
ELC_8: Blaikie Heugh – Balfour Monument

Site information

Location and summary description:

The Balfour Monument sited on the 15m high lava escarpment of Blaikie Heugh offers stunning views of Traprain Law, Berwick Law and the Garleton Hills (ELC_8_P1). The site is approximately 2.5km north-east of the village of Garvald. The site displays the “Craiglockhart Basalt Lava” belonging to the Garleton Hills Volcanic Formation. To the east of this site, a smaller escarpment exposes a hornblende-bearing trachybasaltic lava flow.

National Grid reference:

Mid-point: [NT 57631 73049]

West end: [NT 57373 72969]

East end: [NT 57895 73165]

Site type: Natural section; Natural exposure; Natural view

Site ownership: Unknown

Current use: Agricultural Land

Field surveyors: Rachael Ellen and Eileen Callaghan

Current geological designations: None known

Date visited: 10th June 2014

Other designations: The Balfour Monument is listed

Site map

(Figure 13) Blaikie Heugh Location Map. The site boundary includes rock and landforms including boulder fields lying at the base of the cliff, the cliff escarpment and streamlined bedrock. The area between the two rock exposures is classed as geologically significant for access between the sites and for an appreciative view point toward the cliffs.

Site description

Background

The Balfour Monument is located by the roadside on an escarpment overlooking Traprain Law. The Monument is a red sandstone obelisk, dedicated to James Balfour (1820–56), a Major Commandant of the East Lothian Yeomanry Cavalry. The Blaikie Heugh escarpment is formed of an olivine- clinopyroxene-macrophyric basalt traditionally known as the ‘Craiglockhart Basalt’ type, which is of widespread occurrence in the lower Carboniferous lavas of the Midland Valley. A nearby escarpment to the east is also of geological interest, being composed of a hornblende-bearing trachybasalt.

Volcanic rocks

The escarpment below the Balfour Monument (ELC_8_P2) is composed of an olivine- clinopyroxene-macrophyric basalt, comprising abundant large (<1cm) augite pyroxene phenocrysts and brown-red pseudomorphs after olivine (<0.5 cm),

set in a fine grained groundmass. The main outcrop is 15 metres in height with rough columnar jointing observed (ELC_8_P3). The basalt has a dark grey groundmass with phenocrysts of augite and pseudomorphs after olivine. The augite phenocrysts (ELC_8_P4) are black with an equant crystal shape, and have visible cleavage planes. The olivine pseudomorphs (ELC_8_P5) have been replaced by a reddish-brown clay, and are equant-lobate in crystal shape. Fine, mm scale 'ribs' cross cut the olivine pseudomorphs, possibly a relict feature of the original olivine's crystal fractures. Large boulders of the basalt can be examined in the boulder-field lying at the base of the cliff.

The minor escarpment just to the east of the Balfour Monument (moulded and streamlined by glacial erosion) is composed of a westward dipping hornblende-bearing trachybasaltic flow (an alacime-bearing hornblende-phyric trachybasalt), which stratigraphically underlies the olivine-clinopyroxene macrophyric basaltic lava found at Blaikie Heugh. The minor escarpment is approximately 3 metres in height (ELC_8_P6). The trachybasalt is massive and well-jointed, with the rock itself much decomposed and reddened. Mineralised veins and pseudomorphed (oxidised) hornblende phenocrysts (ELC_8_P7) are vaguely visible within the rock.

The volcanic rocks described above form part of the Garleton Hills Volcanic Formation, part of the Strathclyde Group of the lower Carboniferous.

Access and additional information

Access to the site is at the Balfour Monument off a minor road [NT 57549 72961]. There is parking in a lay by at the monument. The monument is on an artificially made platform with a drop of approximately 1.5 m to the field. The escarpment drops steeply from the raised area and it is best to access the base of the escarpment by either heading east or west. The best and easiest accessible outcrop is approximately 250 metres east of the monument near the boundary fence. The main escarpment can be accessed by descending the slope and traversing the field. The smaller escarpment approximately 370 metres north-east of the monument can only be accessed by climbing over a fence.

Stratigraphy and rock types

Age: Carboniferous Garleton Hills Volcanic Formation

Rock type: Olivine-clinopyroxene-macrophyric basalt (Craiglockhart Basalt)

Age: Carboniferous

Formation: Garleton Hills Volcanic Formation

Rock type: Trachybasalt

Assessment of site: access and safety

Road access and parking Parking in the lay by at the Balfour Monument.

Safety of access Care has to be taken as the monument is at the top of the escarpment looking down onto the fields. The ground is steep and traversing the field either east or west gives access to the base of the escarpment. There is also a boulder field at the foot of the escarpment, and loose rock is covered by grass. The minor escarpment to the north-east is accessed through fenced pastures.

