Soil Survey Bulletin No. 1

# Soils of Co. Wexford

*by*

*M. J. Gardiner and Pierce Ryan*

**National Soil Survey of Ireland**

**An Foras Taluntais**
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## *FOREWORD*

In a country like Ireland, where agriculture occupies such a vital role in the economy, it is obviously of the utmost importance that the use of land, the basic primary resource, should be as efficient as possible. At a time when traditional methods in agriculture are rapidly giving way to new, scientifically-based techniques, it is especially necessary that there be sufficient background information to guide the consequential adjustments. In this connection, a knowledge not only of the stable inherent characteristics of individual soils but also of their relationships to one another and of their behaviour under different cropping and management practices is a basic prerequisite. Such information is essential for the most efficient land use planning and practice.

Like any natural product, each soil has its own history; the individual character of a particular soil is the result of the interaction of a number of factors—including geological origin, climatic, topographic and biotic influences—operating over time. Each of these factors is variable; this gives rise to a variety of soil formation processes which are reflected in the complex pattern of soils obtaining, sometimes within relatively small areas. Despite these complexities soils can be scientifically classified on the basis of their inherent characteristics and use suitabilities.

Soil surveys provide the scientific background for many important activities relating to land use. Perhaps the most important forms of application are in selecting suitable soils for special enterprises and crops; in promoting the intensification of crop production and grassland management practices, particularly in relation to interactions between management, climate and soils; in guiding farm management methods and advisory work; in planning land division and re-allotment; in designing land drainage and reclamation projects and in the rationalisation of land use practices on a national scale. There are many other purposes, some in fields outside agriculture, for which basic soils information is also highly important.

In the formulation of the research programme of An Foras Taluntais, it was decided to approach the matter of systematic soil survey on a county and regional basis. While reports on some *ad hoc* surveys of a local or regional character have already been published, this report on the soils of Wexford is the first of the county series. It is hoped that it will be of value to all those concerned with the development of agriculture in that county.

Finally it may be added that the task of carrying out a soil survey such as this is quite a complex undertaking. It involves the development, in the first place, of the appropriate scientific criteria for classification. The field investigations applying these criteria are time consuming; they demand a high degree of scientific training. This also applies to the organisation of the data and field information, and the preparation of the report and maps for publication. Its successful prosecution reflects great credit on all concerned. I am sure that the experience gained will be of very great help in the work of the National Soil Survey now under way in other areas.

*T. WALSH,*
Director.

## *PREFACE*

The National Soil Survey was established within the Soils Division of An Foras Taluntais (The Agricultural Institute) in 1959 and was charged with the task of surveying, classifying and mapping the soils of Ireland. The survey is being done on a county by county basis, and the field work has already been completed or is far advanced in a number of counties. This bulletin and the accompanying maps present the findings of the soil survey of County Wexford.

Mr. M. J. Gardiner, following some preliminary observations in late 1959, commenced the survey in 1960 and completed the field work in 1962. In the first season he had the assistance of Mr. T. F. Finch. The bulletin has been compiled and written by Mr. M. J. Gardiner and Dr. P. Ryan.

Various members of the staff of the Soils Division, An Foras Taluntais, have contributed to this bulletin; Mr. J. Lee and Mr. E. Culleton wrote part of Chapter V and also Appendix III; Mr. G. A. Fleming, the section on trace elements; Mr. J. P. O'Callaghan, the section on clay mineral studies; and Mr. S. Diamond, Appendix IV. The analytical data in Appendix I were provided mainly by the laboratory staff of the Soil Survey Department, but some also were provided by the staff of the Soil Chemistry Department. The data in Appendix II were provided by the laboratory staff of the Plant Nutrition and Biochemistry Department. The maps and figures were prepared by Mr. J. Lynch, Cartographic Section, assisted by Mr. A. Walsh. Assistance in final preparation and proofing was given by a number of the Soil Survey staff and, in particular, by Mr. E. Culleton, Mr. J. Lynch and Mr. M. Ryan. Photographs were provided principally by Mr. J. P. O'Callaghan and Mr. J. Doyle.

Dr. T. Walsh, Director of An Foras Taluntais, read the manuscript and offered many helpful suggestions. The manuscript was edited for publication by Mr. P. V. Geoghegan and in the early stages also by Dr. D. Murphy.

Assistance also came from a number of outside sources. The staff of the Geological Survey contributed to Chapter II as also did Mr. G. F. Mitchell of Dublin University. Mr. M. T. Connolly, Chief Agricultural Officer, contributed Chapter VII, and, in compiling the information on soil suitability, personnel in the local Agricultural and Horticultural Advisory Services, in Forestry and in the Land Rehabilitation Project gave valuable assistance. The farmers of the county gave the entire project their wholehearted co-operation. Climatic data were provided by the Metereorological Service, and the colour printing of the maps was executed by the Ordnance Survey which was also the source of base maps for the field mapping. The printed maps are based on the Ordnance Survey map with the sanction of the Minister for Finance.

It is regrettable that the entire detail mapped on the field sheets at a scale of 6 inches to 1 mile (1:10,560) could not be shown on the published soil map due to scale limitation, but copies of the field maps are available for inspection in the Soil Survey Office at Johnstown Castle, Wexford. Place-names throughout the bulletin and on the maps are not, in all cases, in accord with local spelling, *e.g.* Tacumshin for Tacumshane; Oilgate for Oylegate; Slievecoiltia for Slieve Coilte, but it was deemed desirable to adhere in all cases to the official place-name spelling used by the Ordnance Survey.

*PIERCE RYAN,*
Head, National Soil Survey of Ireland.

Soils Division,
An Foras Taluntais,
Johnstown Castle,
Wexford.

May 1964.

*ACKNOWLEDGMENTS*

Grateful acknowledgment is made to all those contributors mentioned in the Preface. Acknowledgment is also due to colleagues in various countries who so willingly gave the benefit of their experience in this field of research. Particular thanks are due to Dr. F. W. G. Pijls, Director, Mr. J. J. Jantzen and the cartographic staff of the Netherlands Soil Survey Institute, who rendered such valuable assistance and advice with map printing methods. The assistance of Dr. R. Glentworth, Head of the Soil Survey of Scotland, and his staff; Professor R. Tavernier, Director of the Belgian Soil Survey Institute, and his staff; the Soil Survey staff, Soil Conservation Service, United States Department of Agriculture; Mr. N. H. Taylor, ex-Director, Soil Bureau, D.S.I.R., New Zealand (who visited the area in the course of the survey and gave most valuable advice) and of Mr. A. C. S. Wright, F.A.O. Mission to Chile, is also gratefully acknowledged.

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Based on the Ordnance Survey by permission of the Government May 1963

*Fig. 1—County Wexford—geographic location and principal towns and villages*

# CHAPTER I

## GENERAL DESCRIPTION OF THE AREA

### Location and Extent

County Wexford is situated in the extreme south-east of Ireland, between 52°7′ and 52°48′ north latitude and 6°8′ and 7°1′ west longitude. It is a maritime county bounded on the south by the Atlantic Ocean and on the east by the Irish Sea and St. George's Channel. Its neighbouring counties to the north and west are Wicklow, Carlow, Kilkenny and Waterford (Fig. 1).

The county occupies an area of 584,521 acres (913 square miles), and is included in the ½-inch (1: 126,720) Ordnance Survey Sheets 19 and 23. Sheet 19 embraces the northern portion of the county which includes the principal towns and villages of Enniscorthy, New Ross, Gorey, Bunclody, Ferns, Clonroche and Kiltealy. Sheet 23 covers the south of the county, with Wexford, Rosslare, Taghmon, Campile, Fethard, Bridgetown, and Kilmore the principal towns and villages (Fig. 1). Wexford, the capital town of the county, has a population of 12,247 (Census of Population, 1961).

### Physical Features

The county may be divided broadly into three main physiographic regions as follows (Fig. 2):

(a) *Uplands*—Elevated region (750–2,610 ft. O.D.)—mostly moderately steep topography.

(b) *Intermediate region*—(250–750 ft. O.D.)—gently undulating topography.

(c) *Lowlands*—Lowlying region (less than 250 ft. O.D.)—flattish topography.

*Uplands*

This area is a part of the Leinster Mountain Range and occurs in the northern and north-western portion of the county. The region is characterised mainly by considerable elevations such as Mount Leinster (2,610 ft.), Blackstairs (2,409 ft.), Croghan (1,993 ft.) and Annagh Hill (1,499 ft.) and by moderately steep slopes.

*Intermediate Region*

Almost the entire central portion of the county is characterised by gently undulating topography with elevations ranging from 250 to 750 ft. O.D.

*Lowlands*

This portion of the county is mainly a low-lying tract below the 250 ft. contour line. It stretches from Gorey in the north in 4 to 5 mile-wide belt along the east

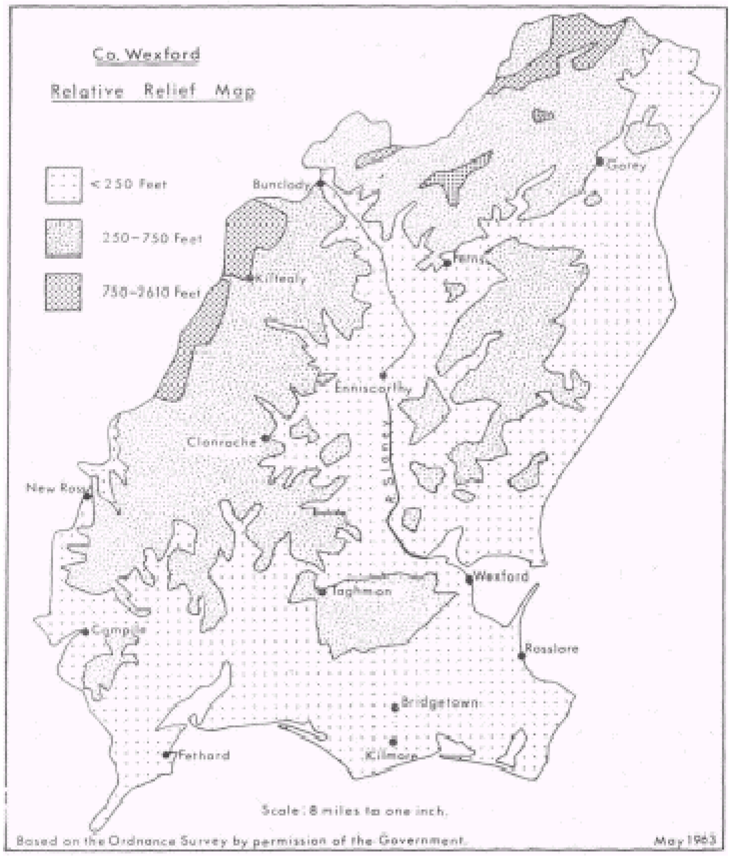


*Fig. 2—County Wexford—relative relief features*

coast and fans out to occupy most of the south-eastern and southern portions of the county. West of Wexford town, a ridge of high ground, called the Mountain of Forth, having peaks of 779 ft. and 687 ft. O.D., occurs.

## River Systems

The main river systems and catchment areas are shown in Figure 3. The greater part of the county is drained by the River Slaney and its tributaries the Urrin, Boro and Bann. This watershed is bounded on the west by Mount Leinster and the Black-stairs Mountains, on the north-east by Croghan Mountain and on the east by Oulart, Carrigroe and Slieveboy Hills. The south-western region of the county is drained southwards by the Rivers Barrow and Suir.

The southern, south-eastern and eastern parts of the county are drained by small rivers or streams, each having an independent water basin. These include the Corock and Owenduff, both flowing into the northern estuary of Bannow Bay, the 'Stream' flowing into Ballyteige Bay, the River Sow flowing into Wexford Harbour, the Owenavorragh flowing into Courtown Harbour and the Clonough which joins the sea just south of Kilmichael Point.

Bordering the coastline are extensive muddy estuaries separated from the open sea by ridges of wind-blown sands. Of these estuaries the largest is the expanse called Wexford Harbour at the mouth of the Slaney. This estuary, facing eastwards, is margined by the sand ridges, known as the Raven and Rosslare banks. West of Carnsore Point are the estuaries of Lady's Island lake and Tacumshin. North-west and north of Forlorn Point at Kilmore are the estuaries associated with Ballyteige Bay and separated from the sea by sand banks known as the Ballyteige Burrow. Further west is the estuary called Bannow Bay. This is separated from the open sea by Bannow Island and by a shingle beach between the island and the mainland, together with a ridge of blown sand that has grown out from the opposite headland near Newtown.

## Climate

Ireland has a typical west maritime climate with relatively mild, moist winters and cool, cloudy summers. For the greater part of the year, warm maritime air associated with the Gulf Stream helps to moderate the climate. The prevailing winds are westerly to south-westerly. The average relative humidity is high. Annual average precipitation is highest on the west coast and in inland areas of high relief.

County Wexford has a rather more favourable climate than most other parts of the country, enjoying a somewhat lower average annual rainfall, lower average relative humidity, higher mean annual temperatures, longer annual periods of bright sunshine and longer frost-free periods. Whereas climatic conditions throughout the county are rather uniform their effect is modified by altitude and distance from the sea, resulting in the climate becoming generally less favourable on moving inland from the coast.

*Rainfall*

The mean annual rainfall varies within the county from approximately 34 inches along the east and south coasts to approximately 48 inches in the vicinity of the Leinster Mountain range. The county can be divided broadly into high, intermediate

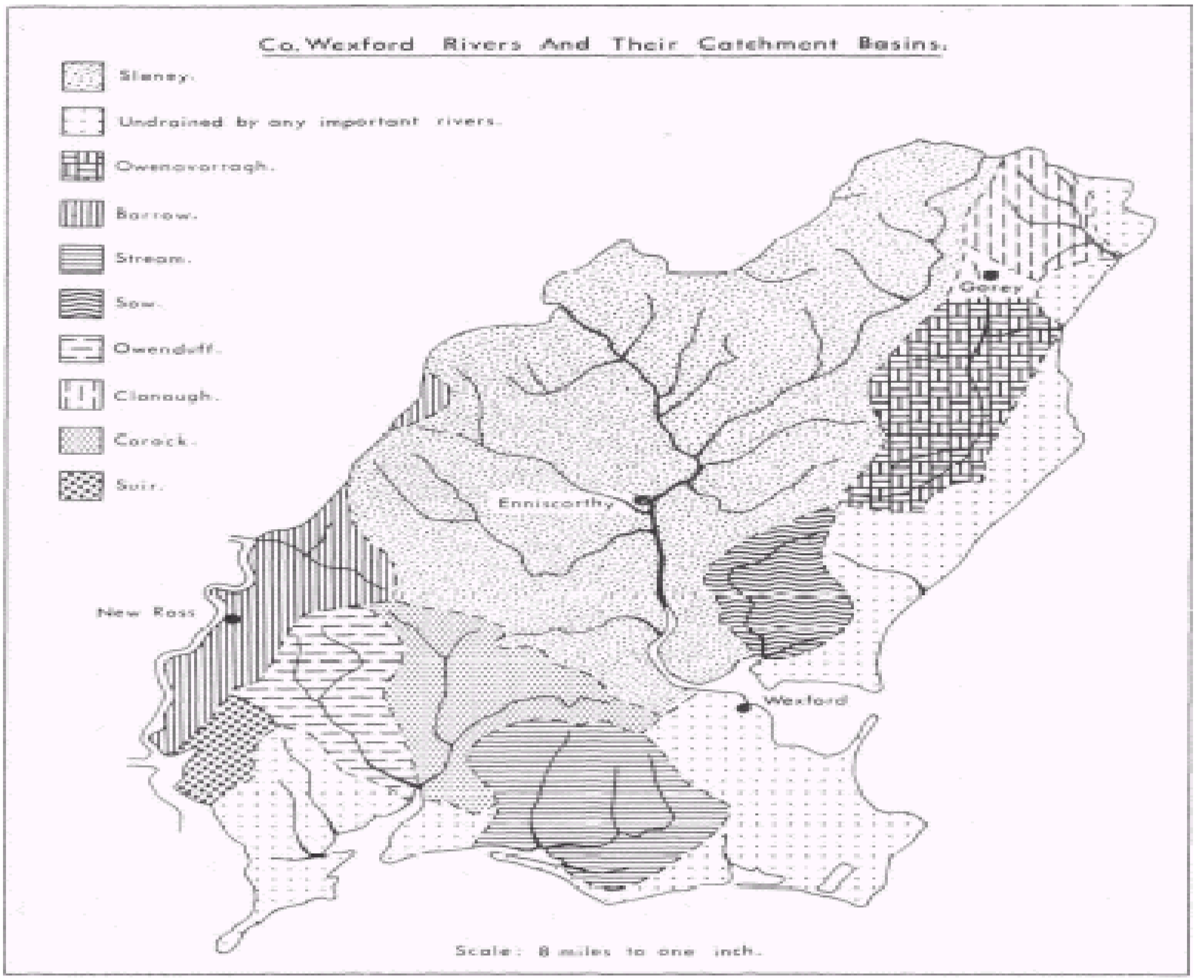


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***Fig. 3—County Wexford—rivers and their catchment basins***

and low rainfall areas (Fig. 4). These areas in general coincide with the three distinct physiographic regions (Fig. 2). The mean annual rainfall (Table 1) for the low, intermediate and high rainfall areas are 34.0, 39.6 and 48.4 inches respectively. The mean monthly distribution for the three areas is shown in Figure 5. It can be seen that for each area the minimum occurs in April, the maximum in December, and a secondary peak in August-September.

