Tables

(Table 1.1) Carboniferous-Permian Igneous Rocks Block: GCR networks and site selection criteria.

Site name	GCR selection criteria
Chapter 2	Dinantian volcanic rocks of the Midland Valley of
	Scotland and adjacent areas Network
	Representative of the lower, basic members of the Garleton
North Berwick Coast	Hills Volcanic Formation. Exceptional examples of tuff-rings
	and small-scale volcanic vents. Internationally important for
	crustal and mantle xenoliths.
	Representative of the trachytic upper member of the
Garleton Hills	Garleton Hills Volcanic Formation and of Dinantian trachytic
	volcanism in general.
	Representative of the silica-undersaturated, highly evolved
Traprain Law	intrusions of East Lothian. Exceptional example of a
	laccolith.
	Representative of the Arthur's Seat Volcanic Formation.
	Exceptional examples of classic volcanic features that
Arthur's Seat Volcano	dominate the city landscape, influencing development and
	culture. Internationally important for the historical
	development of geology and understanding of igneous
	processes.
	Representative of the Kinghorn Volcanic Formation.
Burntisland to Kinghorn Coast	Examples of fragmented lava (hyaloclastite) with associated
Burntisland to Kinghorn Coast Touch, Fintry and Gargunnock Hills	pillow lavas, formed in a marine lava delta.
	Representative of the north-eastern part of the Clyde
Touch, Fintry and Gargunnock Hills	Plateau Volcanic Formation. Exceptional example of a
	volcanic escarpment with 'trap' features.
	Representative of the northern part of the Clyde Plateau
Campsie Fells	Volcanic Formation and of the North Campsie Linear Vent
	System. Exceptional examples of volcanic vents, remnants
	of ash cones and plugs.
Dumbarton Rock	Exceptional example of a visually striking volcanic plug
	associated with the Clyde Plateau Volcanic Formation.
	Exceptional examples of composite hawaiitic lava flows with
Dunrod Hill	potential international importance. Representative of the
	dominant member in the western part of the Clyde Plateau
	Volcanic Formation.
	Representative of Dinantian volcanism north-west of the
Machrihanish Coast and South Kintyre	Highland Boundary Fault. Exceptional example of a trachyte
	lava dome.
	Exceptional example of a Dinantian volcanic neck,
Heads of Ayr	comprising the roots of a tuff-ring, with superb
-	three-dimensional coastal exposures. Contains crustal and
	upper mantle xenoliths.
Chapter 3	Dinantian rocks of the Northumberland, Solway and Tweed
Cill Deals	basins Network
Gill Beck	Representative of the Tournaisian Cockermouth Lavas.

	Representative of a tholeiitic andesite lava, rare in the British				
Bothel Craggs Quarry	Carboniferous lava successions and providing evidence for				
	fractionation of the tholeiitic magmas.				
	Representative of dykes and pyroclastic rocks of a neck,				
Little Mell Fell Quarry	both associated with the Cockermouth Lavas but well to the				
	east of the main outcrop.				
Langhalm Nawaastlatan Hilla	Representative of the Tournaisian Birrenswark Volcanic				
Langholm–Newcastleton Hills	Formation.				
Lintmill Railway Cutting	Representative of the Tournaisian Kelso Lavas.				
Harabaugh Craiga	Representative of the plugs associated with the Kelso				
Hareheugh Craigs	Lavas. A rare composite example.				
Cottonshope Head Quarry	Representative of the Tournaisian Cottonshope basalts.				
Kershope Bridge	Representative of the Visean Kershopefoot basalts.				
River Esk, Glencartholm	Representative of the Visean Glencartholm Volcanic Beds.				
	Silesian and Early Permian volcanic rocks of Scotland				
Chapter 4	Network				
	Representative of the Namurian Troon Volcanic Member				
Ardrossan to Saltcoats Coast (Chapter 5)	and the Ayrshire Bauxitic Clay Member.				
	Representative of Late Carboniferous to Early Permian				
	necks. Internationally renowned for cross-sections through				
East Fife Coast	the roots of phreatomagmatic tuff-rings at various structural				
	levels. Exceptional examples of crustal and upper-mantle				
	xenoliths.				
	Representative of the Early Permian Mauchline Volcanic				
Howford Bridge	Formation.				
	Representative of the Early Permian Carron Basalt				
Carron Water	Formation. Exceptional examples of volcanic rocks				
	interdigitating with contemporaneous fluvial and aeolian				
Chanter F	sedimentary rocks.				
Chapter 5	Alkaline basic sills and dykes of Scotland Network,				
	Representative of alkali dolerite sills of various ages in the				
	eastern Midland Valley. Exceptional examples of both upper				
Arthur's Seat Volcano (Chapter 1)	and lower contacts that have great historical significance				
	and hence international importance. Spectacular part of the				
	city landscape.				
	Representative of alkali dolerite sills in the eastern Midland				
South Queensferry to Hound Point	Valley. Internal mineralogical and textural variations are well				
	displayed. Exceptional examples of hydrothermal alteration				
	to 'white trap'.				
	Representative of the composite alkali dolerite sills of the				
Ardrossan to Saltcoats Coast	western Midland Valley. Exceptional examples of internal				
	and external contacts and of metamorphic effects on the				
	sedimentary country rocks.				
	Internationally important example of a composite, alkaline				
	basic sill, both historically and in recent times.				
1	Representative of the early Permian alkaline basic sills of				
Lugar	the western Midland Valley, exhibiting a wide variety of				
	rock-types from peridotite to spectacular late fractionates				
	termed 'lugarite'.				
	Representative of olivine-rich alkaline basic sills of the				
Benbeoch	western Midland Valley. Exceptional examples of fresh,				
	olivine-rich, nepheline-dolerite.				

