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## 3.4.9 Quartz-dolerite sills and dykes

Quartz-dolerite (and Quartz-tholeiite) has been intruded into the Carboniferous sedimentary and volcanic strata of West Lothian both as sills and as dykes.

Quartz-dolerite sills and dykes comprise approximately 1,949 hectares, or 4.5% of the surface area of West Lothian. They crop out in the north and north-west part of the district (Figure 124).

The quartz-dolerite sills of West Lothian form part of the south-western margin of the Midland Valley Sill Complex. The outcrop of this major sill is imperfectly annular and characteristically dips inward towards the centre of the carboniferous sedimentary basin. It forms part of a major suite of high-level tholeiitic intrusions extending throughout Scotland and into the North Sea. On the basis of radiometric dates of 302 to 297 Ma, the suite is generally accepted as being of late Westphalian to Stephanian age (Figure 1).

### 3.4.9.1 Soils, habitats and land use

Unlike the alkali-dolerite sills, most quartz-dolerite sills have a distinct landform expression, normally forming distinct areas of higher ground e.g. the ridge from Eastcraigs Hill [NS 904 680] to Gowanbank [NS 916 713] north-west of Armadale, Tophichen Hills [NS 975 726] (Figure 151), The Knock [NS 991 711] — (Figure 126), (Figure 127), (Figure 128), (Figure 129), Cockleroy [NS 989 744] (Figure 135), (Figure 136), (Figure 137), (Figure 138), and Binny Craig [NT 043 735] (Figure 142)–143, 150). Soil types are very variable on the sill outcrops, but poorly-drained non-calcareous gleys dominate the till covered parts and free to imperfectly-drained brown forest soils and soil complexes are most common on the till-free hill tops and slopes (Figure 6). Agriculture, particularly rough grazing is the main land use on the quartz-dolerite sill areas. Like the Bathgate Group, the hilly topography with its variable microclimate and variety of soil types and drainage status has probably resulted in a wide variety of habitats.

### 3.4.9.2 Biodiversity

Conservation biodiversity interest is concentrated in (Figure 12) the mixed biological and geological SSSI at Petershill [NS 985 693]–[NS 990 710] and the biological SSSIs at Carriber Glen [NS 968 751], the raised bog at Tailend Moss [NT 00 67] (see section 3.4.10.10) and Calderwood [NT 07 66]. At the Calderwood SSSI, the valleys of the Murieston Water and Linhouse Water merge together at the northern end of the site to enclose an area of mixed birch woodland and grassland on a plateau with a northerly slope. The sides of both river valleys contain long established mixed deciduous woodland and in the floor of the Linhouse Valley oxbow lochans have developed into rich marsh communities. There are two small ponds in the northern section with emergent plant species. The valley woodlands are dominated by deciduous trees particularly Ash and Elm but including Oak, Hazel, Rowan and Gean. The ground flora is dominated by herbs characteristic of long established woods. This habitat is restricted and declining within West Lothian. Much of the ground between the valleys has developed into Birch Woodland with a mixture of Ferns *Dryopteris* spp. grasses *Holcus* spp. *Agrostis* spp. and Bracken *Pteridium aquilinum* underlying. The bracken cover increases in the more open areas and grades into unimproved neutral grassland rich in herbs such as Common Knapweed *Centaurea nigra*, Harebell *Campanula rotundifolia*, Lesser Stitchwort *Stellaria graminea* and Meadow Vetchling *Lathyrus pratensis*. The marsh areas in the valley floor are diverse in species. The wettest sections contain Meadowsweet *Filipendula ulmaria*, Valerian *Valeriana officinalis*, Reed Canary grass *Phalaris arundinacea* and several species of sedge. On drier ground mixed willow carr has become established. Marsh habitats of this type are localised in West Lothian and are also declining.

