

Ancient Monuments Laboratory  
Report 26/86

THE SOILS AND GEOMORPHOLOGY OF THE  
ISLES OF SCILLY.

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Summary

The soils and geomorphology of the islands are described. The main soils of the islands are formed in granitic Head, loess (wind-blown silt) and blown sand. Most soils are podzolic and their nature reflects the parent material type whilst man has strongly influenced soil development via vegetation change and more directly by the addition of seaweeds and by deep and intensive cultivation.

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# THE SOILS AND GEOMORPHOLOGY OF THE ISLES OF SCILLY

## Introduction

This account of the soils of the Isles of Scilly is mainly based upon fieldwork carried out by the author during the mapping of the 1:250,000 National Soil Map by the Soil Survey of England and Wales. The islands have not been mapped in detail and this account must be regarded as interim.

Terminology and the soil classification system used follows that of the Soil Survey of England and Wales and reference can be made to Avery (1980), Clayden and Hollis (1985) and Hodgson (1974) for details of the classification system and terminology employed.

The account that follows is divided into sections on climate, geology, geomorphology and soils. A number of plates and soil descriptions are included in an appendix.

The islands occur as a group of five main inhabited islands and a number of smaller uninhabited islands and many rocks about 45km south west of Lands End. They are the westernmost outcrop of the Hercynian granites of South West England and have affinities in terms of climate, vegetation and soils with both mainland Cornwall and Brittany.

## Climate

The climate and weather of the Isles of Scilly is strongly influenced by its western, oceanic position which is very similar to that of western Cornwall and Brittany. Rainfall is lower than the mainland at about 850mm per annum (34 inches) with a strong winter maximum and least rain in June). The climate is warm with no frosts and a growing season that lasts the whole year whilst the accumulated temperature above 0 degrees centigrade is 1769, the highest for the United Kingdom. Sunshine levels are high and the islands are very exposed to strong, salt laden winds. Potential transpiration as a result is quite large at about 620 mm (24 inches) with maximum soil moisture deficits at about 110-120 mm (4-4.5 inches). Summer drought can therefore be significant, particularly on the shallower soils. The field capacity season lasts from the beginning of November to early April with soils being at or near field capacity over much of the winter. However the coarse texture of most soils means that this has little significance in terms of cultivation. Essentially the soils are capable of being cultivated throughout the growing season.

## Geology and Geomorphology

The solid geology of the islands is simple. They are composed of

fine and coarse grained granite with some fine grained elvan or quartz porphyry dykes. The granite is an acid rock which is composed of much quartz and feldspar with brown mica and tourmaline. It is frequently coarsely crystalline with very large feldspar crystals. Finer grained varieties are less common.

The unconsolidated deposits are much more complicated and it is this which gives rise to the multiplicity of soil types on the islands. It is rare that soils are developed directly from in situ granite and most are in drift deposits. Although granite-derived drift is very common not all the drift deposits are local.

### Granitic Head

This almost everywhere covers the in situ granite. Morphologically there are two types.

The most extensive, known locally as "ram", "rab" or "growan", is typically a yellowish brown, compact gravelly material. Gravel size varies between 2 and 6mm with occasional larger stones. The gravel fragments are composed of individual crystals or, more commonly somewhat rotten fragments of granite. The Head is a periglacial deposit and is apparently slightly cemented by translocated silt and some clay which bridges grains and fills some voids. There may also be some slight cementation from iron compounds. However much of the toughness that this Head can display probably relates to close packing as much as chemical cementation. The Head is rarely indurated as are similar deposits in northern England and Scotland. It has a large pore space and is very or extremely porous allowing free passage of soil water.

The other type of granitic Head is coarse and rubbly, composed of large granite stones and boulders. This sort of material is commonly seen in cliff sections below the compact gravel, often lying on top of raised beaches and wave cut platforms. It also occurs at the surface above other Head deposits as a boulder scree.

The origin of these Head deposits which also occur extensively on the mainland granites of Devon and Cornwall is thought to relate to a series of periglacial episodes which followed a period of deep weathering. The weathering which has been variously ascribed to late Tertiary weathering or weathering in a warm interglacial period left the granite in a rotted state. From the condition of the feldspars on the islands and the low elevation it is probable that the granite weathering occurred during an interglacial. Deeper, more strongly weathered Tertiary weathering mantles were probably removed by later episodes of sub-aerial and marine erosion. Mantles of this age are only found on the higher granite outcrops of the mainland.

### Glacial Deposits

Mitchell and Orme(1967) were the first to identify the presence of glacial deposits on the islands and showed that the patch of Eocene deposits on St Martins was glacial in origin. They also identified "boulder clay" within Head deposits within cliff sections. The deposits on the north of St Martins are remnant and little more than a scattering of exotic stones. The cliff sections at Bread and Cheese Cove comprise lenses of grey clay containing exotic sandstones and other rocks. Many of the cliff sections on other islands contain flints which possibly also relate to this glacial deposit. Mitchell and Orme postulated a tongue of sea ice which came down from Wales or the Irish Sea and rode up over parts of the northern islands but did not penetrate beyond St Martins. As these deposits are very limited in extent they have little significance with respect to soil development on the islands.

### Loess

Both the geological map and Mitchell and Orme mention Upper and Lower Head deposits and the Upper Head has been described as fine grained. It is thought that much of the Upper Head so described is loess (wind-blown silt). This material is typically seen in cliff sections as a more or less stoneless silt loam deposit up to 2m thick which overlies compact gravelly granitic Head. The loess forms a major parent material type for soils on the islands. Catt and Staines(1982) have described loess in Cornwall and the Isles of Scilly. It forms a major component in soils on the main granite masses and of soils developed over the serpentine of the Lizard Peninsula (Staines 1984). There are similar loess deposits throughout southern and south western Britain but Catt and Staines (ibid) have suggested that due to the larger individual grain size and slightly different mineralogy that the loess of western Cornwall and the Isles of Scilly may derive from a source in the Irish Sea rather than from eastern England as has been proposed for the loess deposits of southern England.

On the Isles of Scilly loess occurs mainly on gently sloping or flat sites, especially on footslopes and benches although it does also occur on plateau sites. Cliff profiles often show that the loess is slightly banded and contains stringers of fine granite fragments.

The loess is often overlain by a loamy granite-derived layer which is usually about 40cm thick. The siting of loess deposits, presence of granitic material within it, the occurrence of thin granitic layers above it and the presence of granite boulders at the top of some loess profiles all suggest that the loess has been reworked by solifluctive activity. The assumption can be made that the loess was originally deposited more or less evenly over the whole landscape and that its present distribution reflects redistribution after deposition. This may relate to the landscape of the islands. On the mainland most loess is found on flat plateau sites and is absent elsewhere, these sorts of sites

are rare on the islands. Most loess seems to have accumulated in footslope sites and some is also found on some broad interfluvies on the larger islands. Even where thick deposits of loess do not occur many of the island soils have a large silt component suggesting that loess has contributed significantly to the soil.

### Dating

There is some dating evidence for both the loess and also phases of solifluctive activity. Wintle (1985) has dated the loess of the Isles of Scilly and the Lizard peninsula by means of thermoluminescent techniques. The ages that she determined for samples from St Agnes and St Mary's were 18,600 BP (+ or - 20%) which are similar to dates obtained from other parts of southern England.

Three radiocarbon dates were obtained on samples taken by the author from organic layers found within compact granitic Head on St Mary's and St Agnes. The head within which the organic layers were found was itself below loess deposits in low cliff sections (see plates). The radiocarbon dates were 25,920  $\pm$  550 BP for the site at St Agnes and 26,550  $\pm$  650 and 20,630  $\pm$  450 for a site on St Mary's.

These dates are during the Late Devensian and it is possible to suggest a sequence of events. There was probably a major solifluctive phase at 20-25,000 years BP when much of the compact Head seen in cliff sections was deposited and in places some of the overlying soil material was included within the Head deposits. This was followed by loess deposition at ca 15-20,000 years BP and later local solifluction of the loess and rafting of boulders over some of the loess deposits.

### Blown Sand

Many of the islands have extensive blown sand deposits. The sand is derived from local beaches and is a medium quartz-rich sand containing many micas. It is non-calcareous although the sand on the beaches can have a small carbonate content due to the presence of shells. The blown sand is unlike the shell sands of the north Cornish coast which are almost entirely composed of shell fragments.

The blown sands can overly well developed soil profiles and also occur, in places, over archaeological remains. The available evidence points to major sand blows not earlier than the Bronze Age and probably during Romano-British times. It is likely that the blown sand deposits relate to changes in sea level. The blown sand could either be reworked pre-existing sand dunes which were moved inland with the advancing tide line or they could possibly be derived from the new intertidal zone created by the flooding of dry land by the marine transgression.

Although most of the sands on the islands are uncultivated and occur as dunes in places the sands have been worked by man and partially incorporated within the underlying soil.

### Other Deposits

There are small areas of alluvium and colluvium on the islands - particularly on St Mary's and Bryher.

The main alluvial deposits are close to Hugh Town. They often consist of sands over silts and loams and have been proved in one or two places to rest upon gravelly material. It is likely that the stoneless, loamy and sandy alluvial deposits are the result of erosion initiated by man. There is little erosion and hence subsequent alluviation under wooded conditions and if the assumption can be made that the islands were once wooded then most of the alluvial deposits can be assumed to have derived from erosion. However the materials have not been closely examined and it is feasible that some of the alluvium could be more or less stoneless solifluction deposits.

Colluvium that is, hillwash, ploughwash and other man induced erosion products are common in declivities, dry valleys and some footslope sites on St Marys and some of the other islands. Colluvium is very common on the mainland granites and is commonly accompanied by obviously truncated soil profiles upslope (Staines 1979). The colluvium on the islands usually consists of a more or less stoneless brown or dark brown deposits mainly made up of topsoil material. Little is known of the dating of colluvium on the islands. However comparison with other sites, albeit on different rock types, in southern England suggests that erosion often followed deforestation and subsequent agricultural activity. Phases of soil erosion have been identified during the Bronze Age and in many subsequent periods of intensive agricultural activity.

