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## Appendix 2 Earth science conservation

By J A McCurry

The dramatic coastline and landscapes of south-west Scotland are the product of almost 500 million years of geological evolution. Increasingly it is recognised that our ancient rock foundation provides the basis of an intricate ecological system upon which our soils, flora and fauna depend. In seeking to conserve a part of that system, whether it be the golden eagles of the Merrick or the salt marshes of the Solway, it is important to conserve the working system intact. To alter a part of the system is to affect the whole of it. This holistic approach to conservation is governed by the principle of sustainability: those activities we choose to operate within a landscape (agriculture, recreation, industry) should not permanently alter the systems already operating within that landscape. We face a choice whether to manage the landscape sustainably for present and future generations or to exploit it for short-term gain.

Within our landscape are geological and geomorphological features of particular importance to our understanding of how that landscape formed and operates. These locations are recognised as Sites of Special Scientific Interest (SSSIs). Prior to 1977 geological Sites of Special Scientific Interest were identified on an *ad hoc* basis with no systemised selection procedure. The Geological Conservation Review (GCR), completed between 1977 and 1989, was an attempt to rationalise the site selection process in Britain. Over 90 different subject areas were identified within British geology and, after wide consultation, the key sites critical to our understanding of each subject area were selected. A prerequisite for selection was that each site be of national or international importance. Over 50 geological Sites of Special Scientific Interest were identified in south-west Scotland as a result of this process (Figure 68). These sites are listed in (Table 6) under the Geological Conservation Review interest for which they were selected. Some sites such as the Girvan to Ballantrae Coast SSSI have multiple interests and appear in a number of categories. Other sites such as the Upper Solway Flats and Marshes SSSI are of joint geological and biological interest. By early 1994 all but three of the sites had been notified as Sites of Special Scientific Interest under the Wildlife and Countryside Act (1981) and as such are afforded a measure of legislative protection from activities that may damage their geological interest. Designation as a Site of Special Scientific Interest does not entail an automatic right of access and the landowners permission should be sought in the normal way before visiting a site. A detailed account of the geology of each site is being published in a series of volumes covering each of the Geological Conservation Review subject areas. Two volumes incorporating sites in south-west Scotland have already been published: *Caledonian Structures of Britain* (Treagus, 1992) and *Quaternary of Scotland* (Gordon et al. 1993). Although the network of sites selected as SSSI's will remain broadly intact, it is envisaged that through time advances in research will necessitate a re-evaluation of the network. The effects of such progress in research on the status of two pre-GCR Sites of Special Scientific Interest in south-west Scotland, at Portayew Bay and Corsewall Point, have recently been examined (McCurry, 1994).

(Figure 68) Location of geological Sites of Special Scientific Interest (SSSIs) in south-west Scotland. Full details are listed in (Table 6).

|    |                               |    |                        |
|----|-------------------------------|----|------------------------|
| 1  | Ailsa Craig (G/B)             | 25 | Leadhills-Wanlockhead  |
| 2  | Back Bay to Carghidown (G/B)  | 26 | Lea Larks              |
| 3  | Benbeoch                      | 27 | Locharbriggs Quarry    |
| 4  | Bigholm Burn                  | 28 | Maidens-Doonfoot (G/B) |
| 5  | Blair Farm                    | 29 | Merrick Kells (G/B)    |
| 6  | Borgue Coast (G/B)            | 30 | Millenderdale          |
| 7  | Byne Hill                     | 31 | Nith Bridge            |
| 8  | Carron Water and Hapland Burn | 32 | Penton Linns           |
| 9  | Clatteringshaws Dam Quarry    | 33 | Penwhapple Burn        |
| 10 | Corsewall Point               | 34 | Pibble Mine            |