There is one Listed Wildlife Site (Figure 12) — Cockleroy Hill [NS 987 747] and Wildlife Sites at: Balvormie Meadow [NS 997 738]; Cockleroy Wood [NS 984 748]; Drumbeg Moss [NS 870 683]; Easter Redburn Moss [NS 888 675]; Lochcote Reservoir [NS 978 737]; Mains Burn [NT 033 735] Mosshouse Farm Moss [NS 882 669]; Silvermines Quarry [NS 991 714]; Tailend Moss [NT 009 678]; Witch Craig Meadow [NS 988 725]. There are also over 20 areas of Ancient Woodland and around 12 areas of Semi-Natural Woodland (Figure 12).

### 3.4.9.3 West Lothian Geodiversity Sites

Given the limited coverage of quartz-dolerite sill rocks, the sites described below are considered to well represent the geodiversity of these rocks.

[38 The Knock](#)

[39 Witch Craig Viewpoint](#)

[40 Cockleroy](#)

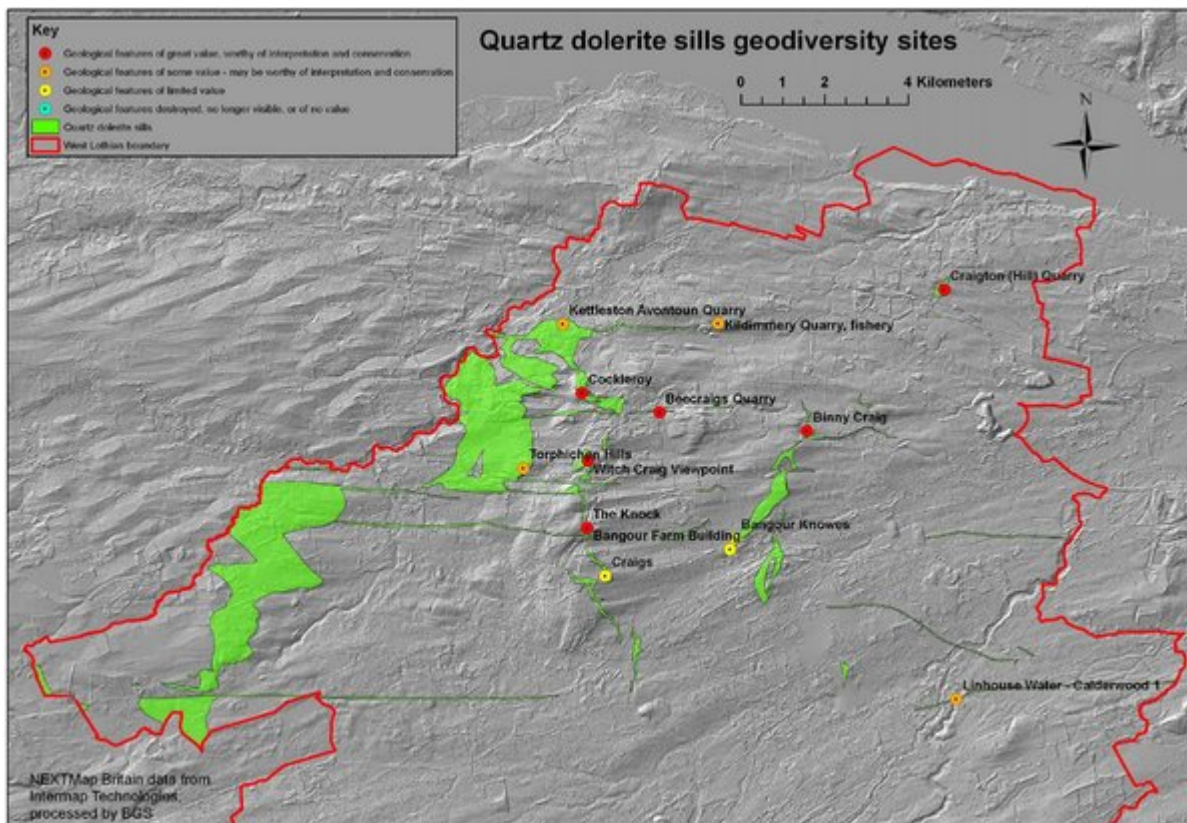
[41 Beecraigs Quarry](#)