### THE SOILS

The following account of the soils derives from visits made to the islands in 1978 and 1979 when data was collected for the National Soil Map project of the Soil Survey of England and Wales and during an investigation of man-made soils.

The data collected is of necessity less than would be needed for a full scale, detailed survey of the islands although an attempt has been made to produce a semi-detailed soil map of the main islands. Detailed soil patterns are therefore absent although it is believed that the major soils of the islands have been identified. Some of these soils have established soil series names but others occur only on the islands and have not been fully enough characterised for an established soil series name to be given. In these cases the soils are called variants of the

named series identified.

The accompanying table shows the main soils of the islands and their classification.

The soil pattern on the islands is closely related to land use and also to position in the landscape. Most of the soils developed on the granite are podzolised soils that is they have a horizon which contains significant amounts of iron, aluminium and/or carbon that have either accumulated in situ or have been translocated from overlying horizons. As many of the soils have been cultivated intensively for many years many of the original features have either been destroyed or are now obscured.

### Soils of the Enclosed Parts of the Islands

The most common soils on the enclosed parts of the islands are brown podzolic soils (Moretonhampstead, Moor Gate and silty variants thereof). These soils have typical horizon sequences of plough soil (Ap) that overlies an ochreous subsoil which contains large amounts of amorphous sesquioxides of iron and aluminium. This in turn usually overlies compact granitic Head. The origin of these soils is unclear but they are very extensive on the enclosed granites of south-west England. Clayden (1968) has suggested that they were formed under a wooded environment which has been more or less continuously under agricultural use since deforestation. These soils have suffered, in places, significant erosion and the rather thin profiles may be the eroded remnants of much deeper soils. Where these soils have been deeply cultivated and where bulky organic manures, seaweed, sea sand etc has been added by man, thick (>40cm) dark topsoils have developed. These are man-made humus soils. They are common on the mainland around Penzance and Ludgvan and are also found on the western coasts of Ireland, the Scottish Islands and also in Brittany.

Podzolic soils with leached, greyish subsurface horizons are in the main confined to uncultivated ground although they also occur on cultivated land.

#### Moor Gate Series

These moderately shallow, acid well drained coarse loamy soils have humose topsoils and are very common on the enclosed parts of St Marys and the other islands.

Moor Gate soils consist of a dark humose topsoil over an ochreous subsoil which contains large amounts of sesquioxides of iron and aluminium. This in turn rests upon compact granitic Head. It is believed that many Moor Gate soils are cultivated and truncated remnants of other podzols like the Cucurrian series and that the dark topsoil is a mix of Ah and Bh horizons of pre-existing podzols. Soil textures are gritty sandy silt loam throughout

although silt loam variants occur. Moor Gate soils occur in close association with cultivated Cucurrian and Cucurrian silty variant soils. No clear pattern could be discerned at the level of detail achieved in the mapping so far.

Some Moor Gate soils could be long cultivated Moretonhampstead soils which have had large amounts of organic maures added thus rendering the topsoil black and humose.

### Moretonhampstead Soils

Moretonhampstead soils are moderately deep, well drained, potentially acid slightly stony coarse loamy soils.

They occur extensively on the mainland on the lower, enclosed and farmed parts of the granite outcrops. They usually consist of about 60cm of gritty sandy silt loam over compact, gravelly granitic Head. Topsoils are dark brown sandy silt loam and subsoils are ochreous (strong brown) sandy silt loam or sandy loam. Both topsoil and subsoil have fine granular structures, especially under grassland. They are similar to Moor Gate soils but topsoils are not humose.

On the islands Moretonhampstead soils are restricted to cultivated ground and are often close to areas of Ludgvan soils. They are often accompanied by similar Moor Gate soils and also by slightly deeper coarse silty variants which have silt loam soil textures. The latter occur where loess forms much of the soil profile. In areas shown as Moor Gate and Moretonhampstead soils on the accompanying soil map there are cultivated typical podzols and humus-ironpan stagnopodzols. Cultivation has mixed the original Ah and Ea horizons but ironpans and humus-enriched podzolic Bh horizons are sometimes identifiable between the topsoil and the podzolic Bs horizon.

It is difficult at present to identify the proportions of different soils shown on the map as Moor Gate and Moretonhampstead soils but the indications are that the silt loam variants of Moretonhampstead, Moor Gate and Cucurrian series may together form the bulk of the soils within this map unit although the Moor Gate series may well be the most common single soil series. That is there are more silty soils than loamy soils.

Silty soils tend to be found in footslopes, on benches and on some flat interfluves. Broadly convex hill tops and convex hillslopes carry shallow Moretonhampstead and Moor Gate soils. These can be eroded soils and small valleys can contain deep loamy colluvial soils. The colluvial soils are identified as the Lowlands series and a profile description is included in the Appendix. Where land has been intensively cultivated man-made soils often occur and these are usually associated with very small fields.

### Ludgvan Soils

The areas shown as Ludgvan series defines the distribution of strongly modified man-made soils. Although there is little documentary evidence for the formation of man-made or "plaggen" soils on the islands there is a large area of such soils near Penzance on the mainland. The origin of these soils is described by Staines (1979). They mainly derive from the addition of seaweed, beach sand and dune sand (shell sand) and organic manures to pre-existing brown earths. On the islands the man-made soils are light loams or sands depending on the amount of sand applied along with the seaweed. Some of the sandy man-made humus soils are deeply cultivated blown sand soils. As the dune sands on the islands are non-calcareous and the beach sands are only very slightly calcareous the man-made soils of the islands are by and large non-calcareous and potentially acid unlike those on the mainland which are principally calcareous. Seaweed is still applied to many fields and must originally have been a significant source of nutrients. It is conceivable that turves from the heaths could have been composted although there is no evidence for this. Turves like this were used extensively in the production of plaggen soils on the North German plain.

Ludgvan soils on the islands consist of at least 40cm of dark coloured humus-rich soil overlying the remnants of the original soil. They usually consist of about 60cm of very dark brown sandy loam or sandy silt loam which often contains rounded beach pebbles. Subsoils are strong brown sandy silt loams or silt loams. They are often podzolic B horizons of pre-existing brown podzolic soils or podzols. The topsoil is usually finely structured and the soil as a whole is permeable and well drained. Man-made soils are most frequently found in areas of most intense cultivation and their distribution coincides with the smallest fields which are usually surrounded by Escallonia hedges.

Where sands have been cultivated there are deep sandy man-made soils. They have dark coloured upper sandy horizons with pale sandy subsoils. In many places the sandy layers are relatively thin and pre-existing buried profiles can be found beneath the deeply worked topsoil.

In the areas shown as man-made soils on the map there are less modified podzolised soils. These are Moretonhampstead and similar soils which have dark coloured topsoils rather less than 40cm deep.

### Beckfoot Series

These soils dominate the areas of dune sand that occur on nearly all the islands. Beckfoot soils have limited soil profile development and most soils consist of a thin dark coloured

topsoil over loose yellowish sand. The least stabilised dunes have least soil development and there are areas of bare sand where the dunes are unvegetated.

The vegetation most commonly found on the dunes is marram grass although fine leaved fescue grassland also occurs whilst there is heath on some of the old long-vegetated dunes on the southern tip of Tresco.

Although most of the blown sand has Beckfoot soils it does occasionally support rather different soils. In places well developed podzol profiles have been indentified on dune sand and low lying "dune slacks" on Tresco have sandy gley soils affected by high groundwater.

### Alluvial Gley Soils and Cambic Gley Soils

These are mapped as a few discrete low lying areas on St Mary's and on Bryher. Due to the heterogeneity of the alluvium there are many soil series present, however they all have similar characteristics.

All the soils are affected by high groundwater and many are waterlogged close to the surface for much of the year. As a result peaty topsoils have developed. In places amorphous peat deposits have accumulated.

A common textural sequence encountered near Hugh Town is sand or upper horizons over silt loam subsoils which pass via loamy material to granitic gravel or Head. On Bryher there are deep, grey and strongly mottled silt loams where soliflucted loess is affected by high groundwater.

A typical profile description is included in the Appendix but subsoils are usually grey and strongly mottled with ochreous colours.

### Soils of the Heaths

These are principally uncultivated or little cultivated soils which occur under semi-natural grassland, bracken, gorse and heath. Although all the soils are podzolised there can be rapid lateral variation in soil type. The main soils are described below, some have no established soil series name and are as yet to be fully characterised but others have been mapped in detail on the mainland (Staines 1979).

Three main subgroups occur on the islands but there are several soil types due to the presence and absence of silty drift (loess) within the soil profile giving two soil series for any one subgroup where the only difference is texture.

Podzolic soils are differentiated according to the presence or absence of diagnostic horizons. Some soils have a grey, strongly leached albic E (eluvial) horizon or a dark coloured Bh horizon containing translocated organic matter immediately beneath the topsoil. These are termed podzols and whilst most podzols are typically pervious and well aerated, the soils recognised as stagnopodzols show evidence of anaerobic conditions either immediately below, in or above the podzolic B horizon. On the Isles of Scilly there are humo-ferric podzols which are more or less freely draining podzols that have an albic (grey and leached) E horizon and a prominent Bh horizon (an accumulation of pyrophosphate extractable carbon) at least 2.5cm thick, that overlies a Bs horizon. They do not have ironpans or grey, gleyed subsurface horizons. There are also humic cryptopodzols which have a humose or peaty topsoil, a humose Bh horizon at least 10cm thick and no albic E, thin ironpan or gleyed subsurface horizon. The characteristic feature of these soils is the large accumulation of incorporated organic matter which obscures the morphological expression of eluvial and illuvial horizons. The latter are identified as such by the presence of organic coats on sand grains, stones and by relatively large accumulations of carbon, iron and aluminium extractable by pyrophosphate. These soils are most characteristically developed in pervious stony materials under upland heath or montane vegetation. On the islands and also on parts of Lands End close to cliffs and under windtrimmed heath vegetation the soils are developed almost entirely in gravelly granitic Head with little or no overlying less stony material.