|    |                                   |    |                                      |
|----|-----------------------------------|----|--------------------------------------|
| 11 | Craighead Quarry                  | 35 | Polehote Burn and Polneul Burn       |
| 12 | Cree Estuary (G/B)                | 36 | Port Logan                           |
| 13 | Cruggleton Bay                    | 37 | Raven Gill                           |
| 14 | Dunaskin Glen                     | 38 | River Esk, Glencartholm              |
| 15 | Fountainhead-Hare Hill            | 39 | Roughneuk Quarry                     |
| 16 | Girvan to Ballantrae Coast        | 40 | Sgavoch                              |
| 17 | Grennan Bay                       | 41 | Shoulder O'Craig                     |
| 18 | Isle of Whithorn Bay              | 42 | South Threave                        |
| 19 | Knockgardner                      | 43 | Talnotry Mine                        |
| 20 | Knocklaugh                        | 44 | Torrs-Masons Walk (G/B)              |
| 21 | Knockormal Hill                   | 45 | Torrs Warren-Luce Sands (G/B)        |
| 22 | Laggan Burn                       | 46 | Turnberry Lighthouse-Port Murray     |
| 23 | Lagrae Burn                       | 47 | Upper Solway Flats and Marshes (G/B) |
| 24 | Langholm-Newcastleton Hills (G/B) | 48 | West Burrow Head                     |

(Table 6) Geological Sites of Special Scientific Interest, south-west Scotland SSSI (located by number in (Figure 68)) For explanation of geological lines see (Figure 67)

| SSSI (located by number in Figure 68) | District  | NGR              | Excursion       |
|---------------------------------------|---|------------------|-----------------|
| 16                                    | Girvan to Ballantrae Coast Balcreuchan Port, Bennane Head   | Kyle and Carrick | [NX 097 875] 8  |
| 37                                    | Raven Gill  | Clydesdale       | [NS 923 199]    |
| 10                                    | Corsewall Point   | Wigtown          | [NX 000 729] 15 |
| 11                                    | Craighead Quarry  | Kyle and Carrick | [NS 232 012] 8  |
| 16                                    | Girvan to Ballantrae Coast Girvan Foreshore, Kennedy's Pass | Kyle and Carrick | [NX 147 931] 8  |
| 22                                    | Laggan Burn   | Kyle and Carrick | [NX 204 947]    |
| 42                                    | South Threave   | Kyle and Carrick | [NS 251 038]    |
|                                       | ORDOVICIAN IGNEOUS  |                  |                 |
|                                       | Byne Hill   | Kyle and Carrick | [NX 180 945]    |
|                                       | Girvan to Ballantrae Coast                                  | Kyle and Carrick |                 |
|                                       | Balcreuchan Port to Port Vad                                |                  | [NX 100 878] 8  |
|                                       | Bennane Lea   |                  | [NX 091 861] 8  |
|                                       | Games Loup  |                  | [NX 103 880]    |
| 20                                    | Knocklaugh  | Kyle and Carrick | [NX 168 920]    |
| 21                                    | Knockormal Hill   | Kyle and Carrick | [NX 138 890]    |
| 30                                    | Millenderdale   | Kyle and Carrick | [NX 177 905]    |
| 40                                    | Sgavoch   | Kyle and Carrick | [NX 073 808]    |