	Representative of the rare Late Carboniferous to Early
	Permian intrusions within the Southern Uplands. An
Craighead Quarry	exceptionally fresh and visually striking porphyritic
	nepheline-gabbro, formerly termed an 'essexite'.
	Visually striking representative of the Late Carboniferous to
	Permian lamprophyric dykes of the western Highlands.
Dubh Loch	Contains exceptional examples of mantle xenoliths and
	xenocrysts.
	Tholeiitic sills and dykes of Scotland and northern
Chapter 6	England Network
	Representative of the Midland Valley Sill-complex.
South Queensferry to Hound Point (Chapter 5)	Exceptional example of a basal contact, exhibiting multiple
	intrusive sheets and apophyses, chilled margins, thermally
	altered sedimentary rocks.
	Representative of the Midland Valley Sill-complex exhibiting
North Queensferry Road Cuttings	a complete section. Exceptional examples of many of the
, ,	features that characterize large sills, including baked
	sediments on top of the sill that prove that it is an intrusion.
	Representative of the Midland Valley Sill-complex.
Wallstale	Exceptional example of a vertical transgression along a fault
	plane.
	Representative of the Midland Valley Sill-complex forming a
	prominent scarp feature. Exceptional example of large-scale
Lomond Hills	transgressive contacts and thermal effects above the sill.
	Equivocal relationships between the sill and alkaline basic
	plugs have generated much debate.
Gloom Hill, Dollar	Representative of the Ochil Fault-intrusion.
	Representative of quartz-dolerite dykes of the tholeiitic
Mollinsburn Cuttings	dyke-swarm of central Scotland. Exceptional examples of
	horizontal columnar joints.
	Representative of basalt dykes of the tholeiitic dyke-swarm
	of central
Corsiehill Quarry	
	Scotland. Exceptionally well-exposed vertical contacts and
	horizontal columnar joints.
	Representative of the thickest part of the Great Whin Sill at
	its lowest stratigraphical level. Nationally important
	landscape features exhibit exceptional examples of many of
Whin Sill Exposures in Upper Teesdale	the features that characterize large sills, including baked
	sedimentary rocks on top of the sill, which prove that it is an
	intrusion, transgressive upper and lower contacts, columnar
	jointing and a pegmatitic central facies.
	Representative of the Great Whin Sill forming a major
	landscape feature of international historical importance.
Steel Rigg to Sewingshields Crags	Exceptional features include offsets in the scarp attributed to
oter rugy to demingshields drags	transgression between stratigraphical levels and baked
	sedimentary rocks above the sill, which prove that it is an
	intrusion.