**TABLE I—Mean monthly rainfall (1950-1960)**

| Rainfallarea | Rainfall, inches | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Yearly total |
| Low | 2·95 | 2·38 | 2·46 | 1·75 | 2·29 | 2·08 | 2·62 | 3 06 | 3·56 | 3·23 | 3·59 | 3·99 | 33·96 |
| Inter-mediate | 3·43 | 2·93 | 3·16 | 1·97 | 2·60 | 2·51 | 2·86 | 3·63 | 4 00 | 3·95 | 4·02 | 4·57 | 39·63 |
| High | 4·49 | 3·54 | 3·94 | 2·46 | 3·04 | 3·07 | 3·69 | 4·67 | 4·81 | 4·58 | 4·77 | 5·35 | 48·41 |

**TABLE II—Average monthly air temperature, °F (1952-1961)**

| Location | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Johnstown Castle | 40·5 | 41·5 | 45·4 | 47·4 | 52·2 | 56·3 | 59 0 | 58·6 | 55·6 | 51·7 | 46·2 | 44·0 |
| Rosslare | 41·9 | 44·3 | 46·2 | 48·7 | 52·7 | 56·7 | 59·2 | 59·5 | 57·9 | 53·2 | 47·8 | 44·7 |
| Ennis-corthy | 40·0 | 42·4 | 45·1 | 49·9 | 52·5 | 57·4 | 60·3 | 59·9 | 56·6 | 50·3 | 45·5 | 43·1 |

*Temperature*

Temperature data are available only for a few stations within the county. Monthly average of mean daily air temperature figures for Rosslare, Johnstown Castle and Enniscorthy are presented in Table 11 and the figures for Johnstown Castle are set out graphically (Fig. 6).

*Relative Humidity*

Relative humidity figures for the county are high, ranging from about 70 to 75 per cent for July to 80 per cent for January.

*Sunshine*

Average of daily mean duration of bright sunshine registered at Rosslare (1948–1958) was as follows (hours): January 1.75, February 2.50, March 3.75, April 5.50, May 5.75, June 6.50, July 5.75, August 5.0, September 4.50, October 3.25, November 2.50, December 1.50. Figures recorded at Rosslare would be somewhat higher generally than those obtaining throughout the county.

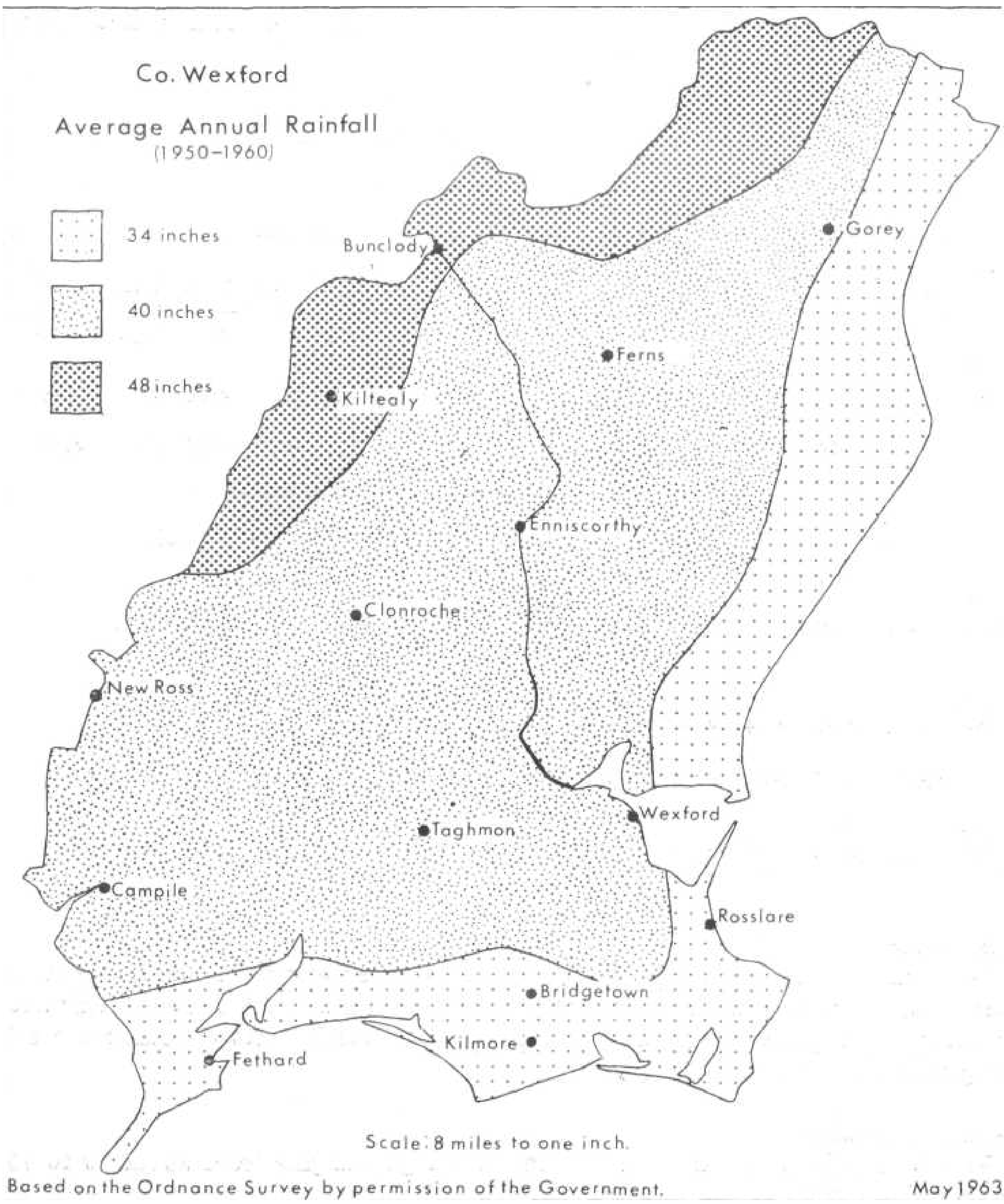


*Fig. 4—Rainfall distribution on an average annual basis*

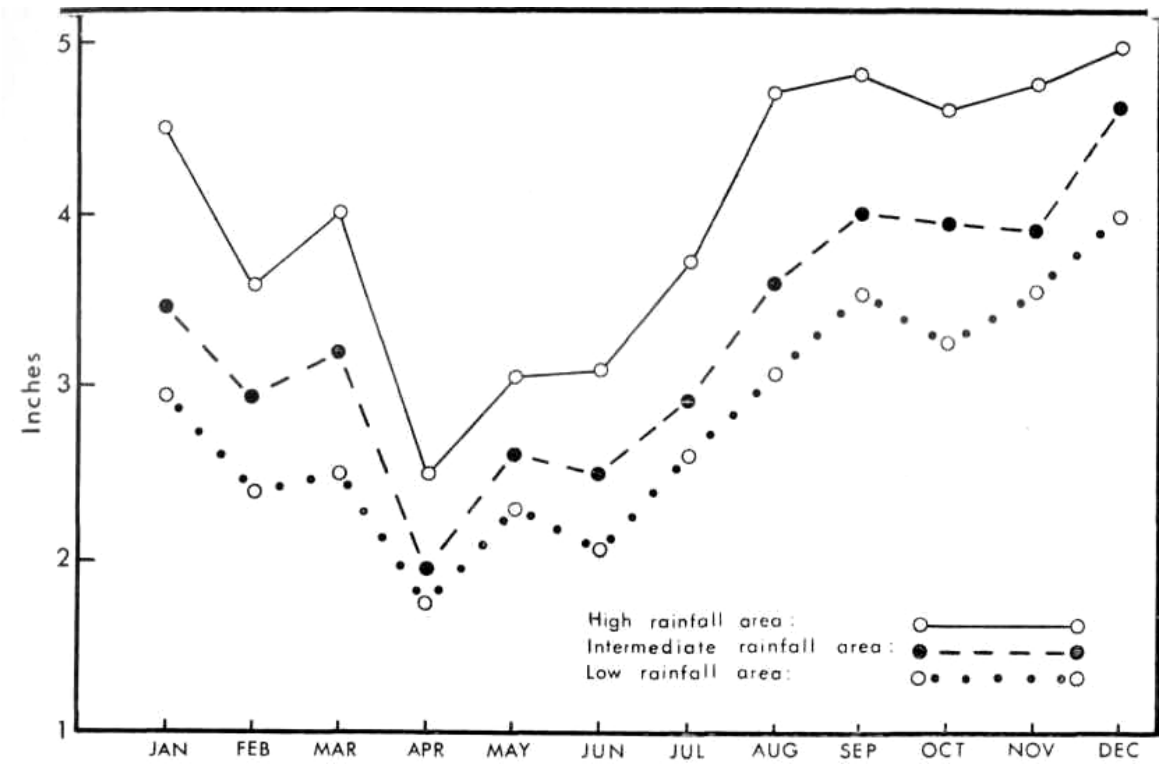


*Fig. 5—Mean annual rainfall—monthly distribution* (*1950-1960*)

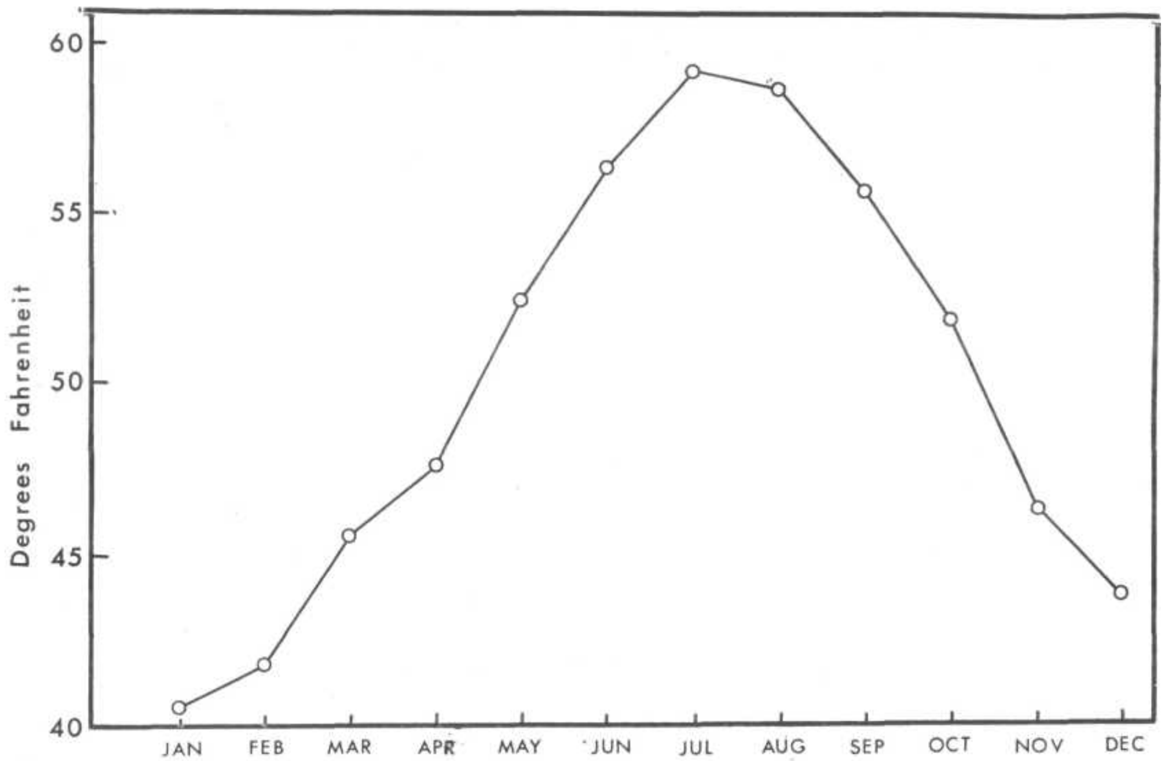


*Fig. 6—Mean annual air temperature—monthly distribution* (*Johnstown Castle station* (*1952-1961*)

*Frost*

Except for the more elevated regions in the north-west, the county has a long annual frost-free period. The average number of frost days (i.e. minimum air temperatures below 32°F) is low by general country standards. The lowest number of frost days occurs close to the coast with a gradual increase in the number on moving inland. For this reason a considerable part of the county, especially the coastal areas, has climatic conditions suited to the production of crops which require long annual frost-free periods.

*First and last occurrence of ground frost:* Few figures are available for the dates of first and last occurrence of ground frost. The figures taken at Rosslare (1956–1961), Johnstown Castle (1951–1961) and Enniscorthy (1954–1961) are given in Table III.

TABLE III—Average dates of first and last occurrence of ground frost at Rosslare, Johnstown Castle and Enniscorthy

| Location | Date of first occurrence of ground frost | Date of last occurrence of ground frost |
|---|---|---|
| Rosslare … … … | Nov. 11 | March 18 |
| Johnstown Castle … … | Oct. 19 | April 8 |
| Enniscorthy … … … | Oct. 14 | April 10 |

## CHAPTER II

GEOLOGY OF THE COUNTY

### Solid Geology*

The broad features of relief (Fig. 2) are closely related to the geological formations of the county. The elevated region in the north-west consists mainly of granite and associated mica-schist formations. The gently undulating, central part of the county consists mainly of Ordovician shale formations associated with a number of basic and acid igneous and volcanic rocks. The flattish low-lying region consists mainly of Cambrian shale formations with a narrow belt of Carboniferous limestone traversing the Cambrians diagonally in a north-east, south-west direction. A brief account of the location and characteristics of the pre-Pleistocene formations of the county is given below in chronological order. An outline of the solid geology is provided in Fig. 7.

*Cambrian Formations*

These formations occupy the greater part of the area south-east of a 36-mile line from Roney Point on the east coast to Clammers' Point in Bannow Bay on the south coast. The series is represented mainly by bright red-purple and green coloured, irregularly cleaved slates and quartzose massive grits. The rocks are unaltered and metamorphosed, containing quartz rock, which in the latter has changed into quartzite. An extensive mass of quartzite occupies a rather large area just west of Wexford town.

*Ordovician Formations*

These formations occupy a very large area stretching from the northern extremity to the south coast and are bounded on the south-east by the limit of the Cambrians already described, and on the north-west by the granite and mica-schist formations. The Ordovician formations are generally metamorphosed and consist mainly of light green and grey shales and grits, containing interstratified eruptive rocks (felstones, gabbros, eucrites). However, unaltered patches of original material may be found. Dykes and cakes of quartz-rock occur but they are rare compared with those found in the Cambrian formations.

*Caledonian Formations*

This system is represented mainly by granite rocks, the principal mass of which forms the Blackstairs and Mount Leinster ranges occupying the county west of a line approximately from Bunclody to Ballywilliam. This 'Leinster Granite' is usually fine-grained and firm, of a light grey colour, and contains the usual constituent minerals, potassium feldspar, quartz and the two micas, muscovite and biotite.

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*The contribution of the staff of the Geological Survey of Ireland in preparing this section is gratefully acknowledged

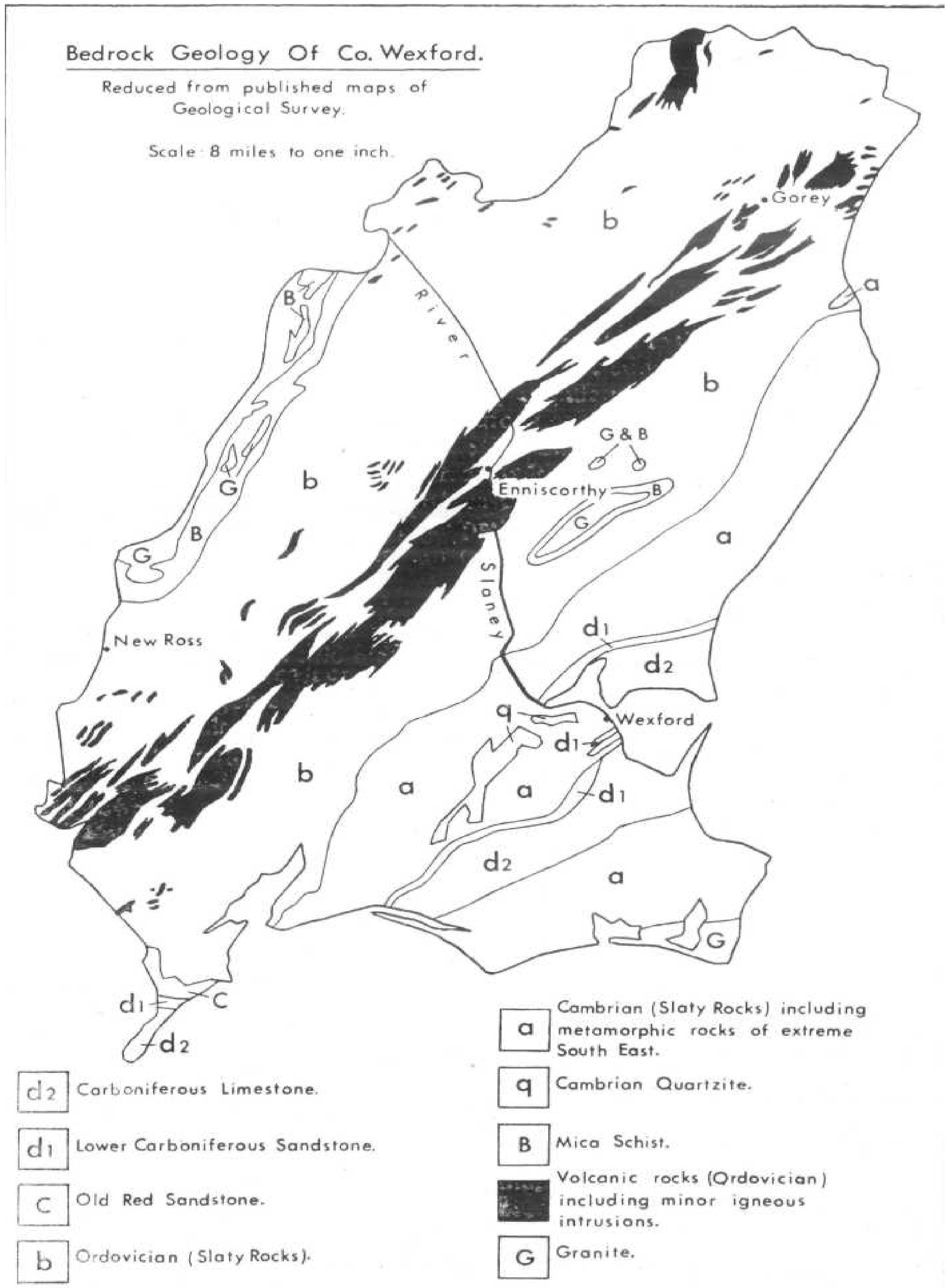


*Fig. 7—Distribution of solid geological formations*

A small outcrop of granite, considered to be coeval with the 'Leinster Granite', occupies the extreme south-east corner of the county at Carnsore. This is different in many respects from the 'Leinster Granite'. It is red in colour, coarse-textured, and contains two or three feldspars (the principal one being orthoclase), the two micas, as well as amphibole and quartz.