|    |  |                            |              |       |
|----|--|----------------------------|--------------|-------|
|    | LLANDOVERY   |                            |              |       |
| 5  | Blair Farm   | Kyle and Carrick           | [NS 325 024] |       |
| 16 | Girvan to Ballantrae<br>Coast Woodland Point           | Kyle and Carrick           | [NX 169 953] | 8     |
| 33 | Penwhapple Burn  | Kyle and Carrick           | [NX 230 984] |       |
| 39 | Roughneuk Quarry                                       | Kyle and Carrick           | [NS 270 040] |       |
|    | WENLOCK  |                            |              |       |
| 6  | Borgue Coast Meikle<br>Ross                            | Stewartry                  | [NX 640 449] | 5     |
| 19 | Knockgardener  | Kyle and Carrick           | [NS 355 036] |       |
| 44 | Torr's?Masons Walk                                     | Stewartry                  | [NX 676 465] | 11    |
|    | CALEDONIAN<br>STRUCTURES OF<br>THE SOUTHERN<br>UPLANDS |                            |              |       |
| 2  | Back Bay to<br>Carghidown                              | Wigtown                    | [NX 368 394] | 13    |
| 6  | Borgue Coast<br>Barlocco                               | Stewartry                  | [NX 585 485] | 5     |
| 13 | Crugleton Bay  | Wigtown                    | [NX 477 448] |       |
| 17 | Grennan Bay  | Wigtown                    | [NX 074 438] | 15,18 |
| 18 | Isle of Whithorn Bay                                   | Wigtown                    | [NX 476 365] | 13    |
| 48 | West Burrow Head                                       | Wigtown                    | [NX 452 341] | 13    |
|    | CALEDONIAN<br>IGNEOUS                                  |                            |              |       |
| 9  | Clatteringshaws Dam<br>Quarry                          | Stewartry                  | [NX 548 754] | 16    |
| 26 | Lea Larks  | Stewartry                  | [NX 563 690] |       |
| 29 | Merrick-Kells?Loch Dee                                 | Wigtown and Stewartry      | [NX 466 847] | 7,16  |
| 41 | Shoulder O'Craig                                       | Stewartry                  | [NX 663 491] | 5     |
|    | OLD RED<br>SANDSTONE<br>IGNEOUS                        |                            |              |       |
| 28 | Maidens?Doonfoot<br>Culzean Harbour                    | Kyle and Carrick           | [NS 231 102] |       |
|    | Dunure Castle  |                            | [NS 252 159] |       |
| 46 | Turnberry<br>Lighthouse?Port Murray                    | Kyle and Carrick           | [NS 196 072] |       |
|    | DINANTIAN OF<br>SCOTLAND                               |                            |              |       |
| 28 | Maidens-Doonfoot<br>Bracken Bay?Longhill<br>Point      | Kyle and Carrick           | [NS 292 188] |       |
| 32 | Penton Linns   | Annandale and Eskdale      | [NY 434 774] | 1     |
| 47 | Upper Solway Flats and<br>Marshes Kirkbean             | Nithsdale                  | [NX 987 563] | 10    |
|    | WESTPHALIAN  |                            |              |       |
| 14 | Dunaskin Glen  | Cumnock and Doon<br>Valley | [NS 454 088] |       |
| 23 | Lagrae Burn  | Nithsdale                  | [NS 705 153] |       |
| 35 | Polehote Burn and<br>Polneul Burn                      | Nithsdale                  | [NS 688 123] |       |

