Keoldale NC 383662

General setting

Unlike the other inlets on the north coast of Scotland, the Kyle of Durness is not straight, but contains two major bends, the more southerly of which is a right angle. At the outer edge of this right angle, a sandy beach has formed, and behind it a machair slopes up to the 50m limestone plateau which lies between the Kyle and the village of Durness. This beach complex differs from the other beaches in the Kyle of Durness, and although its machair coalesces with those of the other beaches, it is considered worthy of separate treatment since it is more intensively used for recreation.

Beach

The beach is thin, flat and wet, with only a very narrow backshore not exceeding a few yards in width. The sand of the beach is broken by numerous immobile cobbles, and the quantity of mobile sand is very small. The sand is largely of mineral origin, with a relatively low lime content of 30%.

Coastal edge, dunes and machair

The coastal edge is mostly in the form of a low sea wall, behind which runs the road serving the Kyle of Durness ferry and the Cape Wrath Hotel. Some blown sand is banked against this low sea wall, but the combination of the thin wet beach and the seawall barrier means that there is very little continuing supply of sand available for dune or machair building. Dunes are completely lacking, and the machair appears to consist largely of old, well humified sand of ancient rather than recent origin. Most of the machair is under 2m in thickness, and the thickness decreases rapidly landwards. In plan the machair is assymetrical, being much wider towards the east end, where southwest winds have blown sand along the slight depression occupied by the A838. The machair is almost invariably smooth, forming a thin blanket over the underlying topography, and erosion scars are few. Indeed the main characteristics of the beach complex are its subdued forms and processes.

Land use

The machair forms part of the Keoldale Sheep Stock Club, which is a farm which was acquired by the state and is now run as a joint farm in which a number of crofters in the Durness area have shares. Much of the machair is enclosed by dykes and fences, and has been improved. Crops of hay and silage are still taken from the enclosed fields.

Recreational use originates from the Cape Wrath Hotel, which lies behind the beach near its west end, and from the car park at the end of the unclassified road serving the Kyle of Durness ferry. Most of the visits to the beach are of a short term nature, and camping and caravanning are prevented by the low wall and fences which separate the machair from the road. At the extreme east end of the beach, at the junction of the unclassified road with the A838, an area of unfenced grass heath is used for wild caravanning and camping, but blown sand is almost completely lacking, and little physical damage is done, although the site is visually exposed.

Neither the scientific interest nor the scenic quality of the beach are high, and the attractiveness of the beach is reduced by discharge of pipes onto the beach.

Recommendations

The present pattern of use appears to be satisfactory, and specific management measures are not at present necessary.

Melness NC 585615

General setting

Melness beach complex lies on the west shore of the Kyle of Tongue, and is about 500m from the township of Midtown. Access on foot is gained by crossing fields; vehicular access is not possible.

Beach, dunes and machair

The inter-tidal beach area is very large, extending to nearly 25sq km. Composed of medium sand with a carbonate content of 18%, this inter-tidal beach is subjected to a complex pattern of tidal and drainage movements. Its drier upper part has provided sand for two main dune and machair areas. The south area is the larger and consists of a curved promontory or foreland. The dunes reach a high of around 20m, and form a main coastal ridge with subsidiary lines and hollows inland. The more northerly area is less clearly defined and is best described as a hillside veneer of blown sand with dune-like edge accumulation. A topographical hollow south of the promontory of Ard Skinid has allowed the sand to move up to 300m inland and to a height of over 35m O.D. In both areas the coastal edge is complex; in places it is eroding but is mainly accreting.

Land use

Sheep grazing is the main land use. The intensity is highest in the north, and in places grazing has led to the development of some erosion scars. Recreation in both areas is minimal or absent. The land forms part of Melness Estate.

Talmine NC 588625

General setting

Talmine lies at the west entrance of the Kyle of Tongue. There are three beach areas; the northern-most is in the form of a patch of sand near the old pier; the central beach is adjacent to the township of Talmine, and the eastern-most gravelly beach is near Talmine Island. Access to the north and central beaches is easy, and is gained from a metalled road which runs along the shore.

Beach and machair

The beaches have built up in sheltered locations in the lee of the Rabbit Islands and offshore skerries. The main accumulation is near the stream mouth, and has a lime content of 24%. There are no dunes, but a small triangular area of thin machair has formed near the stream outlet. This area of machair is thought to overlie raised shingle and cobbles.

Land use

The machair area is used as grazing for cattle and sheep. Recreational use of the two more accessible beaches is relatively high, and is reflected in car parking, caravanning and camping on the easily accessible machair, which is held as common grazing. The area lies within Melness Estate.

Recommendations

The machair appears to be resilient and there is little obvious sign of physical damage resulting from recreational use, although at present it receives little management for recreational purposes.

Strathan NC 574650

General setting

Strathan (or Achininver, beach occupies an inlet a few kilometres west of Tongue Bay and the Kyle of Tongue. This inlet is the seawards extension of the valley of the Strath Melness Burn. The beach complex is readily accessible on the east side from the metalled road linking Melness and Achininver, but there are no convenient parking facilities.

Beach

The beach is composed of medium sand with a carbonate content of 42%. It is extensive, and at low tide resembles a broad infilling of a parallel-sided structural valley trough. The Strath Melness Burn winds sinnously across the beach, before finding an outlet (at the time of survey) against rocks on the northwest corner of the bay. At high water the central part of the beach is flooded, creating a broad shallow lagoon, and offering an attractive site for bathing.

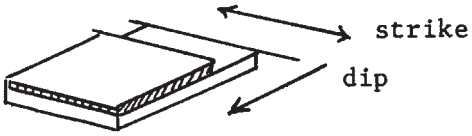
Dunes and machair

There are no dunes. Machair consists of a thin cover on the low river flood plain in the south, but on the east side there is a much more extensive hillside machair reaching as far as the road (35m OD). It is close grazed by sheep and cattle (with some rabbits) and there are some erosion scars. The machair, which slopes at angles of between 10° and 18°, appears to be an old surface with relatively thick humified layers.

Land use

The main form of land use is grazing on the hillside machair, with grazing and occasional cultivation on the low flat enclosed machair river terrace. Recreational use is of a very low intensity, and is largely confined to informal day recreational use (there is one static caravan on the hillside). The area is unspoilt and extremely attractive. It lies within the Melness Estate, and is partly croftland and partly common grazing.

Appendix 1 Glossary

BERM	A temporary ridge of beach sand, usually in the inter-tidal zone.
BLOWOUT	Erosion corridors or depressions in a dune or machair surface caused by wind scour.
CONGLOMERATE	A sedimentary rock consisting of larger rounded stones cemented by a finer matrix.
DEFLATION	A general term describing the removal of sand by wind action.
DIP AND STRIKE	The attitude of geological beds. eg 
ERRATICS	Boulders carried by ice from their source region and deposited on top of a different bedrock.
ESKER	Ridge of sand and gravel of fluvio-glacial origin.
EUSTATIC CHANGE IN SEA LEVEL	World-wide change in sea level due to changes of total volume of oceans.
FETCH	The amount and direction of open water in front of any specified point on the coastline.
FLUVIO-GLACIAL	(See outwash).
FOLIATION	The alignment of flow structures in metamorphic rocks. It is an index of the pressure conditions to which these rocks have been subjected.
GEO	A narrow, steep-sided sea inlet usually cut along a joint or other line of weakness.
ICE SCOURED SURFACE	One whose regolith has been removed and which has been roughened or grained by ice movements.
ISOSTATIC CHANGE IN SEA LEVEL	Regional changes in sea level due to changes in loading of earth's crust, specifically in this context during and after Ice Age.
MACHAIR	Relatively smooth sand surface stabilised by vegetation forming a continuous short grass and herb-rich sward.

MARRAM	*Ammophila arenaria*. The dune grass best suited to fix mobile sand.
MELTWATER CHANNEL	Valley-shaped depression cut by meltwater from a melting ice mass.
MORAINE	General term for unconsolidated material deposited by ice.
OUTWASH	Materials generally of sand, gravel and shingle deposited by meltwater from a melting ice mass.
REFRACTION	The bending and modification of a wave front as it approaches and reaches the coast.
REGOLITH	Layer of weathered material overlying unweathered rock.
SCHIST AND GNEISS	Types of metamorphic rock.
SKERRY	Small offshore rocky island.
SOIL CREEP	The gradual movement of soil and regolith downslope, mainly under the action of gravity.
SYENITE	Intermediate igneous rock of similar origin to granite.
TILL	As moraine but characteristically unsorted.

Appendix 2 Statistical Summary of Beach, Dune and Machair Characteristics

Area	N.G. Co-ords. (all N.C.)	O.S. 1" Sheet	Site	*Sand Median	(Microns) 25%-75% Range	×Shell Content	Beach		Rotation	0-V.Unstable 5-V.Stable
							c/p Index	Orientation (of p)		Stability
Achmelvich	056,248	13	Machair	300	230-422	74.5%	11.25	316°	Slight clockwise	1
Stoer and	039,283	13	High Machair	450	390-495	46.0%	3.6	248°	Slight clockwise	3/4
Clachtoll	040,272	13	Central Blowout	388	283-496	43.5%	4.9	247°	Slight clockwise	1
Clashnessie	057,311	13	Dune	288	260-320	2.2%	6.0	19°	None	2
Scourie	154,448	9	Dune	196	157-257	47.5%	—	—	—	4/5
Oldshore More	200,585	9	Beach	377	264-497	74.7%	2.9	162°	Clockwise	4
Odshore Beg	190,590	9	Beach	—	—	70.4%	4.4	218°	None	4
Sheigra	182,600	9	Beach	368	263-504	41.6%	5.0	224°	Slight anti-clockwise	2/3
Sandwood	220,650	9	Dune	460	378-545	—	9.3	312°	Clockwise	3
Balnakeil	395,690	9	Beach	292	232-422	52.0%	5.1 (mean of N. & S. beaches)	256°	Clockwise	4/5
Sango Bay	412,678	9	Beach	321	281-381	17.9%	8.5	54°	Anti-clockwise	3
Traigh Allt Chailgeag	443,657	9	Beach	—	—	—	—	44°	—	4
Sangobeg	428,665	9	Beach	—	—	—	—	31°	—	5
Coldbackie	610,603	10	Dune	—	—	16.1%	—	—	—	2/3
Torrisdale Bay	690,620	10	—	—	—	—	4.1	353°	Clockwise	—
Borgie	682,620	10	Young Dunes	303	260-345	4.3%	—	—	—	4
Naver	698,620	10	—	—	—	3.1%	—	—	—	4
Inver Naver	708,604	10	Machair Blowout	268	237-289	3.8%	—	—	—	2/3
Farr Bay	713,626	10	—	—	—	—	6.0	297°	Clockwise	3
Clerkhill	716,630	10	Ridge Top Sand	192	152-250	12.9%	—	—	—	—
Armadale	794,647	10	Beach	358	264-458	—	10.0	5°	Slight clockwise	4
Strathy	836,660	10	Beach	322	267-428	8.2%	48.3	26°	Slight clockwise	4
Melvich	885,650	10	Dune	496	407-580	16.3%	3.2	29°	Slight anti-clockwise	4

× Calculated using a Collins' Calcimeter. Variations in shell content represent three factors, viz. 1. age of sand: the older the sand the longer it has been subject to leaching; 2. degree of leaching due to topographical factors; 3. source of sand. The significant feature of these shell sand values is the much higher proportions of material from an organic source on the west coast compared with the low values especially east of Loch Eriboll.

* In general terms, sand with a median diameter less than 200 microns is FINE, less than 600 microns is MEDIUM and less than 1100 microns is COARSE.

Appendix 3 *Vegetation Analysis – Farr Bay

Detailed breakdown of vegetation communities on dune, machair and marginal landforms.

The area of Farr Bay and Clerkhill is used as a case-study to demonstrate the richness and content of dune, machair and machair-transition flora. The general distribution of these three types of vegetation groupings are shown in the accompanying map.

The scale used in the following tables is the DOMIN scale for *cover* estimates.

ie

DOMIN SCALE for cover estimates.

10	90–100%	cover
9	75–90%	"
8	50–75%	"
7	⅓–50%	"
6	¼–⅓	"
5	⅕–¼	"
4	1/20–⅕	"
3	Small individuals frequent. Low cover <1/20.	
2	Small individuals rare (sparsely distributed).	
1	Individuals very rare, or 1 or 2 only.	

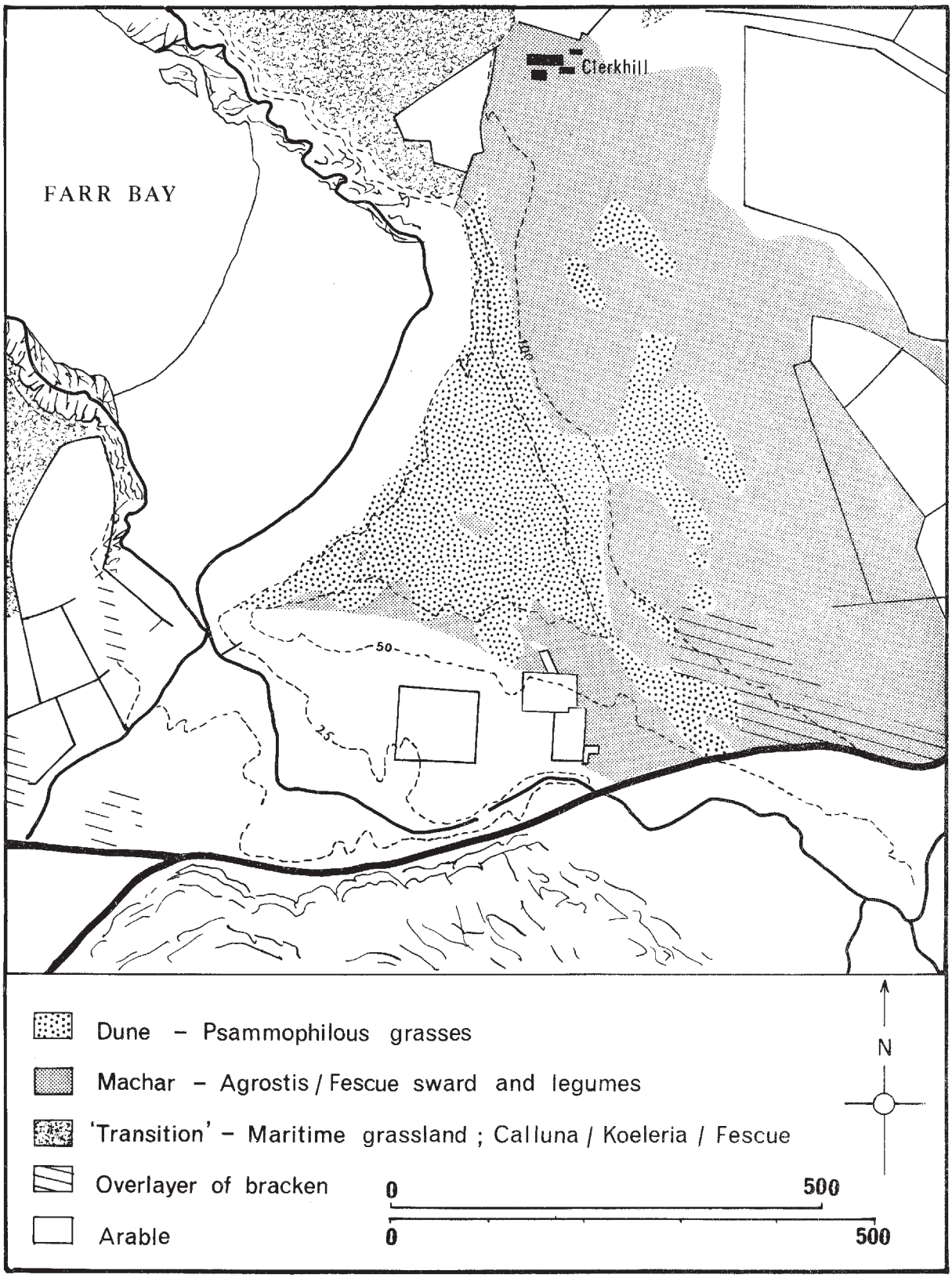
Figures given are for the species occurring in every sample taken; other species are all found within the study area in varying quantities; for instance *Ononis repens* is present on the machair, taken over the whole area in small quantity, but where it occurs it swamps the existing vegetation with ≃80% cover; similarly *Thalictrum minus*. A '+' at the end of the Domin Scale signifies spp. such as the two just mentioned.