*Metamorphosed Rocks (Ordovician Age)*

These rocks occur only on the borders of the Leinster Granite Range and mainly south-west of Bunclody and in the vicinity of Black Rock Mountain. The greater mass of these rocks is made up of micaceous and other schists. Quartzite is not common but occasionally occurs in narrow bands.

*Volcanic Rocks (Ordovician Age)*

This division includes all the volcanic rocks which penetrate or may be included with the Ordovician rocks of the county. They are aligned along the Caledonian axis and form a very marked physical feature. They occur sporadically throughout the general area occupied by the Ordovician formations, but in many cases, especially in the north-west, they extend in almost unbroken lines for many miles. These igneous rocks, although extensive as a sub-stratum, do not always penetrate the stratified Ordovician rocks. Where these outcrop, they nearly always form the higher ground, being, for the most part, composed of hard felstones and fine-grained diorities that are less susceptible to weathering than the surrounding shales and slates.

Both acid and basic igneous rocks occur within this division and often in very close association. The acid igneous rocks are (a) felstones of a light grey or blue colour, usually very compact in texture and very hard, though brittle; (b) felstone porphyry, (c) tuff or felspathic ash which occurs in all degrees of texture and hardness from coarse to compact and indurated. The basic igneous rocks consist mainly of diorite, dolerite, gabbro, and felspathic gabbro. The two latter are usually found in bedded masses but some are found in dykes and protrusions, while the diorites are always found in protrusions.

*Devonian Formations*

These formations are sparsely represented, occurring only in a small area on the Hook Head peninsula, in the form of narrow bands of conglomerates and associated sandstones which stretch across the promontory.

*Carboniferous Formations*

The Carboniferous formations have two main developments: (a) the Limestone Series, and (b) the Lower Avonian shale and associated Calciferous sandstone Series.

*The Limestone Series*

The rocks of this series (arenaceous, argillaceous and argillaceo—calcareous) occur mostly in long narrow tracts which were apparently accumulated in estuaries or fiords. The principal formation is a band of limestone, approximately three miles wide, occupying a narrow trough in the Cambrian formations and extending from the south end of Wexford Harbour to the Atlantic Ocean at Ballyteigue Bay. The limestone band also occurs in the southern part of the Hook-Head peninsula. Associated with the limestones are dolomites, which do not occur in beds or dykes but appear irregularly, without defined boundaries. Conglomerates also occur in which the pebbles are enclosed in a limestone and not in an arenaceous matrix.

*The Avonian Shale-Calciferous Sandstone Series*

This traverses part of the Fethard promontory from east to west in the vicinity of Baginbun Head. The series consists mainly of grey and blackish slates, some of the latter containing dolomitic veins and nodules. There are also conglomeritic slaty rocks, containing grey pebbles, some purple and ribboned slates, quartzose grits and fine gritty conglomerates. The dolomitic veins and nodules are essentially muddy dolomites.

## Glacial Geology*

*Glacial Drift Pattern*

Almost the entire County Wexford has been affected to some extent by the glacial events of the Pleistocene Epoch and is covered by glacial deposits of varying thickness and of different ages. The majority of the soils have been derived from these deposits. A summary of the main events of the Pleistocene Epoch in the county and their relation to glacial events in Ireland in general (Table IV) provides an understanding of the glacial pattern and the drift deposits occurring.

**TABLE IV**—Main events of the Pleistocene Epoch in Wexford and their association with the general glacial pattern of the county

| Wexford | Ireland | |
|---|---|---|
| Alluvium | Post Glacial | |
| Screen ice advance | Weichsel Glaciation | |
| — | Interglacial Period | |
| Killinick-Knockhowlin ice advance Blackhall ice advance Clonroche ice advance Macamore-Rosslare ice advance | Irish Sea re-advance North-Western Component Brittas Component Irish Sea Component | Saale Glaciation |
| — | Great Interglacial Period | |
| — | Elster Glaciation | |

Ireland was affected by three successive glaciations, the Elster, the Saale, the Weichsel. Glacial deposits of the Saale (Fig. 8) and Weichsel (Fig. 9) are wide-spread throughout the country but those of the Elster occur in a few places.

A boulder clay of Elster age occurs at Kildromin in County Limerick and it is probable that during this period ice flowed south down the basin of the Irish Sea and south-west across Wexford. Thus, though no coherent deposits of Elster age have been recognised in County Wexford, glacial material of this age may have been ploughed up by the later ice-sheets and contributed to the existing glacial deposits.

After this first (Elster) glaciation the climate became warm again and the sea level rose; it is probable that during this period the sea stood 100 feet above its

*This section has been prepared in collaboration with Mr. G. F. Mitchell, M.Sc, F.T.C.D., Dublin University, whose assistance is gratefully acknowledged. The assistance of Mr. F. M. Synge. M.Sc, Geological Survey of Ireland, is also much appreciated

present level and that Ireland had a warm, hyperoceanic climate. Evergreen rather than deciduous trees dominated the forests. Fir, spruce, pine, yew, rhododendron and box were common. This interglacial period, often called the Great Interglacial, probably lasted several thousand years.

As the cold conditions of the Saale glaciation began to develop, frost action dis-turbed the existing unconsolidated deposits, churning up those on level ground (cryoturbation), and causing those on sloping grounds to move down hill (solifluction) in the form of solifluction earth or head materials.

The next phase appears to have been the formation of local ice-caps on high ground and the movement downwards and outwards of material derived from the local rocks. Glacial deposits of this early age are known in County Wicklow (Ennis-kerry boulder clay), but have not been recognised in County Wexford. Meanwhile the ice-mass on the highlands of Scotland (much higher ground and, therefore, much colder) was increasing in strength and gradually became powerful enough to send an ice sheet along the floor of the Irish Sea, which by then had again been exposed by the fall in sea-level resulting from ice formation. This ice mass passed over south-east Wexford and proceeded westwards as far as Ballycroneen in County Cork, somewhat east of the mouth of Cork Harbour. Wherever the deposits of this ice sheet have been

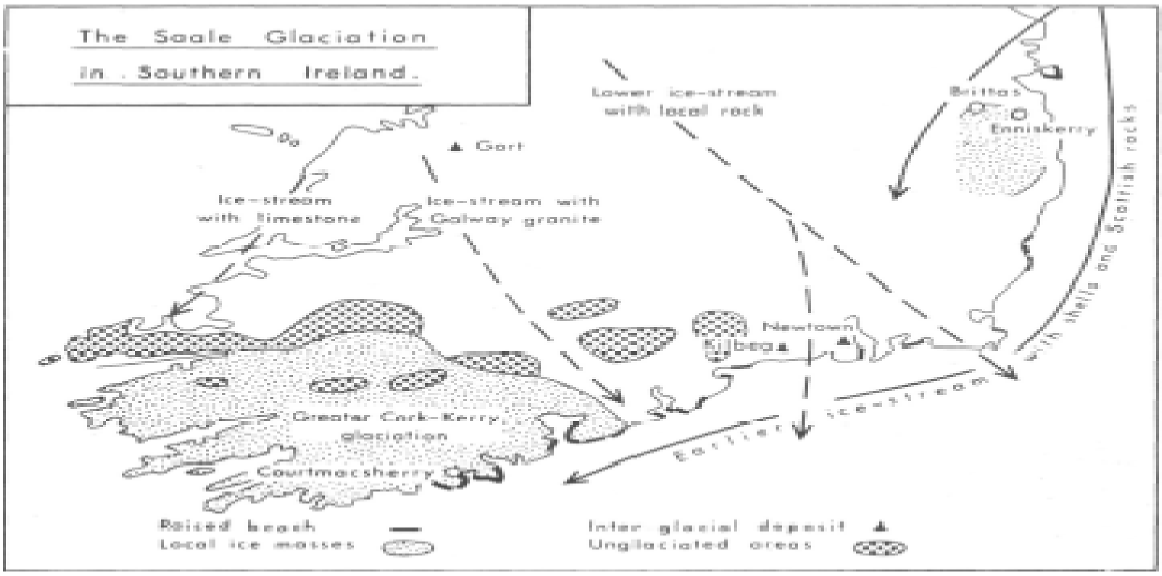


*Fig. 8—Extent and distribution pattern of the Saale Glaciation in Ireland. (After G. F. Mitchell in "A View of Ireland",* Brit. Assoc. Adv. Sci., *Dublin, 1957)*

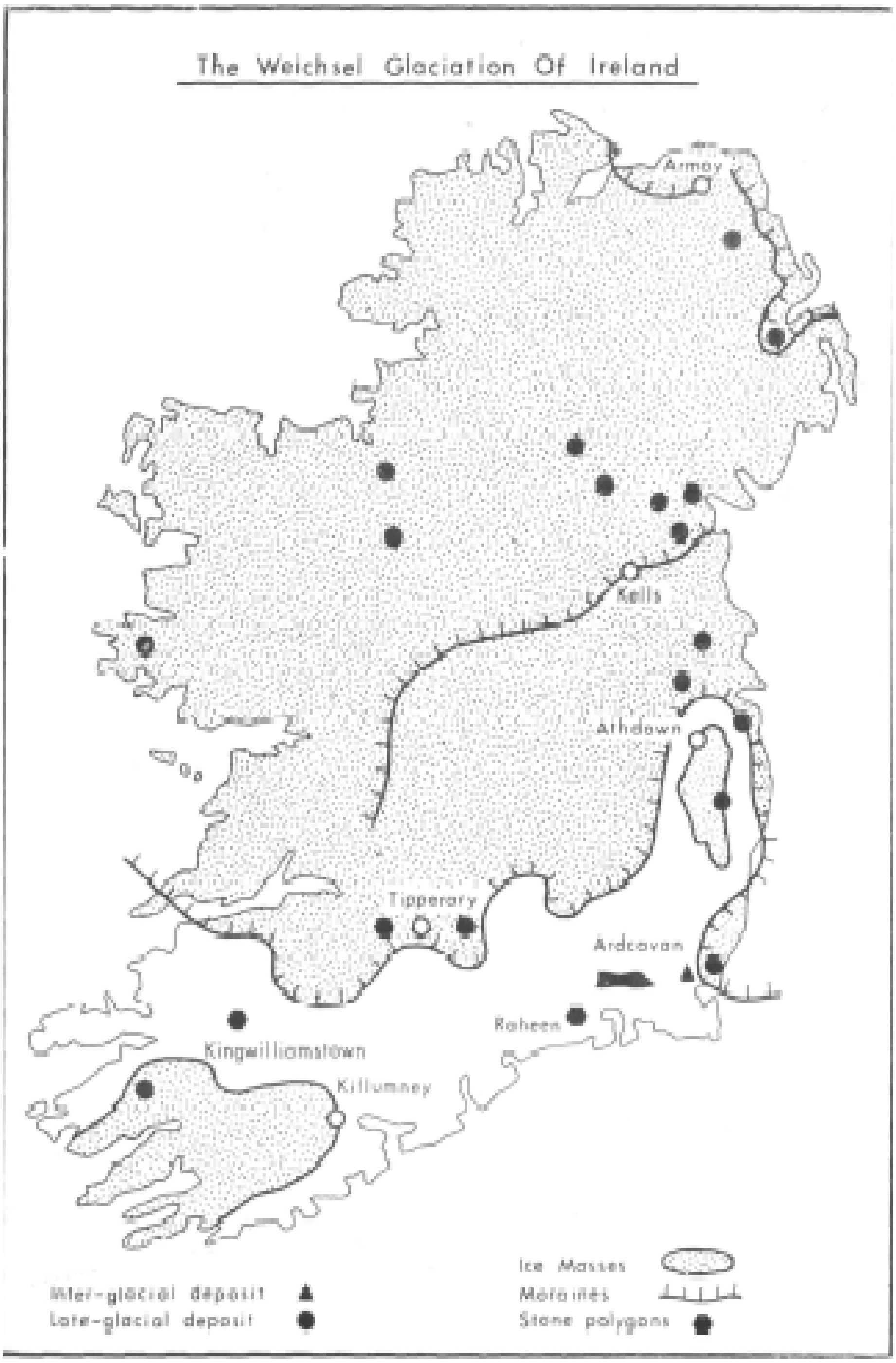


**Fig. 9**—Extent and distribution pattern of the Weichsel Glaciation in Ireland. (After G. F. Mitchell in "A View of Ireland", Brit. Assoc. Adv. Sci., Dublin, 1957)

traced, they have (or originally had) a high content of calcium carbonate and of marine shell fragments, most probably collected from the floor of the Irish Sea, and of erratics belonging to geological formations in Scotland. The ice mass subsequently weakened, and melting may have caused its outer limit to retreat some considerable distance northwards.

Ice increased again in volume at a later stage, and in County Wicklow local ice movements carried material rich in granite (Brittas boulder clay) over the deposits of the Irish Sea ice. In County Wexford the position with regard to this period is not so clear. Ice from north-west Wexford and from still further north-west deposited a sheet of glacial drift of predominantly Ordovician shale composition (with some granite influence) over an extensive part of the county. A boulder clay very rich in Leinster granite occurs as the uppermost layer in the coastal cliff sections from Fethard through Blackhall and east to Cullenstown (Plate 1) and a belt of shelly morainic gravel runs south from Wexford town through Walshestown to Tacumshin Lake (Fig. 10). The granitic drift may be due to expansion of the local ice mass, and the morainic gravels may represent a re-advance of the Irish Sea ice-mass.

The cold conditions of the Saale glaciation gradually gave way to warmer conditions giving rise to another interglacial period. It is known that during this period, which lasted for thousands of years, trees, such as alder, birch, hazel and willow were most widespread.

Following this interglacial period cold conditions of the most recent (Weichsel) glaciation set in and ice once more advanced along the floor of the Irish Sea. As this ice moved forward it was deflected to the south-west by the high ground of the Lleyn Peninsula in north Wales and, as it crossed the present position of the Wexford coast, the glacier was about nine miles wide, stretching from Kilmuckridge to Curracloe. The tip of the glacier just crossed the Slaney Valley south of Oilgate to reach its limit about one mile further west. At this stage the ice began to melt and in doing so deposited material of a very sandy nature throughout the area. These deposits are seen to best advantage in the Screen area where the young morainic landscape with typical 'Kame and Kettle' topography still survives (Plate 2). While this was the only part of County Wexford to be covered by ice at this time, severely cold conditions affected the rest of the county where solifluction and cryoturbation profoundly disturbed the upper parts of the older glacial drifts. Movement of unconsolidated material down slope filled many of the smaller depressions, bringing about a general smoothing of the landscape surface.

The cold again diminished and by about 10,000 B.C. Ireland was probably free of ice. For a time the climate was relatively mild and a thin cover of vegetation, from which tall trees were absent, spread over the country. Colder conditions returned from about 8,800 to 8,300 B.C. but this spell was followed by the generally higher temperatures of the post-glacial period, when active formation of the present day soils began. There is considerable evidence that by 6,000 B.C. extensive high forest covered the countryside. The forest cover flourished until its destruction commenced with the first Neolithic farmers about 3,000 B.C. Later, as the area under cultivation continued to expand, the wooded landscape gradually gave way to the more open countryside of the present day.

*Relationship of Soils to Glacial Deposits*

The complex deposits of the Saale glaciation cover more than 90 per cent of County Wexford and it is from these deposits that the majority of the soils have developed.