[42 Binny Craig](#)

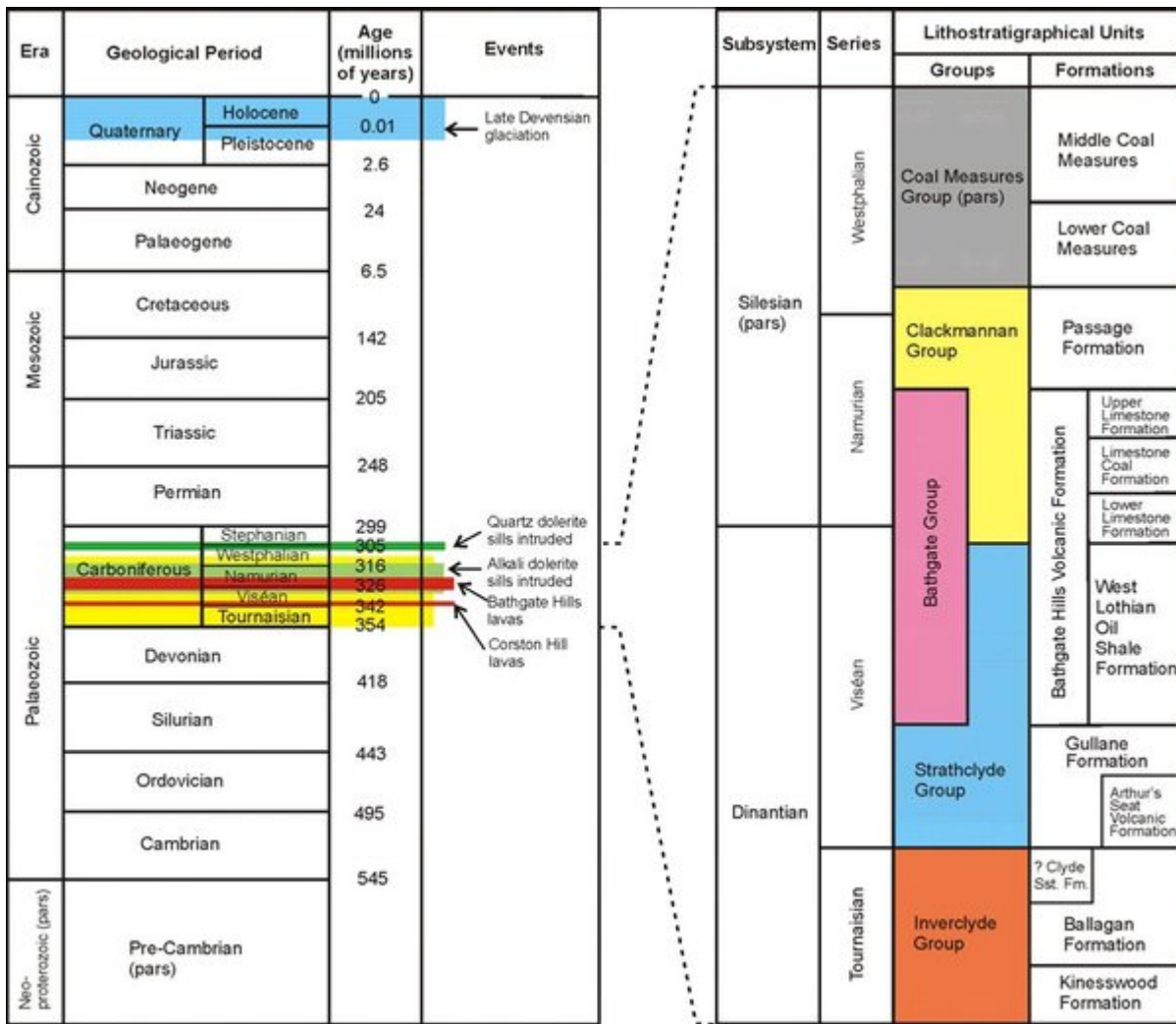
[43 Kildimmery Fishery Quarry](#)