	Representative of the Great Whin Sill. Exceptional features
	include baked sedimentary rocks above the sill, and rafts of
Longhoughton Quarry	sedimentary rock in the upper part, which prove that it is an
	intrusion. The relationship of the sill to movement on the
	Longhoughton Fault is also clearly displayed.
	Representative of the Great Whin Sill. Exceptional features
Cullernose Point to Castle Point	include well-developed columnar jointing, rafts of baked
	sedimentary rock and late-stage veins.
	Representative of the Great Whin Sill. Exceptional for the
Budle Point to Harkess Rocks	large number of rafts of sedimentary rocks with varying
	orientations. Internationally important for the presence of
	miniature ropy flow texture on the insides of large vesicles.
Greenfoot Quarry	Representative of the Little Whin Sill.
	Representative of the Holy Island dyke subswarm, which is
	related to the Whin Sill-complex. Exceptional example of an
Holy Island	intrusion showing 'step-and-stair' transgression and
	numerous contact features. Internationally important for the
	presence of miniature ropy flow texture on the insides of
	large vesicles.
	Representative of the St Oswald's Chapel dyke subswarm,
Wydon	which is related to the Whin Sill-complex. A rare natural
	inland exposure of a simple dyke.
	Carboniferous and Permian igneous rocks of central
Chapter 7	England and the Welsh Borderland Network
	Representative of the upper part of the Visean Upper Miller's
	Dale Lava of Derbyshire. Exceptional example of the
Litton Mill Railway Cutting	brecciation of a lava flow that terminated in an aqueous
	environment.
	The Water Swallows Sill, representative of the alkali dolerite
	sills of Derbyshire, is intruded into the Visean Lower Miller's
Water Swallows Quarry	Dale Lava. Exceptional examples of columnar jointing and of
	mineral layering in the sill.
	The Tideswell Dale Sill, representative of the alkali dolerite
	sills of Derbyshire, is intruded into the Visean Lower Miller's
Tideswell Dale	Dale Lava. The sill shows chilled margins and thermal
	ç
	alteration of country rocks.
	The Calton Hill Volcanic Complex comprises the remains of
	a phreatic tuff-ring associated with the Upper Miller's Dale
Calton Hill	Lava, intruded by basanite sills. Internationally important as
	the only locality in England at which mantle xenoliths can be
	found.
Clee Hill Quarries	The Clee Hills Sill is representative of the West Midlands
	suite of Late Carboniferous alkali dolerite sills.
	The Barrow Hill Complex is an exceptional example of a
Barrow Hill	Westphalian volcanic vent with associated volcanic deposits.
	Internationally important for the presence of the oldest
	anatomically preserved conifers found to date.

Middle Hope	Representative of Tournaisian Middle Hope Volcanic Beds of south-west England. Exceptional examples of lapilli-tuffs and pillow lava. Nationally important for the association of igneous, sedimentological and palaeontological features that allow reconstruction of the growth and subsequent subsidence of a volcanic cone on a marine carbonate shelf.
Spring Cove	Representative of Visean volcanic rocks of south-west England. Exceptional example of a pillow lava erupted under water in a marine carbonate environment.
Golden Hill Quarry	Exceptional example of a monchiquite intrusion associated with a Visean volcanic pipe. Internationally important as the only locality in Wales at which mantle xenoliths are found.

Table 2.1 Succession of the Clyde Plateau Volcanic Formation in the northern part of the Touch, Fintry and Gargunnock hills. (After Francis *et al.*, 1970, table 7.)