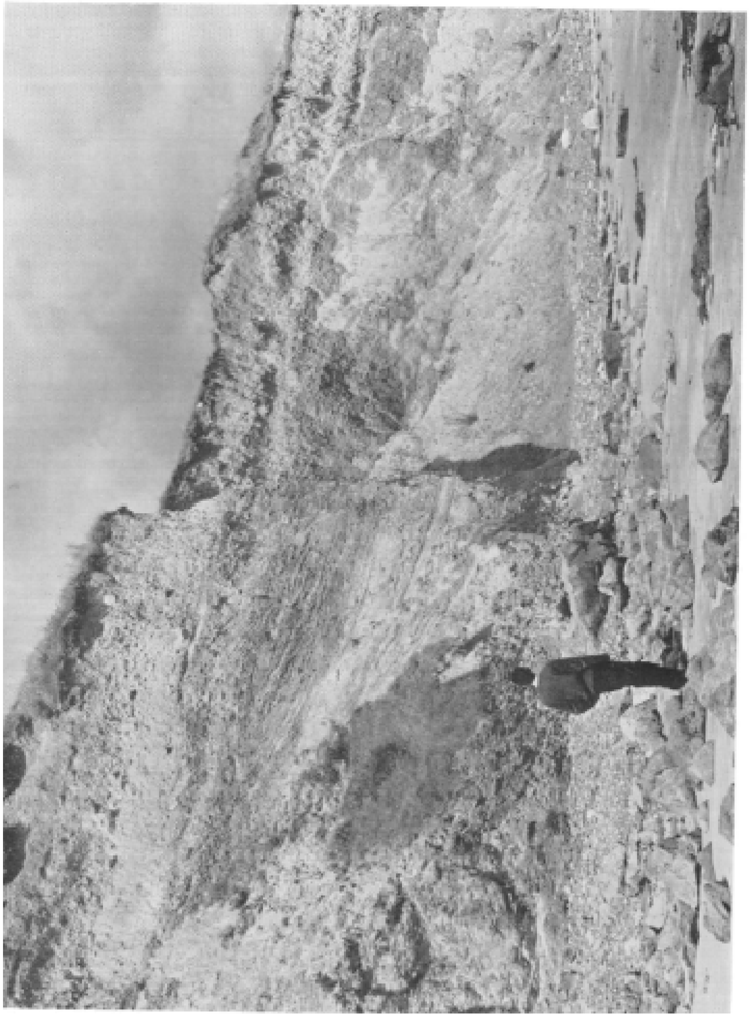

*Plate 1—A cliff section at Fethard, County Wexford, showing two distinct glacial deposits*

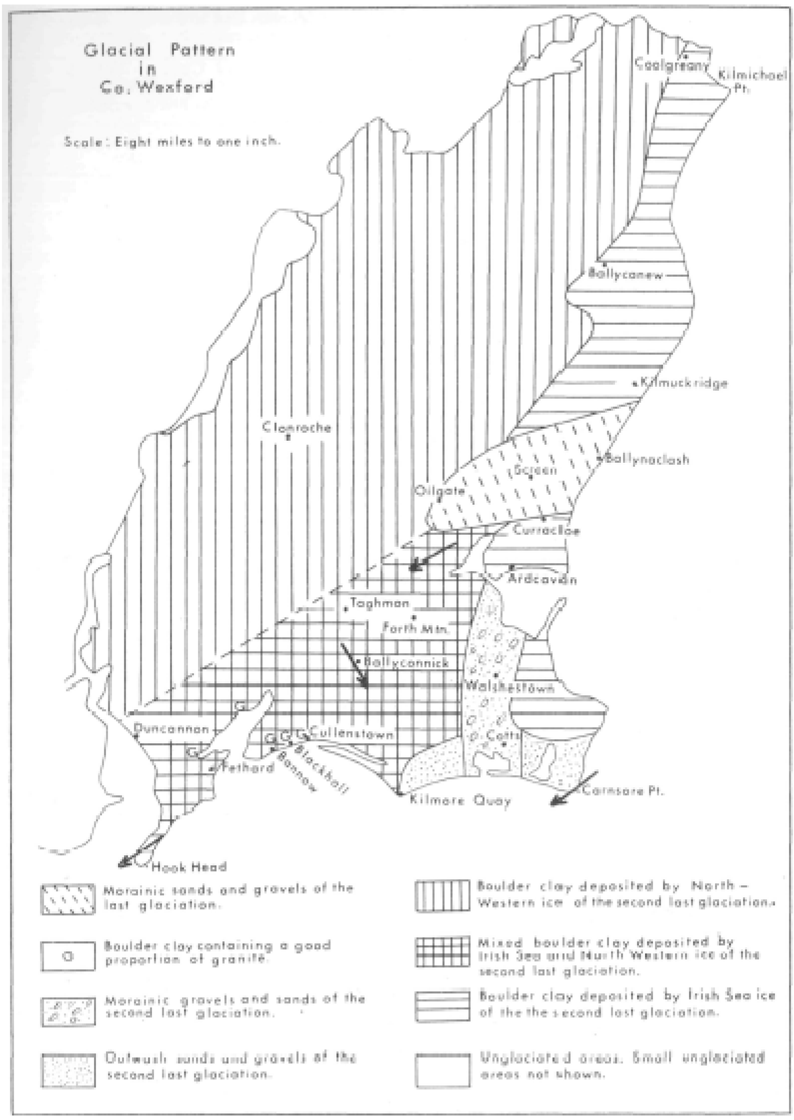


*Fig. 10—Glacial pattern in County Wexford*

In Table V an attempt is made to relate the glacial deposits and the more important soil associations developed from them.

TABLE V—Glacial deposits and major soil associations of County Wexford

| Glacial Deposits | Major Soil Association |
|---|---|
| Boulder clay deposited by Irish Sea ice of the Saale Glaciation, without other material deposited on or incorporated in it. | Macamore |
| Boulder clay containing material contributed both by the Irish Sea ice and by ice from the uplands of north-west Wexford (or from still further north-west) during the Saale Glaciation. | Rathangan |
| Boulder clay deposited by ice of Saale Age from the uplands of north-west Wexford or from still further north-west. Boulder clay from the Wexford uplands becomes more granitic as the Leinster range is approached. | Clonroche |
| Morainic gravels and sands probably deposited at a late stage of the Saale Glaciation. | Killinick |
| Outwash sands and gravels from the Killinick Moraine of the Saale Glaciation. | Broadway |
| Morainic deposits (sands and gravels of the Weichsel Glaciation. | Screen |

*Plate 2—Typical young morainic landscape associated with deposits of the last (Weichsel) glacation and occurring in the Screen area, County Wexford*

With the exception of the Rathangan Association, the main soils of the county have developed on glacial materials, the origin of which is fairly well understood. The origin of the Rathangan material is less clear, but it is thought that the Irish Sea ice swept across Wexford, south-east of a line from Coolgreany through Ballycanew and Taghmon to Duncannon, and deposited characteristic boulder clay. Within the same glacial period the Rathangan area was invaded by ice moving from the north-west, which brought local geological materials with it. This ice mass ploughed up the boulder clay of Irish Sea origin and, by adding the local material, left a mixed boulder clay from which the Rathangan soils have developed.

It is obvious that the geological materials from which the soils of the county have been derived are of very mixed origin and constitution. The glacial history of the area has played a major part in creating this situation which, to a considerable extent, accounts for the complexity of the soil pattern prevailing.

## CHAPTER III

## CONSIDERATIONS IN SOIL SURVEY

### Introduction

Soil is the natural medium for the growth of land plants. Although the soil mantle of the earth is far from uniform, all soils have certain factors in common. Every soil consists of mineral and organic matter, living organisms, water and air. The relative proportions of these components vary between different soils. As a small segment of the earth's surface, every soil extends downwards as well as laterally over the surface so that soil must be regarded as being three-dimensional, having length, breadth and depth (Plate 3).

### The Soil Profile

The soil profile refers to a vertical section of the soil down to and including the geological parent material. The nature of the soil profile is important in many aspects of plant growth, including root development, moisture storage and nutrient supply. The profile is, therefore, the basic unit of study in assessing the true character of a soil. The soil profile usually displays a succession of layers that may differ in properties* such as colour, texture, structure, consistence, porosity, chemical constitution, organic matter content and biological composition. These layers, known as **soil horizons,** occur more or less parallel to the land surface.

*Soil Horizons*

Most soil profiles include three main horizons that are usually identified by the letters A, B, C. The combined A and B horizons constitute the so-called solum or 'true soil' whilst C refers to the parent material beneath. Some soils lack a B horizon and are said to have AC profiles.

Some soils may have a relatively uniform profile with A and C horizons whilst others are so complex that they possess not only A, B and C horizons, but also several sub-horizons (Fig. 11). Where main horizons need to be divided into sub-horizons on the basis of minor differences within the horizon, such sub-divisions are identified by the horizon designation plus a subscript number thus: $A_1$, $A_2$, $A_3$, $B_1$ $B_2$ etc. The various horizons in a soil and their character are a reflection of the process of soil formation that have been operative, and present a picture of the true nature and salient characteristics of a soil which are important in its use and management.

*The A horizon:* The A horizon is the uppermost layer in the soil profile and corresponds closely to the so-called 'surface soil'. It is that part of the soil in which living matter, in forms such as plant roots, bacteria, fungi, earthworms and small animals

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*Texture, structure, consistence and porosity are defined and discussed in Appendix III

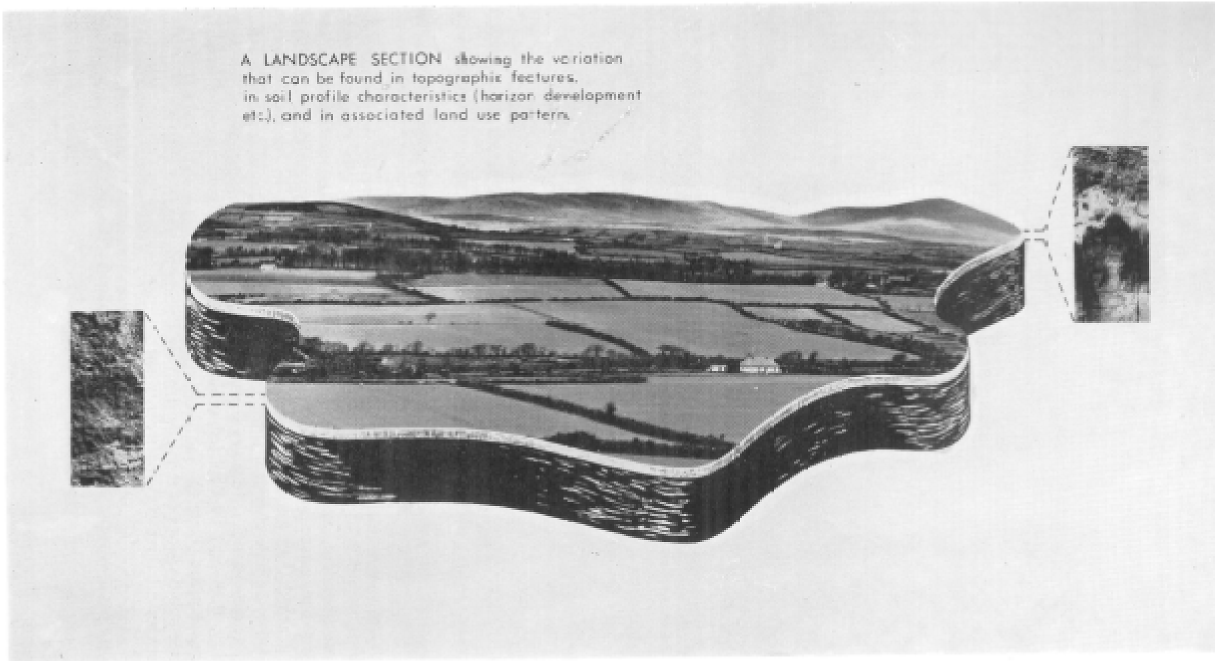


*Plate 3—The soil is the surface layer of the earth's crust*

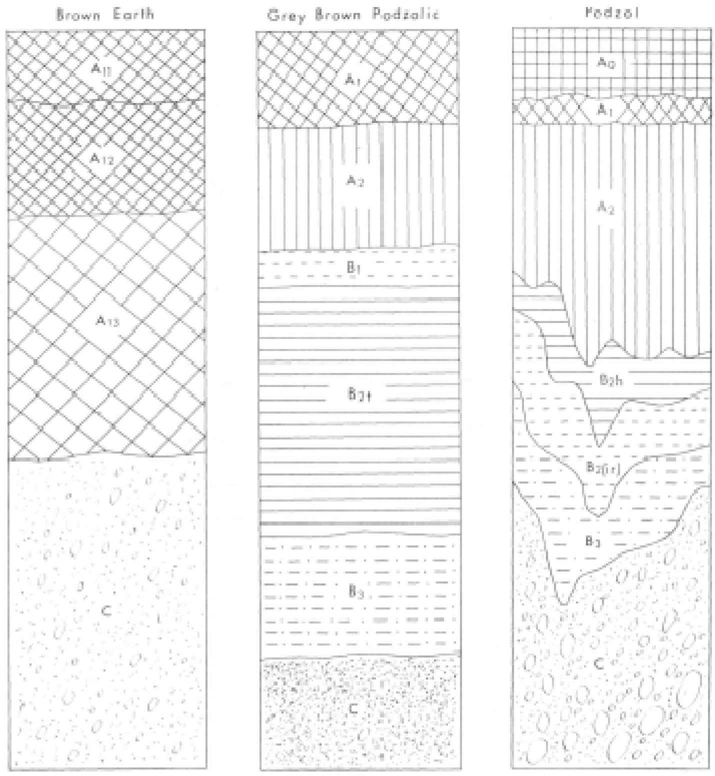


*Fig. 11—Diagramatic representation of hypothetical soil profiles showing different horizon sequences*

is most abundant, and in which organic matter is usually most plentiful. Being closest to the surface this horizon is the first to be reached by rainfall and is, therefore, more leached than underlying horizons. Most A horizons in Irish soils have been depleted of soluble chemical substances and, in certain cases also, of some of their very fine clay particles. In more advanced cases, where the soils have suffered strong leaching, they may be depleted of iron and aluminium oxides and of other constituents besides (Plate 4).

Three sub-divisions of the A horizon are commonly made, namely $A_0$, $A_1$ and $A_2$. Sometimes all three may be represented in a profile, sometimes only two or one. The $A_0$ horizon refers to a surface layer of raw, undecomposed organic matter, more usually associated with very degraded or podzolized soils. The $A_1$ horizon is a surface

*Plate 4—A podzol profile from the Screen Association* (*Glenbough Variant*) *showing the surface A horizon enriched with poorly decomposed organic matter, overlying the grey, highly leached $A_2$ horizon and underneath this the dark coloured $B_2$ horizon with its accumulation of iron and aluminium oxides and humus. Due to disturbance by past cultivation the $A_0$ horizon, so common to such soils, does not occur. The natural vegetation consists of bracken, furze and heather*

mineral horizon that usually contains a higher proportion of organic matter, incorporated with the mineral matter, than any of the underlying horizons. In cultivated soils this horizon corresponds to the plough layer and may be designated $A_p$. The $A_2$ is a comparatively light-coloured horizon and frequently has a bleached appearance. The $A_2$ always refers to the horizon which has undergone the greatest degree of leaching. This is reflected in the lighter colour, mostly the result of a partial removal of colouring constituents, principally iron.

*The B horizon*: The B horizon lies immediately beneath the A and corresponds closely to the so-called ‘subsoil’. Lying between the A and C horizons it possesses some of the properties of both. Living organisms are fewer than in the A horizon but more abundant than in the C horizon. By comparison with the A horizon, the B horizon is one of accumulation and usually has a relatively high content of iron and aluminium oxides, humus or clay that, in part at least, have been leached from the overlying horizons. It is usual to find a more pronounced blocky or prismatic structure where this horizon is clay-enriched. Stronger colours are apparent in the B horizon, especially when the accumulation products are iron oxides and/or humus. If the B horizon is without any appreciable accumulation of leached products but has distinctive colour or structure characteristics, it is usually referred to as a (B) horizon.

Depending on the degree and pattern of accumulation of constituents within the B horizon, several divisions of the horizon (*e.g.* $B_1$, $B_{21}$, $B_{22}$, $B_3$) may be warranted. Besides, symbols such as $B_t$, $B_{ir}$ and $B_h$ are used to denote significant accumulations of clay, iron and humus respectively.

*The C horizon*: The C horizon refers to the parent material of the soil. It consists of the upper part of the loose and partly decayed rock or other parent material such as glacial drift from which the soil has developed. It may have accumulated in place by the breakdown of the native rock or it may have been transported by water, wind or ice. The C horizon is less weathered generally, and has less organic matter and is usually lighter in colour than overlying horizons.

## Factors of Soil Formation

The character of every soil can be attributed largely to the interaction of five major factors of soil formation. These genetic factors are parent material, climate, living organisms, topography and time. These factors control the rate of weathering of rocks, the constitution and composition of the resultant soils, as well as the subsequent gains, losses and alterations within the profile. The relative degree of influence of these factors is responsible for many of the differences to be found in our soils. A sixth factor influencing many non-virgin soils is the human factor or man's interference with the natural development tendencies in soils whilst modifying them for his own particular purposes.

