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# A7 DR6 Barnburgh Cliff

## Site information

**Site name:** Barnburgh Cliff

**Site key:** DR6

**Grid reference:** [SE 5006 0366] (east end)

**Site type:** exposure

**Local authority:** Doncaster Metropolitan Borough Council, South Yorkshire

**Site dimensions:** 1000 m x 100 x 15 m

**Site owner:** Not known

**Conservation status:** Proposed Regionally Important Geological Site **Date:**

**Field surveyor:** Scott Engering **Date:** 13/3/07

## Stratigraphy and rock types

**Time unit:** Carboniferous, Westphalian **Rock unit:** Dalton Rock, Pennine Upper Coal Measures Formation, Pennine Coal Measures Group

**Rock type:** Sandstone **Details:** Massive, cross-bedded yellow-red medium grained sandstone with ironstone pebbles

**Time unit:** Permian **Rock unit:** Wetherby Member, Cadeby Formation, Zechstein Group

**Rock type:** Dolostone **Details:** Horizontally bedded shelly ooid-limestones

## Site map

(Figure 34) — DR6 Barnburgh Cliff

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## Site description

An outcrop of the Wetherby Member of the Cadeby Formation is exposed along nearly the whole length of the escarpment, from [SE 50063 03661] to [SE 49405 03964] and provides the best opportunity to observe and research the Carboniferous-Permian boundary in Doncaster. From east to west, there is a near horizontal exposure of beds that record an ancient reef and inter reef environment.

From [SE 50063 03361] to [SE 50029 03689], there is the largest exposure of Bryozoan/Stromatolite reefs in the region. At [SE 49595 03980], the increasingly yellow colour of the limestone coincides with the appearance of large rifts in the exposure, filled with orange sands and limestone breccia and at [SE 49546 03918], another rift is exposed parallel to the rock face. Here, there is good evidence of slumping and cambering, with the development of large cavities that along the

Don Gorge have been previously investigated as caves.

At [SE 49488 03953], the geomorphology of the region associated with the Don Monocline and North and South Don faults is clearly seen. The increasingly sandy, yellow limestone of the Wetherby Member dies out at [SE 49405 03964] but within less than 1 metre of the lowest exposed beds, there is a large 10 metre x 4.5 metre quarried exposure of yellow to red, massive and cross-bedded sandstone with ironstone pebbles. This is the Dalton Rock. The junction between these two distinctive rocks is marked by the growth of well established trees, with associated and distinctive vegetation and, at this point, this should be considered as the best example of the Carboniferous – Permian unconformity, although the precise boundary is inferred by field evidence but not fully exposed.

## **RIGS assessment of site value**

Ratings: 1–2 very poor; 3–4 poor; 5–6 acceptable/useful; 7–8 quite good; 9–10 very good/excellent; N/A not applicable; D/K don't know

### **Access and safety**

#### **Aspect/Description/Rating**

**Road access & parking** Limited parking at east end of escarpment. Park in Barnburgh and walk up Stables Lane for best access. Rating: 6

**Safety of access** Access along bridleway and well trodden paths. Rating: 6

**Safety of exposure** Where quarried, care must be taken on loose debris and where the foot of the face is overgrown. Rating: 7

**Permission to visit** Access along established rights of way N/A

**Current condition** Very good. Plenty of good exposure. Rating: 8

**Current conflicting activities** None envisaged, although fly tipping at the east end of the escarpment makes access to bridleway less than ideal.

**Restricting conditions** Relatively remote from parking area, so a degree of physical mobility is required to undertake the necessary walk

**Nature of exposure** Natural and quarried exposures in the limestone escarpment

**Multiple exposures/prospect for trail** There is scope for an extended visit to study the variations between reef and inter reef environment and the Carboniferous rocks along the length of the crags

**Notes** A good walk is needed to access the crags but the pathways are well established and safe

### **Culture, heritage & economic**

#### **Aspect/Description/Rating**

**Historic, archaeological & literary associations** None known. Rating: 0

**Aesthetic landscape** A good site with excellent views of the topography to the west and an extended rocky exposure. Rating: 8

**History of earth sciences** One of the very few opportunities to study the geology at the Carboniferous–Permian boundary. Rating: 9

**Economic geology** Local interest. Probably one source of building stone used for historic buildings in nearby Bamburgh. Rating: 7

## Notes

## Education and science

**Surface processes** Weathering of reef and bedded limestones. Rifting and cambering. Rating: 7

**Geomorphology** Excellent views of Carboniferous escarpments and the structural effects of the Don Monocline. Rating: 9

**Sedimentary** A wide variety of lithologies, including well developed reefs, ooid-limestones, massive, cross bedded strata and fissure deposits. Rating: 8

