OR/15/028 Appendix 1: Methodology for subdividing bedrock groundwater bodies in Carboniferous sedimentary rocks of the Midland Valley

Ó Dochartaigh, B É, MacDonald, A M, Fitzsimons, V, and Ward, R. 2015. Scotland's aquifers and groundwater bodies . *British Geological Survey Internal Report*, OR/15/028.

The Carboniferous sedimentary aquifer in the Midland Valley, in the Central Belt, has more complex aquifer geometry and hydrogeology than other aquifers in Scotland, which have been exacerbated by the effects of mining; it is also in the most highly populated and industrialised part of the country; and because of this and the legacy of mining, is subject to more significant pollution pressures than most of the rest of the country.

Step 1 The Carboniferous sedimentary rocks in the Midland Valley were first subdivided according to whether they are coal bearing and have been extensively mined for coal in the past. Due to the complexity and high spatial variability of Carboniferous geology, certain different aquifer types were combined in the same groundwater body — in particular, mixed sequences of extrusive igneous and sedimentary rocks.

Step 2 Coal-bearing Carboniferous rocks were initially identified as the Clackmannan and Coal Measures groups. In some areas, very small adjacent outcrops of non-coal-bearing Carboniferous rocks were included with the coal bearing rocks for ease of mapping.

Step 3 These areas were subdivided along the lines of significant faults, particularly where available groundwater level information suggested that aquifers on either side of a fault were hydraulically separate.

Step 4 Additional structural information (for example, the location of anticlines) was used to further subdivide the Central and Fife Coalfields. In the Central Coalfield, the location of intrusive igneous dykes, which can act as hydraulic boundaries, were also used to subdivide ground- water bodies.

Step 5 The Passage Formation of the Clackmannan Group was defined as a separate groundwater body because of its significance as a highly productive aquifer with distinct hydrogeological properties — this is one of the only bedrock aquifers in Scotland to show significant intergranular flow.

Step 6 Remaining large groundwater bodies were divided along the boundary between the Clackmannan and Coal Measures groups.

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