The last group of podzols are those which show evidence of anaerobic conditions above or within the podzolic B horizon. On the islands these soils have a thin, hard ironpan, usually below a Bh horizon and the evidence of anaerobic conditions is limited to weak mottling immediately above the ironpan. These soils, humus-ironpan stagnopodzols are considered as intergrades to well drained podzols. They usually lack the peaty topsoils characteristic of stagnopodzols on the uplands of Dartmoor and Bodmin Moor. They probably suffer only slight waterlogging above the ironpan, particularly in view of the low rainfall of the islands in comparison with the amounts falling on the higher upland granite masses. It is pertinent to note that soils with ironpans on the granite in south west England occur from near sea level on the Isles of Scilly to about 600m on parts of Dartmoor in a climatic range from 700 to 2,300mm average annual rainfall. This suggests that vegetation type and sequences play a large part in determining the formation of ironpans and that climatic conditions alone are insufficient to explain their distribution. As well as soils with thin Bh horizons above the ironpan there are also those in which a Bh horizon is more or less absent.

### Cucurrian Series

These soils were first mapped and described on the Lands End Peninsula (Staines 1979). They are coarse loamy humo-ferric podzols (=humus iron podzols) formed in loamy granite-derived drift over compact Head.

Under semi-natural vegetation, usually heather moor or bracken infested grassland, topsoils are black, humose sandy loam or sandy silt loam and these overlie less dark (often dark brown or greyish brown) sandy loam eluvial layers. Below this there is usually a thin (ca. 10cm thick) black Bh horizon which commonly rests directly on compact gravelly granitic Head. More rarely there is a friable strong brown Bs horizon between the dark coloured Bh and the granitic Head below. Cucurrian soils are acid and well drained and it is possible that many of the rather deeply cultivated Moor Gate soils now found on the islands could well have been Cucurrian series before the land was used for agriculture.

### Cucurrian Silty Variant

Although not quite as common as loamy Cucurrian soils there are profiles which have a similar sequence of horizons but whose soil textures are silt loam. Such soils are usually stoneless or very slightly stony and tend to be rather deeper than loamy Cucurrian soils. They are often about 80cm thick over gravelly granitic Head and they usually have a well developed Bs horizon below the Bh horizon.

### Trink Series

These are coarse loamy humus-ironpan stagnopodzols with compact gravelly granitic Head at about 60cm depth. They occur mainly on the heaths of the islands and are also extensive on the Lands End granite.

A typical Trink series profile has a thin black Ah horizon which merges into a paler, commonly greyish brown, E horizon. This overlies a black or reddish black Bh horizon which is underlain by a thin, hard, undulating ironpan. Downward undulations of the ironpan often have greyish, slightly mottled pockets of Eg horizon, an indication of some periodic waterlogging caused by the pan. The pan often rests directly on the compact gravelly Head although there can be an ochreous unmottled Bs horizon between the pan and the compact Head.

Trink soils probably only suffer slight periodic waterlogging as the rainfall is not high.

Trink soils occur mainly on hillslopes and broadly convex interfluves and low hills but where loess has accumulated, particularly on footslope benches, a silty variant occurs. These

soils are often seen in low cliff sections on many of the islands.

The silty variant is often much deeper than loamy Trink soils. The loess is commonly about 1-2m thick over the compact gravelly granitic Head.

Typically a black sandy loam or sandy silt loam Ah horizon overlies a greyish silt loam Ea horizon which in turn overlies a black, sometimes slightly mottled silt loam Bh horizon. This rests upon a thin, hard, undulating ironpan below which there is an ochreous (strong brown) silt loam Bs horizon. This usually rests on compact gravelly granitic Head. There is often a second ironpan at the junction of the silty drift and the compact granitic Head.

These profiles are particularly common on footslopes and benches and many appear to have been cultivated in the past. Indeed below high water mark on Sampson Flats and also off Bryher truncated silty Trink profiles occur in association with the "drowned fields" found there. This has some significance in relation to the dating of the formation of these soils. They must have formed prior to the Romano-British inundation whilst they also occur widely under sand dunes in cliff sections on most of the islands.

They thus pre-date Romano-British times. Whether these soils pre-date Bronze Age occupation is unclear but the excavations at Bar Point revealed well developed podzols in loamy Head which had been cultivated in prehistoric times.

#### Unnamed Cryptopodzols

This group of soils is characteristically developed in very gravelly granitic Head from which any original loamy or silty drift is absent. They occur on the northern parts of the islands, in particular on Bryher and Tresco under severely wind-pruned heather.

These soils typically consist of a very thin peaty surface mat a few centimetres thick over a black, humose gravelly Ah horizon in which the gravel fragments and sand grains are leached. This is usually about 20cm thick and passes to a black gravelly horizon in which all the gravel fragments are thickly coated with black organic matter. Commonly many of the granite stones contain weathering feldspars which give slight ochreous mottling. This horizon gradually passes into increasingly compact gravelly Head in which the quantity of organic coatings decreases with depth.

It is not thought that these soils possess podzolic Bs horizons. It is believed that most of the iron translocated from the surface layers has accumulated with the translocated organic matter. It is probable that the character of these soils is determined by the extremely gravelly nature of the parent

material. The presence of thin peaty surface layers may indicate some waterlogging within these soils. Indeed most of the Bh horizons examined were quite compact and it is possible that they are not as permeable as similar horizons in more loamy, less stony materials.

APPENDIX: Profile descriptions and photographs.

Profile Descriptions

LUDGVAN SERIES

Grid ref: SV 930154 Slope: 4 degrees Land Use: Horticulture

Apl

0-40cm Black(10YR2/1) humose sandy loam; few small and medium granite fragments; weak medium and fine subangular blocky structure; weak soil strength; slightly plastic, non-sticky; common roots; clear boundary.

Ap2

40-60cm Dark brown (10YR3/2) sandy loam; few small and medium granite fragments; moderate fine subangular blocky structure; weak soil strength; slightly plastic non-sticky; common roots; clear boundary.

2Bs

60-100cm Yellowish brown(10YR5/6) sandy silt loam; stony with gravel to small granite frgments; strong fine subangular blocky and granular structures; few roots; clear boundary.

MORETONHAMPSTEAD SERIES

Grid ref: SV 925121 Slope : 12 degrees Land Use: Permanent grass

Ah

0-25 Dark yellowish brown (10YR 3/4) sandy silt loam; common small and medium granite fragments; moderate fine subangular blocky structure; slightly sticky and slightly plastic; clear boundary

Bs

25-55cm Strong brown (7.5YR 5/6) sandy silt loam; common to many gravel and small granite fragments; strong fine subangular blocky and granular structure; weak soil strength; slightly plastic, slightly sticky; few roots; clear boundary.

BC

55+ Yellowish brown (10YR 5/6) sandy loam; abundant gravel and small sized granite fragments; brittle; weak platy structure; no roots. This material is compact gravelly granitic Head.

#### SILTY VARIANT OF MORETONHAMPSTEAD SERIES

Grid ref: SV 925118 Slope: 2 degrees Land use: horticulture

Ap

0-25 Very dark greyish brown (10YR 3/2) silt loam; few small granite fragments; weak medium subangular structure; very plastic, slightly sticky; weak soil strength; clear boundary.

Bs

25-45 Yellowish brown (10YR 5/6) silt loam; stoneless apart from a few very small granite fragments; moderate fine subangular blocky structure; weak soil strength; very plastic slightly sticky; clear boundary

2BC

45+ Brownish yellow (10YR 6/6) sandy loam; weak coarse platy structures in places, otherwise structureless; abundant gravel and small granite fragments; brittle in places.

#### LOWLANDS SERIES

Grid ref: SV925119 Slope: 2 degree Land Use: horticulture

Ap

0-30cm Very dark greyish brown (10YR 3/2) sandy silt loam; few small granite fragments; weak medium subangular blocky structure; weak soil strength; slightly sticky, slightly plastic; clear boundary.

Bw

30-100 Dark brown (7.5YR 3/3) sandy silt loam (high silt content); slightly stony with a few small and very small granite fragments; weak medium subangular blocky structure; porous; weak soil strength; slightly sticky and slightly plastic.

#### MOOR GATE SERIES

Grid ref:SV 912116 Slope: 3 degrees Land Use: Permanent grass

Ah

0-30 Black (5YR 2/1) humose sandy silt loam; common small and medium granite fragments; strong fine subangular blocky structure; weak soil strength; very porous; non-sticky and slightly plastic; clear boundary

Bs

30-45 Yellowish red (5YR 4/6) gritty sandy silt loam; many small and very small granite fragments; strong fine subangular blocky

structure; weak soil strength; very porous; clear boundary

BC

45+ Brownish yellow (10YR 6/6) gritty sandy loam; extremely abundant very small and small and occasional large granite fragments; structureless; very porous; compact and brittle

#### SILTY VARIANT OF MOOR GATE SERIES

Grid ref: SV 919107 Slope: 4 degrees Land Use: heath

Ah

0-35cm Dark greyish brown (7.5YR 3/2) humose sandy silt loam; few very small granite fragments; moderate medium subangular blocky and some granular structures; weak soil strength; very porous; non-sticky and slightly plastic; clear boundary

Bs1

35-50 Yellowish brown (10YR 5/5) silt loam; rare small granite fragments; weak medium subangular blocky structure; very porous; slightly sticky and moderately plastic; gradual boundary.