|    |  |   |    |
|----|--|---|----|
| 38 | River Esk,<br>Glencarholm<br>Byre Burn                       | Annandale and Eskdale<br>[NY 389 778]                 |    |
|    | ARTHROPODA   |   |    |
| 38 | River Esk,<br>Glencarholm                                    | Annandale and Eskdale [NY 376 796]                    |    |
|    | PALAEOZOIC<br>PALAEOBOTANY                                   |   |    |
| 14 | Dunaskin Glen  | Cumnock and Doon<br>Valley [NS 454 088]               |    |
| 38 | River Esk,<br>Glencarholm                                    | Annandale and Eskdale [NY 376 796]                    |    |
|    | PERMIAN?CARBONIFEROUS<br>FISH/AMPHIBIA                       |   |    |
| 38 | River Esk,<br>Glencarholm                                    | Annandale and Eskdale [NY 376 795]                    |    |
|    | PERMIAN?CARBONIFEROUS<br>IGNEOUS                             |   |    |
| 3  | Benbeoch   | Cumnock and Doon<br>Valley [NS 492 085]               |    |
| 8  | Carron Water and<br>Hapland Burn                             | Nithsdale [NS 887 024]                                | 2  |
| 24 | Langholm?Newcastleton<br>Hills                               | Annandale and Eskdale [NY 423 902]                    | 1  |
| 28 | Maidens?Doonfoot<br>Heads of Ayr                             | Kyle and Carrick<br>[NS 279 183]                      |    |
| 38 | River Esk,<br>Glencarholm                                    | Annandale and Eskdale [NY 376 799]                    |    |
|    | PERMIAN?TRIASSIC   |   |    |
| 8  | Carron Water and<br>Hapland Burn                             | Nithsdale [NS 887 024]                                | 2  |
| 27 | Locharbriggs Quarry  | Nithsdale [NS 990 010]                                | 9  |
|    | TERTIARY IGNEOUS   |   |    |
| 1  | Ailsa Craig  | Kyle and Carrick [NX 019 997]                         |    |
|    | QUATERNARY   |   |    |
| 4  | Bigholm Burn   | Annandale and Eskdale [NY 316 812]                    |    |
| 29 | Merrick-Kells?Loch Dee<br>Loch Dungeon                       | Stewartry [NX 525 846]                                |    |
|    | Round Loch of<br>Glenhead                                    | Wigtown [NX 450 804]                                  |    |
|    | The Tauchers   | Kyle and Carrick [NX 462 876]                         |    |
| 31 | Nith Bridge  | Cumnock and Doon<br>Valley [NS 594 141]               |    |
| 36 | Port Logan   | Wigtown [NX 092 402]                                  | 15 |
| 47 | Upper Solway Flats and<br>Marshes<br>Newbie<br>Redkirk Point | Annandale and Eskdale<br>[NY 165 651]<br>[NY 301 652] |    |
|    | COASTAL<br>GEOMORPHOLOGY<br>OF SCOTLAND                      |   |    |

|    |  |                            |              |               |
|----|--|----------------------------|--------------|---------------|
| 45 | Torr's Warren?Luce<br>Sands<br>SALTMARSH<br>MORPHOLOGY           | Wigtown                    | [NX 150 555] |               |
| 12 | Cree Estuary<br>Upper Solway Flats and                           | Wigtown                    | [NX 465 545] |               |
| 47 | Marshes Solway Firth<br>North Shore<br>MINERALOGY OF<br>SCOTLAND | Nithsdale                  | [NY 003 668] |               |
| 15 | Fountainhead?Hare Hill   | Cumnock and Doon<br>Valley | [NS 659 104] | 4, Appendix 1 |
| 25 | Leadhills?Wanlockhead  | Clydesdale                 | [NS 881 158] |               |
| 34 | Pibble Mine  | Wigtown                    | [NX 524 607] | Appendix 1    |
| 43 | Talnotry Mine  | Wigtown                    | [NX 478 703] | Appendix 1    |
| 47 | Upper Solway Flats and<br>Marshes<br>Southwick?Needle's<br>Eye   | Stewartry                  | [NX 915 561] | Appendix 1    |

Sites listed under the Geological Conservation Review interest for which they were selected. These are located on (Figure 68). The excursion number is given where an SSSI is included in one of the itineraries.