Fintry Hills	Touch and Gargunnock hills
Kirkwood	d Formation
Conglomerates, sandstones and mudstones derived	from weathering of Clyde Plateau Volcanic Formation
Regional diachronous	s erosional unconformity ————
	Touch House Member (thickness not known)
	Feldspar-macrophyric olivine basalts
	Black Mount Member (>24 metres) Microporphyritic basalts
	and subordinate trachybasalts
Finter Hills Member (. 400 metres) Feldener meerenburg	Gargunnock Hills Member (91->152 metres)
Fintry Hills Member (>122 metres) Feldspar-macrophyric	Feldspar-macrophyric olivine basalts and composite basalts
olivine basalts with a high proportion of microporphyritic	with subordinate microporphyritic basalts and rare
basalts and rare trachybasalts	mugearites
Shelloch Burn Member (40–60 metres) Trachybasalts,	
microporphyritic basalts and feldspar-macrophyric olivine	Lees Hill Member (0–40 metres) Trachybasalts
basalts	
Spout of Ballochleam Member (24-92 metres) Feldspar-r	nicrophyric basalts; Stronend Interbasaltic Beds in middle part
Slackgun Interbasaltic Member (0-79 metres) Tuff (possi	bly volcanic detritus),I aterites and weathered lavas
Unco	nformity
Skiddaw Member (0–37 metres) Feldspar-macrophyric	Baston Burn Member (9–67 metres) Feldspar-macrophyric
olivine basalts and composite basalts	olivine basalts
	Basal Member (30–46 metres) Trachybasalts,
	feldspar-macrophyric olivine basalts and
	feldspar-microphyric basalts
Clyde Sands	tone Formation
Fluvial sandstones and conglomerates; som	e reworked volcaniclastic detritus in upper part
(Table 2.2) Succession of the Clyde Plateau Volcanic Fo 1998. table 4)	ormation in the western Campsie Fells. (After Hall <i>et al.,</i>

	Lava types	Source
Holehead Lava Member	Mainly feldspar-macrophyric basalt ('Markle type')	Waterhead central volcano
	Microporphyritic basalt, mugearite,	Local centres and North Campsie Linear
Fin Glen Lava Member	trachybasalt and a persistant phonolitic trachyte	Vent System
Upper and Lower North Campsie lava members	Microporphyritic basalt, basalticCampsi lava members hawaiite and hawaiite	e North Campsie Linear Vent System

(Table 4.1) Lithological units and features of the volcanic necks between Lundin Links and St Monance, East Fife Coast.

(Abbreviations: LL = Lundin Links; VF = Viewforth; RP = Ruddons Point; KC = Kincraig; CF = Craigforth; CN = Chapel Ness; EH = Elie Harbour; EN = Elie Ness; WL = Wadeslea; AR = Ardross; CH = Coalyard Hill; NW = Newark; DC = Dovecot; DR = Davie's Rock; SM = St Monance.) Based on Francis in Forsyth and Chisholm, 1977, figs 20–24; Upton *et al.*, 1999.

Lithological units / LL Necks Basaltic	VF	RP	КС	CF	CN	EH	EN	WL	AR	СН	NW	DC	DR	SM
tuff and agglomerate (bedded) Basaltic	•	•	•	•		•	•	•	•		•			•
tuff and agglomerate (unbedded) Basaltic	•	•	•				•	•	•	•	•	•		•
breccia Sediment-deri tuff	ived		•	•		•			•	•	•			
Tuffisite breccia		•	•	•	•	•		•	•			•	•	•
Tuffisite dyke(s) Tuffisite	•	•	•		•		•					•		•
intrusion(s) Basaltic								•	•		•	•		
dyke(s) Basaltic				•		•	•	•	•			•		
intrusion(s) (not specified)		•	•							•			•	•
Olivine basalt and					•	•							•	
basanite intrusion(s)	_													
Olivine-dolerite intrusion(s) Sandstone	e					•	•							
(large xenoliths and rafts)		•	•			•			•	•		•		•
Carboniferous sedimentary rocks		•	•	•	•	•	•	•	•	•	•	•	•	•

Bedding:

•									
=collapsed;■	•		•			•			
=									
centroclinal									
Marginal									
ring-faults									
or •	•		•		•			•	
shear									
zones									
Cryptovolcanio)		•	•					
structures			•	•					•
Megacrysts									
and		•				•	•	•	
xenoliths									

(Table 4.2) Distribution of accidental xenoliths and megacrysts in the East Fife necks (* = fragmental pyrope garnets – the famous, so-called 'Elie Ruby') (additional minor xenocryst phases are listed in the text). (Abbreviations: RP = Ruddons Point; EN = Elie Ness; CH = Coalyard Hill; AR = Ardross.)