*This appendix was kindly provided by Miss A. Slater of the Department of Botany, University of Aberdeen.

DUNE 4 x sqm plot

Achillea millefolium	—	Agropyron junceiforme	—
Anthyllis vulneraria	—	Ammophila arenaria	8
Bellis perennis	—	Dactylis glomerata	—
Campanula rotundifolia	—	Festuca ovina	—
Cerastium vulgatum	—	Festuca rubra	4
Cirsium arvense	—	Lolium perenne	—
Daucus carota	—	Poa annua	—
Euphrasia officinalis	—		
Galium verum	—	Carex arenaria	—
Leontodon taraxacoides	—	Carex nigra	—
Lotus corniculatus	+	Luzula multiflora	—
Ononis repens	+	Juncus squarrosus	—
Parnassia palustris	—		
Pinguicula vulgaris	—	Equisetum arvense	—
Plantago lanceolata	3		
Plantago maritima	—	Camptothecium lutescens	—
Primula vulgaris	—	Dicranum scoparium	—
Prunella vulgaris	—	Ditrichum flexicale	—
Ranunculus acris	—	Hylocomium splendens	3
Rumex acetosa	—	Hypnum cupressiforme	3
Senecio jacobaea	—	Rhytidiadelphus squarrosus	3
Succisa pratensis	—	Rhytidiadelphus triquetus	4
Thalictrum minus	3	Tortula ruraliformis	—
Trifolium campestre	—		
Trifolium pratense	—	Cladonia crispata	—
		Peltigera canina	3

Appendix 3


Clerkhill
FARR BAY
100
50
25
Dune – Psammophilous grasses
Machar – Agrostis / Fescue sward and legumes
'Transition' – Maritime grassland ; Calluna / Koeleria / Fescue
Overlayer of bracken
Arable
N
0
500
0
500

MACHAIR 4 x sqm plot

Achillea millefolium L.	—	Succisa pratensis	—
Anthyllis vulneraria	+	Taraxacum officinalis	—
Bellis perennis	—	Thalictrum minus	+
Campanula rotundifolia	—	Thymus drucei	3
Centaurea nigra	—	Trifolium campestre	3
Daucus carota	—	Trifolium pratense	—
Dryas octopetala	+		
Galium verum	3	Agrostis tenuis	4
Gentianella campestris	—	Festuca rubra	4
Euphrasia officinalis	—	Holcus lanatus	—
Hieracium pilosella	—	Poa annua	—
Leontodon taraxacoides	—	Carex arenaria	2
Linum catharticum	—	Luzula multiflora	—
Lotus corniculatus	3		
Ononis repens	+	Pteridium aquilinum	—
Oxytropis halleri	+		
Parnassia palustris	—	Camptothecium lutescens	2
Plantago lanceolata	2	Dicranum scoparium	—
Plantago maritima	4	Ditrichum flexicale	2
Polygala vulgaris	—	Hypnum cupressiforme	—
Primula vulgaris	—	Tortula ruraliformis	—
Prunella vulgaris	—		
Sedum anglicum	—	Peltigera canina	—
Senecio jacobaea	—		

TRANSITION 4 x sqm plot

Achillea millefolium	—	Trifolium pratense	—
Antennaria dioica	—	Ulex europaeus	—
Anthyllis vulneraria	—		
Calluna vulgaris	4	Agrostis tenuis	3
Centaurea nigra	—	Anthoxanthum odoratum	2
Cerastium vulgatum	—	Cynosurus cristatus	—
Daucus carota	—	Deschampsia flexuosa	—
Erica cinerea	—	Festuca ovine	—
Erica tetralix	3	Festuca rubra	2
Euphrasia officinalis	—	Holcus lanatus	—
Galium verum	—	Koeleria gracilis	3
Gentianella campestris	—	Nardus stricta	—
Hieracium pilosella	—	Sieglingia decumbens	2
Hypericum pulchrum	—	Carex demissa	—
Leontodon hispidus	—	Carex flacca	—
Leontodon taraxacoides	—	Carex nigra	—
Linum catharticum	—	Luzula multiflora	—
Lotus corniculatus	3	Juncus squarrosus	—
Narthecium ossifragum	—		
Parnassia palustris	—	Dicranum scoparium	—
Pedicularis sylvatica	—	Hylocomium splendens	—
Plantago lanceolata	—	Hypnum cupressiforme	—
Plantago maritima	2	Polytrichum commune	—
Polygala vulgaris	—	Rhytidiadelphus squarrosus	—
Potentilla erecta	2	Sphagnum spp.	—
Primula vulgaris	—	Plagiochila aspleniodes	—
Prunella vulgaris	—		
Ranunculus acris	—	Cladonia crispata	—
Rhinanthus minor	—	Cladonia impexa	—
Rumex acetosa	—	Parmelia physodes	—
Salix repens	1		
Succisa pratensis	—	Selaginella selaginoides	—
Trifolium campestre	—		

Appendix 4 List of Licensed Caravan Sites and List of Scheduled Sites of Scientific Interest

List of licensed caravan sites in area studied as supplied by Sutherland County Planning Office, September 1969.

Bettyhill	30
Tongue	15
Achmelvich	36

List of Scheduled Sites of Scientific Interest in area studied.

Aird Torrisdale
Balnakeil Bay
Eilean nan Ròn
Eriboll
Faraid Point
Handa Island
Scourie
Smoo Caves

References

BURNETT, J. H.	1964	The Vegetation of Scotland. Oliver & Boyd, Edinburgh.
COULL, J. R.	1968	Crofters Common Grazings in Scotland. *Agric. Hist. Rev., 16*, pt. II, 142-154.
DICKEN, S. N.	1961	Some Recent Physical Changes of the Oregon Coast. Department of Geography, University of Oregon.
GODARD, A.	1965	Recherches de Géomorphologie en Écosse du nord-ouest. Paris.
MATHER, A.	1966	Sutherland County Council – Tourism Survey and Proposals.
PHEMISTER, J.	1960	Geological Report. H.M.S.O.
SISSONS, J. B.	1967	The Evolution of Scotland's Scenery. Oliver & Boyd, Edinburgh.

Figure 5a Exposure Index

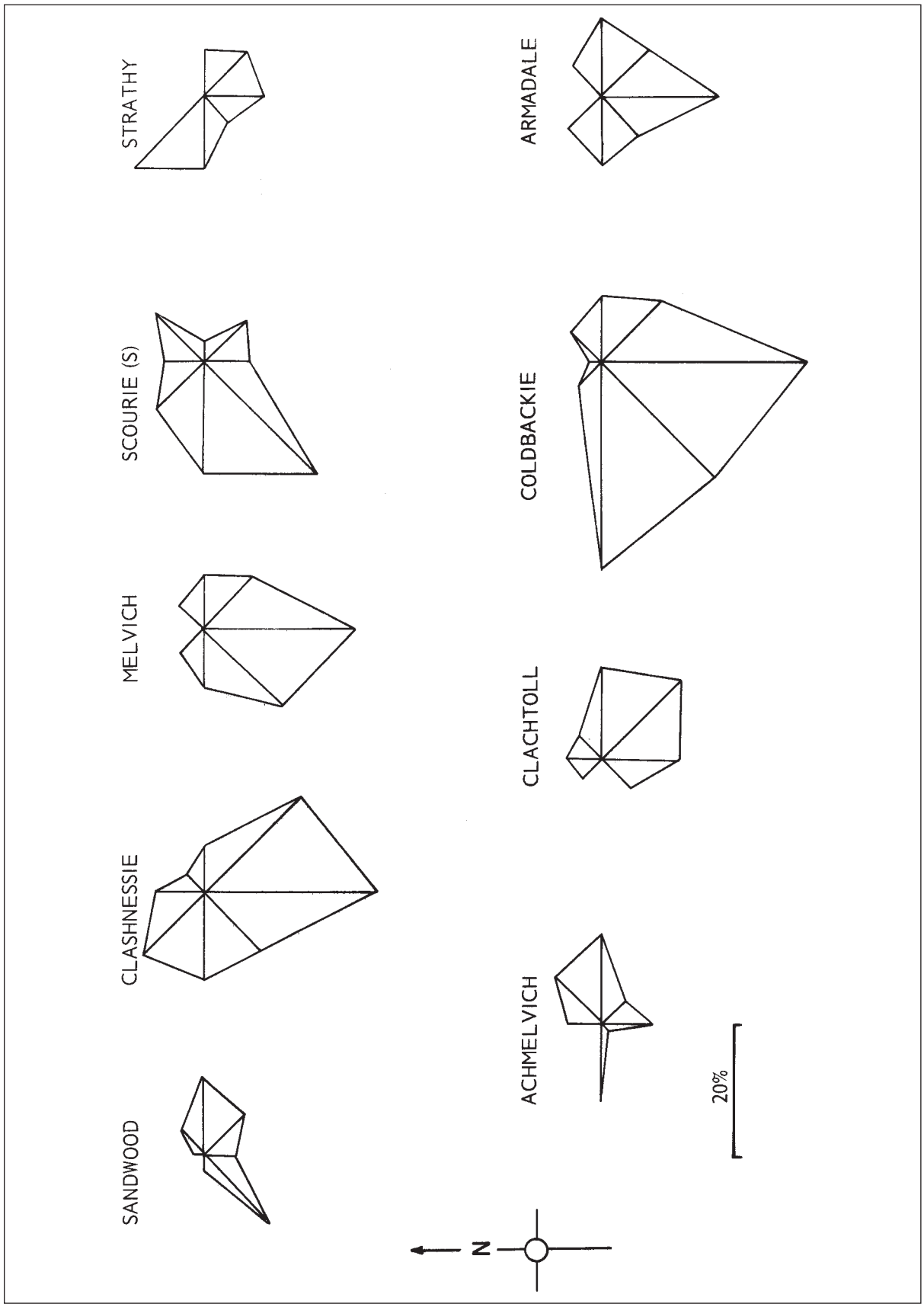


Figure 5b Exposure Index

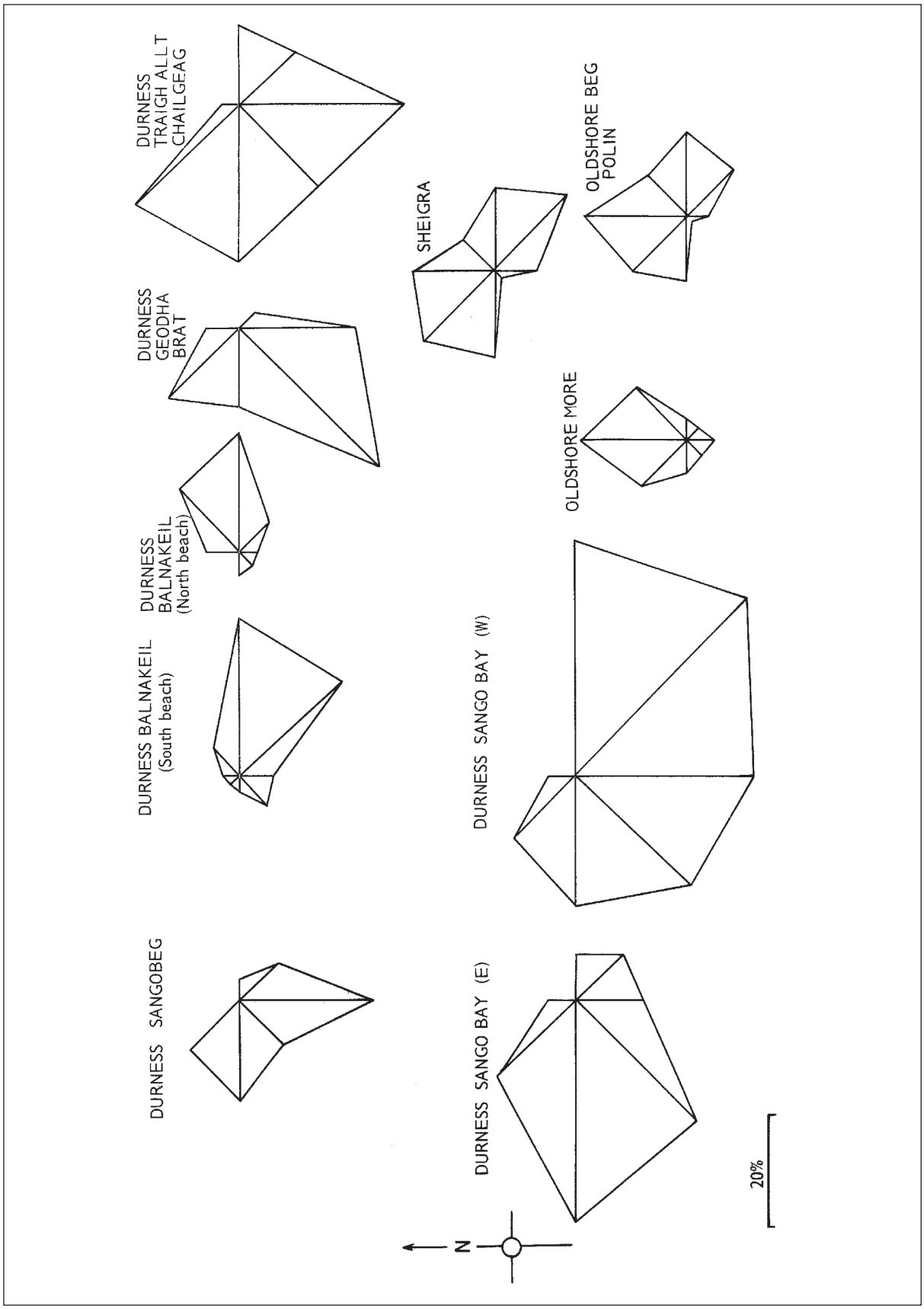
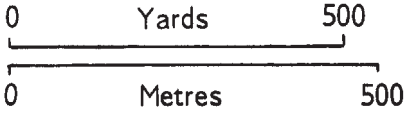


Figure 6 Vegetation Key

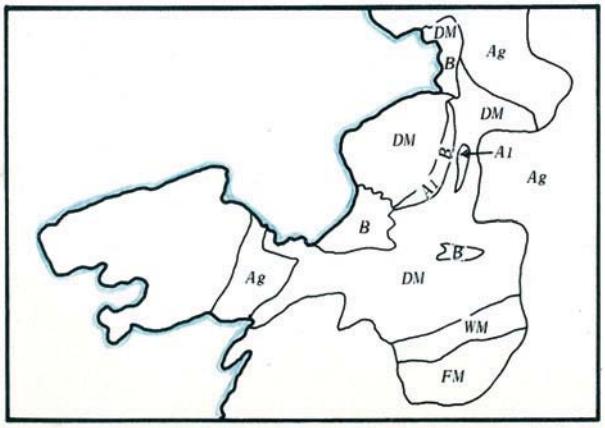
B	Bare, unvegetated surface of sand or rock.
A1	Pioneer and early stage communities – *Agropyron* and young marram.
A2	Older marram communities – old grey dunes.
DM	Dry machair communities.
WM	Wet machair communities.
FM	Freshwater marsh communities
SM	Saltmarsh communities.
Br	Bracken.
T	Shrubs and Trees.
Ag	Maritime communities affected by salt spray or small quantities of blown sand.