*Parent Material*

Parent material may be either solid rock which has weathered or some superficial deposit such as glacial drift or alluvium that has been derived from weathered rocks and transposed. Rocks vary tremendously in composition and such variation is reflected in the derived soils. For example, quartzite is highly resistant to weathering and its composition is such that during the slow weathering process little clay is formed and release of mineral nutrients is poor. Besides being inherently poor, soils on such materials degrade easily as the leaching process outpaces the rate of weathering. Fortunately, most rocks are mixtures of many minerals, few of which are able to withstand weathering as well as quartz. Glacial drift, the most common parent material of Irish soils, varies considerably in constitution and in geological composition, giving rise to many different soils.

*Living Organisms*

Living organisms in the soil include plants, animals, insects, fungi, bacteria and other biological forms. These play an important role in soil development such as determining the kind and amount of organic matter that is incorporated in the soil under natural conditions. They also govern the manner in which organic matter is added, whether as leaves and twigs on the surface or as fibrous roots within the profile. The rate of decomposition of organic matter is strongly influenced by the type and activity of living organisms present. Plants can reverse the leaching process in part. The roots may take up calcium, potassium, phosphorus and other elements from the lower horizons and these elements are returned to the surface with the decay of leaves, roots and other plant remains.

The nature of vegetative cover itself is known to have a decided influence on soil development. Other factors being equal a forest cover promotes a different soil forming process to either grass or cultivated cropping. Trees also differ in their influence on soil development, the main difference in this respect being between the conifers and the deciduous trees. In general, coniferous species are more conducive to soil degradation and the formation of podzolized soils, particularly on acid parent materials. Certain forms of ground cover, such as heath vegetation, are even more conducive to podzol formation.

Organisms such as earthworms and insects and also micro-organisms such as fungi and bacteria perform many important functions in the soil and strongly affect soil character and behaviour.

*Topography*

Since topography governs the position of a soil on the landscape, it is important in many respects, especially in its effect on water runoff and drainage. The amount of water that moves through a soil is less on steep than on gentle slopes, and low-lying and flat areas generally receive more water. This accounts to some extent for the preponderance of poorly drained soils in low-lying areas. Soils of poor drainage, however, may be found on good slopes where the lower soil horizons or parent material are of poor permeability, leading to retardation of water movement.

Elevation, with its attendant climatic and vegetational changes, has a strong influence in conditioning the soil development pattern. Other features such as erosion and those related to aspect are also associated with topography. Apart from its influence in soil formation, topography can be an important deciding factor in the use of soils.

*Time*

Considerable time is needed for the accumulation of soil parent material and for the development of horizons in the soil profile. The degree of maturity of a soil depends to a large extent on age, as well as on the parent material and other factors. Soils developed on young deposits, such as alluvium, show less distinct horizons, in general, than soils developed on older materials over a longer period.

## Differences and Similarities among Soils

None of the five factors of soil formation is uniform over the face of the earth. There are many kinds of rocks, many types of climate, many combinations of living organisms, great variation in topography and many different ages of land surfaces. As a result there are innumerable combinations of the factors of soil formation, giving many different soils.

Differences amongst soils are both local and regional. Most farms consist of local kinds of soil which have importance to management and productivity whilst over the country, as a whole, there are also many different soils. Although it is true that great variability exists, nevertheless, the pattern of distribution is not so haphazard as might be expected. Each soil is a reflection of the environment in which it has formed. Each occupies a definite geographic area and occurs in certain patterns with other soils. By recognising the main factors of soil formation and by distinguishing the reflected characteristics in the soils themselves, geographic units of soils can be segregated. Thus similarities and differences amongst soils can be recognised, and the various soils can be classified and their distribution mapped.

## Soil Mapping

*Soil Series*

It is principally on the basis of profile character, as expressed by the nature of the various horizons, that soils are classified and mapped. By studying the profile character of the soil at frequent intervals across an area of landscape, by means of open pits, it becomes apparent that whilst each profile has its individual character, some have so many features of importance in common that they can be placed together in a single primary category. The primary category used in mapping is the **soil series,** which comprises soils with similar type and arrangement of horizons, developed on similar parent material. The soil series is also a basic category in soil classification.

A major problem in mapping soils is the delineation of boundaries between different series. Typical profiles representative of two different soil series may differ widely but, where the series are contiguous, it is usual for them to merge, sometimes over a considerable distance. Consequently, a line on the map very often defines the merging zone between soil series, but may not imply a sharp change in the soil character.

A soil series is named usually after the location in which the particular soils are best expressed or occur most widely.

*Soil Variants*

Variants are really separate soil series that are too small in extent to be shown at certain scales of mapping. A soil which is recognised and defined as a variant in one survey area, however, may be designated as a separate series later in another area, if found in sufficient extent.

*Other Soil Units*

Soils within a soil series may be further sub-divided into **soil types** on the basis of textural differences in the surface soil. Different **soil phases** may also be. mapped covering variations in features, such as slope, depth or stoniness, that exist and that are important in soil behaviour and land use. Segregation at these levels requires more detailed survey than that employed in County Wexford.

*Soil Associations*

In order to relate soils to their environment and, in particular, to their geological parent materials, series may be grouped into larger mapping units, or **soil associations**. A soil association is a grouping of series developed on similar parent materials but varying in profile character as a result of differences in other soil-forming factors. Soils within the same association, therefore, although they may fall into a number of series on the basis of profile differences, have many important physical and chemical properties in common, which have been inherited from the same parent material. The association is named after the most widely occurring series within it.

*Scale of Mapping*

Field mapping is carried out on a scale of 6 inches to 1 mile (1:10,560) but this detail is reduced to a scale of ½ inch to 1 mile (1:126,720) for publication. As one 6-inch sheet covers an area of 24 square miles, to publish on this scale would necessitate, in the case of County Wexford, at least forty individual map sheets. Considerations such as the cost of colour printing as well as ease of handling and use of the final product warrant reduction to the smaller scale.

This reduction, however, introduces certain difficulties. It has been found necessary to consolidate and, in some cases, to delete some of the least extensive soil separations shown on the larger scale. On a scale of 1 :126,720 it is possible to show a minimum area of 25 acres, and so any uniformly coloured area on the published map may include enclaves of less than 25 acres in extent. Where soil series are recognised, but where their distribution pattern with contiguous series is so intricate as to defy clearcut delineation on the map, a **soil complex** is mapped. The component series within the complex are named and, where possible, their relative proportions are given.

To accommodate those potential users of the soil map, who are interested in more detail for special purposes, the field sheets (at a scale of 1:10,560) showing the entire field survey records are being retained for consultation at the National Soil Survey headquarters, Johnstown Castle, Wexford (Plate 5).

*Plate 5—Johnstown Castle, Wexford—Headquarters of the National Soil Survey of Ireland*

## Description of Soil Profiles

During the survey of an area, profiles typical of each soil series are selected for special study. Fresh profile pits are opened for this purpose. The depth of pit may vary according to soil depth but is usually about 4 to 5 feet. Each profile is thoroughly examined and described and a record made of its salient characteristics (Plate 6).

A soil profile is described by first noting certain features of the soil's environment,

*Plate 6—Soil profiles representative of each soil series are examined and described. Samples are taken from each horizon for laboratory analysis*

followed by a detailed description of the general characteristics of the profile. The constituent horizons are then described individually. The characteristics which apply to the site include relief position, slope, aspect, altitude and vegetative cover. Drainage condition and the pattern of horizon development within the profile are considered next and, finally, such properties of the individual soil horizons as texture, structure, consistence, colour, mottling, amount of organic matter, stoniness, presence of hard-pans and root development are described.

### Laboratory Investigations

A bulk sample is taken from each soil horizon and the samples are subjected to a number of physical and chemical analyses at the Soil Laboratory (Plate 7). The analytical data supplement many of the field observations and provide a more complete picture of true soil character. The results of these analyses for representative profiles of each soil series are given in Appendices I and II.

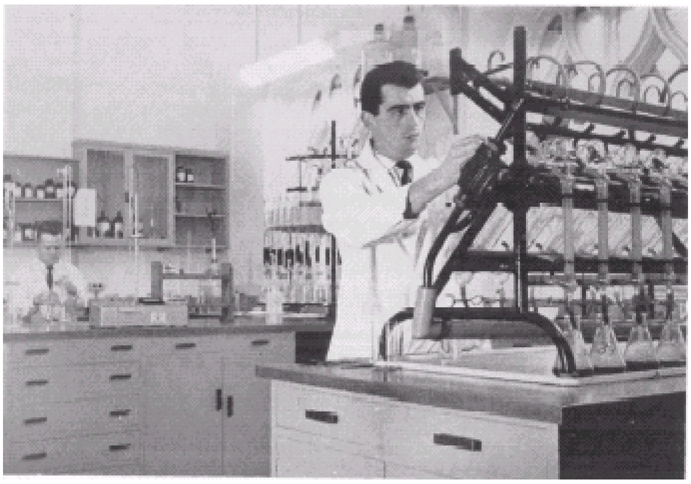

*Plate 7—Representative soil samples are subjected to various analyses in the laboratory*

## CHAPTER IV

### THE SOILS

### Soil Associations and Series

Thirty-five of the **soil series** that have been recognised within the county have been grouped for mapping convenience into twenty-three larger units **(Soil Associations)** on the basis of the geological similarities of the parent materials. The series have been given geographic names based on the location in which the particular soils are best expressed or occur most widely. The associations are named after their most extensive or most important series. Two soil complexes and six soil variants have also been recognised. Areas of peat, alluvium and wind-blown sands are described.

The various associations and series mapped and the extent of their occurrence in the county are given in Table VI. (Association boundaries are not separately shown on the map but the outer boundaries of the component series within each association serve also as the association boundaries.)

TABLE VI—Soil Associations and Soil Series in County Wexford

| Association | Area (acres) | Series | Area (acres) | Parent Material |
|---|---|---|---|---|
| Ambrosetown | 2,750 | Ambrosetown | 2,750 | Mainly drift of predominantly Cambrian shale-quartzite composition and of Saale Age |
| Baldwinstown | 1,160 | Baldwinstown | 1,160 | Glacial drift of Carboniferous limestone—Cambrian shale composition and of Saale Age |
| Ballindaggan | 31,260 | Ballindaggan | 23,580 | Mica schist and glacial drift of similar composition and of Saale Age |
| | | Templeshanbo | 2,380 | |
| | | Black Rock Mountain | 5,300 | |
| Bannow | 1,000 | Bannow | 1,000 | Outwash sands with glacial drift of predominantly Cambrian shale composition and of Saale Age |
| Broadway | 10,200 | Broadway | 10,200 | Mainly outwash sands and gravels of Saale Age |
| Broomhill | 1,080 | Broomhill | 1,080 | Glacial drift of Old Red Sandstone composition and of Saale Age |
| Carne | 1,400 | Carne | 960 | Mixed outwash sands and gravels of Saale Age with local granite influence |
| | | Nethertown | 440 | |

TABLE VI (continued)

| Association | Area (acres) | Series | Area (acres) | Parent Material |
|---|---|---|---|---|
| Clonroche | 290,865 | Clonroche | 240,265 | Ordovician shale and glacial drift mostly of shale origin with some granite influence and of Saale Age |
| | | Kilpierce | 44,800 | |
| | | Slievecoiltia | 5,800 | |
| Fethard | 5,890 | Fethard | 3,590 | Glacial drift of predominantly Avonian shale—Calciferous sandstone composition and of Saale Age |
| | | Ballinruan | 2,300 | |
| Forth Commons | 4,240 | Forth Commons | 4,240 | Cambrian quartzite with some pockets of glacial drift of local origin |
| Hook Head | 1,200 | Hook Head | 1,200 | Glacial drift of predominantly Carboniferous limestone com-position and of Saale Age |
| Killinick | 9,680 | Killinick | 9,680 | Morainic gravels and sands of Saale Age |
| Kiltealy | 20,760 | Kiltealy | 8,740 | Granite and granitic glacial drift of Saale Age |
| | | Ballywilliam | 2,940 | |
| | | Blackstairs | 9,080 | |
| Macamore | 52,050 | Macamore | 52,050 | Dense calcareous glacial drift of Irish Sea origin and Saale Age |
| Old Ross | 6,880 | Old Ross | 6,460 | Glacial drift of mixed Ordo-vician shale—granite com-position and of Saale Age |
| | | Knockroe | 420 | |
| Rathangan | 52,620 | Rathangan | 52,620 | Dense glacial drift of pre-dominantly Cambrian shale and quartzite composition intermixed with glacial drift of Irish Sea origin, all of Saale Age |
| Screen | 36,120 | Screen | 27,300 | Coarse-textured, end-morainic material of the Weichsel glaciation |
| | | Ballyknockan | 1,700 | |
| | | Randallsmill | 7,120 | |

*Alluvial Soils*

| | | | | |
|---|---|---|---|---|
| Millquarter | 1,280 | Millquarter | 1,280 | Lake alluvium (base-poor) |
| Coolaknick | 5,610 | Coolaknick | 4,040 | Lake alluvium (base-rich) |
| | | Oulartleigh | 1,570 | |
| Clohamon | 2,240 | Clohamon | 2,240 | River alluvium and terrace gravels |
| Kilmannock | 3,240 | Kilmannock | 3,240 | River—estuarine alluvium |
| Kilmore Slob | 2,960 | Kilmore Slob | 2,960 | Estuarine alluvium (coarse texture) |
| Wexford Slob | 5,040 | Wexford Slob | 5,040 | Estuarine alluvium (fine texture) |

TABLE VI (continued)

| Complex | Area (acres) | Series | Area (acres) | Parent Material |
|---|---|---|---|---|
| Crosstown | 7,960 | Crosstown | — | Mixed glacial drift of Saale Age with solifluction and loess-like materials |
| | | Crossabeg | — | |
| | | Johnstown | — | |
| Carrickbyrne | 7,300 | Carrickbyrne | — | Acid and basic igneous rocks and Ordovician shale through which these rocks protrude |
| | | Slievecoiltia | — | |
| Basin Peat | 1,400 | — | — | — |
| Hill Peat | 400 | — | — | — |
| Alluvium | 9,500 | — | — | — |
| Aeolian Sand | 2,920 | — | — | — |

*Variants*

| Association or Complex | Variant | Parent Material |
|---|---|---|
| Screen | Glenbough | End-morainic sands of the Weichsel glaciation |
| Kilmore Slob | Kilmore Slob | Estuarine alluvium (fine tex-tured) |
| Wexford Slob | Wexford Slob | Estuarine alluvium (fine textured but with sand layers) |
| Crosstown | Whitegate | Loess-like material |
| | Sandhills | Sand deposits |
| | Deerpark | Loess-like material intermixed with dense drift |

**Ambrosetown Association**

The soils of this association occur in the neighbourhood of the slightly elevated situations in south Wexford. Because of their position on the landscape these areas are largely unaffected by the tenacious glacial drift material of Irish Sea origin common to the surrounding countryside and influencing the Rathangan soils. The soils of the Ambrosetown Association are derived largely from drift material of Cambrian shale and quartzite composition. They occupy some 0.47 per cent (2,750 acres) of the county. Within the Association one soil series has been recognised, namely the Ambrosetown Series.

*Ambrosetown Series:* These moderately well-drained soils of loam and loam to clay loam textures and of medium to high base status have been classified as Brown-Earths.[1] The profile is characterised by a rather uniform dark-brown to yellowish-brown colour throughout the entire depth. Structure in the surface is a moderate, medium crumb. Mottling, indicative of slight drainage impedance, is evident below two feet. Root development is moderately good.

[1] For definition of Brown Earths and other major soil groups referred to in classifying the soils in this chapter see the section "Major Soil Groups in the County" at end of this Chapter

*Generalised profile description*

| | |
|---|---|
| Slope: | 1° |
| Aspect | East |
| Altitude: | 150 feet O.D. |
| Vegetation: | Old pasture |
| Drainage Class: | Moderately well-drained |
| Parent Material: | Glacial drift predominantly of Cambrian shale and quartzite composition, of Saale Age |

| *Horizon* | *Depth (in)* | *Description*[2] |
|---|---|---|
| $A_{11}$ | 0–5 | Loam; dark-brown (10 YR 4/3); moderate, medium crumb structure; friable; plentiful diffuse roots; gradual boundary to: |
| $A_{12}$ | 5–10 | Loam to clay loam; dark-brown (10 YR 4/3); moderate to strong, medium crumb structure; friable; plentiful diffuse roots; clear, smooth boundary to: |
| (B)* | 10–21 | Loam to clay loam; yellowish-brown (10 YR 5/6); moderate, fine and medium sub-angular blocky structure; friable to very friable; plentiful diffuse roots; clear, smooth boundary to: |
| B/C | 21–36 | Loam to clay loam; dark-brown (10 YR 4/3); weak, medium sub-angular blocky structure; firm; some medium yellowish-brown (10 YR 5/6) mottles; no roots |

**Baldwinstown Association**

The soils of this association occupy 0.20 per cent (1,160 acres) of the county. They occur in the vicinity of the village of Baldwinstown and are derived from mixed glacial drift material of predominantly Carboniferous limestone—Cambrian shale composition. The area in general lies between 100-150 feet O.D. and has a gently undulating topography. Only one series has been segregated within the association, namely, the Baldwinstown Series.