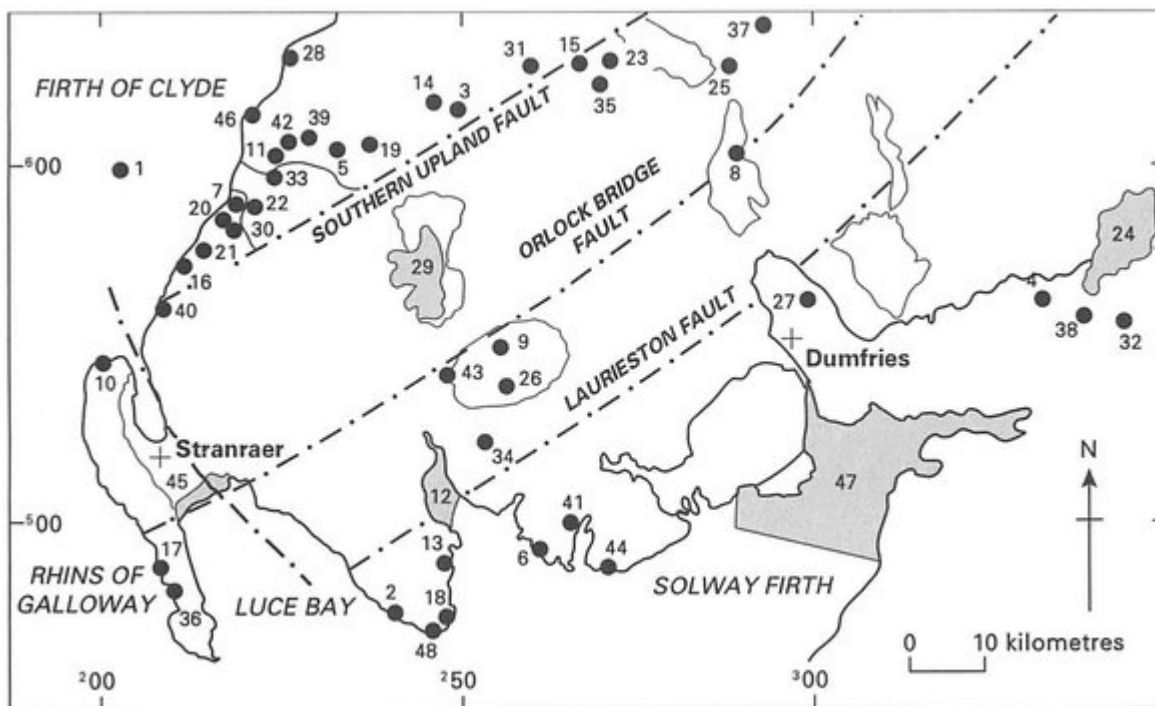
Any questions about our earth science heritage in south-west Scotland should be directed to the relevant SNH Area Office or the Earth Science Branch in Edinburgh.

Dumfries and Galloway Area, Scottish Natural Heritage, 106 High Street, 9 Dalbeattie, Kirkcudbrightshire, DG5 4HB

Earth Science Branch, Research and Advisory Services, Scottish Natural Heritage, 2 Anderson Place, Edinburgh, EH6 5NP Tel: 01556 610086 Tel: 0131 447 4784

**Note added in proof** A recent addition to this list is Morroch Bay on the west coast of the Rhins of Galloway (Wigtown District), [NX 017 525]. The conservation review interest is Caradoc—Ashgill stratigraphy and the locality is examined by Excursion 18 (3).