Figure 6 Vegetation

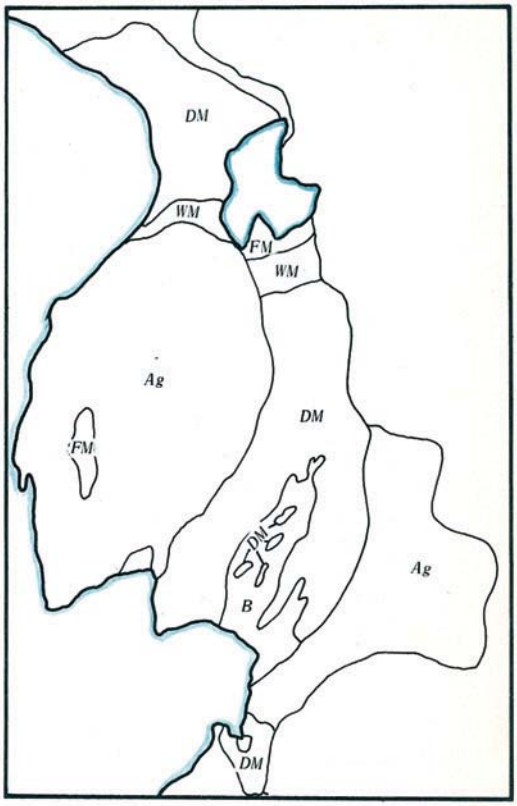
(All maps produced at scale of 1:10,560 and orientated North-South)



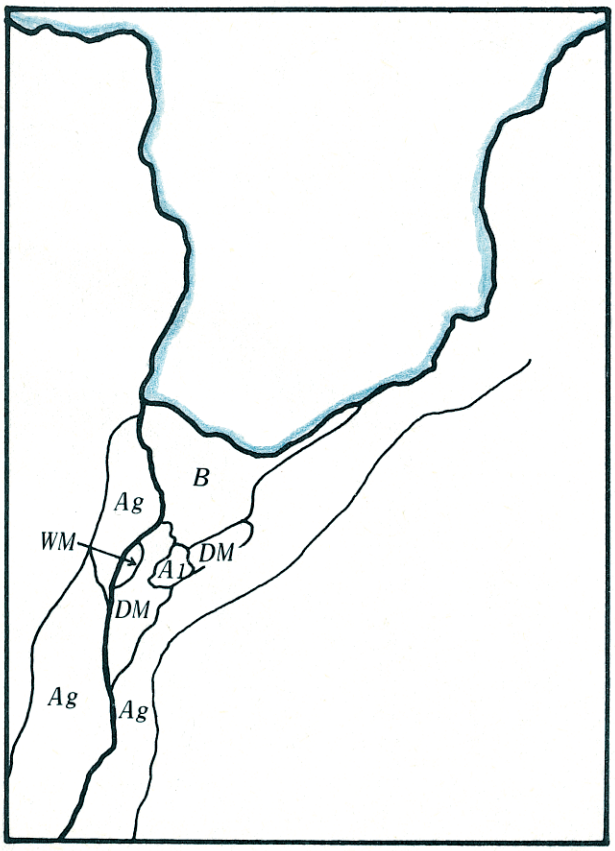
6.1 Achmelvich



6.2 Stoer and Clachtoll



6.3 Clashnessie



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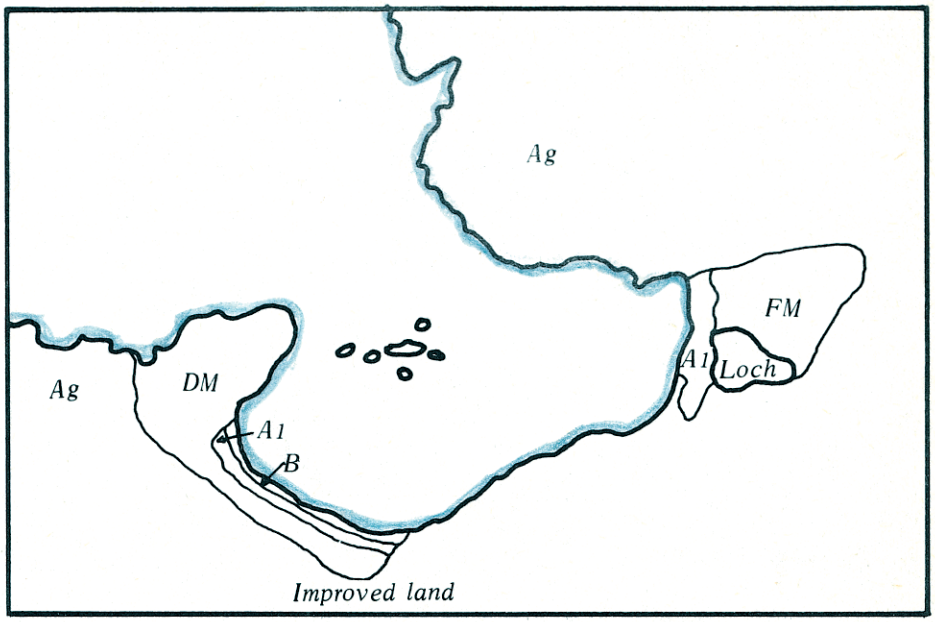
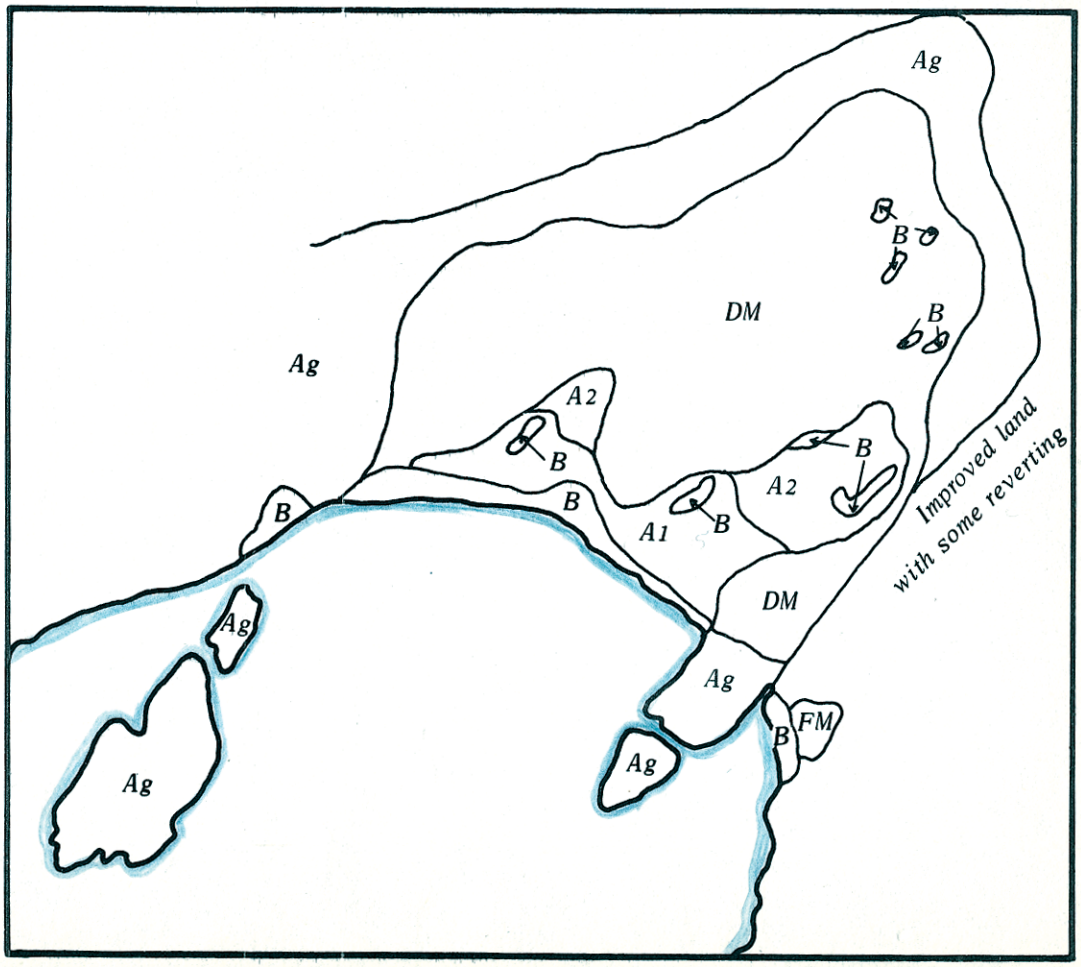
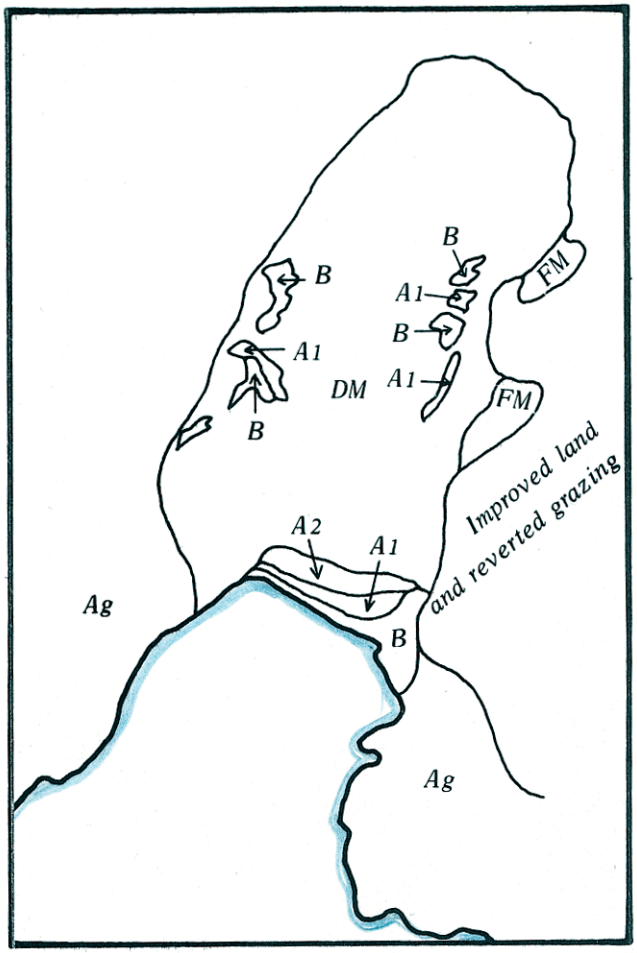