*Baldwinstown Series:* The soils of this series are moderately well-drained, of medium to high base status and of loam to sandy clay loam texture and have been classified as Brown Earths (tending towards Grey-Brown Podzolics). The soil profile is characterised by a relatively uniform colour throughout its entire depth, the surface horizon being dark greyish-brown and the remainder of the profile uniformly dark-brown in colour. The surface horizon has a moderate, medium crumb structure and the (B) horizon a moderate, medium sub-angular blocky structure which becomes weaker with depth. There is a slightly heavier texture in the (B) horizon at 27-36 inches but not sufficient to qualify this as a $B_t$† horizon. Slight drainage impedance below three feet is indicated by the presence of mottles. Root development is good.

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[2] In describing soils the procedure mostly followed is that described in the *Soil Survey Manual* (U.S. Dept. Agric. Handbook. No. 18. Washington D.C.). Colour designations are according to Munsell Colour Notation. Colour, structure and consistence are measured on moist soil unless otherwise stated

*(B) denotes a colour or structure B horizon

†$B_t$ denotes a B horizon with a relative enrichment by clay and is usually referred to as a textural B horizon

*Generalised profile description*

| | |
|---|---|
| Slope: | 1° |
| Aspect: | West |
| Altitude: | 100 feet O.D. |
| Vegetation: | Pasture |
| Drainage Class: | Moderately well-drained |
| Parent Material: | Glacial drift of predominantly Carboniferous limestone—Cambrian shale composition, of Saale Age |

| *Horizon* | *Depth (in)* | *Description* |
|---|---|---|
| $A_{11}$ | 0–9 | Loam to sandy clay loam; dark greyish-brown (10 YR 4/2); moderate, medium crumb structure; friable; plentiful diffuse roots; gradual boundary to: |
| $A_{12}$ | 9–18 | Loam; dark-brown (7·5 YR 4/2); moderate to strong, medium and fine crumb structure; friable; plentiful diffuse roots; gradual boundary to: |
| $A_{13}$ | 18–27 | Loam; dark-brown (10 YR 4/3); moderate to strong, medium and fine crumb structure; very friable; very porous; good earthworm activity; plentiful diffuse roots; clear, smooth boundary to: |
| (B) | 27–36 | Loam to clay loam; dark-brown (10 YR 4/3); moderate, medium sub-angular blocky structure; friable; few roots; clear, smooth boundary to: |
| B/C | 36–45 | Loam; dark-brown (10 YR 4/3) and brown (10 YR 5/3); weak, medium sub-angular blocky structure; somewhat firm; some distinct strong-brown (7·5 YR 5/6) mottles; no roots. |

**Ballindaggan Association**

The soils of this association are derived from Mica-schist and drift material of similar composition. They are most widely represented in the north-western part of the county, in the vicinity of Ballindaggan, Bunclody and Watch House Village, and also occur in the vicinity of Oulart.

They occupy 5.4 per cent (31,260 acres) of the county, and occur mostly in areas of relatively high elevation but the range is from approximately 300 to 2,000 feet O.D. The association is characterised by rolling topography but in the areas of higher elevation moderately steep slopes are encountered. Because of differences in elevation, and position on the landscape, climatic and hydrologic conditions vary throughout the area giving rise to different soils. Three series, therefore, have been recognised within the association, namely, Ballindaggan, Templeshanbo and Black Rock Mountain.

*Ballindaggan Series*: The soils of this series are derived from Mica-schist drift material. They occupy 4.07 per cent (23, 580 acres) of the county. They occur mostly below the 600 foot contour line, in those parts of the Association area having rolling topography. These well-drained soils of clay loam to loam texture and of low base status have been classified as Brown-Podzolics. These soils are rather similar in profile morphology to the soils of the Clonroche Series but are somewhat 'heavier' in texture. The profile is characterised by reddish-brown surface horizons, overlying a yellowish-red (B) horizon at a depth of twelve inches. This horizon merges with the pale-brown parent material at a depth of about fifteen inches. Structure is a moderate, medium crumb formation and root development is good.

*Plate 8—Typical soil profile of the Ballindaggan Series*

*Generalised profile description*

| | |
|---|---|
| Slope: | 6° |
| Aspect: | East |
| Altitude: | 600 feet O.D. |
| Vegetation: | Old pasture, mostly *Agrostis* spp. |
| Drainage Class: | Well-drained |
| Parent Material: | Glacial drift material of predominantly Mica-schist composition, of Saale Age |

| *Horizon* | *Depth (in)* | *Description* |
|---|---|---|
| $A_{11}$ | 0-6 | Clay loam to loam; reddish-brown (5 YR 4/3-4/4); moderate, medium crumb structure; friable; plentiful, diffuse roots; gradual boundary to: |
| $A_{12}$ | 6-11 | Clay loam to loam; reddish-brown (5 YR 4/3-4/4); moderate to strong, medium crumb structure; friable; plentiful, diffuse roots; abrupt, smooth boundary to: |
| (B) | 11-15 | Loam; yellowish-red (5 YR 5/6); moderate, fine crumb structure; friable; some roots; clear, wavy boundary to: |
| B/C | Below 15 | Sandy loam; pale-brown (10 YR 6/3); moderate, fine granular structure; very friable; few roots; many, medium-sized schist fragments present. |

*Templeshanbo Series:* This is the least extensive soil of the association, occupying only 0.41 per cent (2,380 acres) of the county. The soils are poorly-drained and are restricted to the depressions and less favourably sloping ground. Their poor drainage is due mainly to the presence of a high water-table but in some situations springs and seepage water are contributory factors. These soils of organic, silt loam texture and of low base status have been classified as low-humic Gleys. The profile is characterised by an organic surface horizon with poor structure and with ochreous staining along root channels overlying horizons which are grey and mottled. Root development is poor and the natural vegetation consists of rush (*Juncus*) and furze (*Ulex*) dominated pasture.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 300 feet O.D. |
| Vegetation: | Pasture dominated by rush (*Juncus*) and furze (*Ulex*) |
| Drainage Class: | Poorly-drained |
| Parent Material: | Glacial drift of predominantly Mica-schist composition, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0-4 | Organic silt loam; dark-grey (10 YR 4/1); massive structure held in sod by roots; very sticky when wet; clear, smooth boundary to: |
| $A_{12g}$* | 4-9 | Loam; grey (5 Y 5/1); very weak, medium crumb structure; sticky when wet; strong-brown (7-5 YR 5/6) staining along root channels; abundant roots; abrupt, smooth boundary to: |
| A/CG** | 9-15 | Sandy loam; grey (2-5 Y 5/0); massive structure; sticky when wet; shaly; strong-brown (7-5 YR 5/6) stains on root channels; few roots |

*Subscript "g" (*e.g.* $A_{12g}$) denotes evidence, principally in the form of mottles, of gleying or retarded drainage

** "G" denotes a strongly gleyed or mostly waterlogged condition in a soil horizon as expressed by drab grey and blue-grey colours, with or without mottling

*Black Rock Mountain Series:* The soils of this series are found in the more elevated parts of the area occupied by the Ballindaggan Association. They occupy 0.92 per cent (5,300 acres) of the county, and are located on the hill tops and steeper slopes, areas which, for the most part, have not been affected by glacial drift. The soils, therefore, are derived mainly from the underlying Mica-schist bed-rock. The profile is similar in some respects to that of the Ballindaggan Series but the higher altitudes, with attendant increased rainfall and lower temperatures, have contributed to the accumulation of raw humus on the surface and to the greater degree of leaching of the Black Rock Mountain soils. These have been classified as Podzols and the profile is characterised by a black, peaty, surface $A_0$ horizon, a black, slightly peaty $A_1$ horizon, a narrow greyish-brown leached $A_2$ horizon, a thin, discontinuous iron pan $B_2$(ir) horizon and a wide yellowish-red $B_{22}$ horizon. The $B_{22}$ horizon merges with the yellow-brown parent material at about twenty-four inches. These soils are generally somewhat shallow, the maximum depth being approximately thirty inches.

*Generalised profile description*

| | |
|---|---|
| Slope: | 8° |
| Aspect: | South |
| Altitude: | 1,000 feet O.D. |
| Vegetation: | Heath vegetation—*Calluna, Erica* with *Molinia* and *Ulex* |
| Drainage Class: | Well-drained |
| Parent Material: | Mica-schist |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_o$ | 2-0 | Undecomposed organic material |
| $A_1$ | 0-10 | Slightly peaty loam; black (10 YR 2/1); moderate medium crumb structure; friable; abundant roots; clear, smooth boundary to: |
| $A_2$ | 10-12 | Sandy loam; greyish-brown (10 YR 5/2); weak, fine crumb structure; very friable; some roots; abrupt, smooth boundary to: |
| $B_2$($_{ir}$)* (iron pan) | — | Very thin, discontinuous iron-pan, approximately ¼inch thick: |
| $B_{22}$ | 12-23 | Loam; yellowish-red (5 YR 5/8); moderate, fine and medium granular structure; friable; occasional roots; clear, smooth boundary to: |
| B/C | Below 23 | Loam; yellowish-brown (10 YR 5/6); moderate, fine granular structure; friable; few roots |

**Bannow Association**

The soils of this association occupy 0.17 per cent (1,000 acres) of the county and are located in a small area surrounding Bannow village on the south coast. They are derived from mixed glacial drift of predominantly Cambrian shale composition. The drift is of Saale Age and of stony loam texture. Overlying the stony loam drift is a sandy loam material which contains some smooth, rounded pebbles. This material is evidently mainly sea sand, which in the past has been added to the soil and mixed with the heavier drift derived material. One series, namely Bannow, has been seg-regated within the association.

*$\mathbf{B}_2$($_{ir}$) denotes a $\mathbf{B}_2$ horizon with a relative enrichment by finely disseminated iron oxides

*Bannow Series:* These soils are moderately well-drained and have been classified as Grey-Brown Podzolics. The profile shows a marked textural differentiation. Clay content, which is about 12 per cent from 0 to 18 inches, increases to 29 per cent at the 18 to 23 inch depth and decreases to 24 per cent in the C horizon. This is due partly to the movement of clay from the A to B horizon and partly to the addition of sea sand to the surface. Some clay skins are present in the B horizon. The C horizon is massive and compact and light-grey mottles indicate slow permeability. Carbonates are present in the A and B horizons but not in the C. The presence of carbonates is attributed to the calcareous nature of the sea sand added to the surface. The base saturation of the C horizon is higher than that expected in a parent material of predominantly shale composition. This is due to leaching of bases from the base-enriched surface horizons.
The following is a description of a profile representative of this series:

| | |
|---|---|
| Slope: | 2° |
| Aspect: | Nil |
| Altitude: | 50 feet O.D. |
| Vegetation: | New pasture |
| Drainage Class: | Moderately well-drained |
| Parent Material: | Glacial drift of predominantly Cambrian shale composition, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{1p}$* | 0-7 | Sandy loam; dark greyish-brown (10 YR 4/2); weak, medium granular and crumb structure; very friable; abundant, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 7-18 | Sandy loam; dark greyish-brown (10 YR 4/2) to greyish-brown (10 YR 5/2); weak, medium and coarse, sub-angular blocky structure; friable; few roots; clear, wavy boundary to: |
| $B_{2t}$ | 18-23 | Clay loam; yellowish-brown (10 YR 5/4); weak, medium and coarse, sub-angular blocky structure; firm; few clay skins; very sparse roots; gradual, wavy boundary to: |
| C | 23-36 | Stony loam; yellowish-brown (10 YR 5/4-5/8) with common, medium, distinct, light grey (10 YR 7/2) mottles; almost massive; firm, compact; no roots |

**Broadway Association**

The soils of this association occupy 1.76 per cent (10,200 acres) of the county. They occur mostly in the Broadway, Ballytrent, Tacumshin area but also in the vicinity of Kilmore Quay and Ballyhealy. The area has an elevation of 100-150 feet O.D. and a flattish topography. The soils are derived mainly from outwash sands and gravels of mixed geological composition and of the Saale glaciation, with some mixed local drift in places. The latter are underlain at a considerable depth by the dense Irish Sea boulder clay of Saale Age, which gives rise to the Macamore soils in other parts of the county. Only one series, namely, Broadway has been recognised within the association.

* $A_{1p}$ denotes a cultivated surface horizon or plough layer

*Broadway Series*: These soils are moderately well-drained, of medium to high base status and of sandy loam texture and have been classified as Brown Earths (tending towards Grey-Brown Podzolics). The profile, which is more or less uniform in colour throughout its entire depth, has a friable consistency and moderate structure. There is a slight clay increase apparent in the 16-25 inch depth. It is possible that blown sands may have contributed to the more coarse-textured nature of the surface horizons. There is evidence of strong earthworm activity, and root development is good.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 100 feet O.D. |
| Vegetation: | Cultivated |
| Drainage Class: | Well-drained |
| Parent Material: | Outwash sands and gravels of mixed com-position, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{1p}$ | 0-7 | Sandy loam; dark yellowish-brown (10 YR 3/4); moderate, medium crumb structure; very friable; plentiful, diffuse roots; clear, smooth boundary to: |
| $(B)_1$ | 7-16 | Sandy loam; dark-brown (10 YR 4/3); moderate, fine sub-angular blocky structure; very friable; plentiful, diffuse roots; clear, smooth boundary to: |
| $(B)_2$ | 16-25 | Sandy loam to sandy clay loam, strong-brown (7-5 YR 5/6); moderate, medium sub-angular blocky structure; friable; some roots; abrupt, smooth boundary to: |
| B/C | 25-40 | Sandy loam; brown (7-5 YR 5/4); moderate, medium sub-angular blocky structure; friable; few roots |

**Broomhill Association**

The soils of this association occur on gently undulating to rolling topography on the north-western part of the Hook Head promontory. They occupy 0.19 per cent (1,080 acres) of the county. The parent material consists of glacial drift of pre-dominantly Old Red Sandstone composition. Only one series, namely, Broomhill has been segregated within the association.

*Broomhill Series:* These soils are well-drained, of loam to sandy clay loam texture and have been classified as Brown Earths. In their natural state they are of low base status but liberal applications of sea-sand, sea weed and fertilisers have altered the base status considerably in certain cases as shown in the analyses for the selected representative soil (Appendix 1). The profile displays a dark reddish-brown colour throughout its entire depth. Structure is good and root development is moderate. These soils are somewhat shallow, the bed-rock coming to within two feet of the surface as a general rule.

*Generalised profile description*

| | |
|---|---|
| Slope: | 3º |
| Aspect: | West |

| | |
|---|---|
| Altitude: | 200 feet O.D. |
| Vegetation: | Cultivated |
| Drainage Class: | Well-drained |
| Parent Material: | Glacial drift of Old Red Sandstone com-position, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{1p}$ | 0-8 | Loam to sandy clay loam; dark reddish-browu (5 YR 3/3); moderate, medium crumb structure; friable; plentiful diffuse roots; gradual boundary to: |
| $A_{12}$ | 8-15 | Sandy clay loam; dark reddish-brown (5 YR 3/3); moderate to strong, medium crumb structure; friable; plentiful diffuse roots; porous; clear, smooth boundary to: |
| A/C | 15-21 | Very stony sandy loam to sandy clay loam; dark reddish-brown (2-5 YR 3/4); brashy sandstone conglomerate; firm and cemented *in situ* but breaks to coarse angular fragments; no roots; gradual boundary to: |
| C | Below 21 | Old Red Sandstone bedrock |

**Carne Association**

The soils of this association occupy 0.25 per cent (1,400 acres) of the county and occur in the south-eastern corner. The area is generally flat to gently undulating. The soils are derived from mixed outwash sands and gravels of Saale Age overlying, in places, dense drift material of Irish Sea origin and, in other places, local material of predominantly granite composition. The soils for the most part are relatively deep, but where underlain by the local material, boulders and outcrops of granite are common. Between the boulders the soil can be deep, but because of the frequency with which outcropping boulders occur and because of the difference in the under-ying materials, the soils have been segregated into two series, namely, Carne and Nethertown.

*Carne Series:* The soils of this series consist of moderately well-drained, sandy loams of medium base status and occupy 0.17 per cent (960 acres) of the county. Because of the unusual nature of the soil profile they have been left unclassified. The profile is characterised by a dark-grey surface horizon of sandy loam texture and friable consistency. At a depth of twelve inches this overlies a dark greyish-brown horizon. The latter is somewhat cemented and hard and contains many yellowish-red iron nodules which become less plentiful with depth. The underlying material is brown and of sandy loam texture.