Safety of exposure Care should be taken and an assessment made of the escarpment face before approaching as loose material may fall.

Access Access via agricultural land.

Current condition Lichen covers the basalt but generally well exposed.

Current conflicting activities None

Restricting conditions Livestock in fields.

Nature of exposure Escarpment

Assessment of site: culture, heritage & economic value

Historic, archaeological & literary associations Balfour Monument erected in 1858 in memory of James Maitland Balfour of Whittinghame, father of Prime Minister Arthur James Balfour.

Aesthetic landscape Panoramic views from the monument of the Pentland Hills, Edinburgh, Fife, and in East Lothian, the Garleton Hills, Berwick Law, Traprain Law and the Bass Rock.

History of earth sciences No known association

Economic geology No known association

Assessment of site: geoscientific merit

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

Site geoscientific value

The site comprises exposures of two different kinds of basalt, relevant to the interpretation of the volcanic environment during the Carboniferous. There are few examples of hornblende-bearing trachybasalts across East Lothian, whereas the 'Craiglockhart' basalt is found across the Midland Valley of Scotland.

Blaikie Heugh provides a moderately good example of Carboniferous basalt lava flows, with national to regional significance.

Assessment of site: current site usage

Community The Balfour Monument at the site is of historical interest, and is likely to attract some visitors. The views from the monument are also impressive.

Education The site presents moderately good exposures of 'Craiglockhart' type basalt and hornblende-bearing trachybasalt, and affords excellent views across much of East Lothian. This site may be a good locality for educational fieldwork relating to the volcanic environment of the Carboniferous in Scotland, and on-site interpretation board explaining the geology of the view from the monument may also be appropriate.

Assessment of site: fragility and potential use of the site

Fragility Natural overgrowth and erosion and weathering of feature.

Potential use Higher/further education, school education, on-site interpretation

Geodiversity summary

Blaikie Heugh contains natural exposures of two types of basalt lava flows belonging to the Garleton Hills Volcanic Formation: an olivine-clinopyroxene-macrophyric basalt traditionally known as the 'Craiglockhart Basalt' type, and a hornblende-bearing trachybasalt. Both of these lava types are not well distributed throughout East Lothian, and this site represents an opportunity to study both of the lava types at the same time. A trachybasalt is also exposed at North Berwick Shore, but exposure is limited in the intertidal zone. The site also affords historical links (Balfour Monuments) and panoramic views across East Lothian.

Site photos

(ELC_8_P1) View of Traprain Law and Berwick Law from Balfour Monument, looking north-east. © BGS, NERC.

(ELC_8_P2) View of Blaikie Heugh escarpment and monument, looking west. The rocks forming the escarpment are of 'Craiglockhart' basalt, an olivine-clinopyroxene-macrophyric basalt. © BGS, NERC.

(ELC_8_P3) Faint columnar jointing seen in olivine-clinopyroxene-macrophyric basalt, exposed in the escarpment of Blaikie Heugh. Photo looking south-east © BGS, NERC.

(ELC_8_P4) Detail of an augite (type of pyroxene) phenocryst within the olivine-clinopyroxene-macrophyric basalt, exposed in the Blaikie Heugh escarpment. Finger (resting on white lichen) is pointing toward a black, equant augite phenocryst. © BGS, NERC.

(ELC_8_P5) Detail of a pseudomorph after olivine within the olivine-clinopyroxene-macrophyric basalt, exposed in the Blaikie Heugh escarpment. Finger (resting on white lichen) is pointing toward a red-brown pseudomorphs after olivine. Fine mm-scale ribs, cutting across the pseudomorph from left to right, may represent relict crystal fractures of the original olivine. © BGS, NERC.

