3.4.4 Bathgate Group rocks

The Bathgate Group is a persistent group of volcanic rocks which interdigitate with the sedimentary rocks of the upper part of the Strathclyde Group and the larger part of the Clackmannan Group ((Figure 1)B). In West Lothian the group comprises the Bathgate Hills Volcanic Formation.

Outcrops of Bathgate Group rocks comprise approximately 3,185 hectares, or 7.4% of the surface area of West Lothian. They crop out in a north–south strip from north of Linlithgow to just south of Bathgate (Figure 64).

The Bathgate Hills Volcanic Formation occurs in the north-western part of the district where it is intercalated with and replaces sedimentary formations. It is up to 600 m thick. The basal beds of the formation are tuffs which lie at a widespread horizon just above the Two Foot Coal in the Hopetoun Member. Towards the top of the volcanic pile, olivine-basalt lava becomes predominant, occurring in layers or flows with vesicular or rubbly tops. The central parts of lava flows are commonly hard, compact and very fresh, hence well exposed at outcrop. The top and base of flows are typically amygdaloidal and/or scoriaceous with much hydrothermal alteration and are consequently less well exposed, giving rise to a conspicuous ridged topography (trap featuring) in places which reflects the alternating hard and 'soft' parts of the flows. The hard lavas and tuffs of the Bathgate Hills Volcanic Formation have resisted glacial erosion better than the softer sedimentary rocks of the Strathclyde, Clackmannan and Coal Measures Groups, resulting in the uplands of the Bathgate Hills, which reach an altitude of 312 m at Cairnpapple.

Coals and seatclays with rootlets are commonly developed directly on top of lava flows and fragments of fossil wood have been found incorporated in the base of flows, including some 'trunks' in apparent position of growth recorded at Grangepans by Cadell in 'The Story of the Forth' in 1925. In the northern part of the outcrop, between Linlithgow and Bo'ness, there is evidence to suggest that magma was erupted on to, or even intruded into, wet unconsolidated sediments. Irregular blocks of lava and rounded pillow-like masses are wrapped in a matrix of disturbed sediment, and sediment infills cavities or occurs as clasts within the lavas. Petrographically the lavas are remarkably uniform. Large areas of basalt are exposed in a belt running through the Riccarton Hills but this belt dies out to the north. A more widespread belt of basaltic rocks lies to the west and is exposed on the hills to the north and south of Linlithgow. The basalts and tuffs are thought to have erupted from local volcanic vents, such as those now exposed to the south-east of the extrusive rocks at Tar Hill and The Binns. These vents are now filled with volcaniclastic rocks (agglomerate).

The overall regional setting of the Bathgate Hills volcanicity has been described and a detailed account given of the interaction between eruption, erosion, clastic deposition and carbonate precipitation in Lower Limestone Formation time. Jameson envisaged the volcanic rocks accumulating above sea level to form islands surrounded by coastal plains, restricted lagoons and a variety of carbonate reef facies, which accumulated during longer periods of volcanic quiescence. This succession was terminated by subaerial exposure and erosion followed by renewed volcanic activity.

3.4.4.1 Soils, habitats and land use

Bedrock with brown forest soils occurs on most of the hill tops, though most of the lower ground and the lee slopes of the crags are till covered with non-calcareous gleys and brown forest soils with gleying present (Figure 6). The hilly topography with its variable microclimate and the greater variety of soil types and drainage status has probably resulted in a wider variety of habitats than any other part of West Lothian. Ley grassland, rough grazing, plantation forestry and the urban area of Linlithgow are the dominant land uses.

3.4.4.2 Biodiversity

Conservation biodiversity interest is concentrated in: the biological SSSIs at (Figure 12) Linlithgow Loch [NS 995 774]–[NT 009 778] (Figure 155) and part of Lochcote Marsh [NS 981 742]; the mixed biological and geological SSSIs at Firth of Forth (also a Ramsar site and SPA) and Petershill [NS 985 693–NS 990 710]; several areas of Ancient and Semi-Natural Woodland, the largest being Beecraigs Wood [NS 993 741].