Bs2

50-80 Yellowish brown (10YR 5/6) silt loam; rare becoming few with depth of small and very small granite fragments; weak medium subangular blocky structure, becoming platy with depth; very porous; slightly sticky and moderately plastic; clear boundary

2BC

80+ Brownish yellow (10YR 6/6) gritty sandy loam; extremely abundant very small and small granite fragments; weak platy structure in places, otherwise structureless; extremely porous.

#### BECKFOOT SERIES

Grid ref: SV 897139 Slope: flat Land Use: lowland heath (stabilised dunes with lichen ground flora)

Ah

0-15 Black (10YR 2/1) humose medium sand; stoneless; fine granular structure; non-sticky and non-plastic; very porous; abundant roots; clear boundary

Cu

15-100 Pale brown (10YR 6/3) stoneless medium sand; structureless, single grain; extremely porous; non-sticky, non-plastic.

UNNAMED HUMIC ALLUVIAL GLEY SOIL

Grid ref: SV912103 Slope:flat Land Use: permanent grass

Ah

0-20 Very dark grey (10YR 3/1) humose loamy sand; stoneless; medium subangular blocky structure; clear boundary

2Bg

20-100 Grey (10YR 6/1) silt loam with abundant medium mottles of brownish yellow (10YR 6/8); stoneless; structureless; waterlogged.

It is unclear whether this material is alluvium or stoneless drift.

CUCURRIAN SERIES

Grid ref: SV 912121 Slope: 6 degrees Land Use:Bracken

Ah

0-15 Black (10YR2/1) sandy silt loam; common small granite stones; weak medium subangular blocky structure; weak soil strength; non-sticky and slightly plastic; very porous; clear boundary

Ea

15-25 Dark greyish brown (10YR4/2) sandy silt loam; common small granite stones; weak blocky structure; non-sticky, slightly plastic; very porous; clear boundary

Bh

25-35 Dark reddish brown (5YR 3/2) gritty sandy silt loam; many small and very small granite stones; structureless; slightly brittle; very porous; gradual boundary

Bs

35-55 Yellowish red (5YR 4/6-5/5) sandy silt loam with few ochreous areas as iron concentrations; very stony with small and very small granite fragments; fine subangular blocky structure; non-sticky, non-plastic; clear boundary

BC

55+ Strong brown(7.5YR 5/6) gritty sandy loam; extremely abundant small and very small granite fragments; structureless; slightly compact and brittle; very porous.

TRINK SERIES

Grid ref:SV 876157 Land Use: Heath

Ah

0-17 Black(10 YR 2/1) humose sandy loam; common small and medium granite stones; moderate medium subangular blocky structure; non-sticky, slightly plastic; very porous; clear boundary

Ea

17-25 Dark greyish brown (10 YR 4/2) sandy silt loam; common small granite stones; weak subangular blocky structure; very porous; clear boundary.

Bh

25-47 Black (5YR 2/1) sandy loam with common strong brown (7.5 YR 5/8) mottles as rotting feldspar fragments; many small and medium granite frgaments; structureless; very porous; sharp boundary

Bf

@47 Thin, hard undulating ironpan

BC

47+ Yellowish brown (10YR 5/6) gravel dominant Head

TRINK SERIES SILTY VARIANT

Grid ref: SV924176 Land Use: Heath

LF

0-18 Litter and fermentation layer

Ah

18-31 Black (10YR 2/1) humose sandy silt loam; few small granite fragments and occasional granite boulders; strong fine subangular blocky structure; non-sticky and slightly plastic; moderately porous; clear boundary

Ea

31-69 Pale brown (10YR 6/3) silt loam; stoneless apart from rare granite fragments; weak fine subangular blocky structure; very porous; weak soil strength; gradual boundary

Bh

69-85 Dark reddish brown (5 YR 2/2) silt loam with few ochreous mottles; stoneless; structureless; slightly brittle; very porous; sharp undulating boundary

Bf

@ 85 Thin, hard, undulating, continuous ironpan.

Bs

85-125 Strong brown to yellowish red (7.5-5 YR 5/6) silt loam; few small granite fragments; weak medium subangular blocky structure, weak medium platy towards base; slightly sticky and moderately plastic; very porous; clear boundary

BC

125+ Gravel dominant, compact granitic Head

UNNAMED HUMIC CRYPTOPODZOL

Grid ref: SV 877157    Slope: 7 degrees    Land use: heath

Ah1

0-17 Black (10 YR 2/1) humose sandy loam to loamy peat; slightly stony with very small bleached granite fragments; moderate fine subangular blocky and granular structure; very porous; gradual boundary

Ah2

17-25 Very dark brown (10 YR 3/2) gravelly sandy silt loam; abundant very small and small bleached granite fragments; weak fine subangular blocky structure; moderately porous; gradual boundary

Bh

25-45 Black (5YR 2/1) humose sandy silt loam as coatings to gravel; extremely abundant very small and small granite fragments some of which are weathering to give strong brown colours; very porous; gradual boundary

BC

45-70 Yellowish brown (10YR 5/6) gravelly sandy loam; extremely abundant small and very small granite stones; very porous.

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LEGEND TO SCILLIES SOIL MAP

SYMBOL	MAIN SOIL SERIES	ASSOCIATED SOILS
Bck	Beckfoot	Sandy gley soils, brown sands
Lv	Ludgvan	Moor Gate, Moretonhampsted, sandy man-made humus soils, Lowlands
MQ	Moor Gate/ Moretonhampstead	Ludgvan, Cucurrian, silty variants of main soils, Lowlands
Tk	Trink/Cucurrian/ unnamed cryptopodzols	Moor Gate, silty variants of Trink and Cucurrian
Tk'	Silty variants of Trink/Cucurrian	Silty variants of Moor Gate,
GL	Alluvial gleys and cambic gleys	Amorphous peat soils

SOIL CLASSIFICATION

MAJOR GROUP	GROUP	SUBGROUP	LITHOLOGY	SOIL SERIES
RANKERS	Sand-rankers	Typical sand-rankers	Sandy stoneless drift (blown sand)	Beckfoot
BROWN SOILS	Brown earths	Colluvial brown earths	Coarse loamy non-calcareous colluvium	Lowlands
PODZOLIC SOILS	Brown podzolic soils	Typical brown podzolic soils	Coarse loamy over litho-skeletal granite	Moretonhampstead
			Coarse silty over litho-skeletal granite	Unnamed coarse silty variant
		Humic brown podzolic soils	Coarse loamy over litho-skeletal granite	Moor Gate
		Coarse silty over litho-skeletal granite	Coarse silty variant	
	Humic crypto-podzols	Typical humic crypto-podzols	Coarse loamy lithoskeletal granite	Unnamed
	Podzols	Humo-ferric podzols	Coarse loamy over litho-skeletal granite	Cucurrian

			Coarse silty over litho- skeletal granite	Silty variant
	Stagno- podzols	Humus- ironpan stagno- podzols	Coarse loamy over litho- skeletal granite	Trink
			Coarse silty over litho- skeletal granite	Silty variant
MAN-MADE SOILS	Man-made humus soils	Earthy man-made humus soils	Loamy drift with siliceous stones	Ludgvan

Note: There are also a number of alluvial gley soils and cambic gley soils with varying textural arrangements. These soils are not fully characterised and further classification may be misleading.



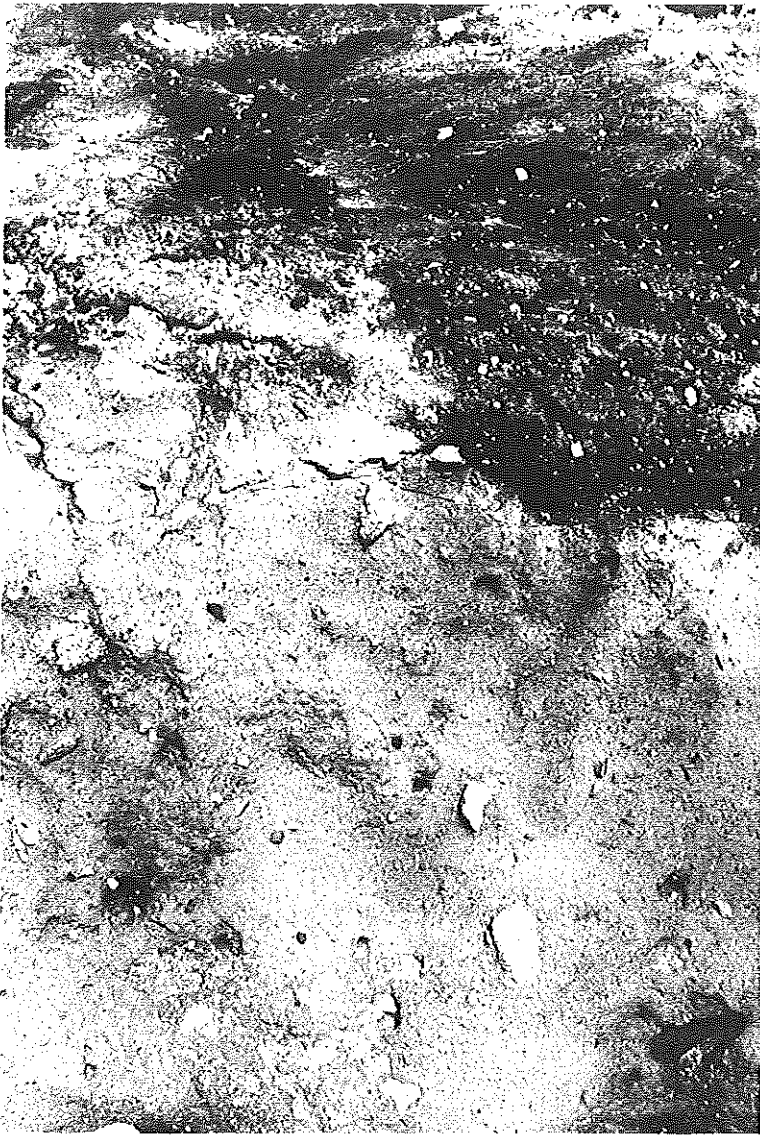
Horizon	Texture
Ah/Ea	Silt loam
Bh	Silt loam
Bfe	
Bs	Silt loam