Volcanic Neck	RP	EN	СН	AR
Xenoliths				
Hydrated ultramafic		•		•
rock		-		-
Spinel Iherzolite	•		•	
Wehrlite	•		•	
Biotite-amphibole	•		•	
pyroxenite	·		•	
Anorthoclasite	•	•		
Pyroxene granofels an	d			
gneiss	·			
Quartzo-feldspathic		•		
granofels and gneiss		•		
Garnetiferous				
quartzo-feldspathic			•	
granofels and gneiss				
Garnetiferous ultramaf	ic	•		
rock		-		
Principal megacrysts				
and xenocrysts				
High-temperature				
feldspar — mainly	•	•	•	•
anorthoclase				
Garnet *		•		
Corundum	•			
Zircon		•		

(Table G1) Local nomenclature of basic igneous rocks of Carboniferous and Permian age in Scotland, as used on Geological Survey maps and in most literature since 1928. Now being replaced by more-standard terminology based on dominant phenocrysts and, where possible, the chemical composition. (pl = plagioclase, ol = olivine, cpx = clinopyroxene, fetiox = iron-titanium oxides.)

Basalt type of Phenocrysts MacGregor (1928) Macroporphyritic (phenocrysts > 2mm)	Phenocrysts abundan	Phenocrysts may be t present in lesser amounts	Chemical classification after Macdonald (1975)	Type locality
Markle	рІ	± ol, fetiox	pl ± ol ± fetiox-phyric hawaiite, basaltic hawaiite or basalt	Markle Quarry, East Lothian
Dunsapie	pl + ol + cpx	± fetiox	ol + cpx + pl ± fetiox- phyric basaltic hawaiite or ol + cpx + pl-phyric basalt	Dunsapie Hill, Edinburgh (neck intrusion)
Craiglockhart	ol + cpx		ol ± cpx-phyric picrobasalt or basanite	Craiglockhart Hill, Edinburgh (flow)
Microporphyritic (phenocrysts < 2mm)				
Jedburgh pl		± ol, fetiox	pl ± ol ± fetiox-phyric hawaiite, basaltic hawaiite or in some cases basalt	Little Caldon, Stirling ■ shire (plug). Also in Jedburgh area
Dalmeny	ol	± cpx, pl	ol ± cpx-phyric basalt	Dalmeny Church, West Lothian (flow)
Hillhouse	ol +cpx		ol ± cpx-phyric basalt o basanite	r Hillhouse Quarry, West Lothian (sill)