*Generalised profile description*

| | |
|---|---|
| Slope: | 1° |
| Aspect: | West |
| Altitude: | 75 feet O.D. |
| Vegetation: | Cultivated |
| Drainage Class: | Moderately well-drained |
| Parent Material: | Mixed glacial outwash sands and gravels (with local granite influence) of Saale Age, overlying dense drift |

| Horizon | Depth (in) | Description |
|---|---|---|
| $A_{1P}$ | 0–6 | Sandy loam; dark-grey (10 YR 4/1); moderate, fine to medium crumb structure; very friable; plentiful, diffuse roots; clear, smooth boundary to: |
| $A_{12}$ | 6–12 | Sandy loam; dark greyish-brown (10 YR 4/2); moderate, medium crumb structure; very friable; plentiful diffuse roots; clear, wavy boundary to: |
| $B_{21}$ | 12–19 | Sandy loam; dark greyish-brown (10 YR 4/2) with many yellowish-red iron nodules; cemented and hard in *situ* but breaks to fine crumb and single grained structure; few roots; gradual, smooth boundary to: |
| $B_{22}$ | 19–26 | Similar to above horizon but having less yellowish-red iron nodules; clear, smooth boundary to: |
| B/C | 26–47 | Sandy loam; brown (10 YR 5/3); many, coarse, strong-brown (7-5 YR 5/6) mottles; massive structure; somewhat firm; no roots |

*Nethertown Series:* This series consists of well-drained soils of sandy loam texture and of low base status that have been classified as reclaimed Podzols. They occupy 0.08 per cent (440 acres) of the county. The profile is characterised by a dark-brown surface horizon of sandy loam texture and friable consistency which, at a depth of eight inches, overlies an horizon of yellowish-brown colour but of similar texture and consistency. At a depth of fifteen inches there is a reddish-brown $B_{2(ir)}$ horizon which is somewhat cemented and in which there is an obvious accumulation of iron oxides. There is a semblance of an iron-pan at the lower boundary of this horizon which overlies the coarse sandy, cemented and compact, yellowish-brown parent material.

*Generalised profile description*

| | |
|---|---|
| Slope: | 3° |
| Aspect: | West |
| Altitude: | 50 feet O.D. |
| Vegetation: | Old pasture |
| Drainage Class: | Well-drained |
| Parent Material: | Mixed glacial outwash sands and gravels (with local granite influence), of Saale Age, overlying local granite rock |

| Horizon | Depth (in) | Description |
|---|---|---|
| $A_{11}$ | 0–8 | Sandy loam; dark-brown (10 YR 3/3); moderate, fine to medium crumb structure; friable; plentiful, diffuse roots; clear, smooth boundary to: |
| $A_{12}$ | 8–15 | Sandy loam; dark yellowish-brown (10 YR 3/4); moderate, fine to medium crumb structure; friable; plentiful, diffuse roots; clear, smooth boundary to: |
| $B_2(_{ir})$ | 15–21 | Sandy loam; reddish-brown (5 YR 4/4); weak, fine granular structure; somewhat cemented; semblance of an iron-pan present at lower boundary to: |
| B/C | Below 21 | Loamy coarse sand; yellowish-brown (10 YR 5/6); cemented and very compact; no roots |

**Clonroche Association**

The Clonroche Association is the most extensive in the county, occupying 50.23 per cent of the area (290,865 acres). The soils of the association are derived from Ordovician shale and drift material of similar composition, with some granite influence. The area occupied by the association is characterised, for the most part, by easy rolling topography. In places, however, particularly in the neighbourhood of igneous intrusions, the topography becomes rolling to moderately steep. These topographic changes and their attendant hydrologic and soil forming influences are responsible for the principal soil differences within the association.

Three series, namely, Clonroche, Kilpierce and Slievecoiltia, have been segregated within the association.

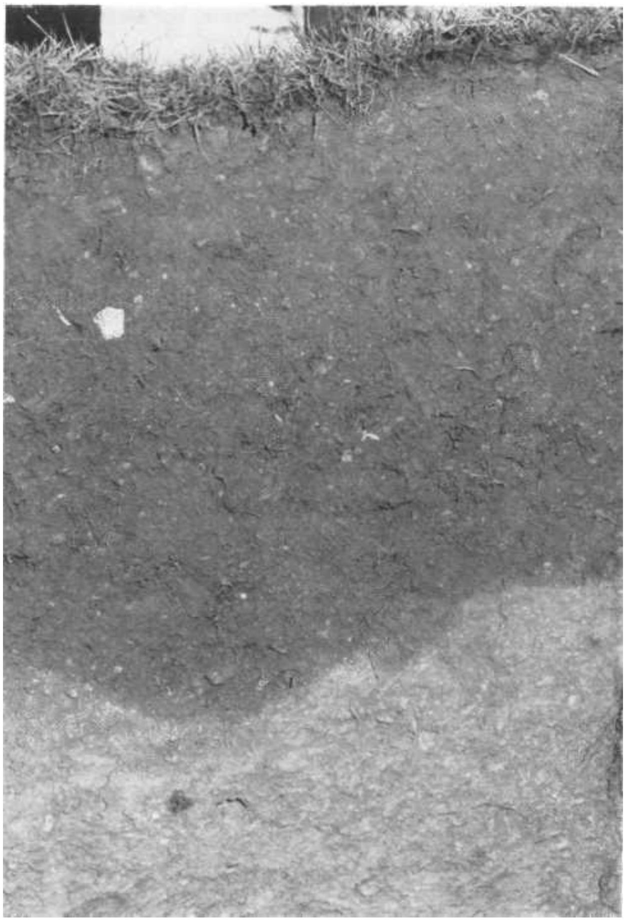

Plate 9—*Soil profile representative of the Clonroche Series* (*Clonroche Association*)

*Cionroche Series:* The Clonroche Series is the most extensive of the association and occurs on the easy rolling topographic situations. It occupies 41.49 per cent (240,265 acres) of the county. The soil parent material is a glacial drift predominantly derived from the Ordovician shale which forms the underlying rock strata but some granite influence occurs also. The soils are well-drained, of loam to clay loam texture and of low to medium base status and have been classified as Brown Earths. The profile is characterised by a dark reddish-brown surface horizon with a moderately strong, medium crumb structure. This sometimes overlies a strong brown (B) horizon which merges with the dark yellowish-brown parent material. More often, however, this (B) horizon is either absent or weakly expressed. The profile contains appreciable quantities of small shale fragments which enhance the internal drainage of these soils.

*Generalised profile description*

| | |
|---|---|
| Slope: | 3° |
| Aspect: | South-east |
| Altitude: | 250 feet O.D. |
| Vegetation | Cultivated |
| Drainage Class: | Well-drained |
| Parent Material: | Glacial drift of predominantly Ordovician shale composition (with some granite influence), of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–6 | Loam to clay loam; dark reddish-brown (5 YR 3/2); moderate, medium crumb structure; friable; plentiful, diffuse roots; clear, smooth boundary to: |
| $A_{12}$ | 6–14 | Loam to clay loam; reddish-brown (5 YR 5/3); moderate to strong, medium crumb structure; friable; plentiful, diffuse roots; clear, smooth boundary to: |
| A/C | 14–36 | Shaly loam; dark yellowish-brown (10 YR 4/4); moderate, fine granular to single grained structure; friable; some roots |

*Kilpierce Series:* The Kilpierce Series forms an intricate pattern with the Clonroche Series. It occupies 7.74 per cent (44,800 acres) of the county. These are poorly-drained soils and throughout the association are restricted to depressions and the less favourable slopes.

These soils of clay loam texture and of low to medium base status have been classified as low-humic Gleys. The profile is characterised by a dark greyish-brown, slightly organic surface horizon and by a grey sub-soil showing extensive mottling. Occasionally there are six inches or more of a plastic clayey material associated with the surface horizon. The presence of this material is correlated with post-glacial lakes and rivers which were responsible for the deposition of this alluvial material. Because of its small extent this alluvium has not been segregated as a separate series but has been mapped with the Kilpierce Series. The poor drainage of these soils is due mainly to the presence of a high water-table.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 150 feet O.D. |

| | |
|---|---|
| Vegetation: | Old pasture dominated by rush (*Juncus*) |
| Drainage: | Poorly-drained |
| Parent Material: | Glacial drift of predominantly Ordovician shale composition (with some granite influence), of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}g$ | 0–6 | Clay loam; dark greyish-brown (10 YR 4/2); weak, fine crumb structure, held in sod by abundant roots; gradual, smooth boundary to: |
| $A_{12}g$ | 6–10 | Clay loam to loam; greyish-brown (10 YR 5/2); weak, fine crumb structure, held in sod by plentiful roots; friable; clear, smooth boundary to: |
| $A_{13}g$ | 10–16 | Loam; grey (10 YR 5/1) and brownish-yellow (10 YR 6/8); many, prominent yellowish-red (5 YR 4/8) mottles; weak, fine granular to massive structure; few roots; friable; clear, smooth boundary to: |
| A/CG | Below 16 | Loam to clay loam; grey (10 YR 5/1); massive structure; firm; no roots; many distinct, medium yellowish-red (5 YR 4/8) mottles |

*Slievecoiltia Series:* The soils of this series are the least extensive of the association and occupy some 1.00 per cent (5,800 acres) of the county. They are located on the hill tops and steeper slopes, which for the most part have not been affected by glacial drift. The soils, therefore, are derived mainly from the underlying Ordovician shale formations. They are well-drained, of organic clay loam texture and of low base status and have been classified as Brown Podzolics. They are shallow, being rarely more than thirty inches deep and are often stony, especially in the more shallow profiles. The profile is characterised by an organic surface horizon overlying a reddish-brown sub-surface horizon which gradually merges with the underlying shaly parent material.

*Generalised profile description*

| | |
|---|---|
| Slope: | 11° |
| Aspect: | West |
| Altitude: | 800 feet O.D. |
| Vegetation: | Heath vegetation—*Callunu*, *Erica* with *Ulex* and *Pteridium* spp. |
| Drainage Class: | Well-drained |
| Parent Material: | Ordovician shale |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_1$ | 0–10 | Organic clay loam; dark-brown (10 YR 3/3); strong, medium crumb structure, held in sod by abundant roots; friable; gradual, smooth boundary to: |
| $B_2(_{ir})$ | 10–20 | Loam; reddish-brown (5 YR 4/4); moderate, fine, crumb structure; very friable; plentiful, diffuse roots; clear, smooth boundary to: |
| C | Below 20 | Brashy subsoil on rock |

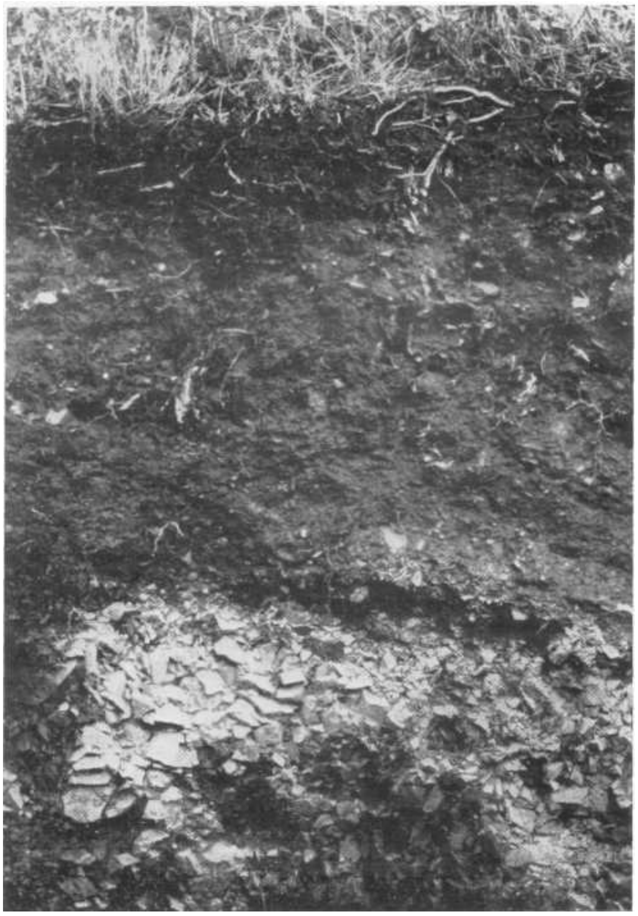

Plate 10—*Soil profile representative of the deeper phases of Slievecoiltia Series* (*Clonroche Association*)

**Fethard Association**

The soils of this association are located mostly on the north-eastern portion of the Hook Head promontory and occupy 1.03 per cent (5,890 acres) of the county. The area ranges from 100–200 feet O.D. and has a gently undulating topography. The soils of the association are derived from mixed drift material of predominantly Avonian shale—Calciferous sandstone composition and of Saale Age. Two series, namely, Fethard and Ballinruan have been segregated within the association. The soils of the Fethard Series occur on the more favourable slopes in the area and are moderately well-to imperfectly-drained, while the soils of the Ballinruan Series are confined to the flatter areas and are poorly-drained.

*Fethard Series:* The soils of this series occupy 0.62 per cent (3,590 acres) of the county. They are moderately well-to imperfectly-drained, of loam to clay loam texture and of high base status and have been classified as Grey-Brown Podzolics. There is a textural B horizon at the 20-27 inch depth. The dark greyish-brown colours of the surface horizons change to pale-brown in the $B_t$ and C horizons. Mottling in varying degree is present throughout the entire profile but not to sufficient extent to place the soils in the 'Gley' class.

*Generalised profile description*

| | |
|---|---|
| Slope: | 2° |
| Aspect: | West |
| Altitude: | 200 feet O.D. |
| Vegetation: | Pasture |
| Drainage Class: | Moderately well-to imperfectly-drained |
| Parent Material: | Glacial drift of predominantly Avonian shale—Calciferous sandstone composition, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–6 | Loam to clay loam; dark greyish-brown (10 YR 4/2); moderate, fine to medium crumb structure; friable; ochreous staining along root channels; gradual, smooth boundary to: |
| $A_{12}$ | 6–12 | Clay loam to loam; dark greyish-brown (10 YR 4/2); moderate, medium crumb structure; friable; plentiful, diffuse roots; gradual, smooth boundary to: |
| A/B | 12–20 | Loam to clay loam; greyish-brown (10 YR 3/2); moderate, coarse granular structure; friable; few, small, faint reddish-brown (5 YR 4/4) mottles; some roots; abrupt, smooth boundary to: |
| $B_{2tg}$ | 20–27 | Clay loam; pale-brown (10 YR 6/3); weak, medium to coarse, sub-angular blocky structure; somewhat firm; clay skins evident; many, small distinct yellowish-brown (10 YR 5/6) mottles; few roots; gradual, smooth boundary to: |
| $B/C_g$ | 27–34 | Clay loam; pale-brown (10 YR 6/3); weak, medium to coarse sub-angular blocky structure; firm; many, medium, distinct yellowish-brown (10 YR 5/6) mottles; no roots |

*Ballinruan Series:* The soils of this series occupy 0.41 per cent (2,300 acres) of the county. They are poorly-drained, of loam texture and of medium to high base status and have been classified as low-humic podzolic Gleys. Their poor drainage is due largely to the presence of a high water-table and rather slow permeability. The profile is characterised by a greyish-brown organic loam surface horizon with weak, medium crumb structure and with ochreous staining along root channels. The sub-surface horizons are grey, mottled and have very weak to massive structure. A thin, light-grey, leached horizon occurs at the 13–15 inch depth. The vegetation consists of rush (*Juncus*) dominated pasture.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 100 feet O.D. |
| Vegetation: | Old pasture |
| Drainage Class: | Poorly-drained |
| Parent Material: | Glacial drift of predominantly Avonian shale—Calciferous sandstone composition, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11g}$ | 0–4 | Organic loam; greyish-brown (10 YR 5/2); weak medium crumb structure, held in sod by grass roots; ochreous staining along root channels; abundant, diffuse roots; clear, smooth boundary to: |

| | | |
|---|---|---|
| $A_{12g}$ | 4–13 | Loam; olive-grey (5 Y 5/2); weak, coarse, crumb structure; friable; some roots; many, fine, strong brown (7·5 YR 5/6) mottles; clear, smooth boundarv to: |
| $A_{2g}$ | 13–15 | Loam; light-grey (5 Y 7/2); very weak, medium, granular structure; friable but slightly sticky when wet; few roots; clear, smooth boundary to: |
| $B_{2t}G$ | 15–28 | Loam to clay loam; light yellowish-brown (2·5 Y 6/4); massive structure; somewhat firm; many, coarse, prominent brownish-yellow (10 YR 6/8) mottles; few roots; clear, smooth boundary to: |
| CG | Below 28 | Loam to sandy loam; grey (5 Y 6/1); massive; firm *in-situ*, friable *ex-situ;* many, coarse yellowish-brown (10 YR 5/4) mottles; no roots |

**Forth Commons Association**

The soils of this association are situated on an easy rolling landscape on Cambrian quartzite formations about three miles west of Wexford town. This formation is known as the Forth Mountain, but the highest peaks are only 779 and 687 feet O.D. respectively. The soils are derived mainly from the underlying Cambrian quartzite with a slight admixture of local drift material of predominantly Cambrian shale-quartzite composition and of Saale Age. They occupy 0.73 per cent (4,240 acres) of the county. Only one soil series, the Forth Commons, has been segregated within the association.

*Forth Commons Series:* The coarse texture and acidic nature of the parent material have contributed to the very leached nature of the soils of this series. These are coarse to medium textured soils of very low base status and have been classified as Podzols. The profile in the virgin state is characterised by a thin surface layer of raw, poorly decomposed plant remains and by a thin cemented iron-pan separated from the surface horizon by a well-defined, strongly leached $A_2$ horizon. The soils in general are shallow, the depth being about twenty-four inches, and the soil cover is frequently interrupted by outcrops and boulders of quartzite. The entire profile is stony and this feature modifies the texture considerably. Rooting depth is limited due to the impermeable nature of the iron pan and, in many cases, there is evidence of impeded drainage above the pan, while below it the profile is free draining.