TRINK SERIES - SILTY VARIANT



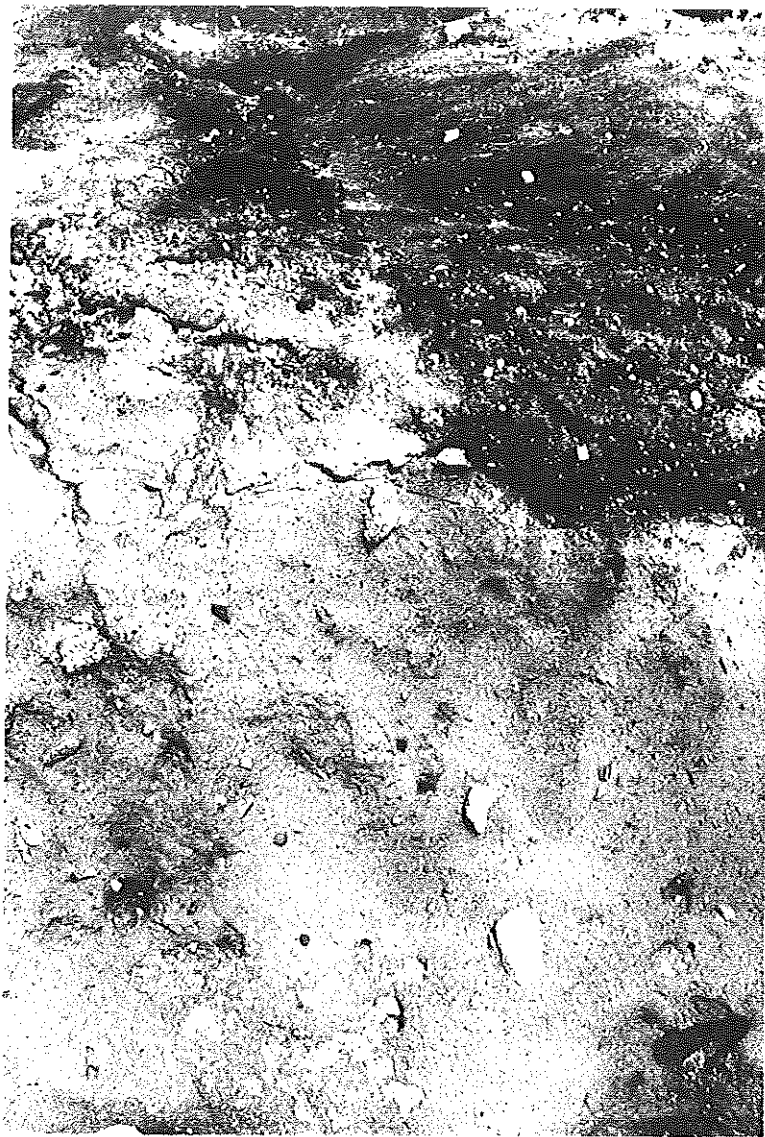
Horizon	Texture
Ah/Ea	Silt loam
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TRINK SERIES - SILTY VARIANT



Horizon	Texture
Ah/Ea	Silt loam
Bh	Silt loam
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Bs	Silt loam

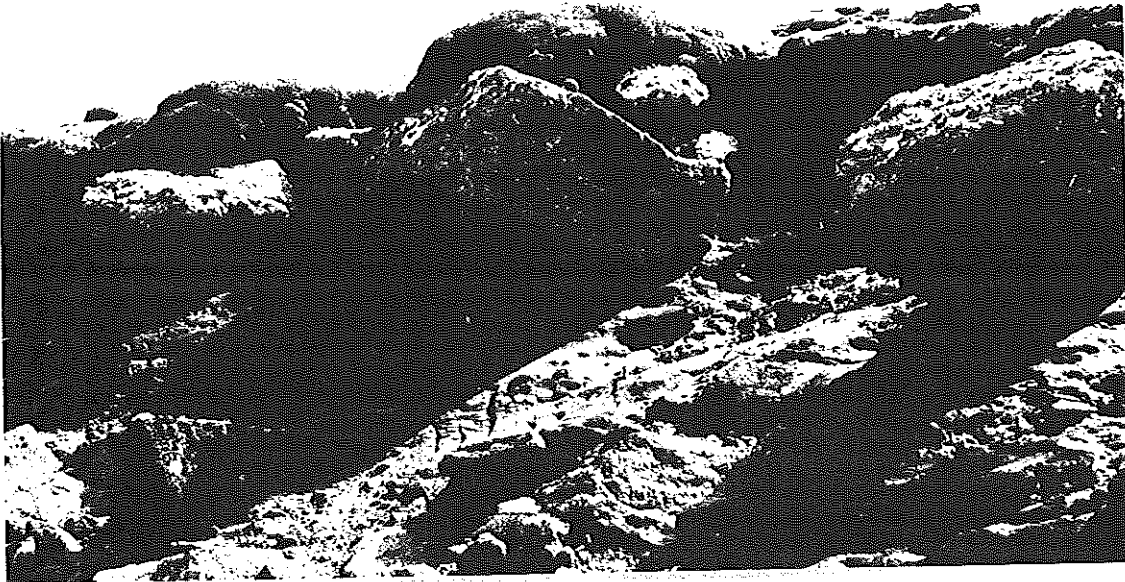
TRINK SERIES - SILTY VARIANT



Horizon	Texture
Ah/Ea	Silt loam
Bh	Silt loam
Bfe	
Bs	Silt loam

TRINK SERIES - SILTY VARIANT

CLIFF SECTIONS : ST MARTINS



Section on northern end of White Island showing coarse silty humus-ironpan stagnopodzol. Large boulders rest on loess deposit which in turn rests upon granitic head

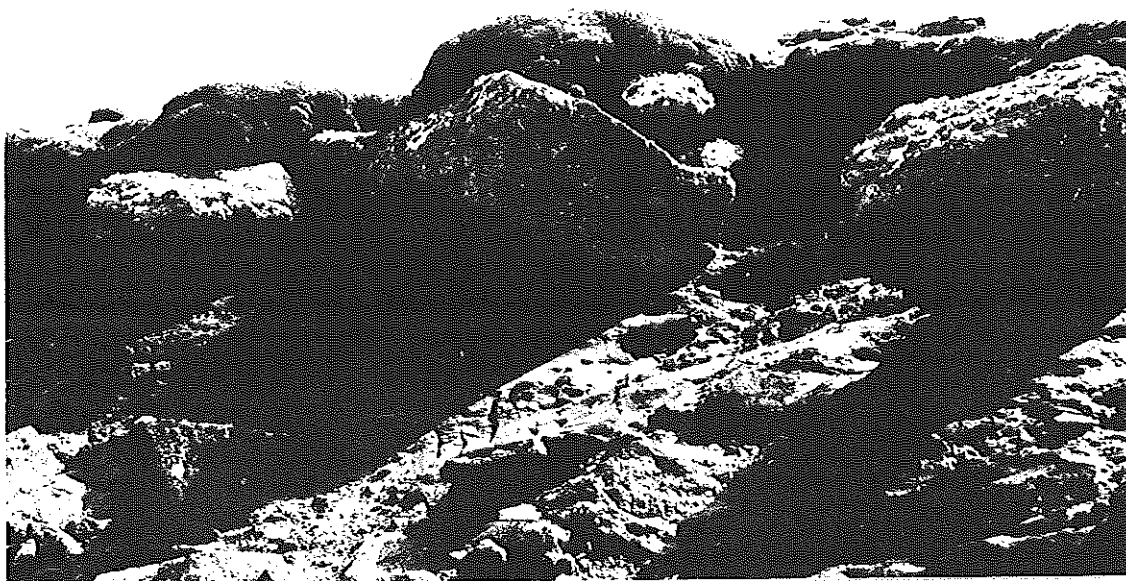


Deeply cultivated man-made soil in blown sand loess (stoneless orange soil)

Granitic Head

Beach

CLIFF SECTIONS : ST MARTINS



Section on northern end of White Island showing coarse silty humus-ironpan stagnopodzol. Large boulders rest on loess deposit which in turn rests upon granitic head

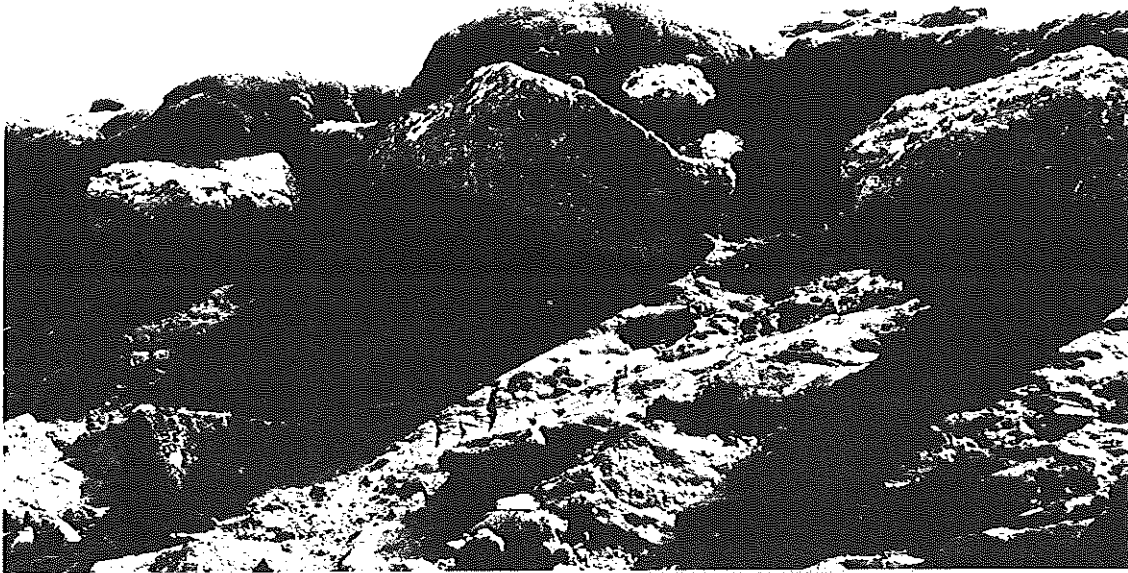


Deeply cultivated man-made soil in blown sand loess (stoneless orange soil)