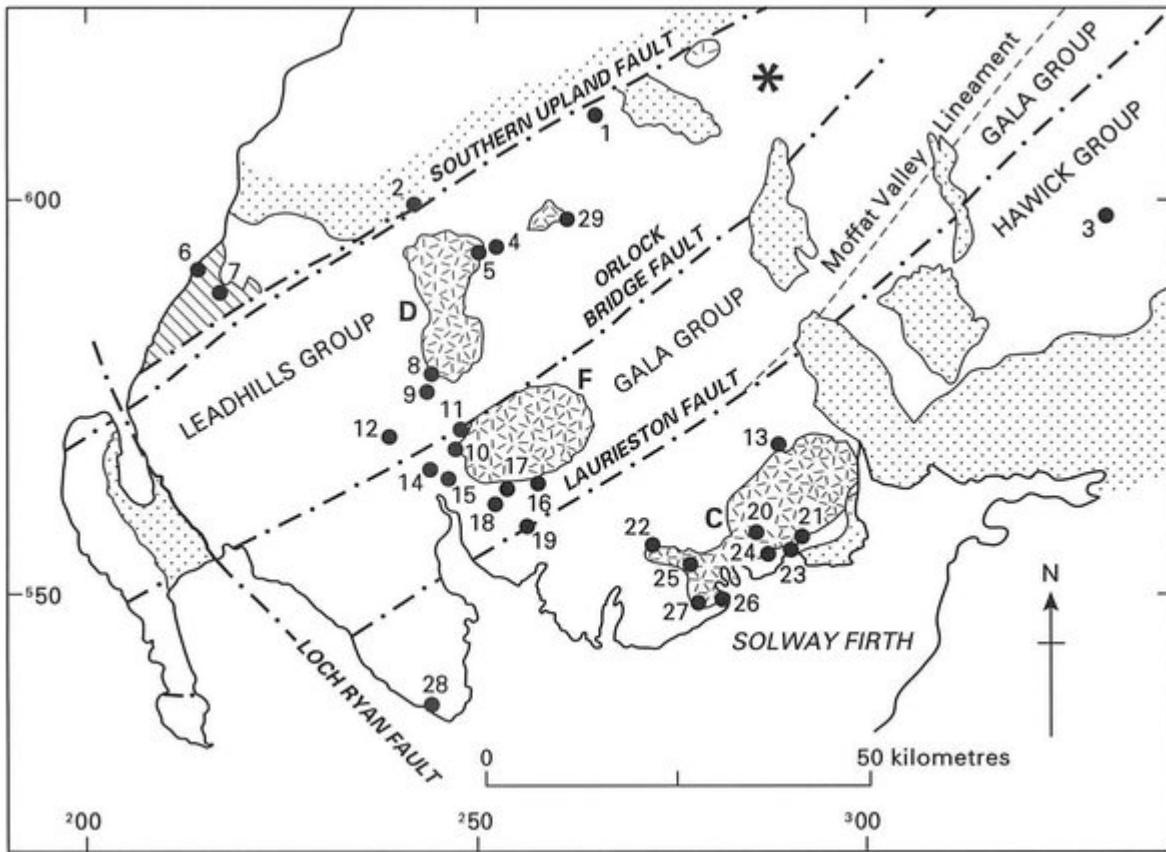
## References



(Figure 68) Location of geological Sites of Special Scientific Interest (SSSIs) in south-west Scotland. Full details are listed in (Table 6).