6.5 Oldshore More

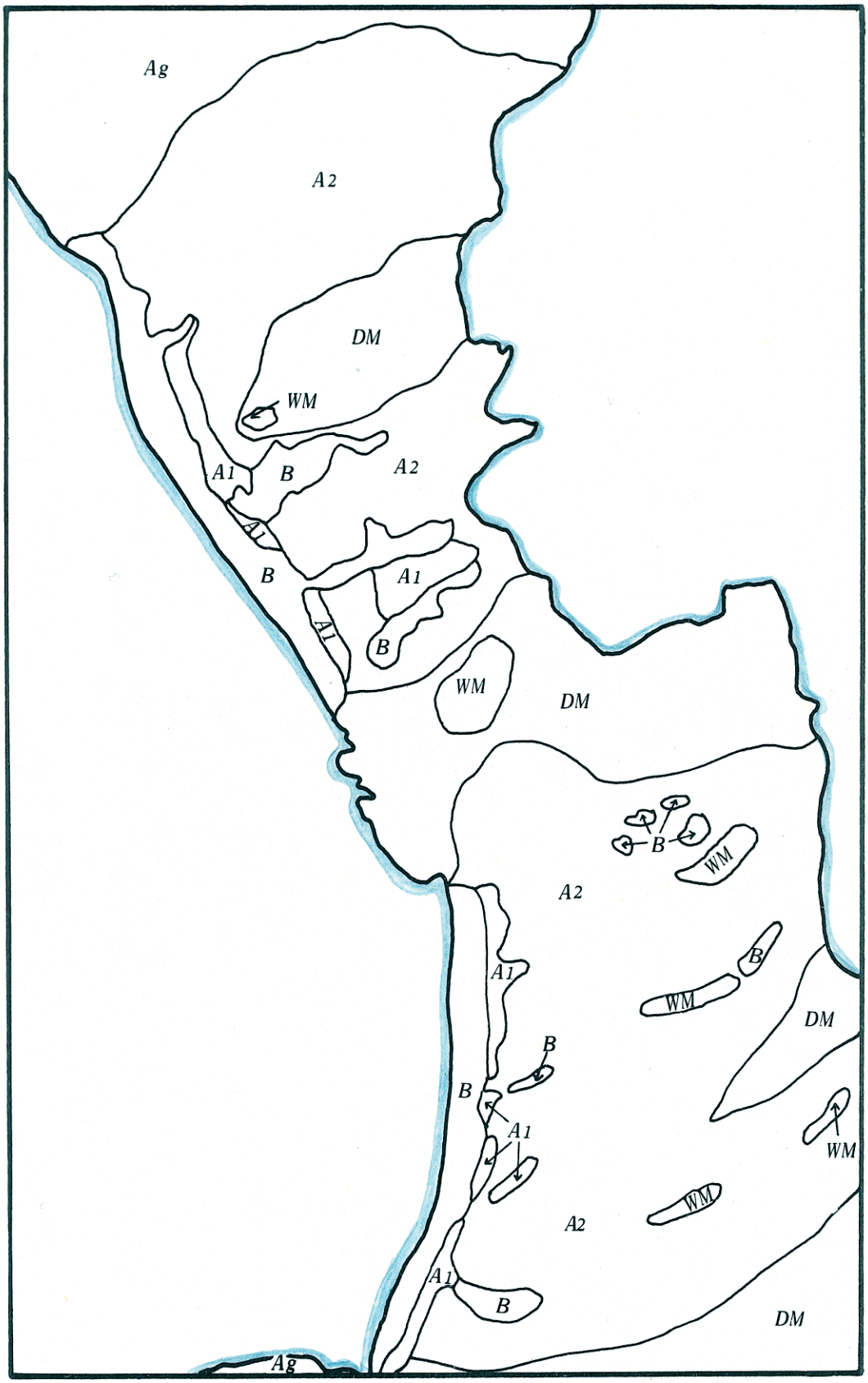


6.6 Oldshorebeg

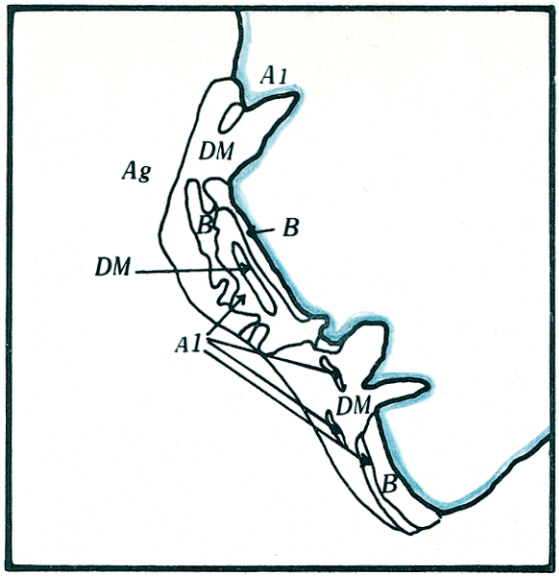


6.7 Sheigra

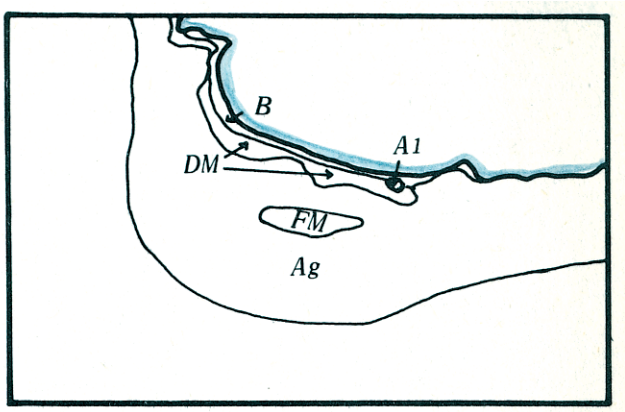
6.8 Balnakeil



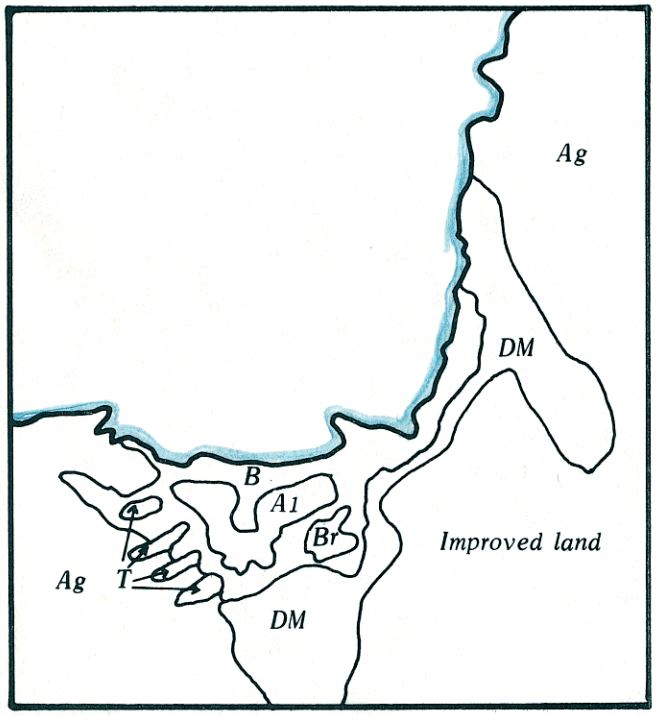
6.9 Sango Bay



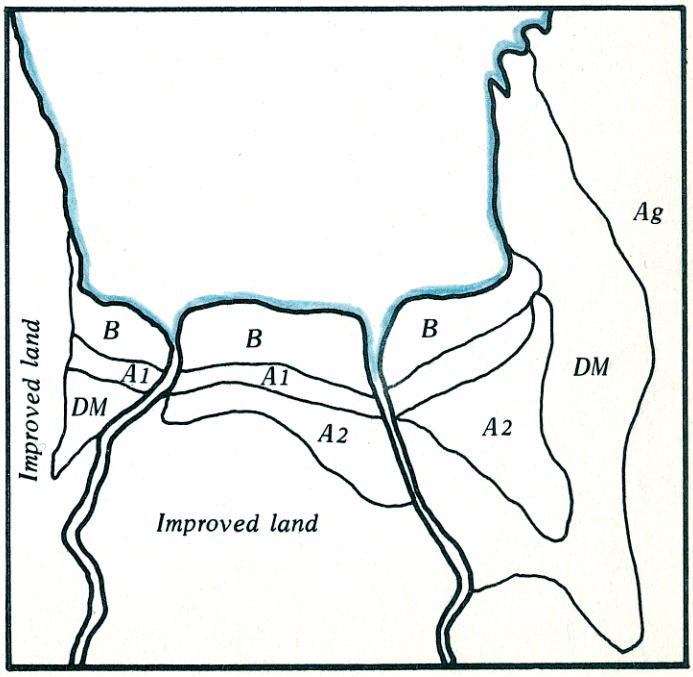
6.10 Sangobeg



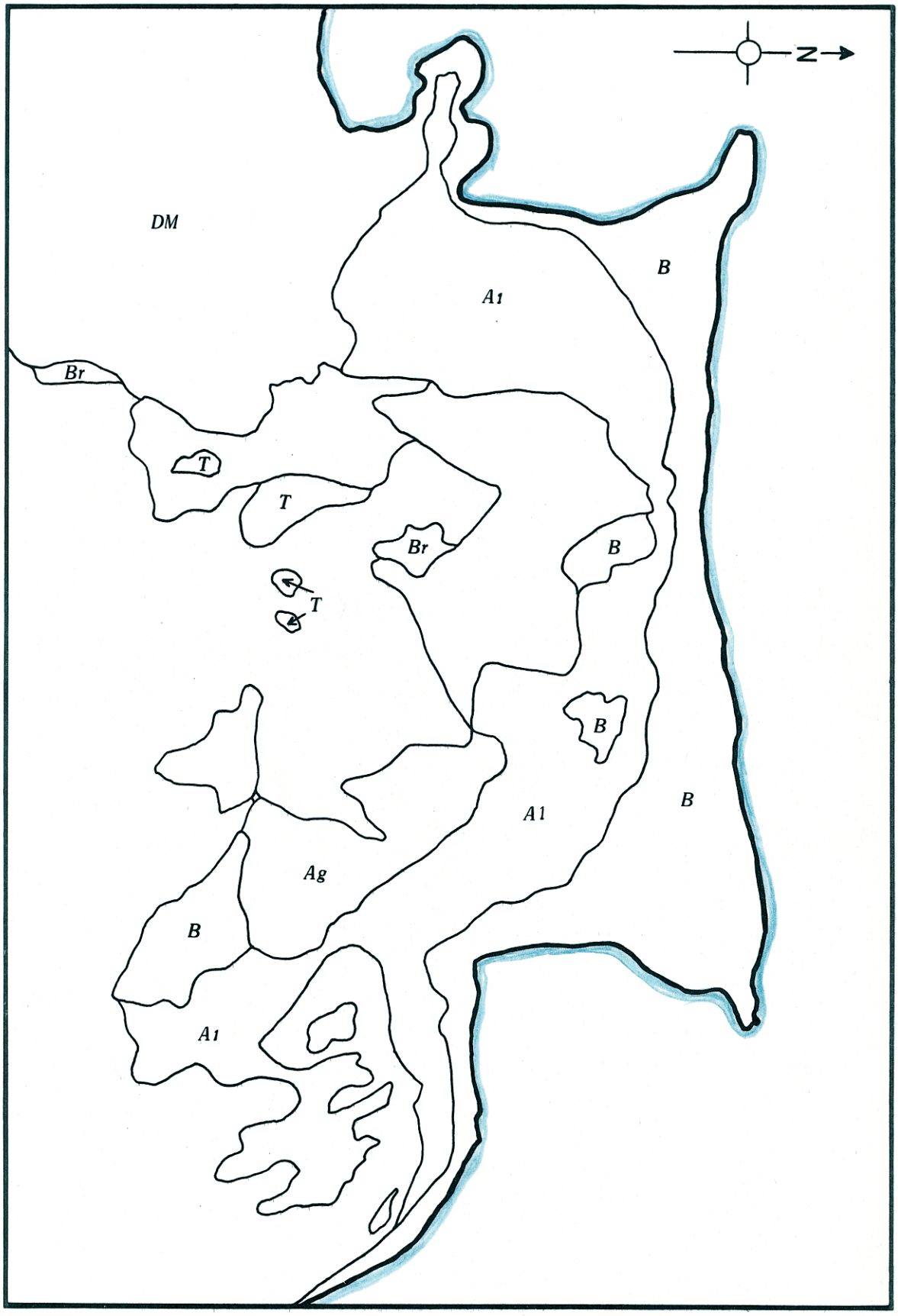
6.11 Coldbackie



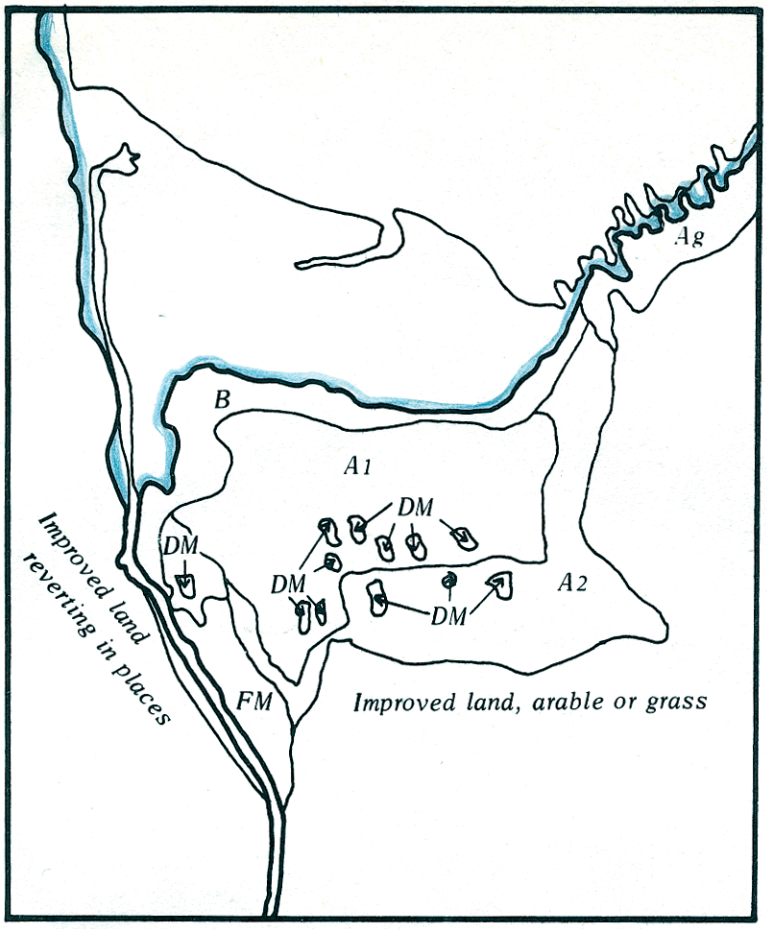
6.12 Armadale



6.13 Torrisdale Bay



6.14 Strathy


Ag
B
A1
DM
DM
DM
DM
DM
A2
Improved land reverting in places
FM
Improved land, arable or grass