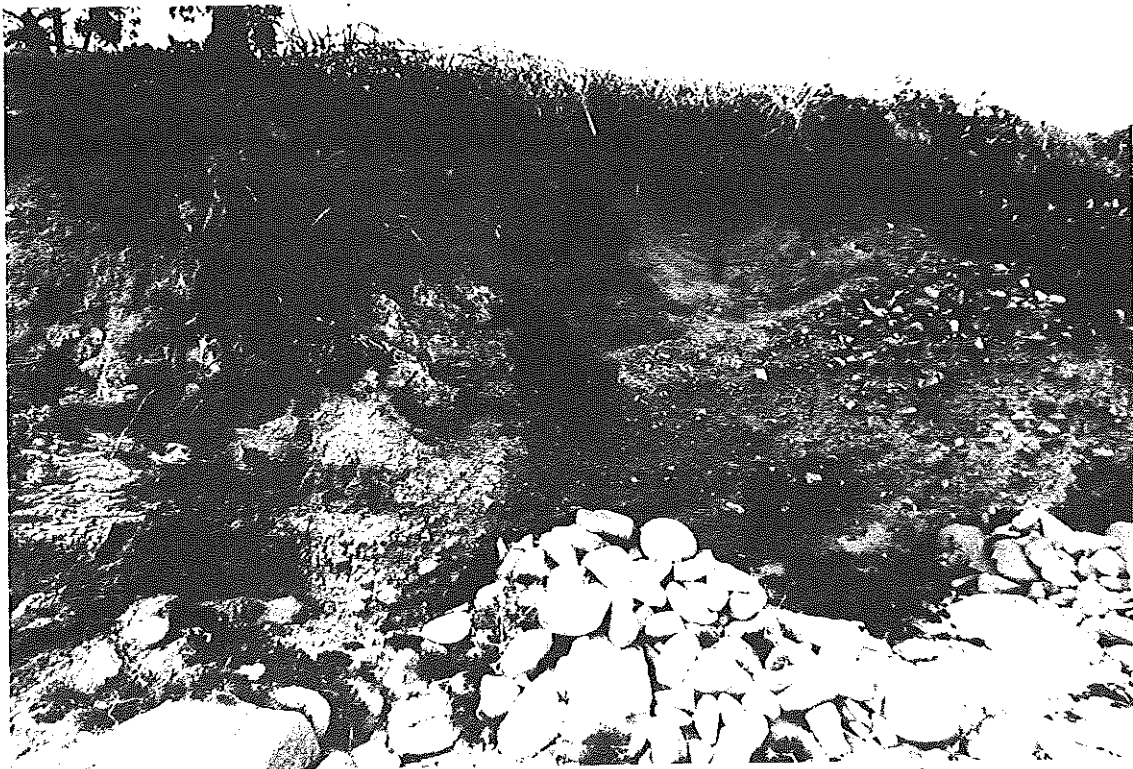
Granitic Head

Beach

CLIFF SECTIONS : ST MARTINS



Section on northern end of White Island showing coarse silty humug-ironpan stagnopodzol. Large boulders rest on loess deposit which in turn rests upon granitic head



Deeply cultivated man-made soil in blown sand loess (stoneless orange soil)

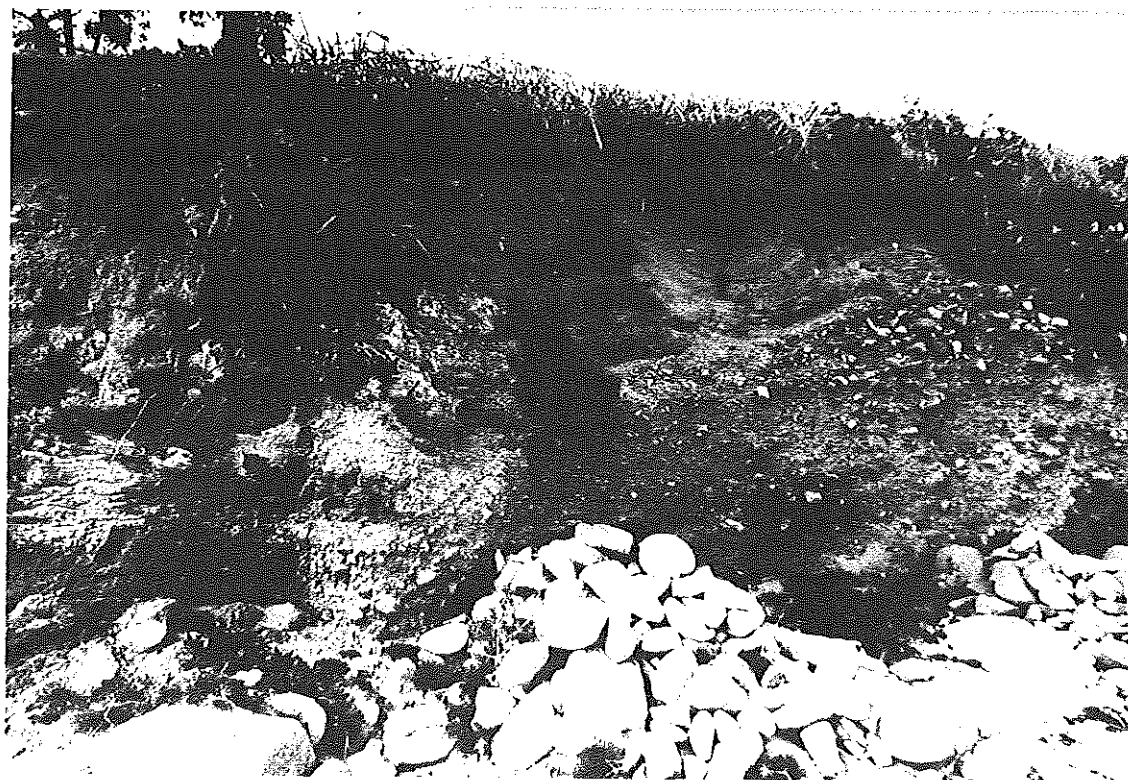
Granitic Head

Beach

CLIFF SECTIONS : ST MARTINS



Section on northern end of White Island showing coarse silty humus-ironpan stagnopodzol. Large boulders rest on loess deposit which in turn rests upon granitic head



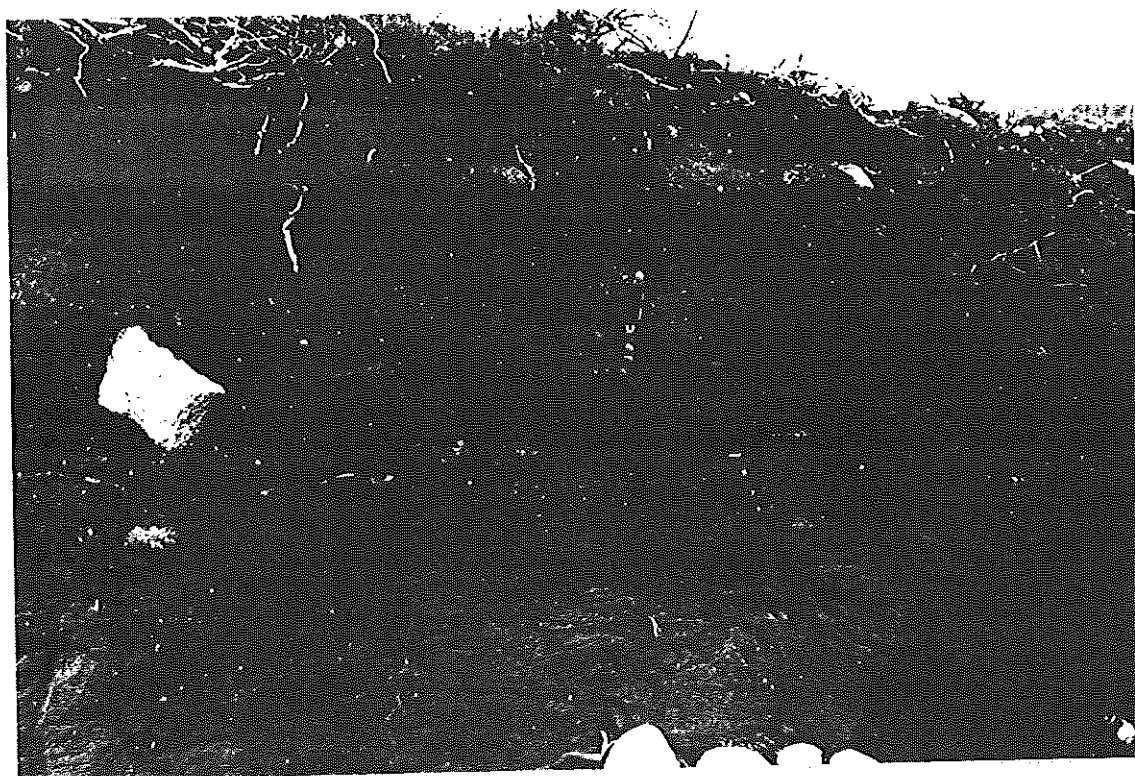
Deeply cultivated man-made soil in blown sand loess (stoneless orange soil)