References

Table LA Carbonitorus-Pers	man Ignation Revis Hitsch, GCR setterooks and site schemion-oritoria.	Bable 5.1 - postal		Table 1.1 - manual.	
Site name Contractory	GCR selection attests	Readord Bridge	Representative of the Early Promise Manchileer Volcanie Formation.	Storel Rigg to Sensingsbields	Reprocessative of the Great White Kill Scening a major latchcape Restore of
Disconting webcasic realise of a	the Midland Valley of Icothand and adjacent areas Serwork, Chapter 2	Carries Water	Representative of the Early Premias Caroon Banh Formation. Exceptional	Crags	international historical importance. Exceptional features include offices in
North Berwick Coast	Representative of the lowest, basic members of the Carloves Hills Yokunar Formation, Europetend examples of taff-topp and seall-wate rokunit reven		examples of volume scale asseringtuning with concerptometron Barial and arotan wolumentary scale.		the scarp arethoned so managements between strangenplocal levels and balant undimentary stoke above the still, which prove that it is an instruction.
	transationally important for crunal and marele servicities.	Alkalize basic silk and dyk	es of Scotland Network, Chapter 3	Longboughton Quarty	Representative of the Great White MIL Receptional Reserve include baland indimensary realis above the xill, and radio of andimensary scale in the upper
Conference Millio	Representative of the trachetic apper member of the Earleton Hills Yokamu Formation and of Dependan medicate volcasion in general.	Arthur's Next Volcane (Chapter 1)	Representative of alkalt disketse sills of various upon in the camora Malland Takes. Exceptional champles of both upper and lower contacts that have		part, which prove that it is an intrustory. The inflationship of the self is movement on the Longboughton Fach is also clearly displaced.
Trapesis Lew	Representative of the silica-and/evaluation, highly evolved assumes of East Ladicas. Encryptional manyle of a lancable.	Argedone ()	prote thereards approach thereards and hence commenced importance. Special-share part of the city landscape.	Culturness Point to Castle	Representative of the Group White Mill. Encoprised Ramour include well-
Arthur's Seat Yolcano	Representative of the Arthur's Sear Volcaria Formation. Encryptional examples of classic volcanic leastness that dominant the city landscape, influencing		d Representative of alkali dolorite sills to the camera Midland Yalley. Insernal	Polet	developed inhumar pointing, rafts of halard indimensiony rock and lam-magn inclus.
	development and culture. Internationally important for the bissoried development of prolong and understanding of generat processes.	Point	minoulogical and tostural cartations are well displayed. Exceptional examples of hydrobiomial abrasists to white may.	Budle Pulset to Harborn Bucks	Representative of the Great White ME. Enceptional for the large number of radia of sedancement racks with samping orientations. Internationally
Remaindand to Kinghows	Representation of the Kingleon Italiansi Formation. Transples of Ingenessed	Andronus to Subcosts Coast			important for the presence of minimum ropy flow nontane on the insides of
Summer and in Konghows	large Availability with percepted pillow large. Remod in a marine large dollar,		Yaley. Exceptional manyles of internal and external consum and of		large resultes.
Truch, Factor and	Representative of the north-cancer part of the Chole Marcas Volume		nurumorphic effects on the technomiany country studies	Greenhoot Quarty	Representative of the Links White Still.
Gargamarck Hills	Formation. Exceptional example of a column exceptions with long-	Lagar	beenvisedly important example of a composite, adultine basic self, both beauwically and to secont times. Representative of the early Permises adultion	Holy Island	Representative of the Holy Island dylar subservers, which is related to the Wate Mill-complex. Exceptional regargin of an immunos showing wap-and-
Computer Stalls	Representative of the northern part of the Ople Flature Volume Formation		hasis sits of the wontons Midland Yalko, anhibiting a wide variety of soch-		stell trangetonics and concernse contact features. Internationally important
	and of the North Campile Linear You System. Enceptional examples of	Beelsock	types from perdonice to specialize late theritonairs seried Sugarie' Representative of obspecials plater hast, effe of the second Halland		for the presence of minimum repp flow semant on the insides of large reserves.
	wolcarete reveals, revenuence of anh-coneys and plugs.		Yafes. Exceptional examples of little, edition stells, septemine-deduction	Wedne	Representative of the St Chevald's Chapad-doke subsevents, which is related to
Duadarton Rock	Eaceptond example of a visually atching volcane plug mercland with the Clyde Planus Volcanic Formation.	Craighrad Quarry	Representative of the care Late Cathonikiston to Kady Permint intrusions waters the bouldern Unlands. At constraining both and simulic orders	Sector operator	the White Sill-complex. A rare named indeed exposure of a simple dylet.
Desired INE	Exceptional examples of composite farmattic laws firms with potential		pophotic acalaine gibbs, formula around as reacting	Carbonitorous and Permiss	ignoous socks of central England and the Welsh Stanforland Network,
	tonenational supersonate. Representative of the dominant member in the	Dabb Lock	Vesselo writing representative of the Low Carboniterous as Permin-	Chapter 7	