[44 Craighton \(Hill\) Quarry](#)

[45 Linhouse Water - Calderwood 1](#)



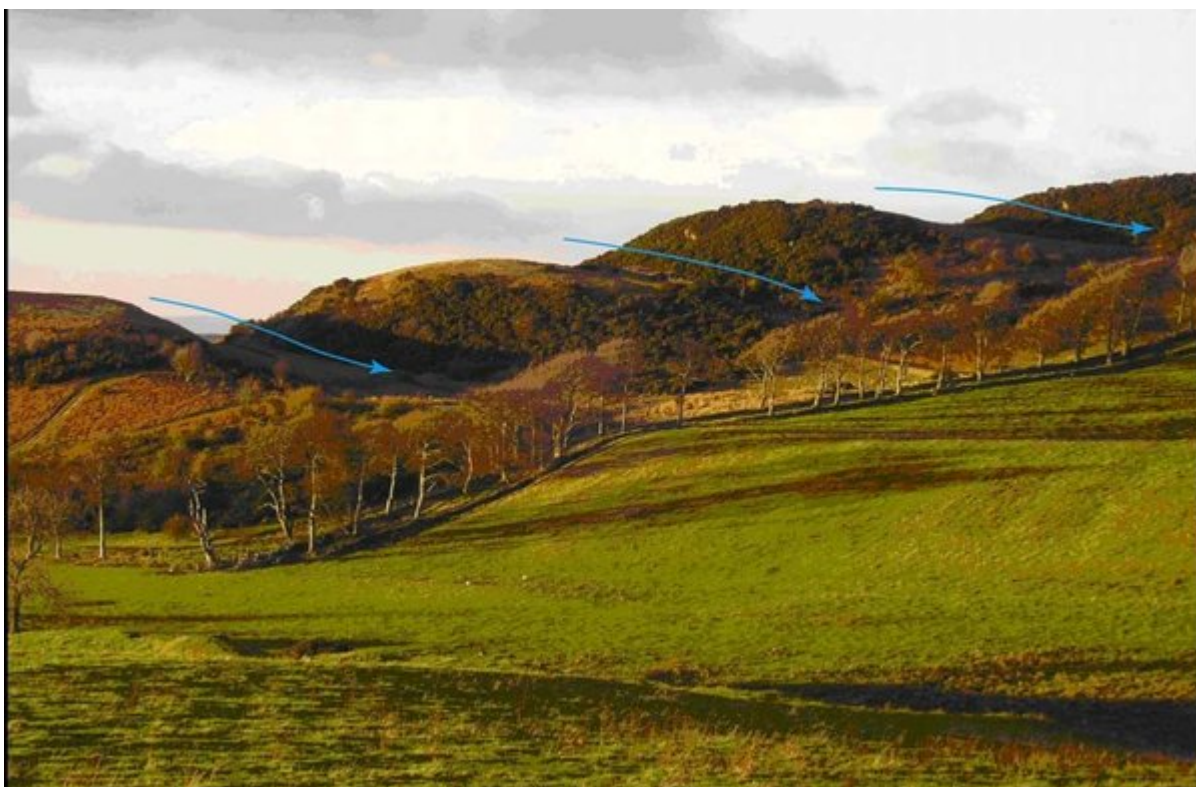
(Figure 124) Quartz-dolerite sills geodiversity sites of West Lothian.



**A**

**B**

(Figure 1) A: Part of the geological timescale with colour bars representing the rocks of West Lothian. Yellow bar = Carboniferous sedimentary rocks; red bars = extrusive igneous rocks; green bars = intrusive igneous rocks. B: Classification of Carboniferous strata in West Lothian.