**Fossils** Permian reef fossils. Specialist interest in Permian marine fauna. Rating: 6

**Igneous** Not applicable. Rating: 0

**Metamorphic** Not applicable. Rating: 0

## Tectonic: structural

Evidence of unconformity, rifts and cambering. Rating: 8

**Minerals** Not applicable. Rating: 0

**Stratigraphy** A very good site to study the Permian and Carboniferous strata at the position of the unconformity. Rating: 8

**Notes** A very good site to demonstrate the lateral variation of strata within the reef facies. An important location at which to see Carboniferous and Permian rocks

## Geodiversity value

A good site to show reef formation and associated beds, fissures and related deposits, an unconformity and geomorphology. Rating: 9

## Site photographs DR6 Barnburgh Cliff

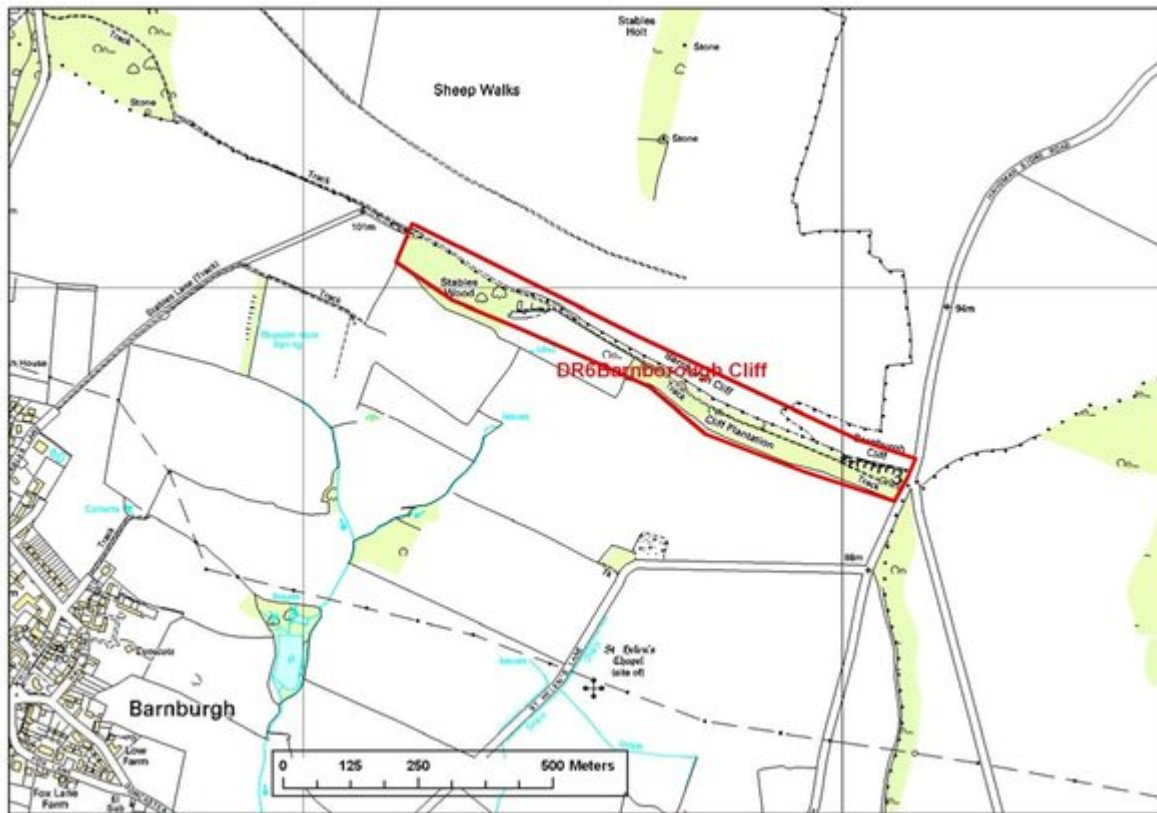
(Figure 35) Quarry exposure of Carboniferous Dalton Rock. Trees and vegetation mark the position of the Carboniferous-Permian unconformity. [SE 49400 03960]

(Figure 36) Detail of uppermost exposure of Dalton Rock [SE 49400 03960].

(Figure 37) Detail of ironstone pebbles in Dalton Rock [SE 49400 03960].

(Figure 38) General view of massive shelly ooid-limestones with overlying reef. [SE 50063 03661]

(Figure 39) Massive horizontally bedded shelly ooid-limestones with iron staining. [SE 49488 03953]



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(Figure 35) Quarry exposure of Carboniferous Dalton Rock. Trees and vegetation mark the position of the Carboniferous-Permian unconformity. [SE 49400 03960].





*(Figure 36) Detail of uppermost exposure of Dalton Rock [SE 49400 03960].*



*(Figure 37) Detail of ironstone pebbles in Dalton Rock [SE 49400 03960].*





*(Figure 38) General view of massive shelly ooid-limestones with overlying reef. [SE 50063 03661].*



*(Figure 39) Massive horizontally bedded shelly ooid-limestones with iron staining. [SE 49488 03953].*