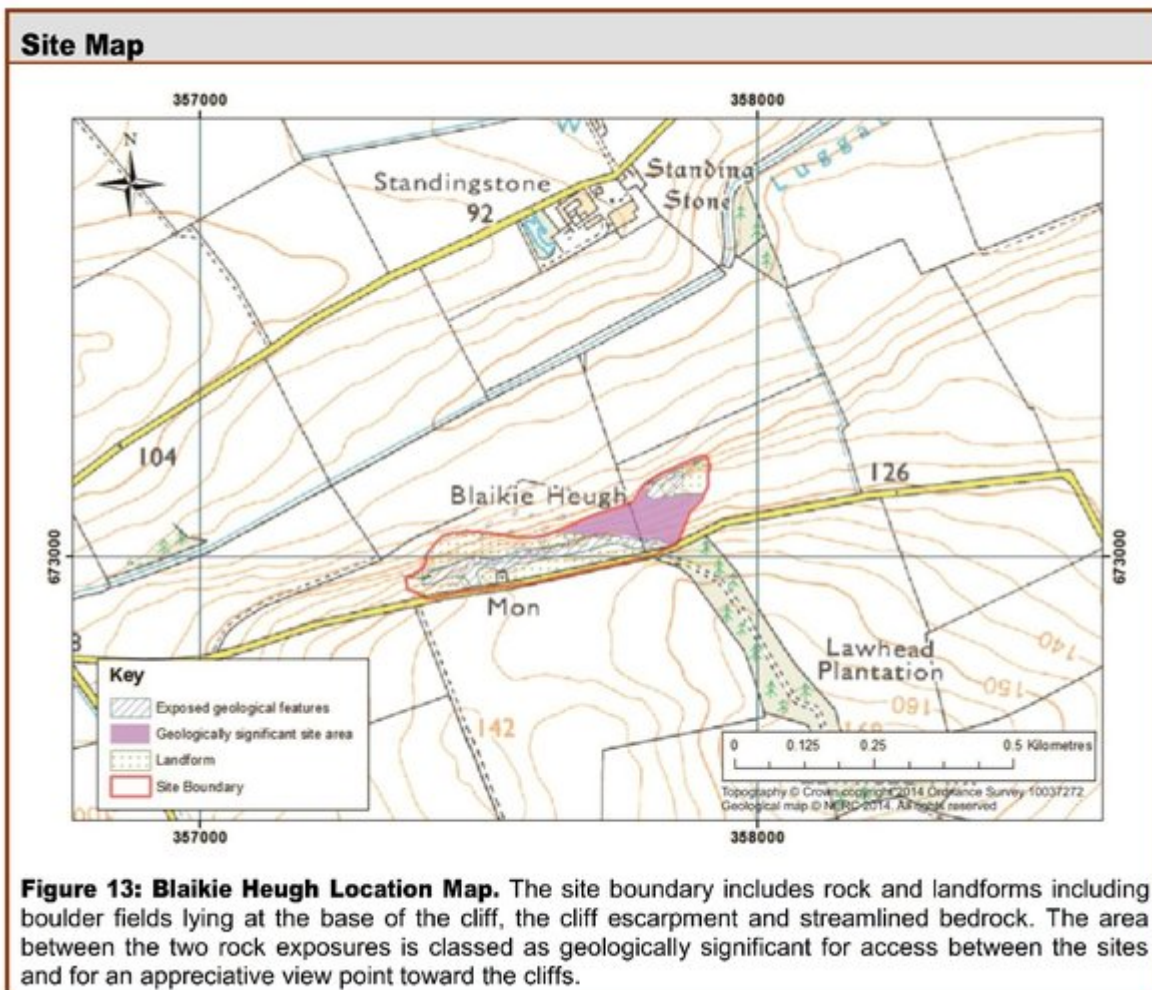
(ELC_8_P6) Minor escarpment to the east of Blaikie Heugh escarpment, displaying a massive, well-jointed trachybasalt flow. Photo looking east. © BGS, NERC.

(ELC_8_P7) Detailed view of the trachybasalt flow. The rock is stained red, due to oxidisation of (pseudomorphed) hornblende phenocrysts. © BGS, NERC.

[References](#)



(ELC_8_P1) View of Traprain Law and Berwick Law from Balfour Monument, looking north-east. © BGS, NERC.



(Figure 13) *Blaikie Heugh Location Map. The site boundary includes rock and landforms including boulder fields lying at the base of the cliff, the cliff escarpment and streamlined bedrock. The area between the two rock exposures is classed as geologically significant for access between the sites and for an appreciative view point toward the cliffs.*



(ELC_8_P2) *View of Blaikie Heugh escarpment and monument, looking west. The rocks forming the escarpment are of 'Craiglockhart' basalt, an olivine-clinopyroxene-macrophyric basalt. © BGS, NERC.*



(ELC_8_P3) Faint columnar jointing seen in olivine-clinopyroxene-macrophyric basalt, exposed in the escarpment of Blaikie Heugh. Photo looking south-east © BGS, NERC.



(ELC_8_P4) Detail of an augite (type of pyroxene) phenocryst within the olivine-clinopyroxene-macrophyric basalt, exposed in the Blaikie Heugh escarpment. Finger (resting on white lichen) is pointing toward a black, equant augite phenocryst. © BGS, NERC.



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(ELC_8_P6) Minor escarpment to the east of Blaikie Heugh escarpment, displaying a massive, well-jointed trachybasalt flow. Photo looking east. © BGS, NERC.



(ELC_8_P7) Detailed view of the trachybasalt flow. The rock is stained red, due to oxidisation of (pseudomorphed) hornblende phenocrysts. © BGS, NERC.