conditions Many of the geological exposures are located within the intertidal range and are not visible at high tide.

Nature of exposure Intertidal rock platform, beach exposures and small cliff sections.

Assessment of site: culture, heritage & economic value

Historic, archaeological & literary associations A quarry was sited near Garlick Rock but there is no historical record of its use. The ruined remains of Kilspindie Castle are just to the south-east of the site. There are only a few blocks of masonry left to indicate the location of this 16th century castle. Aberlady Bay was Britain's first Local Nature Reserve to open in 1952. Concrete tank blockades are in situ to the west of the site, a remnant from past wars.

Aesthetic landscape Coastal landscape

History of earth sciences No known association

Economic geology No known association

Assessment of site: geoscientific merit

	Rarity	Quality	Literature/collections	Primary interest
Lithostratigraphy	Regional	Good		X
Sedimentology	Local	Good		
Igneous/mineral/metamorphic geology	Local	Moderately good		
Structural geology				
Palaeontology	Regional			X
Geomorphology				

Site geoscientific value

Kilspindie Shore displays a cyclic sequence of sedimentary rocks belonging to the Carboniferous Lower Limestone Formation. The Hurllet Limestone, an important marker horizon for the base of the Lower Limestone Formation across the Midland Valley of Scotland, is exposed at this site. There are few natural exposures of the Lower Limestone Formation in central Scotland, making this a regionally important lithostratigraphic site.

Kilspindie Shore provides an excellent example of fossils with regional significance (in particular corals and brachiopods) preserved in good quality limestones. The site also provides a naturally exposed section through the Lower Limestone Formation which has regional litho- stratigraphical significance.

Assessment of site: current site value

Community The site is visited daily by golf club users, although public access along the coast may be used less frequently.

Education The site contains a wealth of fossils, in particular fossilised corals, which may have educational value for schools, higher education and research.

Assessment of site: fragility and potential use of the site

Fragility Weathering/erosion, sample/fossil collecting

Potential use Research, Higher/Further Education, School Education.

Geodiversity summary

The Kilspindie Shore section exposes a near continuous sequence from the top of the Strathclyde Group (Hurllet Limestone) up to the Blackhall Limestone, forming the lower part of the Lower Limestone Formation. Excellent exposures of the Hurllet Limestone allow the chance to examine fossils that lived during the Carboniferous at time of deposition, with the cyclic successions of siliciclastic rocks allowing interpretation of the subsiding deltaic environment and fluctuating sea level changes that deposited these rocks.

Site photos

(ELC_14_P1) The Hurllet Limestone forms a striking rock platform along the shore at the eastern edge of the site. Thin beds of shale between limestones bed have been eroded out, leaving a stepped appearance to the limestone. Photo looking north-west. © BGS, NERC.

(ELC_14_P2) At the western edge of the site, a 20 cm thick coal seam is found beneath the Hurllet Limestone. In the photo the hammer is resting against a coal, with a brown shale layer above. The Hurllet Limestone caps this local

sequence. © BGS, NERC.

(ELC_14_P3) Amongst the many fossils identifiable within the Hurllet Limestone are those of *Koninckophyllum*, a solitary coral. Crinoid fragments are visible surrounding the coral. Modern day barnacles (white) are commonly found on the limestone. © BGS, NERC.

(ELC_14_P4) This remarkable texture within the Hurllet Limestone is a dense concentration of the colonial coral fossil, *Siphonodendron junceum*. The fossils are so distinct that rocks bearing these fossils are locally given the name 'spaghetti-rock'. The bed is exposed just below high water mark, and large boulders or cobbles of the same rock type can be examined/collected at high tide. © BGS, NERC.

(ELC_14_P5) The Blackhall Limestone contains beautifully preserved crinoid stems, such as the ones imaged above. These crinoids lived in shallow waters, and would have been attached to the sea bottom by a stalk, the segmented remains of which are usually preserved in the fossil record. © BGS, NERC.

(ELC_14_P6) The Blackhall Limestone also contains beautifully preserved brachiopods, where the intricate details on their shells can still be seen today. © BGS, NERC.