Rachellanish Court and	ermon part of the Opic Hanos Volumi Romation. Representation of December volumines north-west of the Highland Roumlary		 Inspeciplests drive of die women Highlands. Commun exceptional examples of mande seculida and associtym. 	Litten Mill Railway Carting	Representative of the upper part of the Vanas Typer Miller's Data Lore of Deductory. Encomposed example of the herecamon of a lore flow that
South Kintyre	Fault. Enceptional countries of a conflicter large shows.		Nonland and northern England Network, Chapter 6		terminated in an appendix contribution.
Needs of Apr	Receptional example of a Disamian volume neck, comprising the more of a			Wants Smallows Quarry	The Water Swallows 500, expresentative of the adult deletin sile of
	- suff-ring, with superb forez-dimensional sound expression. Consists chantal and apper mante scendble.	Point (Chapter 5)	d Representative of the Midland Yoley foll-complex. Exceptional example of a hand contact, exhibiting analigie instantor observe and apophysics, chilled		Dediphise, is introduct take the Varian Lower Millor's Date Law, "Exceptional maniples of solutionar jointing and of mineral levering in the oll."
Trippention marks of the North	hamberhand, Solway and Twood havins Network, Chapter 3	and the second	margine, thermally altered softmentary rocks.	Thierwell (hale	The Folosevill Dale NB, representative of the alkali dolerite sills of Dedryshim,
Gill Book	Reprocessment of the Tournamian Cockessmenth Large	North Queendory Real	Representative of the Madiani Valley bill-complex exhibiting a complete		is annuled into the Viscan Lower Hiller's Eale Law. The sill shows chilled
Bodel Crage Dearty	Representative of a theorem and the heat rate in the British Carbonilleman	Castings	sectors. Enceptional examples of many of the features that characterize large		margins and durinal aluration of coursesy mode.
	lars namenana and providing redience for functionation of the theorem		eth, suchafung holed autonesse on mp of the sill that prove that is an interaction	Calves Hill	The Calson Hill Volumic Complex comprises the remains of a phroase suff- ring associated with the Upper Millor's Date Law, annuled by business sills
Linds Nell Fell Quarry	Representative of dylass and pyroclastic multi-of-a neck, both menciated with the Cockermonth Large has well to the case of the multi-captorp.	Walksale	Representative of the Michael Valley Milecomplex. Exceptional example of a metical managements along a bulk plane.		internationally important as the only keeping in England at which manife annolatio can be finand.
	In the second seco	Lonond Hills	Representative of the Midland Yalley Mi-complex Roming a prominent acaep	Cire Hill Quarties	The Circ Hills MR is superscientive of the Wost Mullands sums of Lan
Linimill Ballway Carting	Representative of the Tournamian Devicement Volume Tournament.		Ruture. Enceptional example of large-scale managemente contacts and thermal		Carbondorous alkali dolorius allo.
Harehrugh Craigs	Representative of the plage associated with the ficher Lanas. A new composite		offices above the sill. Equivoral relationships between the sill and alkaline have plags have generated much debate.	Same Sill	The Barrise IIB Complex is an exceptional reample of a Weepholast release were with associated release depents. Internationally important
	crange.	Ghann Hill, Dollar	Representative of the Ochil Fault-Intrusion		for the presence of the oblest associateally preserved conflors leand to date.
Commissions Read Quarry	Representative of the Tournations Comonibusys Installet.	Multischurg Carriage	Representative of quarts delevite delaw of the decletion dela-servers of coveral	Mahlla Hope	Representative of Tournanian Moldle Hope Volcanic Bods of anothwom
Kendeps Bridge	Representative of the Vacual Kembergerlinet bandles		houland. Enceptional examples of hostpointal columnar prime.		England. Exceptional examples of lapilityafs and pillow laws. Nationally
River Esh, Glencartholm	Representative of the Vacuar Glencardwine Volcana: Indu-	Considell Querry	Representative of hands dylars of the tholesite dylarowarm of created bendiated. Teceptionally well-reproduce semical contacts and horizontal		important for the association of ignorus, indimensional and patterniningkul features that allow meconstruction of the prowth and
federates and Early Permiss i	indennie mecko of Scotland Network, Chapter 4		columnar press.		subsequent subsideout of a volcasis cose on a matter carbonaie shell
Androman to Suffernate Court (Chapter 5)	Representative of the Naturalian Texos Volcano: Nonther and the Apostore Research Class Member	White Mill Propression in Upper Torontals:	Representative of the distless part of the Grout Was hill at its knews emigraphical level. Nationally analysis instrume fusions: safeline	Aprileg Care	Representative of Vasue volume code of anath-west England. Exceptional example of a pillow hex enqued under water in a marine carbonant
East File Cased	Representative of Law Carbonillowna to Early Poresian suchs. Internationally		exceptional exception of many of the features that characterize large sills.		and the second s
1	encounted for constantions through the score of planatomaginatic tuff-enge at vertices attactional levels. Encoptional examples of control and upper marshi		including baked softworstary torks on top of the sill, which prove that it is an instantion, stategerative upper and lower contacts, ordermar pointing and a	Coldon Mill Quarty	Exceptional reampto of a monchagate terration selectand with a Viscan without pipe. Selectrationally important as the only locality in Wales at which