Granitic Head

Beach

CLIFF SECTION ST MARTINS

Horizon/Texture



A<sub>b</sub> ZL-SZL

E<sub>a</sub> ZL

B<sub>h</sub> ZL

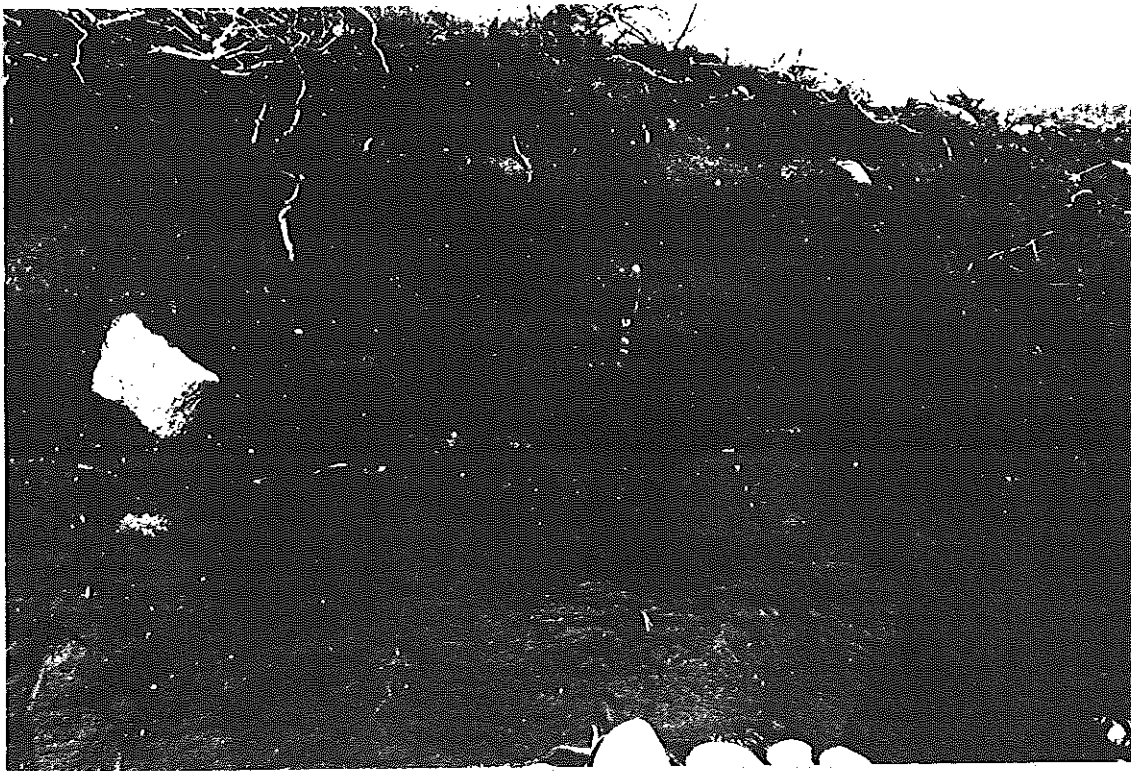
B<sub>f</sub>

B<sub>s</sub> ZL

More or less stoneless humus iron-pan stagnopodzol  
developed in loess deposit

CLIFF SECTION ST MARTINS

Horizon/Texture



A<sub>h</sub> ZL-SZL

E<sub>a</sub> ZL

B<sub>h</sub> ZL

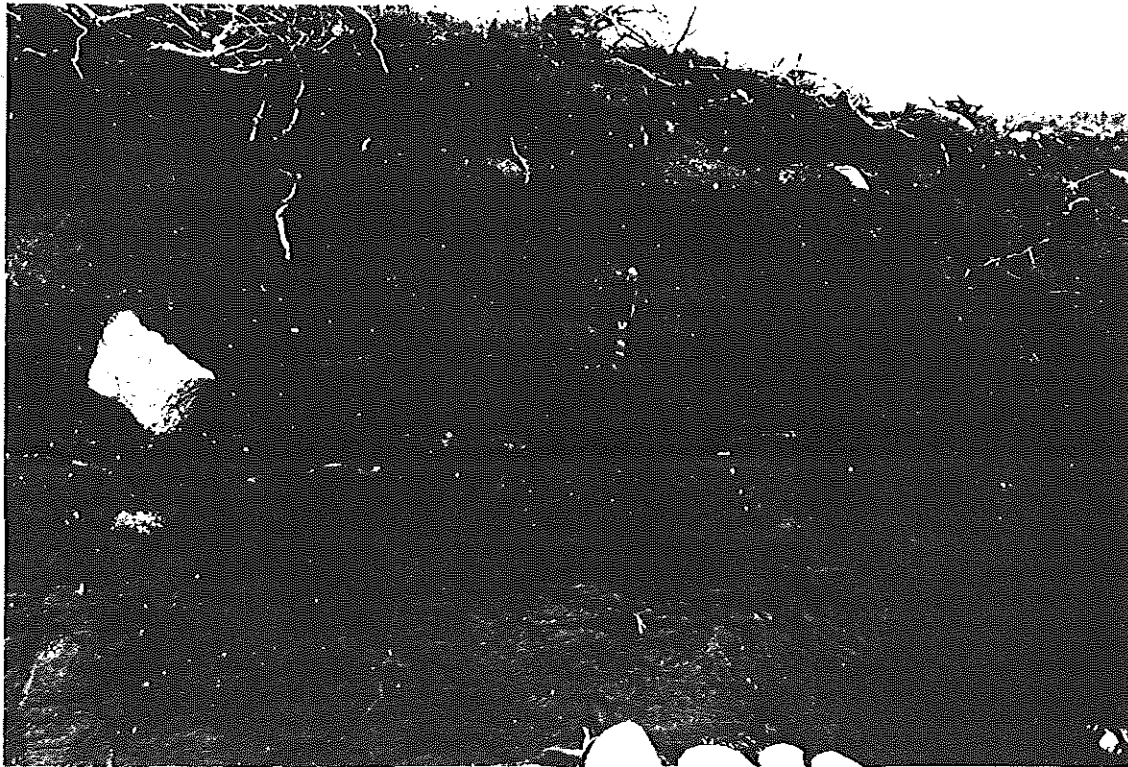
B<sub>f</sub>

B<sub>s</sub> ZL

More or less stoneless humus iron-pan stagnopodzol  
developed in loess deposit

CLIFF SECTION ST MARTINS

Horizon/Texture



A<sub>h</sub> ZL-SZL

Ea ZL

Bh ZL

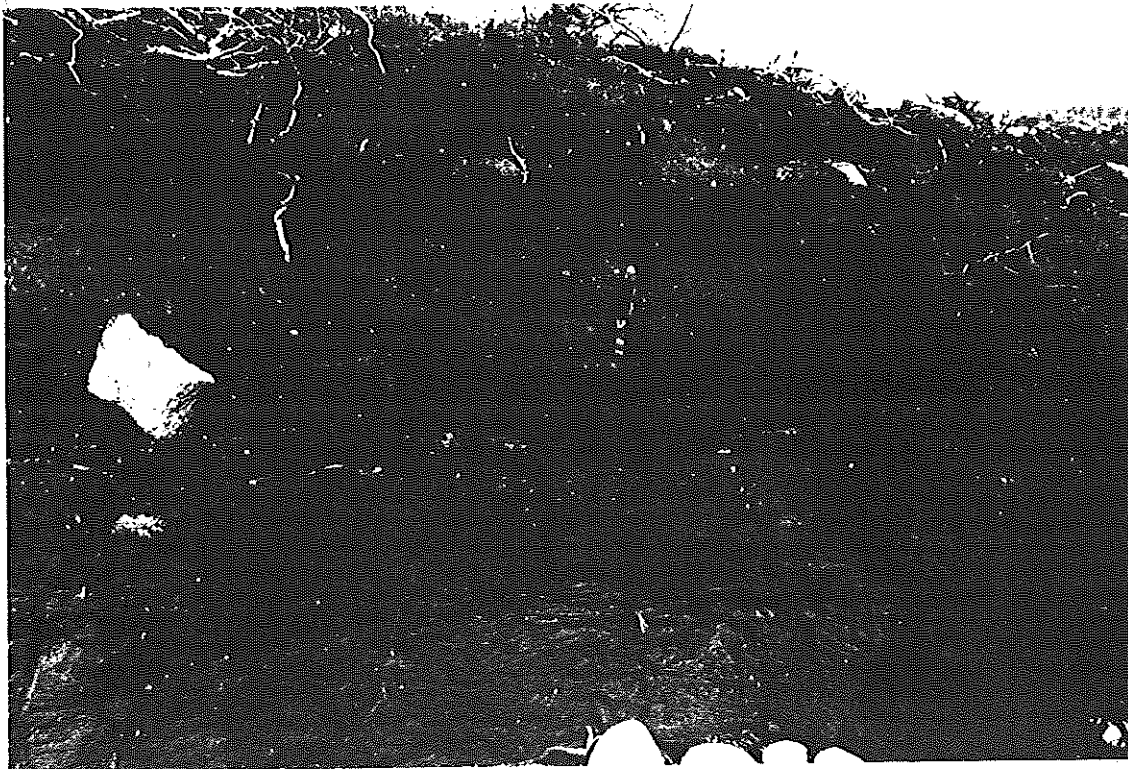
Bf

Bs ZL

More or less stoneless humus iron-pan stagnopodzol  
developed in loess deposit

CLIFF SECTION ST MARTINS

Horizon/Texture



A<sub>h</sub> ZL-SZL

E<sub>a</sub> ZL