There are also a number of Listed Wildlife Sites (Figure 12): Beecraigs Reservoir [NT 010 744]; Cockleroy Hill [NS 987 747]; Cockleroy Reservoir [NS 995 749]; the River Almond and its tributaries Breich Water, Harwood Water, Murieston Water and Linhouse Water; The Union Canal; Old Philpstoun Bing [NT 054 770]; Hopetoun Estate [NT 088 789].

The following are also Wildlife Sites (Figure 12): Balvormie Meadow [NS 997 738]; Bangour Reservoir [NT 012 719]; Bogburn Flood Lagoons [NS 977 677]; Cockleroy Wood [NS 984 748]; Easter Inch Moss [NT 003 664]; Linlithgow Marsh [NS 982 768]; Lochcote Reservoir [NS 978 737]; Petershill [NS 986 695]; Silvermines Quarry [NS 991 714]; Witch Craig Meadow [NS 988 725].

High Priority Wildflower Grasslands (Figure 12) are present at Cairnpapple Hill [NS 987 717] (Figure 65) and Knock [NS 988 715], [NS 992 715] (Figure 125).

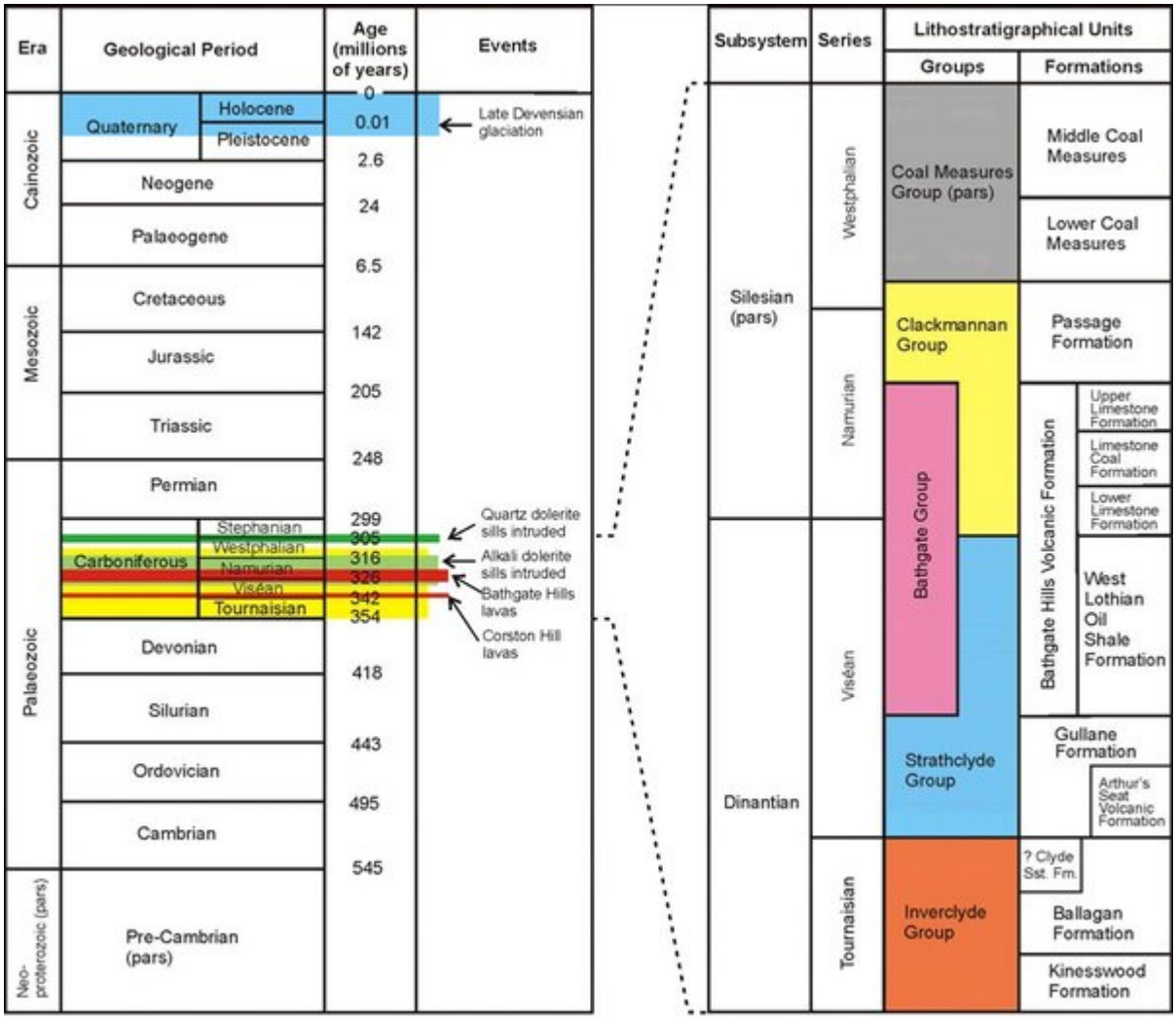
3.4.4.3 West Lothian Geodiversity Sites

Although the coverage of Bathgate Group rocks is limited, three sites described below are considered to be just about adequate to represent the group. Further quality sites may not exist.