*(Figure 151) Deep channels cut by glacial meltwater along faults in Torphichen Hill [NS 975 725] (WLGS 46).*



*(Figure 126) The Knock from the north-west [NS 9906 7114] (WLGS 38). Quartz-dolerite sill on the summit intrudes basalt lavas of the Bathgate Hills Volcanic Formation.*



*(Figure 127) Quartz-dolerite sill, south-east face of The Knock [NS 9906 7114] (WLGS 38). The chilled contact with the basalt lavas of the Bathgate Hills Volcanic Formation can be seen here.*



*(Figure 128) Sphaeroidal weathering in dolerite on The Knock [NS 9906 7114] (WLGS 38).*



*(Figure 129) Millenium Stone circle, Knock Farm [NS 9912 7130] (WLGS 38). Cairnpapple Hill on top left (WLGS 20).*



(Figure 135) A misleading (pre- outdoor access code) sign on Cockleroy [NS 9894 7437] (WLGS 40).



(Figure 136) Quartz-dolerite outcropping on the slopes of Cockleroy [NS 9894 7437] (WLGS 40). Cockleroy is composed of Bathgate Hills Volcanic Formation basalts intruded by a quartz-dolerite sill.



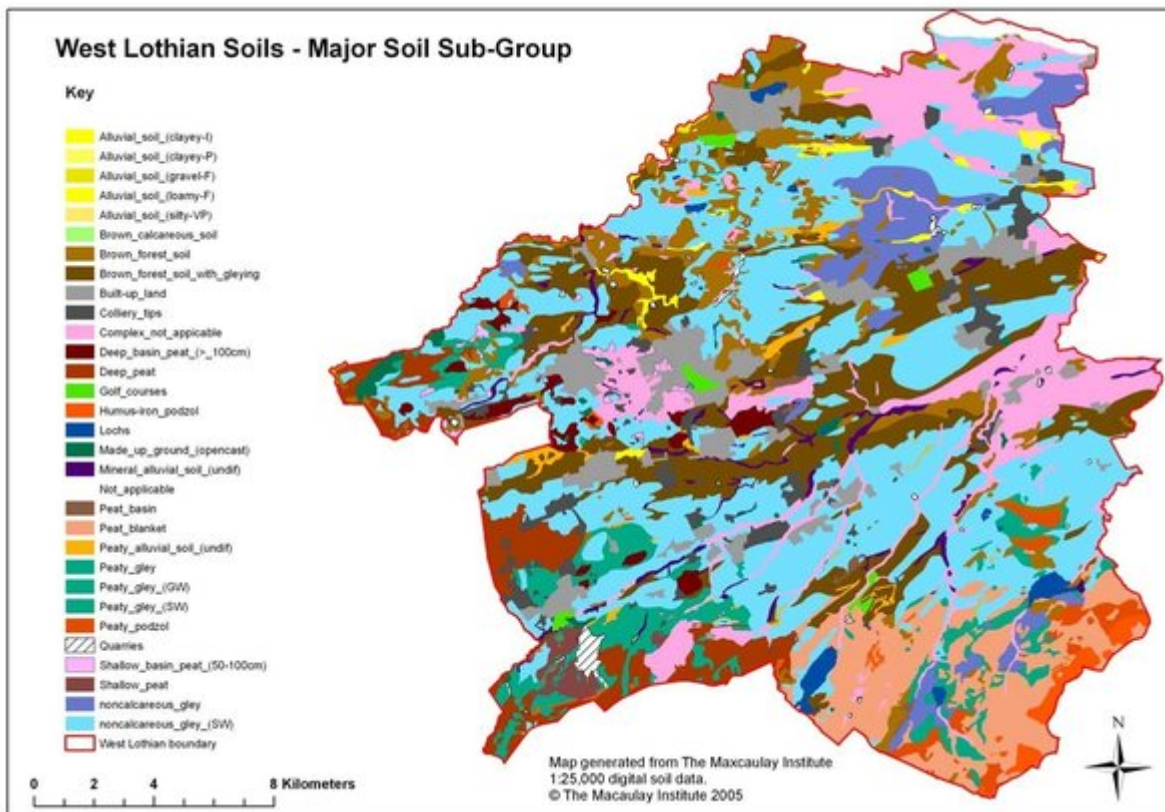
(Figure 137) View west from Cockleroy [NS 9894 7437] (WLGS 40). Cockleroy is composed of Bathgate Hills Volcanic Formation basalts intruded by a quartz-dolerite sill.