6.15 Melvich

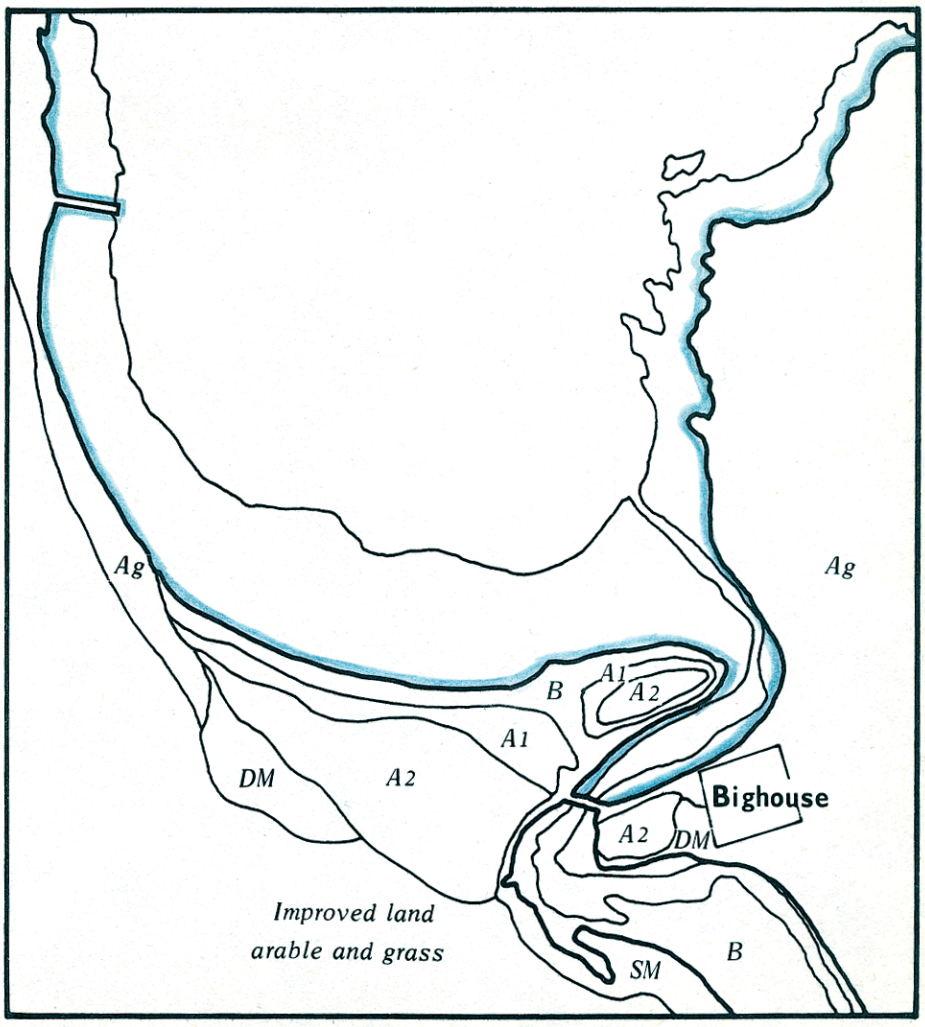
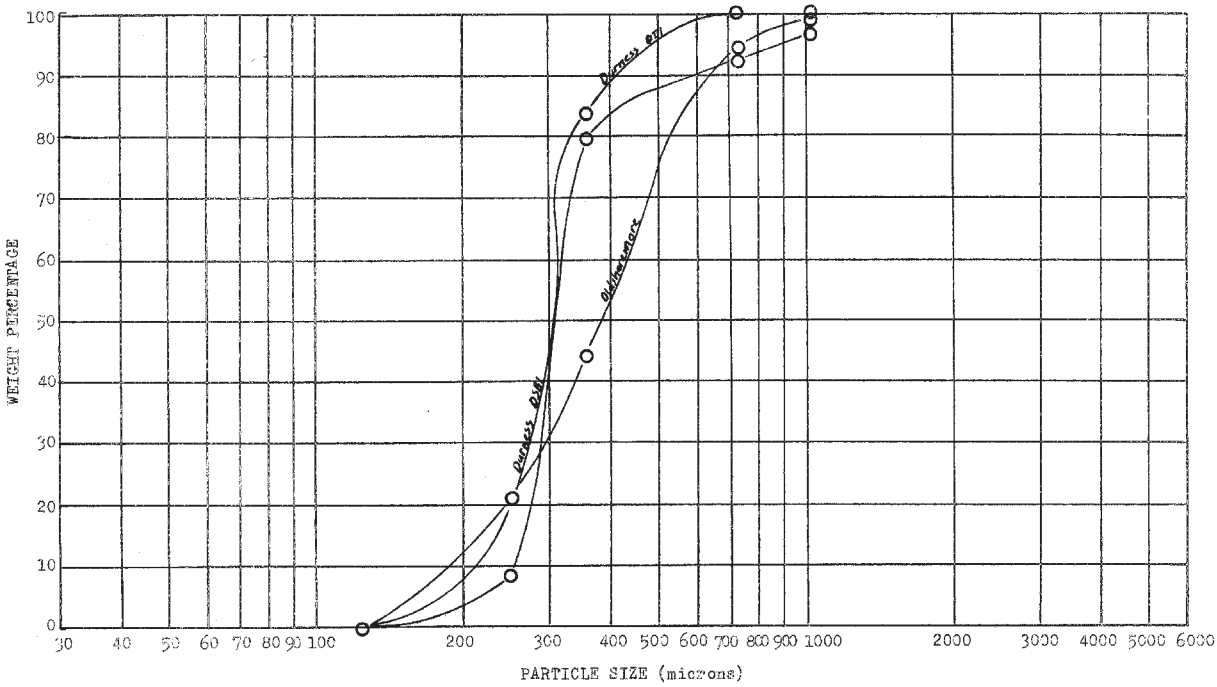

Ag
Ag
B
A1
A2
A1
DM
A2
Bighouse
A2
DM
Improved land
arable and grass
SM
B

Figure 7 Sample Sand Curves

Sieve Analysis Graph Sheet



B.S. Mesh	Aperture (microns)	Oldshoremore		Durness DSBI		Durness DTI			
		Percentages		Percentages		Percentages		Percentages	
		Fractional	Cumulative	Fractional	Cumulative	Fractional	Cumulative	Fractional	Cumulative
16		1.2	98.8	3.1	96.9	0.1	99.9		
22		4.8	94.0	4.5	92.4	0.3	99.6		
44		49.3	44.6	8.9	83.5	20.4	79.2		
60		23.5	21.2	74.6	8.9	60.1	19.1		
120		20.5	0.7	8.9	0	19.0	0.1		
170		0.1	0	0.0		0.1	0.0		
240		0			0.0				
PAN		0							
REMARKS									