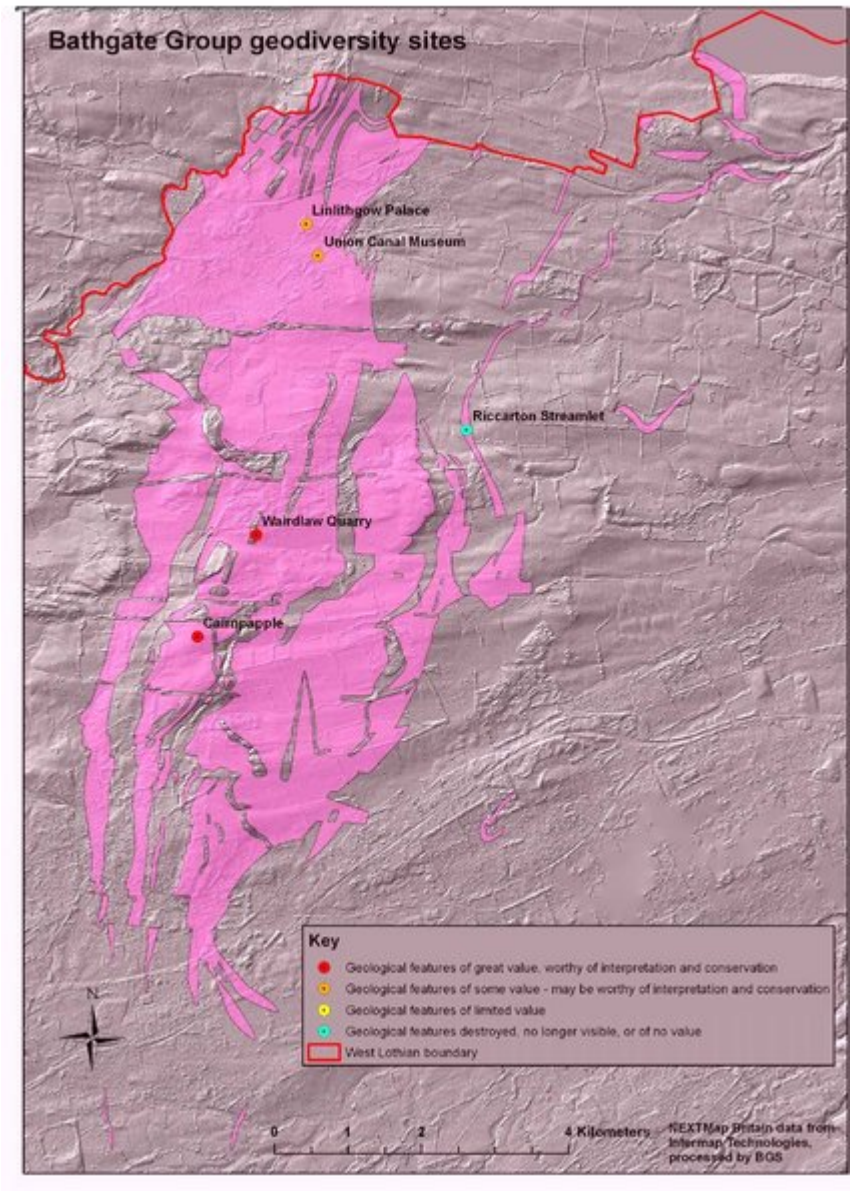
20 Cairnpapple Hill

21 Wairdlaw Quarry

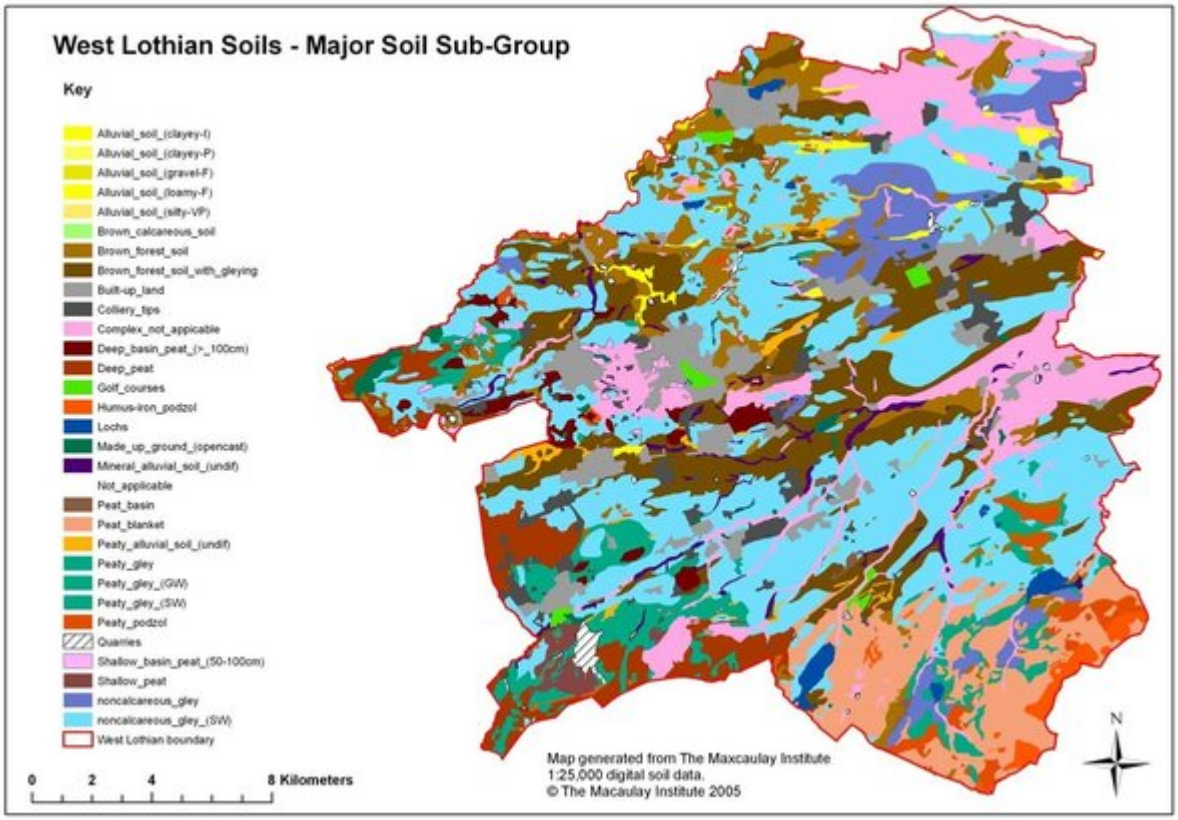
22 Union Canal Museum



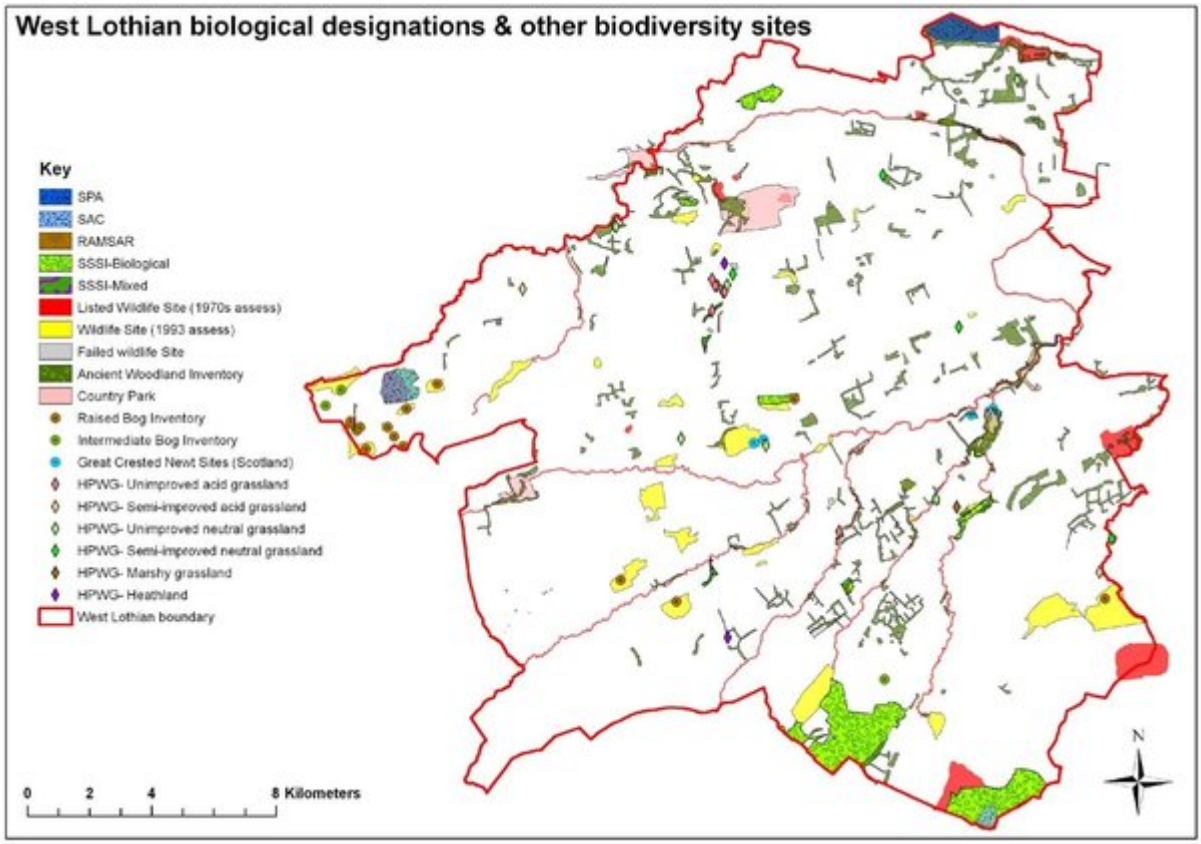
(Figure 1) A: Part of the geological timescale with colour bars representing the rocks of West Lothian. Yellow bar = Carboniferous sedimentary rocks; red bars = extrusive igneous rocks; green bars = intrusive igneous rocks. B: Classification of Carboniferous strata in West Lothian.



(Figure 64) Bathgate Group geodiversity sites of West Lothian.



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



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

(Figure 155) Linlithgow Loch and Linlithgow Palace. The loch is very large kettle hole formed by the melting of a large detached mass of ice trapped within glacial deposits [NT 004 776] (WLGS 47).

(Figure 65) Stone circle and burial cairn on Cairnpapple Hill, viewed from the south-west. Rock types used are mainly local — basalt from the Bathgate Hills Volcanic Formation and quartz-dolerite from nearby intrusions [NS 9872 7174] (WLGS 20).

(Figure 125) Panoramic view east to south-east from The Knock (305 m) [NS 9906 7114] (WLGS 38) towards Edinburgh and the Pentland Hills.