(Figure 138) Cockleroy [NS 9894 7437] (WLGS 40) rocks and flowers A: Vesicular basalt B: Scottish Bluebell (*Campanula rotundifolia*).



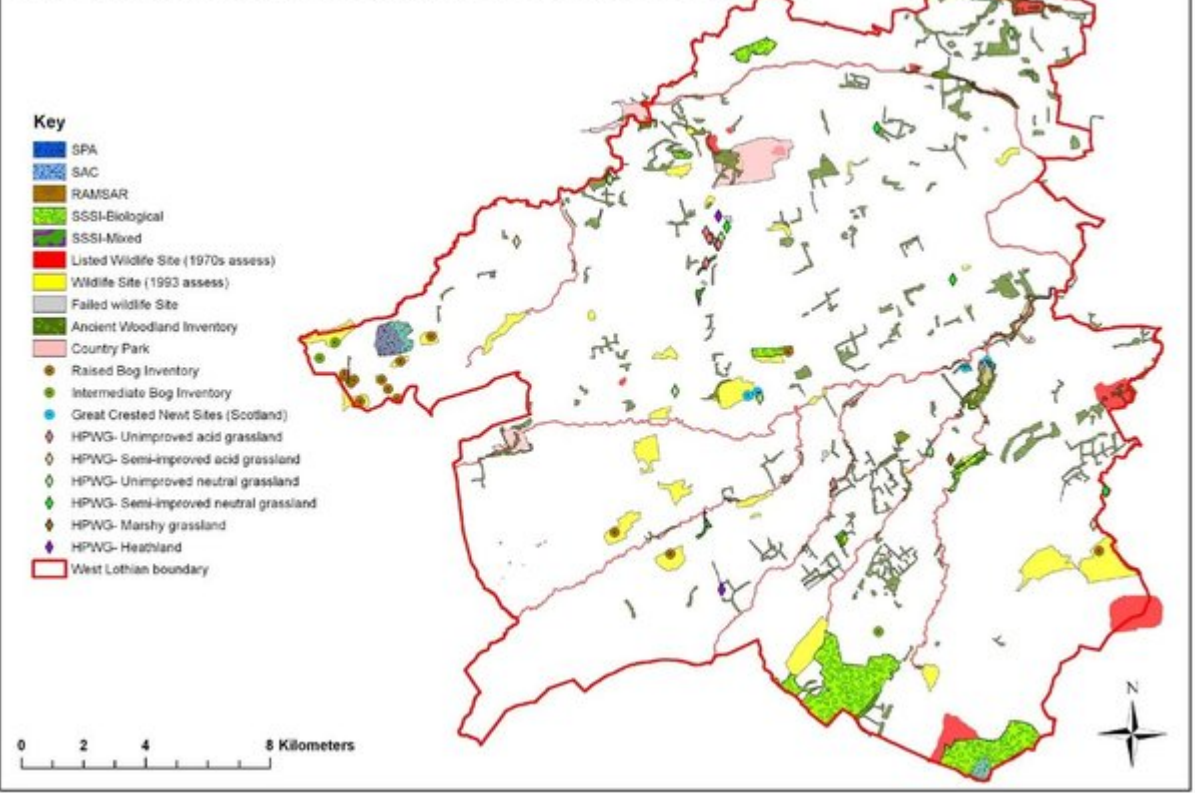
(Figure 142) Panoramic view Binny Craig from the south — a classic 'Crag and Tail' landform sculpted from a basalt sill intruding the West Lothian Oil Shale Formation. 'Crag' on left and 'Tail' on right [NT 0432 7346] (WLGS 42).



(Figure 6) Major Soil Sub-Groups of West Lothian. © The Macaulay Institute 2005.



# West Lothian biological designations & other biodiversity sites



(Figure 12) Biological designations and other biodiversity sites of West Lothian.