Figure 8 Geomorphological Key

Figure 8.1 Achmelvich Bay

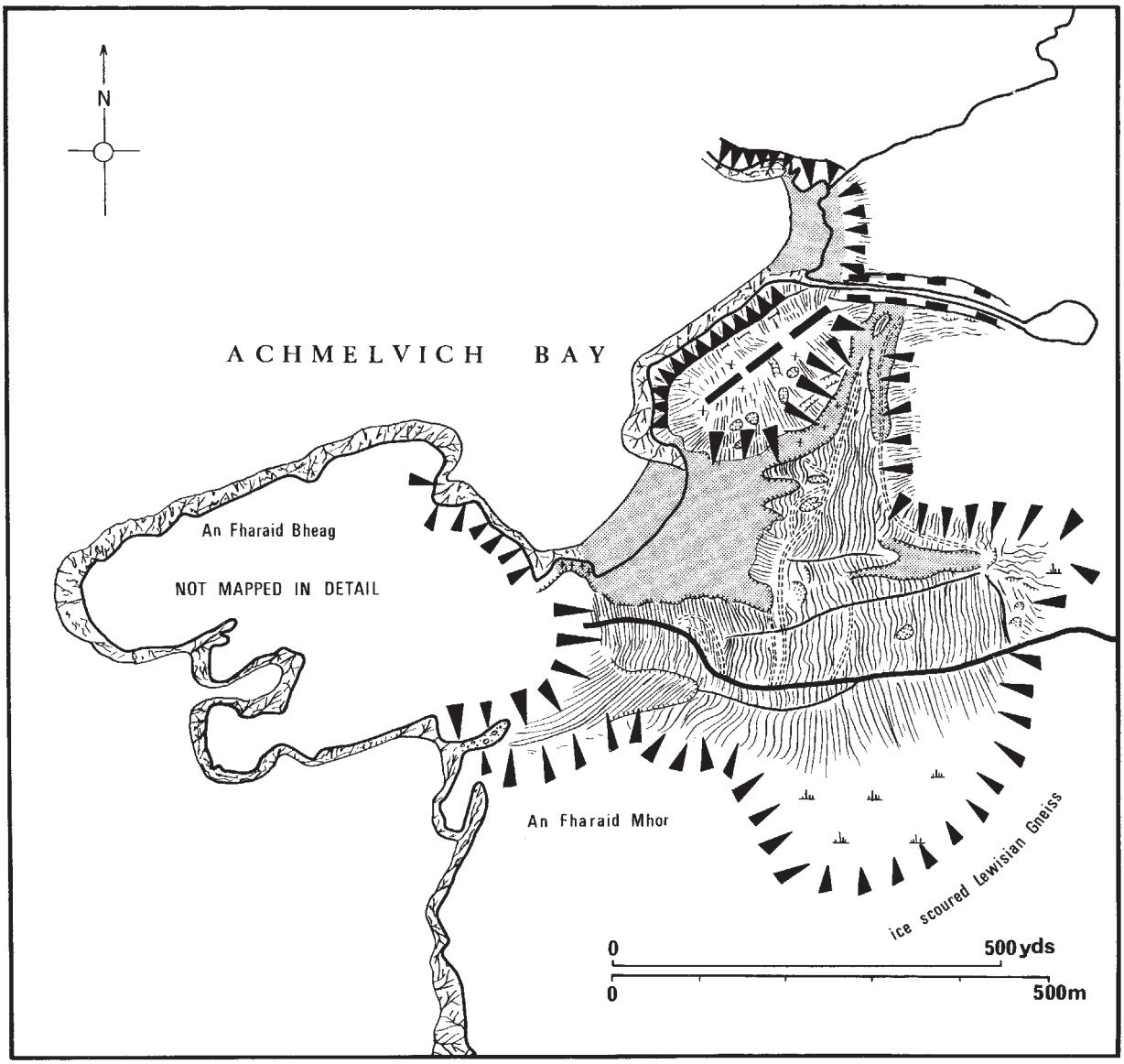


Figure 8.2 Stoer and Clachtoll

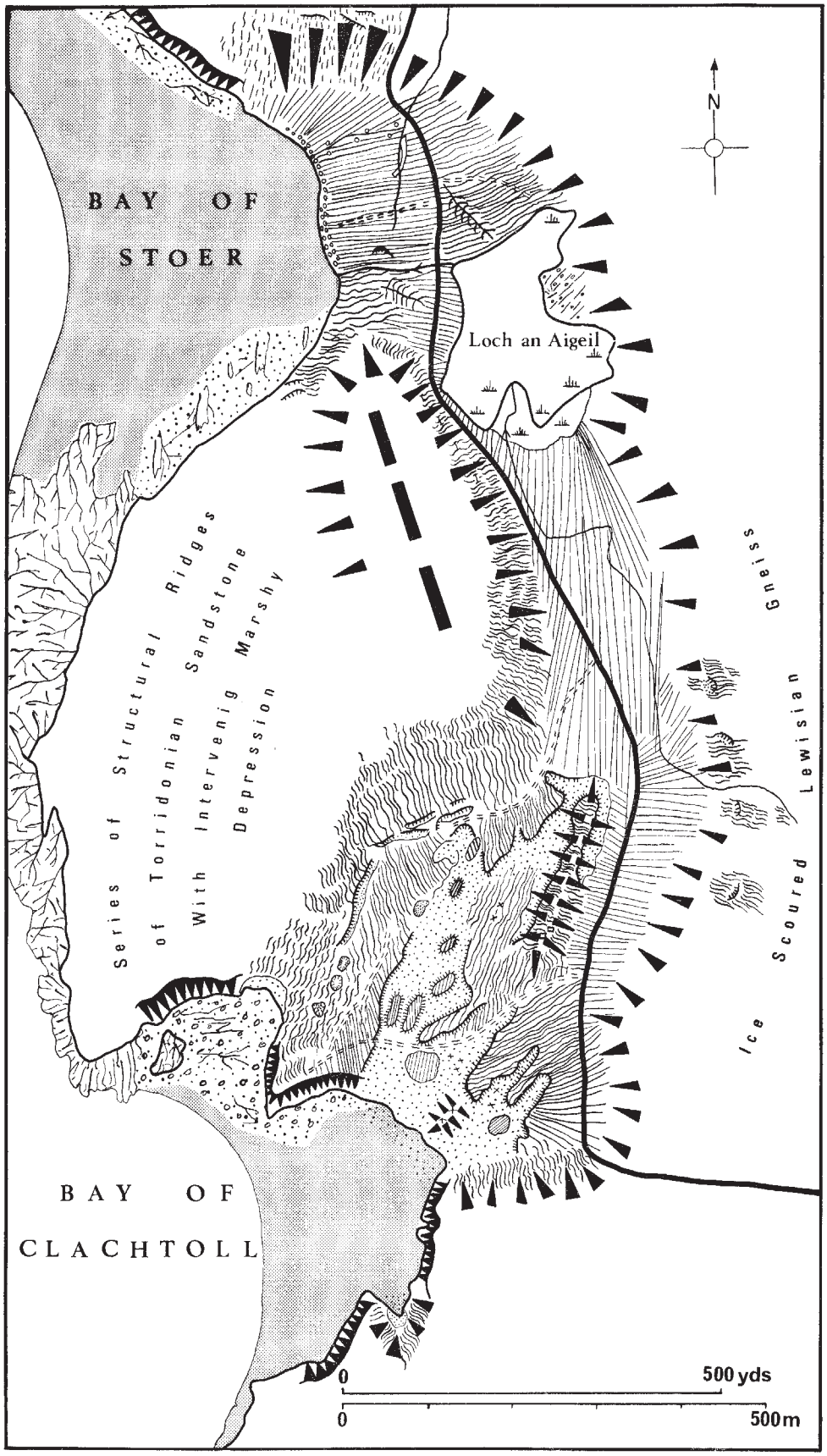


Figure 8.3 Clashnessie Bay

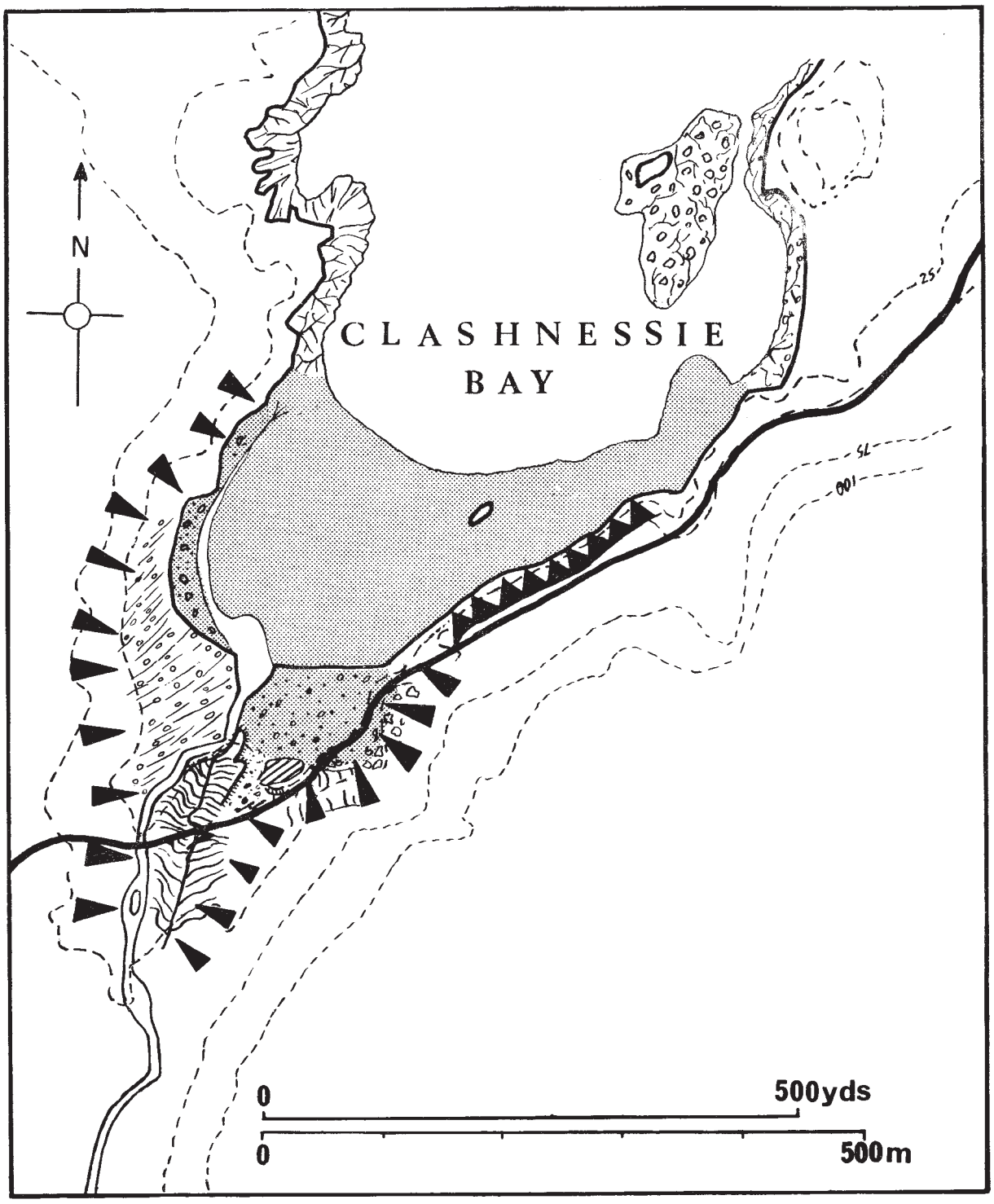


Figure 8.4 Scourie

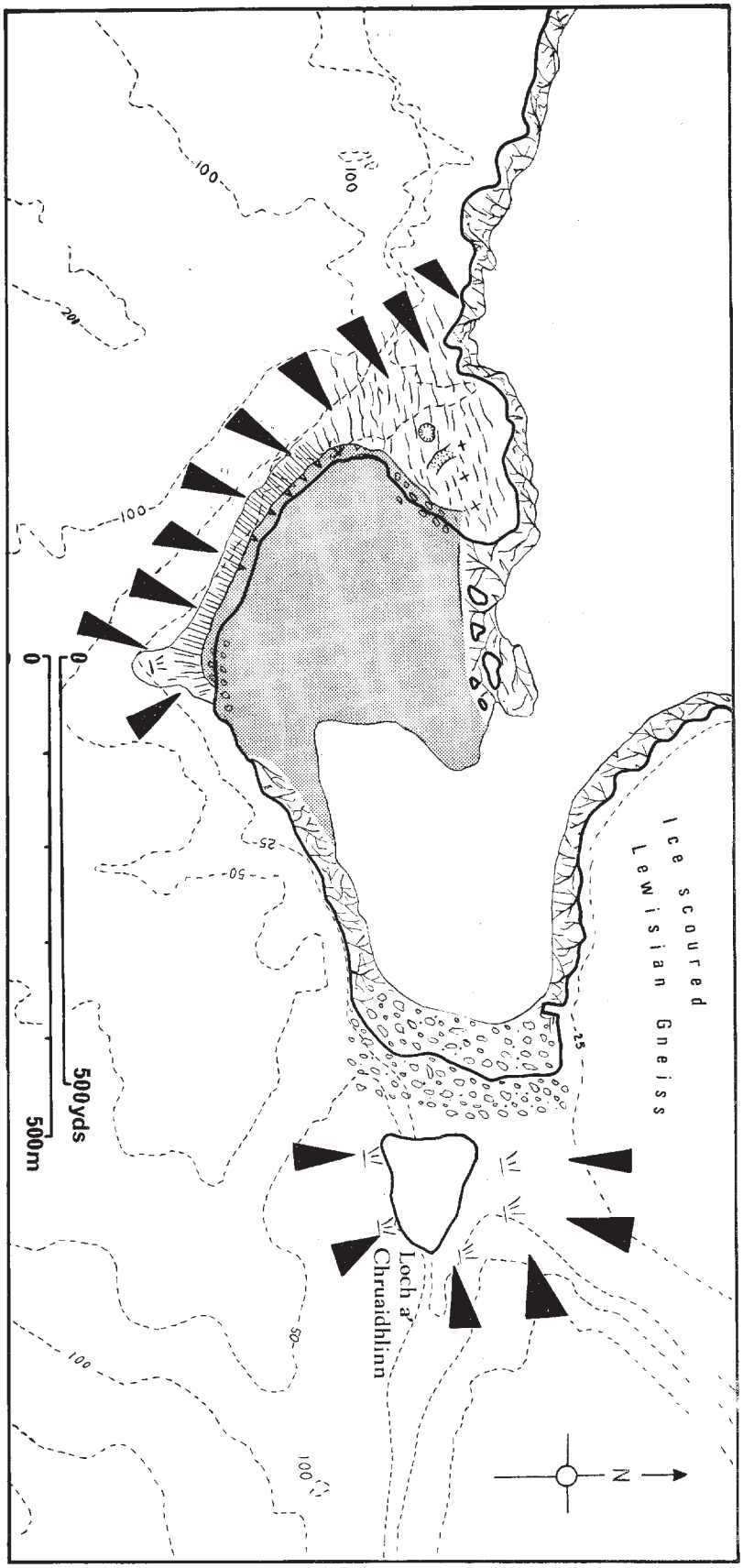


Figure 8.5 Oldshoremore, Oldshorebeg and Sheigra

Figure 8.6 Sandwood Bay

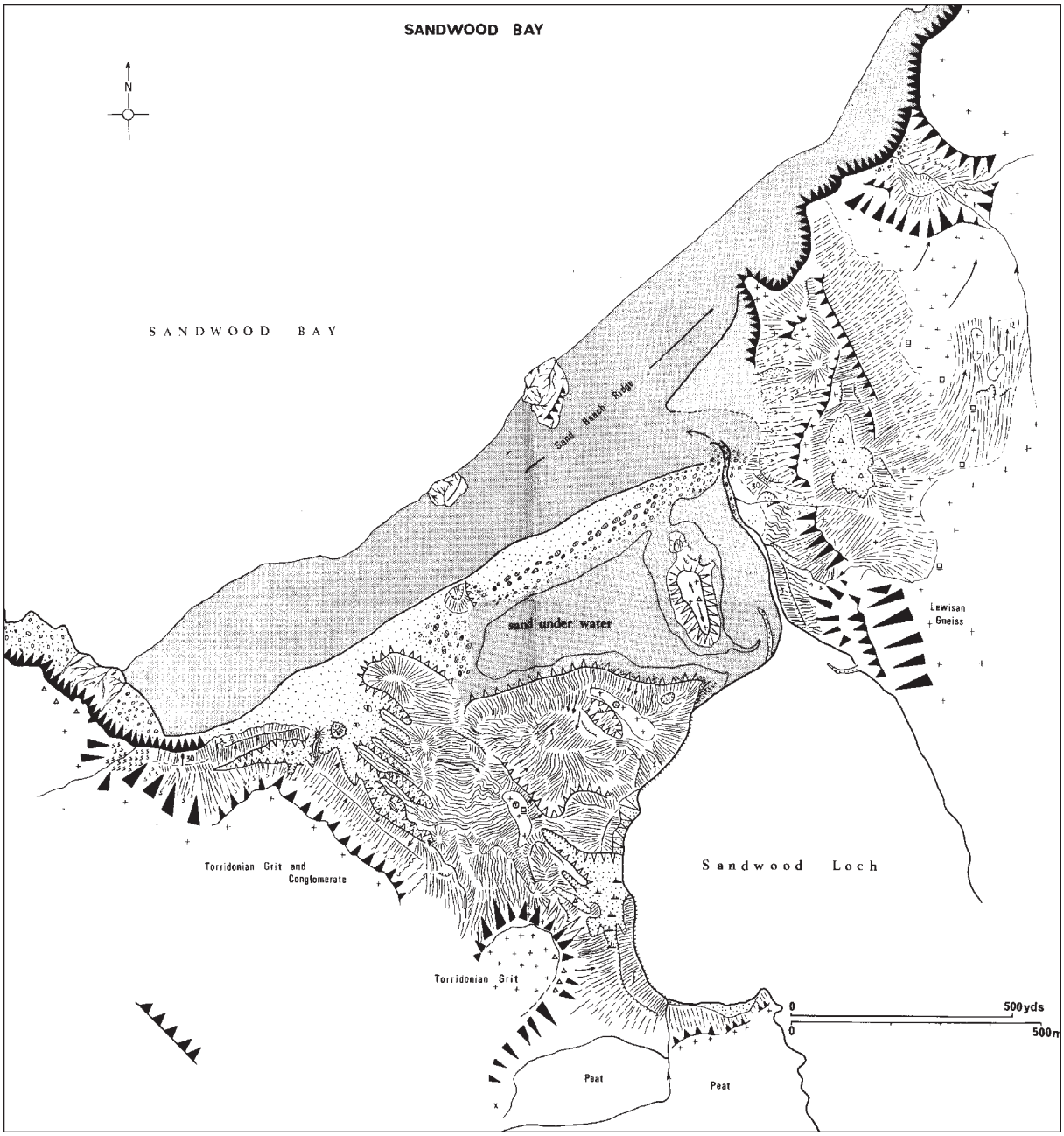