| SSSI (located by number in Figure 68)            | District             | NGR        | Excursion | SSSI                                    | District               | NGR        | Excursion | SSSI                                     | District               | NGR        | Excursion     |
|--|----------------------|------------|-----------|---|------------------------|------------|-----------|--|------------------------|------------|---------------|
| <b>ARMED-LANDSCAPE</b>                           |                      |            |           | <b>OLD RIVER-SOUTHERN UPLANDS</b>       |                        |            |           | <b>QUARRIES</b>                          |                        |            |               |
| 16 Givran to Ballantrae Coast                    | Kyle and Carrick     | NX 097 875 | 8         | 28 Maidens-Doofoot                      | Kyle and Carrick       | NS 231 102 |           | 4 Bigholm Burn                           | Annandale and Eskdale  | NY 516 812 |               |
| 37 Rann Gull                                     | Clydehead            | NS 923 199 |           | 46 Galloway Harbour                     |                        | NS 252 159 |           | 29 Merrick-Kells-Loch Dee                | Stewartry              | NX 525 846 |               |
| <b>CANYON-ARCADE</b>                             |                      |            |           | 46 Tarberry Lighthouse-Port Mary        | Kyle and Carrick       | NS 196 072 |           | Loch Duggan                              | Wigown                 | NX 450 804 |               |
| 11 Crowhead Point                                | Wigown               | NX 000 729 | 15        | <b>DISRUPTED OF SCOTLAND</b>            |                        |            |           | Round Loch of Glenhead                   | Kyle and Carrick       | NX 462 876 |               |
| 11 Crowhead Quarry                               | Kyle and Carrick     | NS 232 012 | 8         | 28 Maidens-Doofoot                      | Kyle and Carrick       | NS 292 188 |           | The Touchers                             | Cumock and Doon Valley | NS 594 143 |               |
| 16 Givran to Ballantrae Coast                    | Kyle and Carrick     | NX 147 911 | 8         | 32 Penton Linn                          | Annandale and Eskdale  | NY 434 774 | 1         | Nith Bridge                              | Wigown                 | NX 092 402 | 15            |
| 22 Laggan Burn                                   | Kyle and Carrick     | NS 204 947 |           | 47 Upper Solway Flats and Marshes       | Kidbarn                | NX 907 563 | 10        | Port Logan                               | Annandale and Eskdale  | NY 165 651 |               |
| 42 South Thorne                                  | Kyle and Carrick     | NS 251 038 |           | <b>WYTHOLDS</b>                         |                        |            |           | Upper Solway Flats and Marshes           | Annandale and Eskdale  | NY 301 652 |               |
| <b>ONCROUSSA GARDENS</b>                         |                      |            |           | 14 Dunakin Glen                         | Cumock and Doon Valley | NS 454 088 |           | <b>NEWBIE REDBICK DRIVE</b>              |                        |            |               |
| 7 Byle Hill                                      | Kyle and Carrick     | NX 180 945 |           | 23 Laggan Burn                          | Nithdale               | NS 705 153 |           |  |                        |            |               |
| 16 Givran to Ballantrae Coast                    | Kyle and Carrick     | NX 100 878 | 8         | 35 Polshair Burn and Polshair Burn      | Annandale and Eskdale  | NS 688 123 |           | <b>CENTRAL GEOMORPHOLOGY OF SCOTLAND</b> |                        |            |               |
| Balvornan Pass to Port Vial                      |                      | NX 091 861 | 8         | 38 River Esk, Glencarholm               | Annandale and Eskdale  | NY 389 778 |           | 45 Tross Warron-Luce Sands               | Wigown                 | NX 150 555 |               |
| Bennane Lea                                      | Kyle and Carrick     | NX 103 880 |           | <b>BYRE BURN</b>                        |                        |            |           | <b>SOUTHERN SCOTLAND</b>                 |                        |            |               |
| Garns Leap                                       | Kyle and Carrick     | NX 168 920 |           | 38 River Esk, Glencarholm               | Annandale and Eskdale  | NY 376 796 |           | 12 Carr Estuary                          | Wigown                 | NX 465 545 |               |
| 20 Knocklough                                    | Kyle and Carrick     | NX 138 890 |           | <b>ARRENDON</b>                         |                        |            |           | 47 Upper Solway Flats and Marshes        | Nithdale               | NY 003 668 |               |
| 21 Knockmeal Hill                                | Kyle and Carrick     | NX 177 905 |           | 38 River Esk, Glencarholm               | Annandale and Eskdale  | NY 376 796 |           | Solway Firth North Shore                 |                        |            |               |
| 30 Millodale                                     | Kyle and Carrick     | NX 073 808 |           | <b>PARSONS-CARONTRICKS ROAD SYSTEMS</b> |                        |            |           | <b>MIRACLES OF SCOTLAND</b>              |                        |            |               |