(Table 1.1) Carboniferous–Permian Igneous Rocks Block: GCR networks and site selection criteria.

	Lava types	Source		
Holehead Lava Member	Mainly feldspar-macrophyric basalt ('Markle type')	Waterhead central volcano		
Fin Glen Lava Member	Microporphyritic basalt, mugearite, trachybasalt and a persistant phonolitic trachyte	Local centres and North Campsie Linea Vent System		
Upper and Lower North Campsie lava members	Microporphyritic basalt, basaltic hawaiite and hawaiite	North Campsie Linear Vent System		

(Table 2.2) Succession of the Clyde Plateau Volcanic Formation in the western Campsie Fells. (After Hall et al., 1998. table 4)

Lithological units / Necks	LL	VF	RP	KC	CF	CN	EH	EN	WL	AR	CH	NW	DC	DR	SM
Basaltic tuff and agglomerate (bedded)				•			•								
Basaltic tuff and agglomerate (unbedded)	٠	•		٠				•	٠	•	•	٠	٠		•
Basaltic breccia				٠			•								
Sediment-derived tuff					•					٠	•	•			
Tuffisite breccia			•	•	•	•	•		•	•			•	•	•
Tuffisite dyke(s)		•	•	٠		•		•					•		•
Tuffisite intrusion(s)									•	•		•	•		
Basaltic dyke(s)	•				•		•	•	•	•			٠		
Basaltic intrusion(s) (not specified)	•		•	٠							•			•	•
Olivine basalt and basanite intrusion(s)						•	٠							•	
Olivine-dolerite intrusion(s)							•	•							
Sandstone (large xenoliths and rafts)			•	•			•			•					•
Carboniferous sedimentary rocks	•	٠	•				•	•	•	•	•	•	•	•	
Bedding: •=collapsed;0=centroclinal		•	0	•	0		0	•0	0						
Marginal ring-faults or shear zones	•	•		•			•								
Cryptovolcanic structures				•	•								•		
Megacrysts and xenoliths										•					

(Table 4.1) Lithological units and features of the volcanic necks between Lundin Links and St Monance, East Fife Coast.

Volcanic Neck	RP	EN	СН	AR
Xenoliths				
Hydrated ultramafic rock		•		•
Spinel lherzolite	•		•	
Wehrlite	•			
Biotite-amphibole pyroxenite			•	
Anorthoclasite		•		
Pyroxene granofels and gneiss	•			
Quartzo-feldspathic granofels and gneiss				
Garnetiferous quartzo-feldspathic granofels and gneiss			•	
Garnetiferous ultramafic rock		•		
Principal megacrysts and xenocrysts				
High-temperature feldspar – mainly anorthoclase	•	•	•	•
Garnet *		•		
Corundum	•			
Zircon		•		

(Table 4.2) Distribution of accidental xenoliths and megacrysts in the East Fife necks.

Basalt type of MacGregor (1928)	MacGregor abundant may be present		Chemical classification after Macdonald (1975)	Type locality		
Macroporphyritic	c (phenocrysts >	2mm)	11 (15 17	In the second		
Markle	pl	± ol, fetiox	pl ± ol ± fetiox-phyric hawaiite, basaltic hawaiite or basalt	Markle Quarry, East Lothian		
Dunsapie	pl + ol + cpx	± fetiox	ol + cpx + pl \pm fetiox- phyric basaltic hawaiite or ol + cpx + pl-phyric basalt	Dunsapie Hill, Edinburgh (neck intrusion)		
Craiglockhart	ol + cpx		ol ± cpx-phyric picrobasalt or basanite	Craiglockhart Hill, Edinburgh (flow)		
Microporphyritic	(phenocrysts <	2mm)		ure 6.5 The most sta		
Jedburgh	pl	± ol, fetiox	pl ± ol ± fetiox-phyric hawaiite, basaltic hawaiite or in some cases basalt	Little Caldon, Stirling- shire (plug). Also in Jedburgh area		
Dalmeny	ol	± cpx, pl	ol ± cpx-phyric basalt	Dalmeny Church, West Lothian (flow)		
Hillhouse	ol + cpx		ol ± cpx-phyric basalt or basanite	Hillhouse Quarry, West Lothian (sill)		

(Table G1) Local nomenclature of basic igneous rocks of Carboniferous and Permian age in Scotland, as used on Geological Survey maps and in most literature since 1928. Now being replaced by more-standard terminology based on dominant phenocrysts and, where possible, the chemical composition. (pl = plagioclase, ol = olivine, cpx = clinopyroxene, fetiox = iron-titanium oxides.)