Figure 8.7 Balnakeil Bay

Figure 8.8 Sango Bay

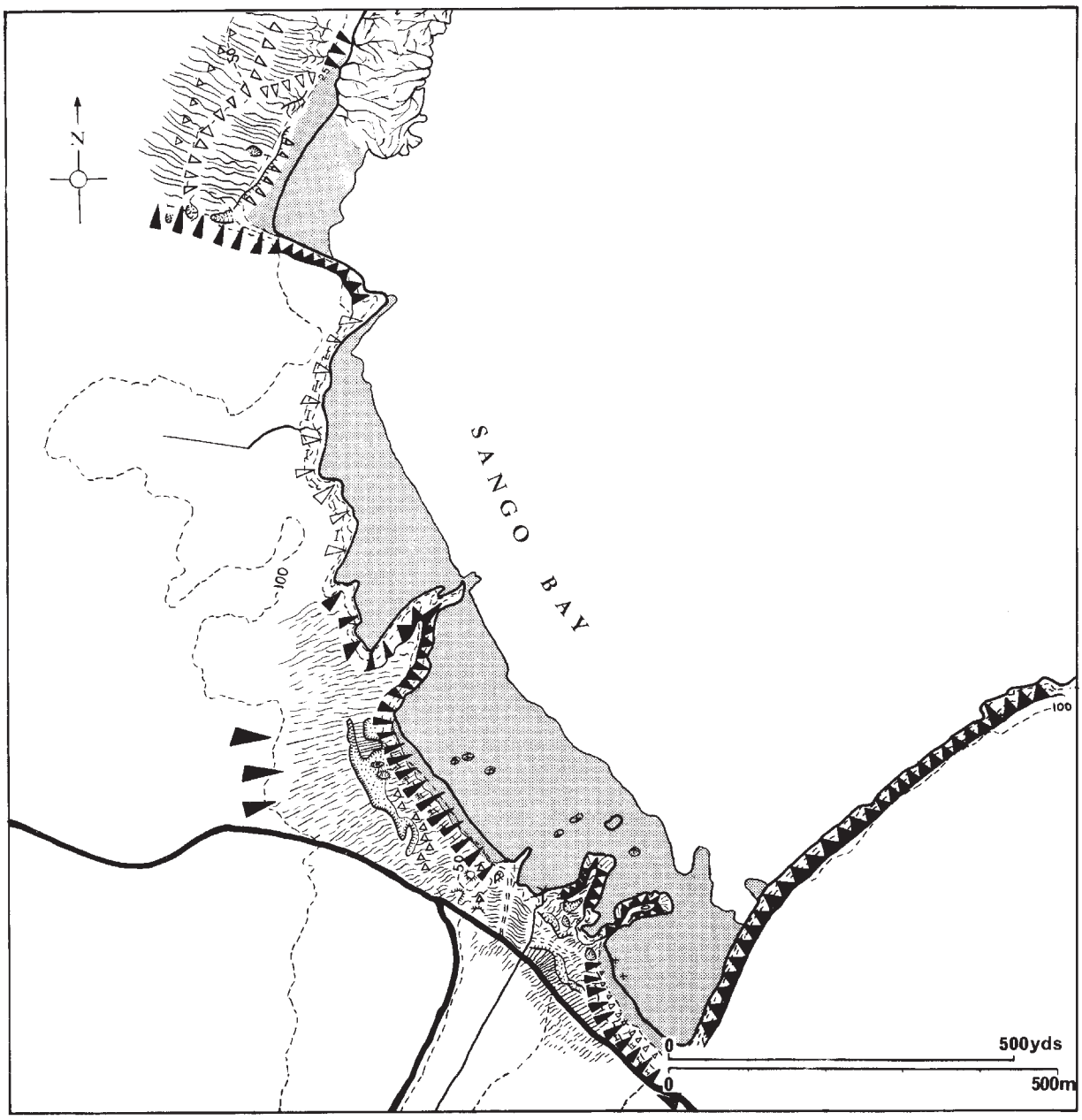


Figure 8.9a Sangobeg

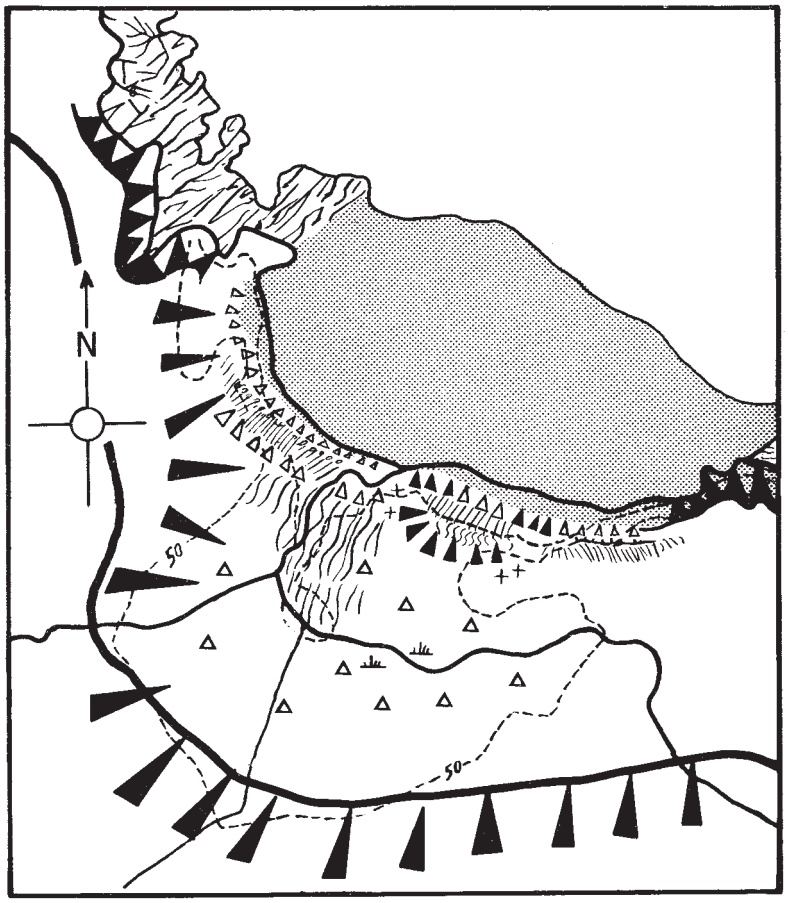


Figure 8.9b Traigh Allt Chailgeag

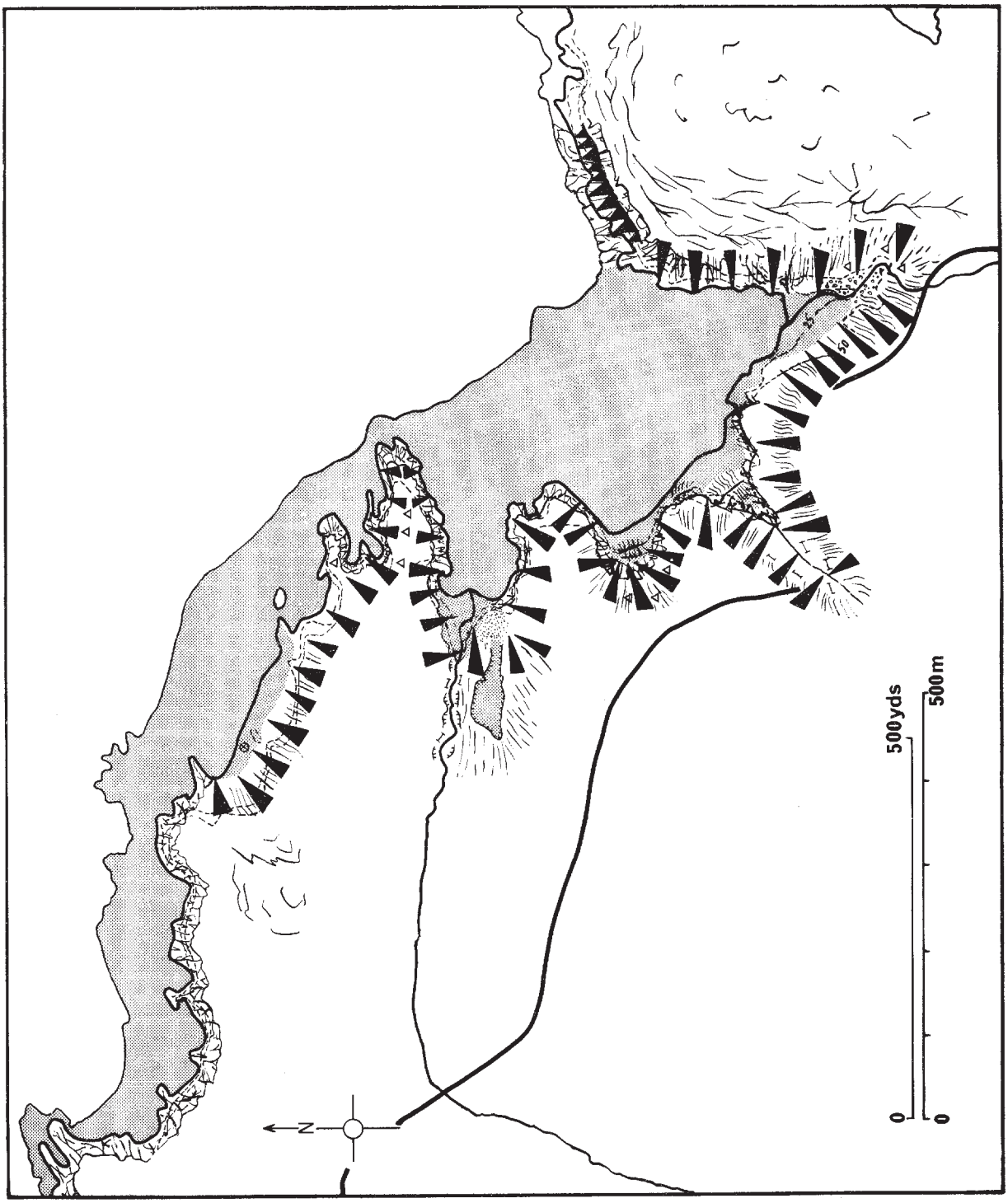


Figure 8.10 Coldbackie Bay

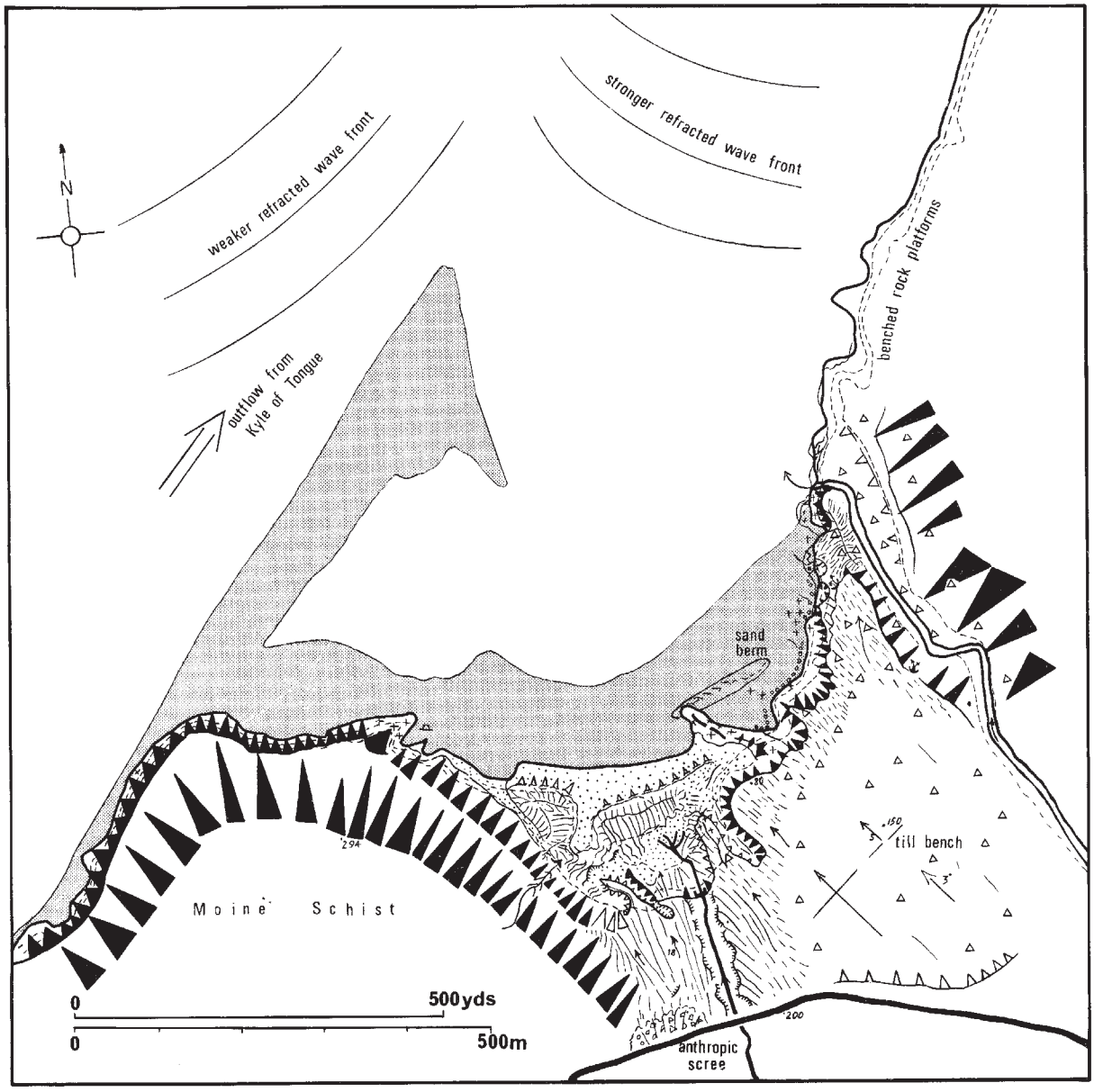


Figure 8.11a Torrisdale Bay (Borgie)

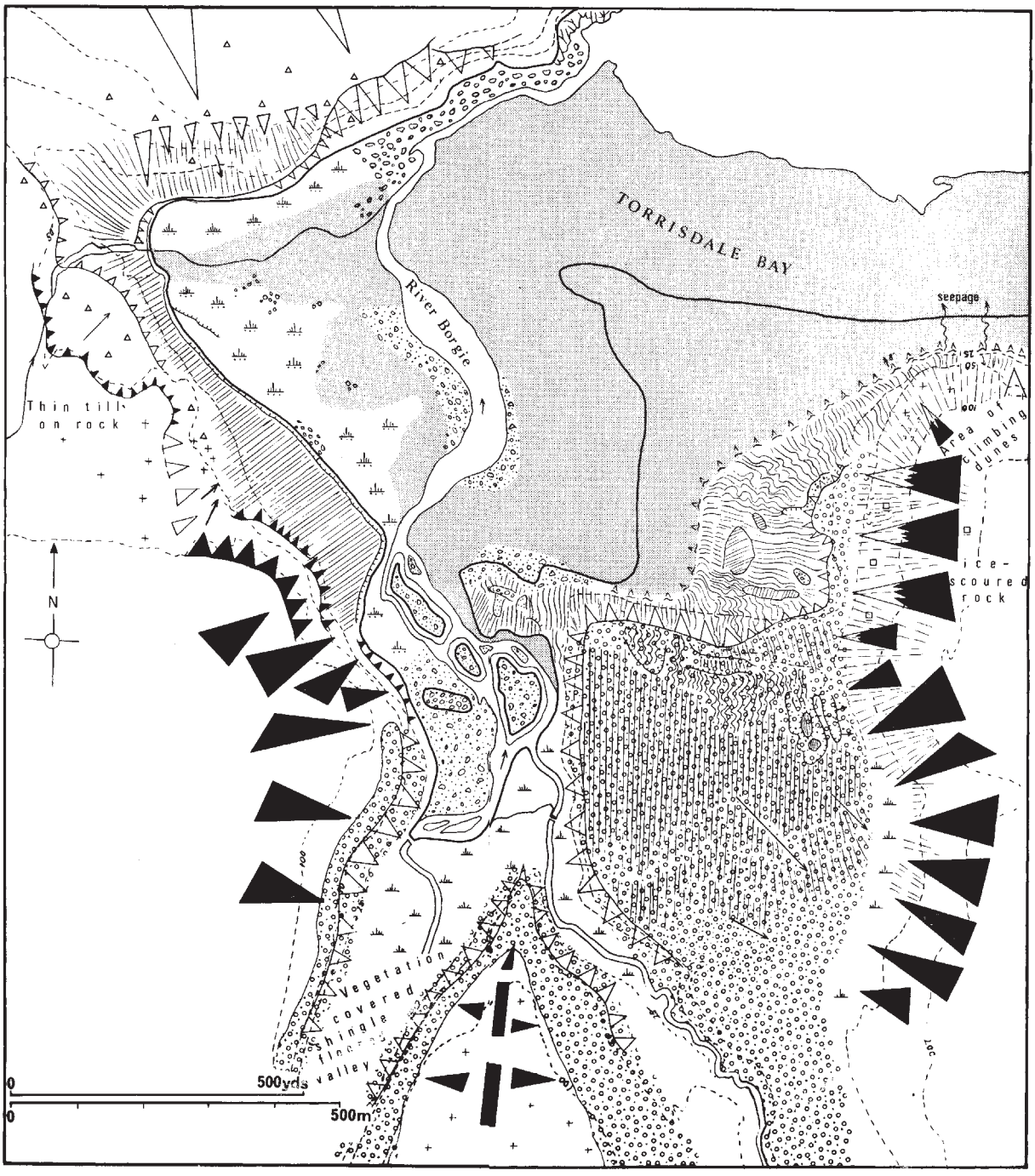


Figure 8.11b Torrisdale Bay (Borgie)