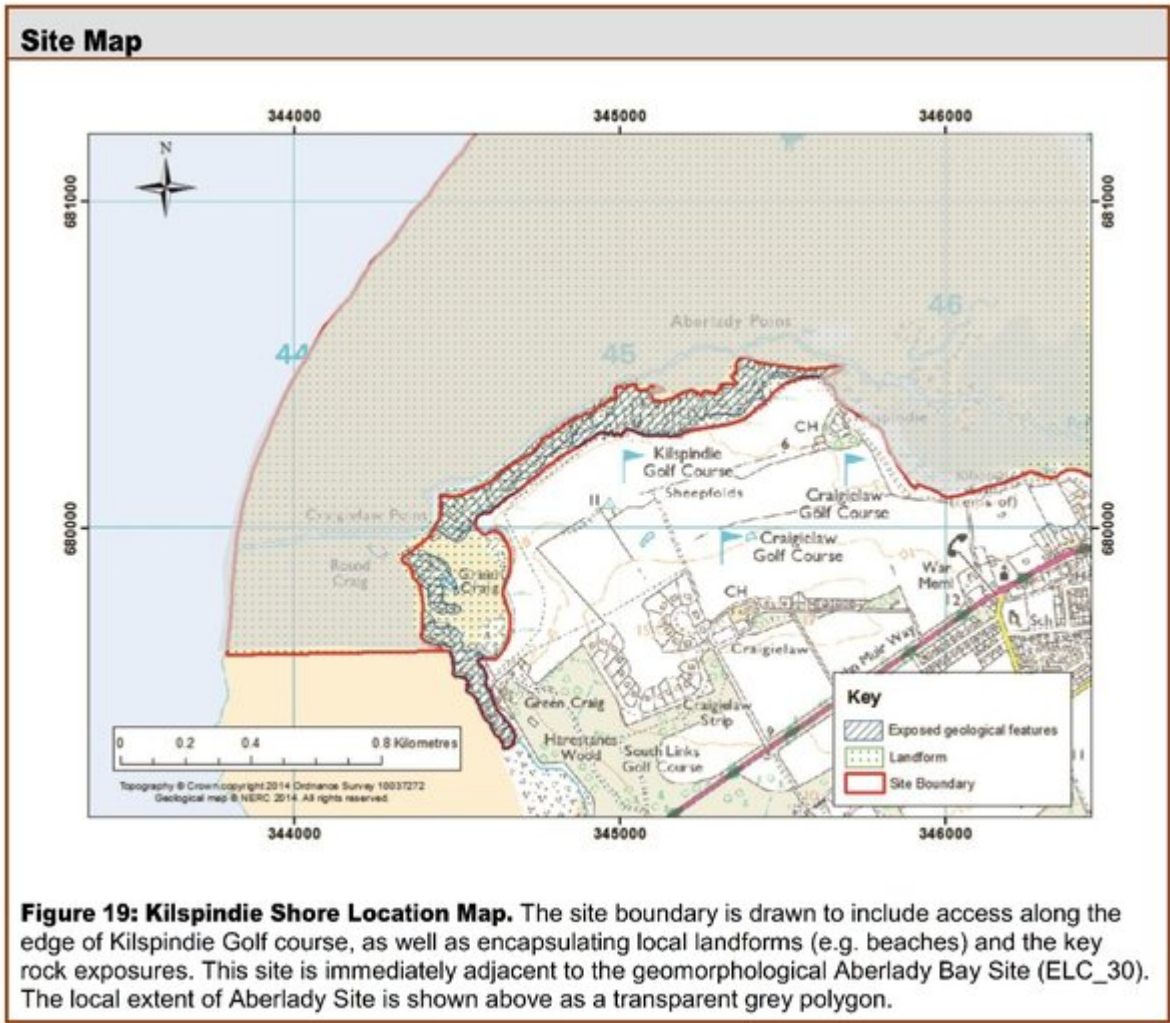
(ELC_14_P7) Sandstone beds of the Lower Limestone Formation display weakly rippled surfaces, evidence of flowing water over the top of the sediment as it was deposited, possibly in a river bed or in a tidal environment. Modern day sand ripples reflecting in the sunshine can be seen on the right of photo. © BGS, NERC.

(ELC_14_P8) Analcime-gabbro of the Gosford Bay Sill is exposed adjacent to concrete tank deterrants at the far west of the site. Yellow lichen tends to prefer mafic rocks, giving the rock a false yellow colour. © BGS, NERC.

(ELC_14_P9) Erratics carried by glaciers are littered across the site. This example is a gabbroic erratic, displaying an excellent example of onion skin weathering, where orthogonal joint sets formed rectangular blocks are smoothed by weathering processes. © BGS, NERC.

(ELC_14_P10) The remains of a sea stack, King's Kist, can be seen in the middle of the site. © BGS, NERC.

[References](#)



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(ELC_14_P1) The Hurler Limestone forms a striking rock platform along the shore at the eastern edge of the site. Thin beds of shale between limestones bed have been eroded out, leaving a stepped appearance to the limestone. Photo looking north-west. © BGS, NERC.



(ELC_14_P2) At the western edge of the site, a 20 cm thick coal seam is found beneath the Hurlet Limestone. In the photo the hammer is resting against a coal, with a brown shale layer above. The Hurlet Limestone caps this local sequence. © BGS, NERC.



(ELC_14_P3) Amongst the many fossils identifiable within the Hurlet Limestone are those of Koninckophyllum, a solitary coral. Crinoid fragments are visible surrounding the coral. Modern day barnacles (white) are commonly found on the limestone. © BGS, NERC.



(ELC_14_P4) This remarkable texture within the Hurler Limestone is a dense concentration of the colonial coral fossil, Siphonodendron junceum. The fossils are so distinct that rocks bearing these fossils are locally given the name 'spaghetti-rock'. The bed is exposed just below high water mark, and large boulders or cobbles of the same rock type can be examined/collected at high tide. © BGS, NERC.



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(ELC_14_P7) Sandstone beds of the Lower Limestone Formation display weakly rippled surfaces, evidence of flowing water over the top of the sediment as it was deposited, possibly in a river bed or in a tidal environment. Modern day sand

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(ELC_14_P8) Analcime-gabbro of the Gosford Bay Sill is exposed adjacent to concrete tank deterrants at the far west of the site. Yellow lichen tends to prefer mafic rocks, giving the rock a false yellow colour. © BGS, NERC.



(ELC_14_P9) Erratics carried by glaciers are littered across the site. This example is a gabbroic erratic, displaying an excellent example of onion skin weathering, where orthogonal joint sets formed rectangular blocks are smoothed by weathering processes. © BGS, NERC.



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