B<sub>h</sub> ZL

B<sub>f</sub>

B<sub>s</sub> ZL

More or less stoneless humus iron-pan stagnopodzol  
developed in loess deposit

CLIFF SECTIONS : ST MARY'S



Loess

Compact  
Gravelly  
Head

HORIZON/TEXTURE/MATERIAL



A<sub>h</sub> SZL

Ea ZL Loess

B<sub>f</sub>

B<sub>s</sub> ZL Loess

BC SL Compact  
Granitic  
Head

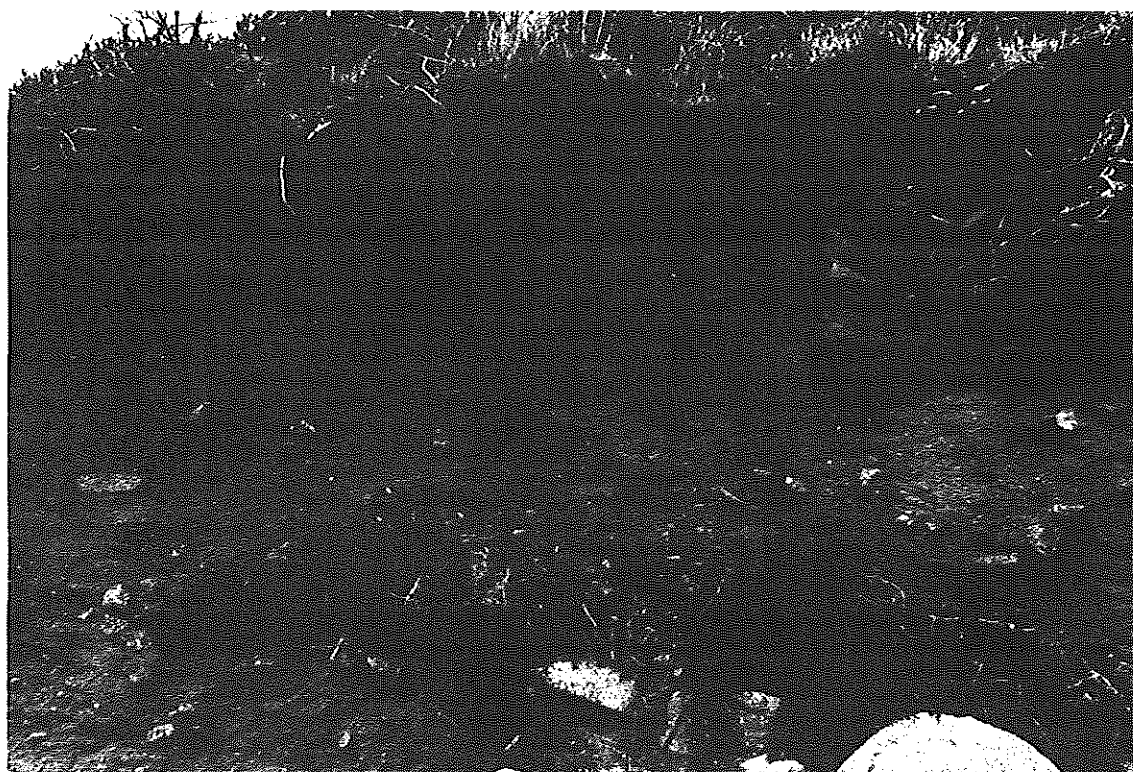
CLIFF SECTIONS : ST MARY'S



Loess

Compact  
Gravelly  
Head

HORIZON/TEXTURE/MATERIAL



A<sub>h</sub> SZL

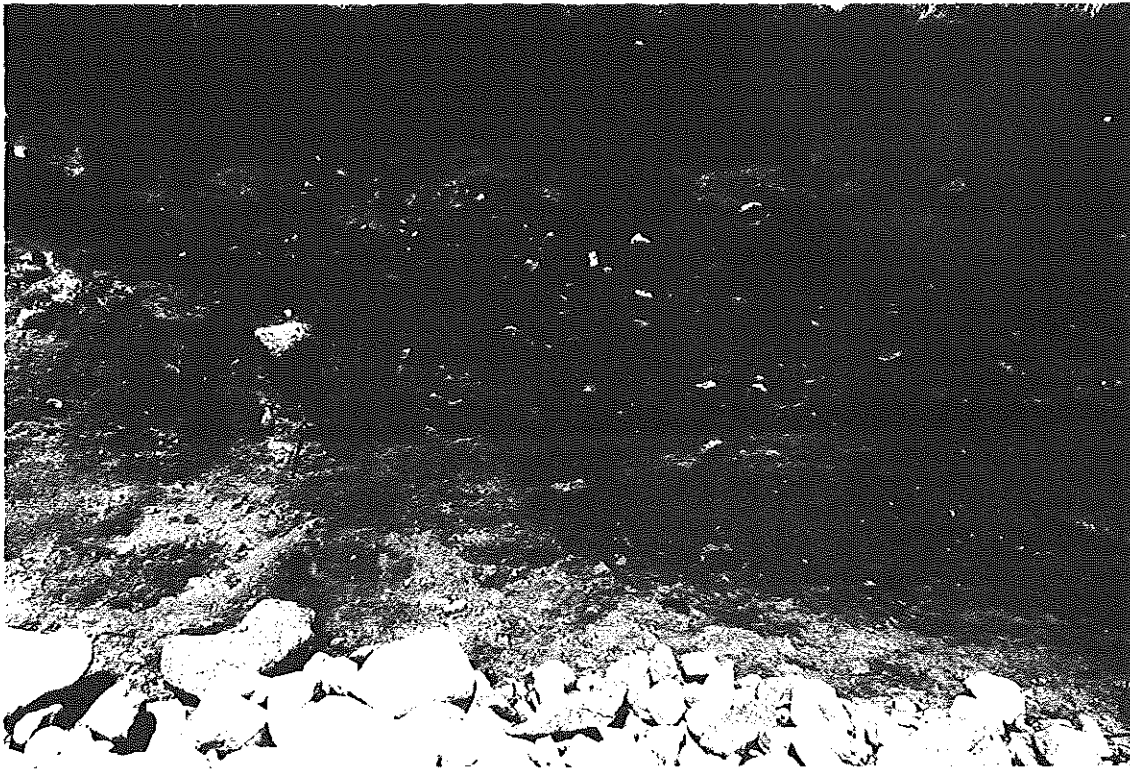
Ea ZL Loess

B<sub>f</sub>

B<sub>s</sub> ZL Loess

BC SL Compact  
Granitic  
Head

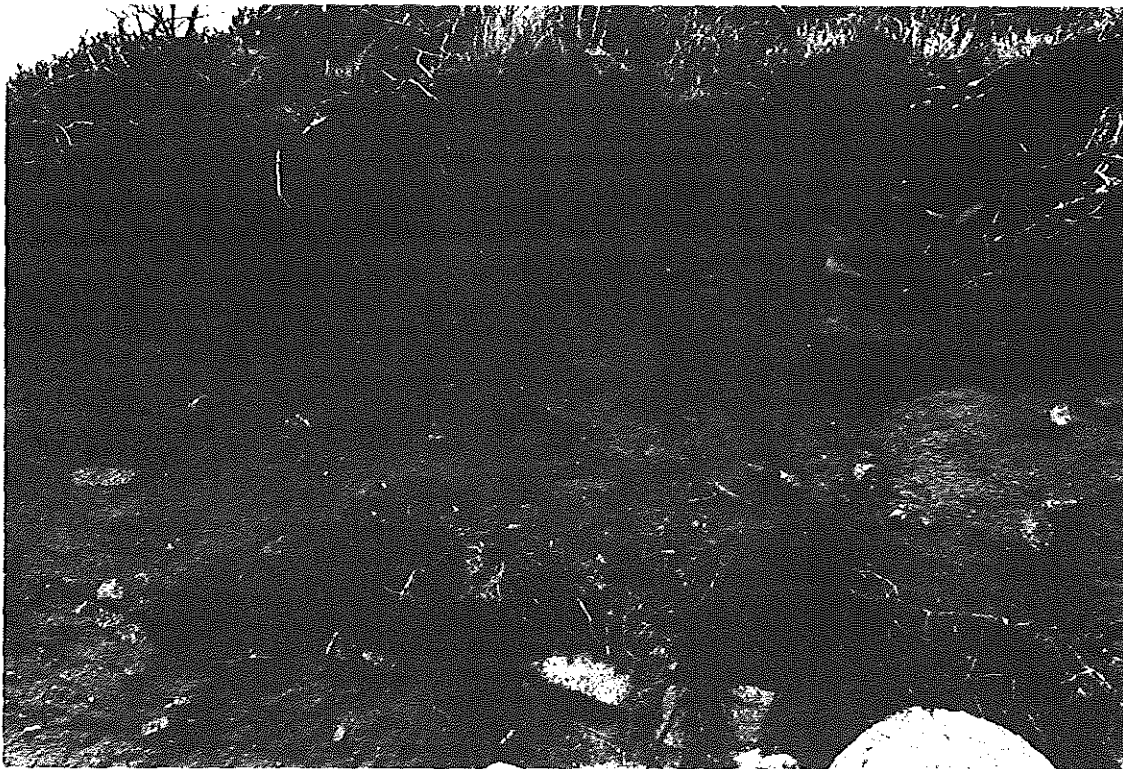
CLIFF SECTIONS : ST MARY'S



Loess

Compact  
Gravelly  
Head

HORIZON/TEXTURE/MATERIAL



A<sub>h</sub> SZL

E<sub>a</sub> ZL Loess

B<sub>f</sub>

B<sub>s</sub> ZL Loess

BC SL Compact  
Granitic  
Head