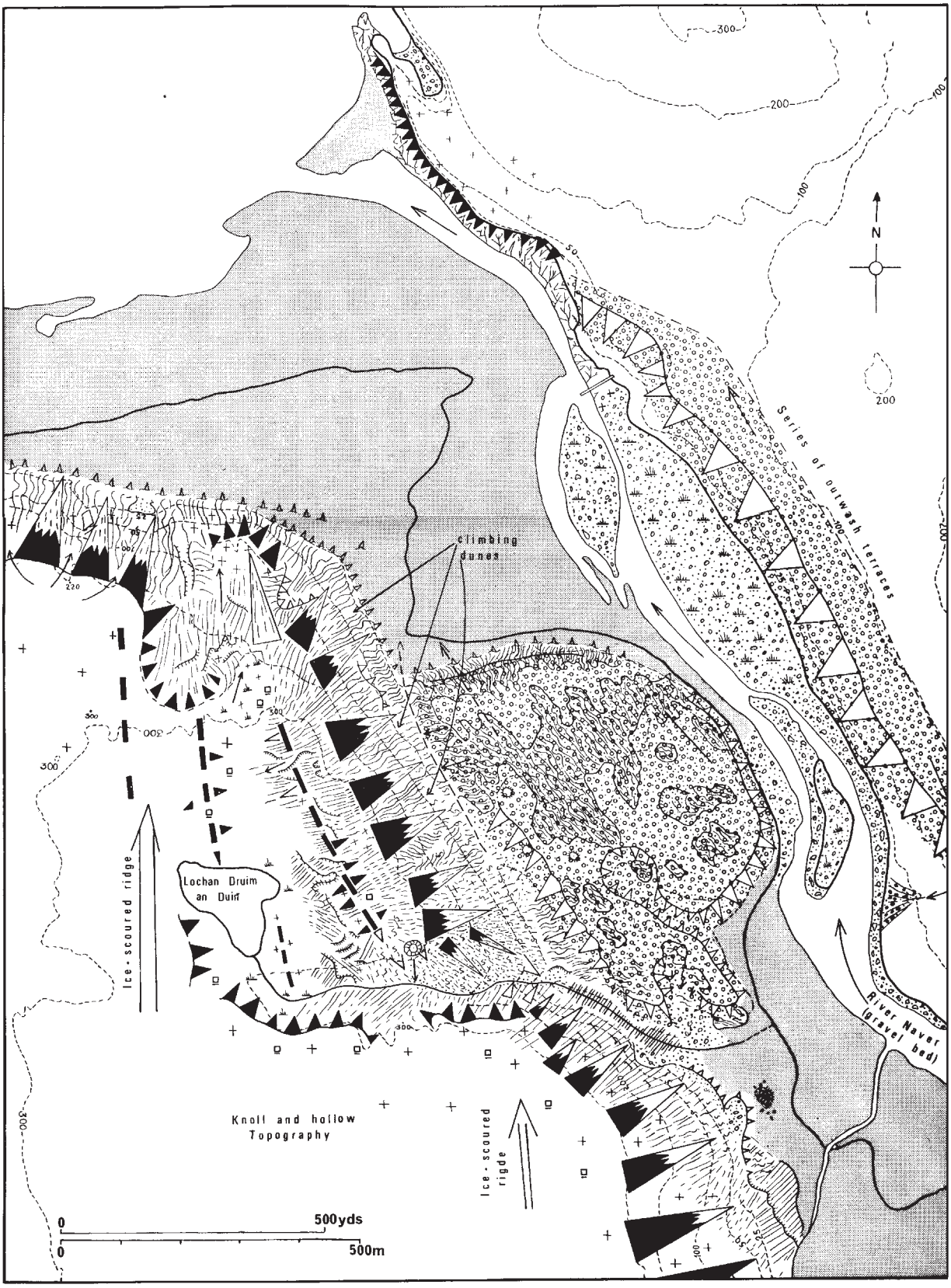


Figure 8.11c Location of Torrisdale Maps Invernaver

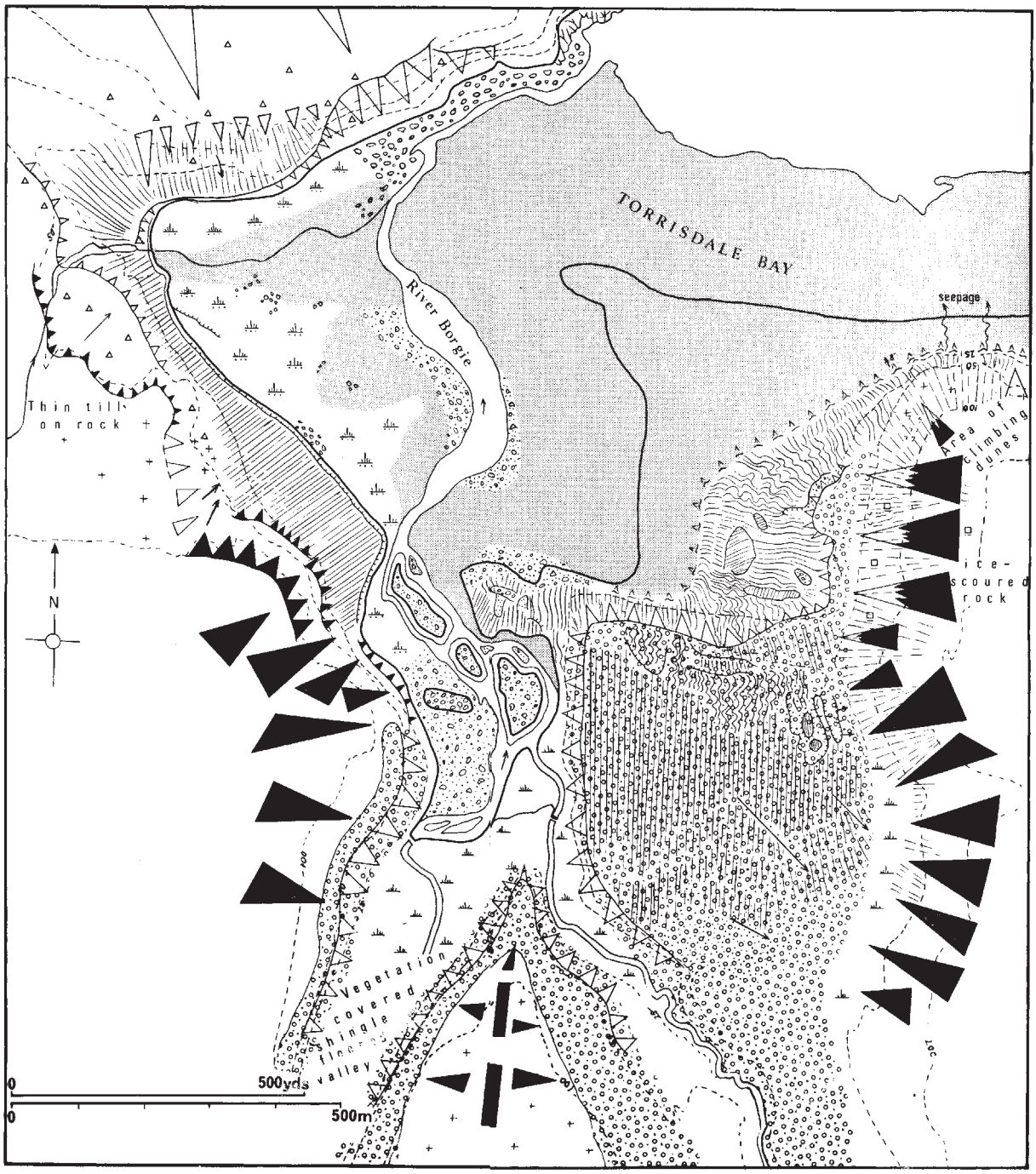


Figure 8.12 Farr Bay

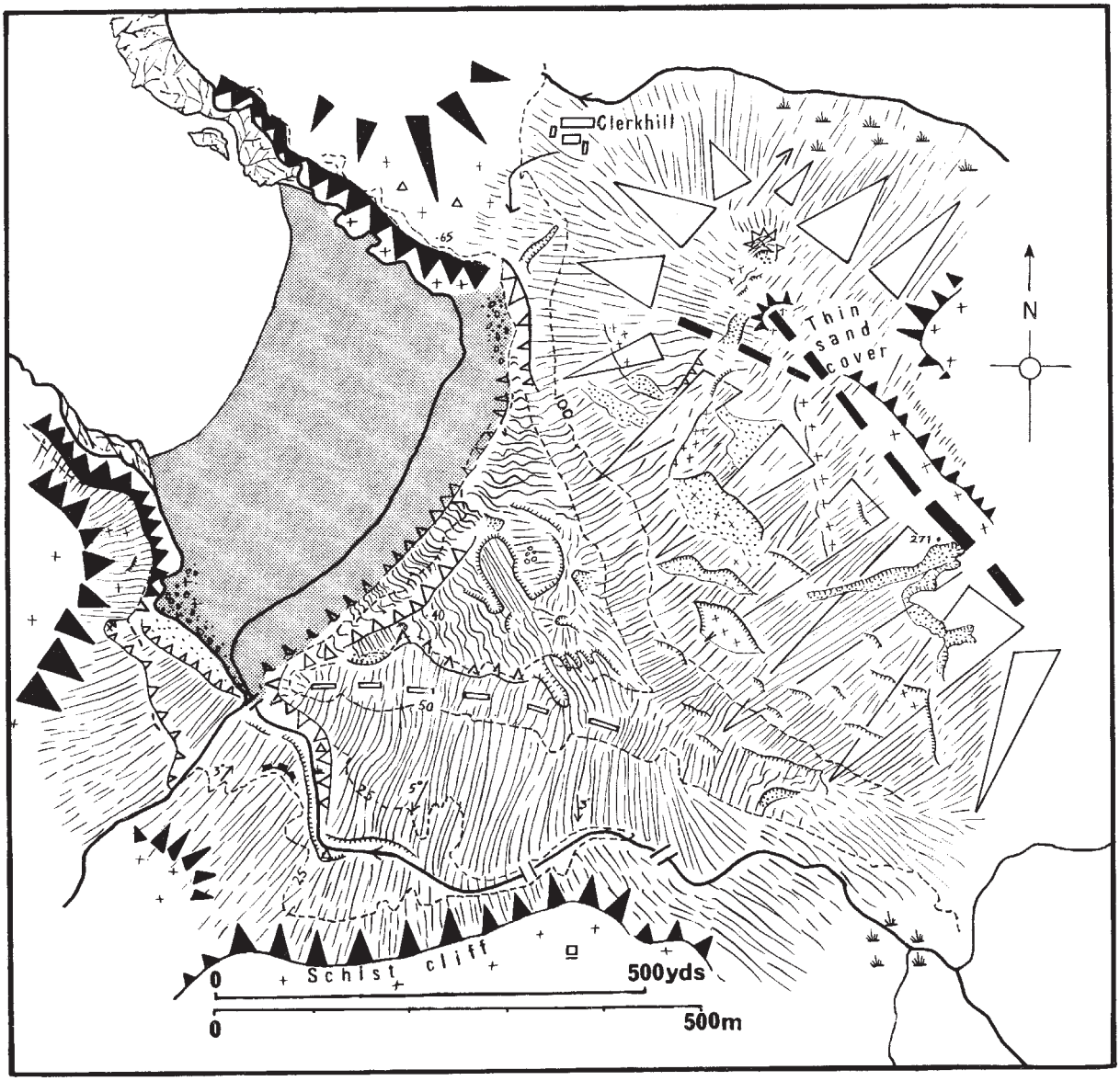


Figure 8.13 Armadale Bay

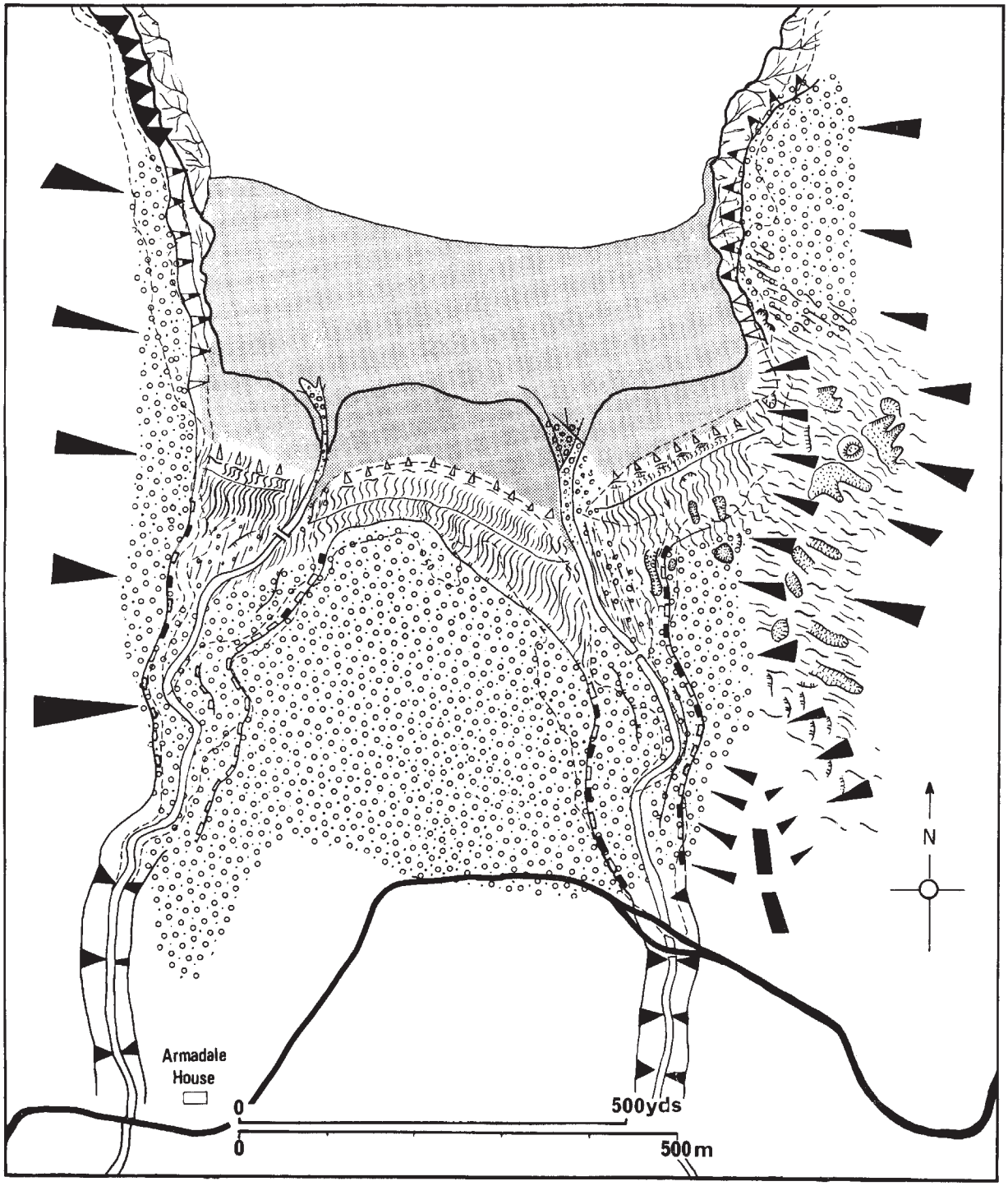


Figure 8.14 Strathy Bay

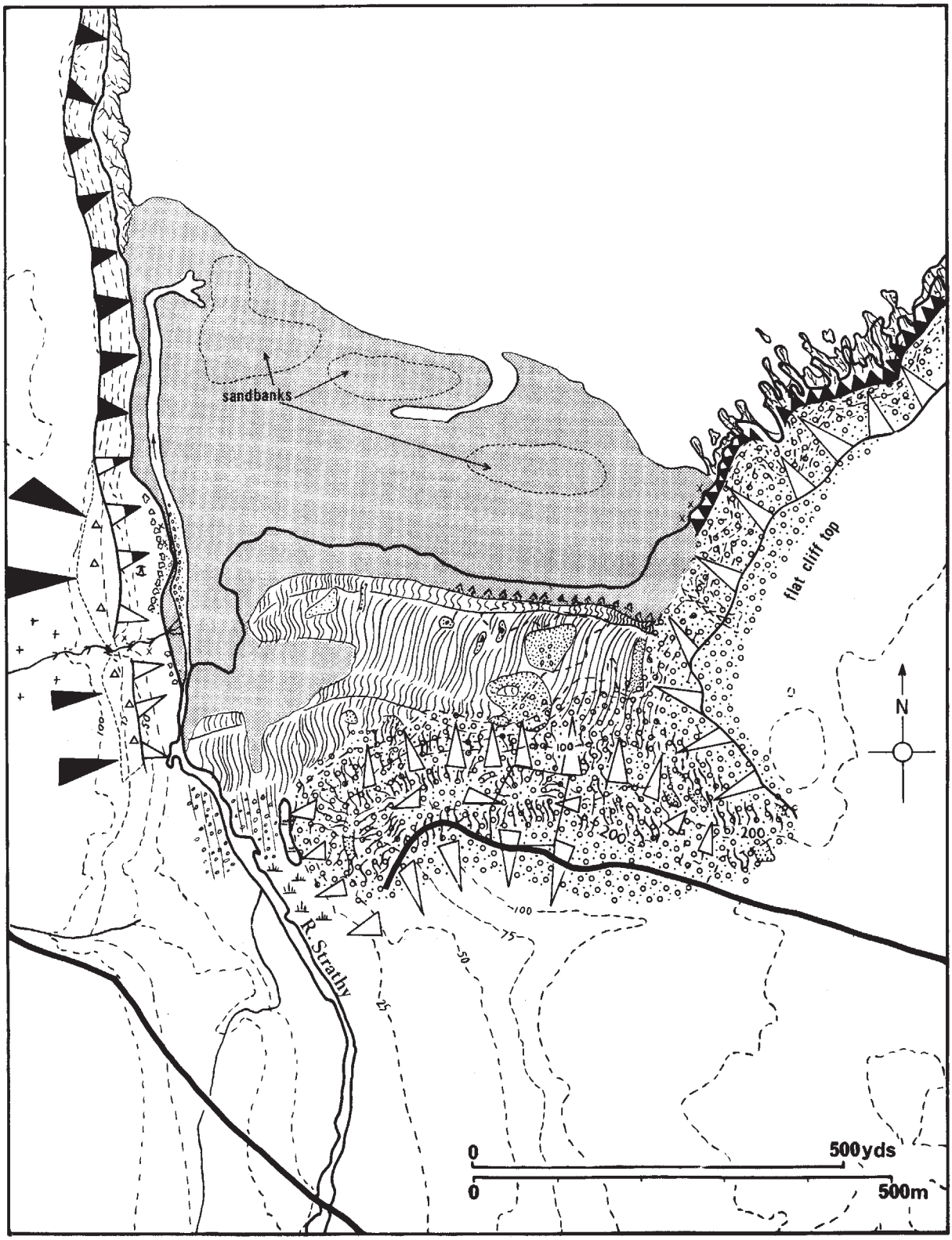


Figure 8.15 Melvich Bay