| 40 Sprouck                                       | Kyle and Carrick     | NS 325 824 |           | 38 River Esk, Glencarholm               | Annandale and Eskdale  | NY 376 795 |           | 15 Fountainhead-Ham Hill                 | Cumock and Doon Valley | NS 659 104 | 4, Appendix 1 |
| <b>LANDSCAPE</b>                                 |                      |            |           | <b>PARSONS-CARONTRICKS</b>              |                        |            |           | 25 Leadhills-Warlockhead                 | Clydehead              | NS 881 158 | Appendix 1    |
| 5 Bar Farm                                       | Kyle and Carrick     | NX 310 953 | 8         | 14 Dunakin Glen                         | Cumock and Doon Valley | NS 454 088 |           | 34 Fiddle Mine                           | Wigown                 | NX 478 703 | Appendix 1    |
| 16 Givran to Ballantrae Coast                    | Kyle and Carrick     | NX 230 964 |           | 38 River Esk, Glencarholm               | Annandale and Eskdale  | NY 376 796 |           | 43 Talnoy Mine                           | Stewartry              | NX 915 561 | Appendix 1    |
| 33 Pineshapple Burn                              | Kyle and Carrick     | NX 270 040 |           | <b>PARSONS-CARONTRICKS BENSICK</b>      |                        |            |           | Upper Solway Flats and Marshes           | Stewartry              |            |               |
| 39 Roughneck Quarry                              | Kyle and Carrick     | NX 640 449 | 5         | 3 Benbuck                               | Cumock and Doon Valley | NS 492 085 |           | Southwick-Noodie's Eye                   |                        |            |               |
| <b>WINDOCK</b>                                   |                      |            |           | 8 Carron Water and Highland Burn        | Nithdale               | NS 887 024 | 2         |  |                        |            |               |
| 6 Borge Coast                                    | Stewartry            | NS 355 036 |           | 24 Loughlin-Newcairn Hills              | Annandale and Eskdale  | NY 423 902 | 1         |  |                        |            |               |
| 19 Knockgardner                                  | Kyle and Carrick     | NX 676 405 | 11        | 28 Maidens-Doofoot                      | Kyle and Carrick       | NS 271 183 |           |  |                        |            |               |
| 44 Torr-Masons Walk                              | Stewartry            | NX 585 485 | 5         | Head of Ayr                             | Annandale and Eskdale  | NY 376 799 |           |  |                        |            |               |
| <b>CANYON STRUCTURES OF THE SOUTHERN UPLANDS</b> |                      |            |           | 38 River Esk, Glencarholm               | Annandale and Eskdale  | NY 376 799 |           |  |                        |            |               |
| 2 Back Bay to Cartholm                           | Wigown               | NX 368 394 | 13        | <b>PARSONS-TRANE</b>                    |                        |            |           |  |                        |            |               |
| 6 Borge Coast                                    | Stewartry            | NX 477 448 |           | 8 Carron Water and Highland Burn        | Nithdale               | NS 887 024 | 2         |  |                        |            |               |
| Barlcoo  | Wigown               | NS 574 438 | 15,18     | 27 Lochaber Quarry                      | Nithdale               | NS 990 810 | 9         |  |                        |            |               |
| 13 Cragglen Bay                                  | Wigown               | NS 478 865 | 13        | <b>TRISTON</b>                          |                        |            |           |  |                        |            |               |
| 17 Givran Bay                                    | Wigown               | NX 452 341 | 13        | 1 Ailsa Craig                           | Kyle and Carrick       | NX 019 997 |           |  |                        |            |               |
| 18 Isle of Whalton Bay                           | Wigown               | NX 548 754 | 16        |   |                        |            |           |  |                        |            |               |
| 48 West Burness Head                             | Wigown               | NS 563 690 |           |   |                        |            |           |  |                        |            |               |
| <b>CANYON STRUCTURES</b>                         |                      |            |           |   |                        |            |           |  |                        |            |               |
| 9 Clatteringhams Dam Quarry                      | Stewartry            | NS 466 847 | 7,16      |   |                        |            |           |  |                        |            |               |
| 26 Lea Linn                                      | Wigown and Stewartry | NX 663 491 | 5         |   |                        |            |           |  |                        |            |               |
| 29 Merrick-Kells-Loch Dee                        | Stewartry            |            |           |   |                        |            |           |  |                        |            |               |
| 41 Shoulder O'Caig                               | Stewartry            |            |           |   |                        |            |           |  |                        |            |               |

(Table 6) Geological Sites of Special Scientific Interest, south-west Scotland.



(Figure 67) Location of significant metalliferous mineralisation in south-west Scotland. Full details are listed in (Table 5).