*Generalised profile description*

| | |
|---|---|
| Slope: | 4° |
| Aspect: | South-east |
| Altitude: | 500 feet O.D. |
| Vegetation: | Heath vegetation—*Catluna, Erica* with *Molinia* and *Ulex* |
| Drainage Class: | Well-drained below the iron pan—somewhat impeded above |
| Parent Material: | Cambrian quartzite with some small pockets of drift material of local origin |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_0$ | 1 ½–0 | Partly decomposed and matted plant remains; dark greyish-brown (10 YR 4/2); abrupt, smooth boundary to: |

| | | |
|---|---|---|
| $A_{2g}$ | 0–5 | Loam to sandy loam; light-grey (10 YR 7/1); single grained structure; very friable; bleached and corroded sand grains; abundant, diffuse roots concentrated in many places along structural cracks. In places common, distinct, medium and coarse olive-yellow (2·5 Y 6/6) mottles; tongues of this horizon extend to a depth of 18 inches; abrupt, irregular boundary to: |
| $B_2(_{ir})$ | (iron-pan) | Thin, hard, iron-pan, on top of which roots are concentrated horizontally |
| $B_{22}$ | 6–26 | Loam to clay loam; strong-brown (7·5 YR 5/6); moderate, fine and medium granular structure; friable; plentiful, diffuse roots where the horizon is thick but where thin, very few roots; clear, irregular boundary to: |
| $C_1$ | 26–37 | Weathered quartzite; light brownish-grey (2·5 Y 6/2); horizontal humus and iron bands present; gradual boundary to: |
| $C_2$ | Below 37 | Disintegrating quartzite; light brownish-grey (2·5 Y 6/2) |

Plate 11—*Typical soil profile of the Forth Commons Series*

**Hook Head Association**

The soils of this association occupy some 0.21 per cent (1,200 acres) of the county. They occur on the southern extremity of the Hook Head Peninsula, and are derived from predominantly Carboniferous limestone drift material of Saale Age. The drift material is relatively shallow and the area is characterised, for the most part, by flattish topography. Only one series, namely, the Hook Head has been recognised within the association.

*Hook Head Series:* The soils of this series are well-drained, of loam texture and of high base status and have been classified as Grey-Brown Podzolics. The profile is characterised by a well developed, strong structure, and by an horizon of distinct clay accumulation at a depth of 20 to 26 inches. The greyish-brown to brown colour is relatively uniform down the profile except in the horizon of clay accumulation, which is reddish-brown. Because of the nature of the parent material, these soils are only slightly leached and are base saturated throughout the profile.

Plate 12—*Carboniferous limestone formations that underlie the soils of Hook Head Series*

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 50 feet O.D. |
| Vegetation: | Pasture |
| Drainage Class: | Well-drained |
| Parent Material: | Glacial drift of predominantly Carboniferous limestone composition, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–7 | Loam; dark greyish-brown (10 YR 4/2); strong, medium crumb structure; friable; peds firm; porous; abundant, diffuse roots; gradual, smooth boundary to: |

| | | |
|---|---|---|
| A/B | 7–20 | Loam; dark-brown (10 YR 4/3); strong, medium sub-angular blocky structure; friable; abundant, diffuse roots; clear, smooth boundary to: |
| $B_{2t}$ | 20–26 | Clay; reddish-brown (5 YR 4/3); very strong, medium sub-angular blocky structure; slightly firm, but somewhat sticky when wet; clay skins evident; abundant, diffuse roots; clear, smooth boundaryto: |
| B/C | 26–36 | Silt loam; dark-brown (7·5 YR 4/4); moderate, fine granular structure; friable; few roots |

**Killinick Association**

The soils of this association occupy 1.67 per cent (9,680 acres) of the county. They occur in the Killinick-Ballycogley area which lies between 50 and 150 feet O.D. and has a gently undulating topography. The soils of this association are derived from mixed end-morainic gravels and sands of Saale Age. The geological composition of these materials is not known fully but they become calcareous below the soil profile. Only one series, namely, Killinick occurs within the association.

*Killinick Series:* The soils of this series are well-drained, of sandy loam texture and of medium to high base status and have been classified as Brown Earths. They are characterised by a relatively uniform profile with no significant horizon development. The surface horizon is dark-brown in colour and has a moderate, medium crumb structure; it overlies horizons which are dark-brown, strong-brown and brown respectively, and which have a moderate, medium granular structure. Root development is good. Small and medium sized rounded stones are common in the profile which becomes progressively more gravelly with depth.

*Generalised profile description*

| | |
|---|---|
| Slope: | 1° |
| Aspect: | West |
| Altitude: | 100 feet O.D. |
| Vegetation: | Old pasture |
| Drainage Class: | Well-drained |
| Parent Material: | Morainic gravels and sands of mixed geological composition and of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–6 | Sandy loam; dark-brown (7·5 YR 4/2); moderate to strong, medium crumb structure; friable; abundant, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 6–11 | Similar to above horizons; roots less abundant; gradual, smooth boundary to: |
| $A_{13}$ | 11–16 | Sandy loam; dark-brown (7·5 YR 4/2) grading to strong-brown (7·5 YR 5/6); moderate, medium crumb structure; friable to very friable; plentiful, diffuse roots; clear, smooth boundary to: |
| A/C | 16–21 | Sandy loam; brown (10 YR 5/3); weak, medium granular structure; firm *in-situ* but friable *ex-situ;* somewhat indurated in places; few roots; abrupt, wavy boundary to : |
| C | Below 21 | Loamy fine gravel; dark-brown; loose; no roots |

**Kiltealy Association**

The soils of this association are widely distributed throughout the north-western part of the county and occupy 3.59 per cent (20,760 acres) of the county. They are derived from granite and granitic drift material of Saale Age. The area varies considerably in topographic features. Elevations range from approximately 300 to 2,610 feet O.D. and topography varies from easy rolling to moderately steep. Consequently hydrologic and climatic conditions vary considerably throughout the area and, as a result, soils of very different genesis and profile character are found. Three series have been mapped within the association: Kiltealy, Ballywilliam and Blackstairs.

*Kiltealy Series:* The soils of this series are derived from granitic drift material and occur in the areas of lower elevation with easy rolling topography. They occupy 1.51 per cent (8,740 acres) of the county. They are well-drained soils of coarse sandy loam to loamy sand texture and of low base status and have been classified as Brown-Podzolics. The profile is characterised by a dark greyish-brown surface horizon and by a reddish-yellow sub-surface horizon in which leached iron and aluminium oxides have accumulated. There is a strong crumb structure in the surface horizons and root development is very good.

| | |
|---|---|
| Slope: | 2° |
| Aspect: | North-West |
| Altitude: | 500 feet O.D. |
| Vegetation: | Pasture |
| Drainage Class: | Well-drained |
| Parent Material: | Granitic drift of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–8 | Coarse sandy loam to loamy sand; very dark greyish-brown (10 YR 3/2); strong, medium crumb structure; very friable; abundant, diffuse roots; sand grains very bleached; very porous; gradual, smooth boundary to: |
| $A_{12}$ | 8–18 | Loamy coarse sand to sandy loam; dark-brown (10 YR 3/3); strong, fine to medium crumb structure; very friable; porous; abundant, diffuse roots; abrupt, smooth boundary to: |
| $B_2(_{ir})$ | 18–26 | Loamy coarse sand with finer material in parts; reddish-yellow (7·5 YR 6/8); moderate, fine crumb structure; plentiful, diffuse roots; gradual, smooth boundary to: |
| B/C | Below 26 | Loamy coarse sand; light yellowish-brown (10 YR 6/4); single grained structure; loose; root development very good |

*Ballywilliam Series:* This series consists of poorly-drained soils largely restricted to depressions and less favourably sloping ground. It occupies 0.51 per cent (2,940 acres) of the county. The poor drainage condition is due mainly to the presence of a high water-table but in some areas, springs and water seepage are contributory factors. These soils of organic loam texture and of low base status have been classified as low-humic, podzolized Gleys. The profile is characterised by a very dark-brown, organic surface layer overlying layers which, for the most part, are grey and mottled.

The profile also displays some podzol features, a leached layer occurring immediately below the surface layer; an horizon of accumulation, principally of iron and aluminium oxides occurs immediately below the leached layer. Soil structure is weak and root development poor, due to water saturation for the greater part of the year. The common vegetation in the unimproved state is rush (*Juncus*) infested pasture.

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 300 feet O.D. |
| Vegetation: | Old pasture—rush (*Juncus*) infested |
| Drainage Class: | Poorly-drained |
| Parent Material: | Glacial drift of predominantly granite composition, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_1$ | 0–10 | Organic loam; very dark-brown (10 YR 2/2); very weak medium crumb structure, held in sod by roots; friable; dark reddish-brown (5 YR 3/4) staining on root channels ; sand grains very bleached; abundant roots; abrupt, smooth boundary to: |
| $A_{2g}$ | 10–14 | Sandy loam to loam; light brownish-grey (10 YR 6/2); very weak, medium granular structure; very friable; many, medium yellowish-red (5 YR 5/8) mottles; few roots; gradual, smooth boundary to: |
| $B_{2g}$ | 14–17 | Coarse sandy loam; dark greyish-brown (10 YR 4/2); very weak, medium granular structure; very friable; dark reddish-brown (5 YR 3/4) staining along root channels; few roots; abrupt, smooth boundary to: |
| B/CG | 17–23 | Coarse sandy loam; light olive-grey (5 Y 6/2); single grain structure; many, coarse, diffuse yellowish-brown (10 YR 5/6) mottles ; no roots; gradual, smooth boundary to: |
| CG | 23–36 | Coarse sandy loam; grey (5 Y 6/1); single grain structure; somewhat firm; many, coarse strong-brown (7·5 YR 5/8) mottles; no roots |

*Blackstairs Series:* The soils of this series occupy 1.57 per cent (9,080 acres) of the county and occur on moderately steep slopes at the higher elevations. Because of high elevation the area was unaffected by glacial drift and the soils are, therefore, derived from the underlying granite formation. In general these soils are shallow, the depth being approximately twenty-four inches. They are of peaty, loamy coarse sand texture and of very low base status and have been classified as Podzols. Due to the high elevation, increased rainfall and lower temperatures have been responsible for the strongly leached nature of these soils and for the accumulation of raw humus on the surface. The profile is characterised by a surface peaty layer and a thin cemented iron-pan down the profile. The iron-pan is responsible for restriction of root development and water penetration; below the pan the soil is free draining. The peaty surface layer varies in thickness, depending largely on the degree of slope. Outcropping rock and boulders are common. Vegetation is dominated by heath (*Calluna*, and *Erica* spp.).

*Generalised profile description*

| | |
|---|---|
| Slope: | 3° |
| Aspect: | South |
| Altitude: | 1,200 feet O.D. |
| Vegetation: | Heath vegetation (*Calluna*, *Erica*) |
| Drainage Class: | Well-drained below the iron pan, impeded above the pan. |
| Parent Material: | Granite |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_0$ | 16–0 | Slightly peaty, loamy coarse sand; black (10 YR 2/1); weak, medium crumb structure; friable; clear, wavy boundary to: |
| $A_1/A_{21}$ | 0–15 | Loamy coarse sand; dark greyish-brown (10 YR 4/2); weak, fine crumb structure; very friable; abundant, diffuse roots; clear, smooth boundary to: |
| $A_{22}$ | 15–19/27 | Loamy coarse sand; yellowish-brown (10 YR 5/4); single grain structure; firm *in-situ*, friable *ex-situ;* few roots; abrupt, very wavy boundary to: |
| $B_2(_{ir})$ | (iron pan) | Thin, very indurated iron-pan |
| $B_{22}$ | 19/27–39 | Loamy coarse sand; yellowish-red (5 YR 5/8) and strong-brown (7·5 YR 5/6); single grain structure; firm *in-situ*, friable *ex-situ;* few roots, except on some vertical cracks; clear, smooth boundary to: |
| C | Below 39 | Loamy coarse sand; brownish-yellow (10 YR 6/6); single grain structure; firm *in-situ*, loose *ex-situ;* no roots |

**Macamore Association**

The soils of this association extend in a 4–5 mile wide strip along the east coast of the county from the north-eastern extremity to Kilmuckridge and again from Curracloe to a line south of Rosslare, close to Greenore Point. Between Kilmuckridge and Curracloe they are overlain by deep deposits of end-morainic material of the last glaciation. The soils of the Screen Association (later described) are derived from the latter material.

The Macamore soils occupy 9.01 per cent (52,050 acres) of the county. The parent material consists of dense, calcareous, marine muds and oozes which were removed from the bed of the Irish Sea and deposited inland by ice of Saale Age. The area is relatively low-lying, ranging from 100 to 250 feet O.D. The topography is flat or gently undulating. Only one series, namely, Macamore has been segregated within the association.

*Macamore Series:* The soils of this series which are of sandy loam to sandy clay loam texture and of medium base status have been classified as low-humic podzolic Gleys. The profile is characterised by a dark greyish-brown surface horizon of sandy loam to sandy clay loam texture with deeper horizons of ‘heavier’ texture which are generally grey and strongly mottled. The weak structure throughout the profile, and the ‘heavy’ texture of the sub-soil are mainly responsible for the poor drainage of these soils. Because of this, they are considered as surface-water Gleys. Poor drainage is evident even on favourable slopes which usually, in the unimproved state, carry rush (*Juncus*) dominated pastures. One of the more outstanding features of the profile is the presence of a uniformly brown (more oxidized) horizon at a depth of thirty-six inches. This phenomenon of strongly gleyed horizons above less gleyed horizons is mainly due to a 'perched' water-table.

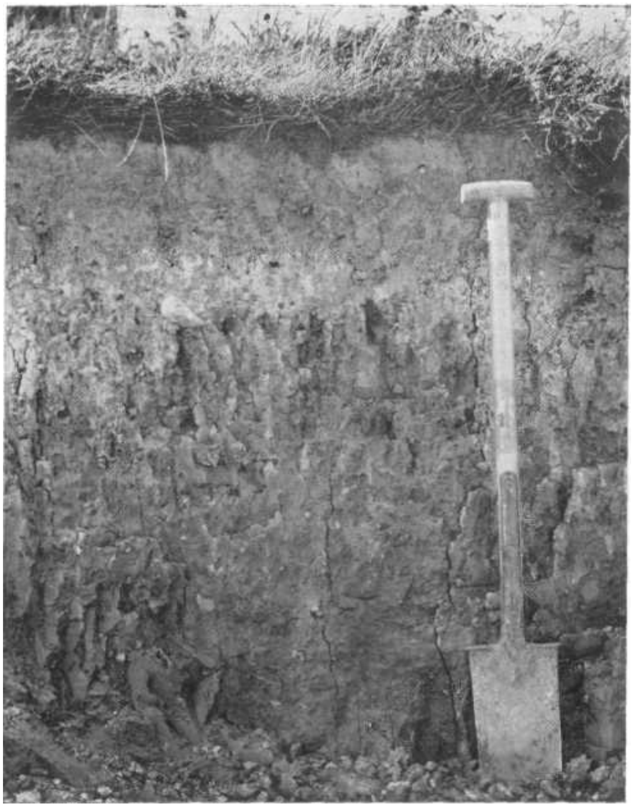

Plate 13—*Soil profile representative of Macamore Series showing the poorly permeable nature of the soil*

*Generalised profile description*

| | |
|---|---|
| Slope: | 2° |
| Aspect: | East |
| Altitude: | 200 feet O.D. |
| Vegetation: | Old pasture—rush (*Juncus*) dominant |
| Drainage Class: | Poorly-drained |
| Parent Material: | Dense, calcareous glacial drift of Irish Sea origin, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{1g}$ | 0–8 | Sandy loam to sa m; dark greyish-brown (10 YR 4/2); weak, medium crumb structure; friable; many, coarse, prominent, yellowish-brown (10 YR 5/4) mottles especially along root channels; abundant, diffuse roots; gradual, smooth boundary to: |

| | | |
|---|---|---|
| $(A_2)_g$* | 8–15 | Sandy clay loam to sandy loam; dark-grey (10? 4/1); weak, fine to medium crumb struct? friable; roots not so abundant as above; ma? coarse, prominent dark yellowish-brown (10 Y? 4/4) mottles; abrupt, smooth boundary to: |
| $B_{21}G$ | 15–36 | Clay; olive-grey (5 Y 5/2); weak, coarse, prismatic structure ; firm ; few roots ; clay skins evident ; many, coarse, prominent, strong-brown (7·5 YR 5/6) mottles; clear, smooth boundary to: |
| CG | Below 36 | Clay; pale-brown (10 YR 6/3); massive structure; firm; many, medium, prominent yellowish-brown (10 YR 5/6) mottles; no roots |

**Old Ross Association**

The soils of this association occupy 1.19 per cent (6,880 acres) of the county; they occur in the vicinity of Old Ross, *i.e.* just south of the area occupied by the soils of the Kiltealy Association. The area is one of gently undulating topography with elevations of 250 to 300 feet O.D. Although underlain by Ordovician shale formations the drift material has been influenced by granite brought into the area by the western component of the Saale Glaciation. The drift is, therefore, an admixture of Ordovician shale (approx. 60 per cent) and granite. Two series have been segregated within the association, Old Ross and Knockroe.

*Old Ross Series:* The soils of this series are well-drained, of coarse sandy loam texture and of low base status and have been classified as Brown Earths. They occupy 1.12 per cent (6,460 acres) of the county. The profile is characterised by rather uniform brownish colours and textures, with no distinct horizon differences. It has a moderately strong crumb structure and root development is good. These soils may be considered as intermediate in some respects between those of the Clonroche and those of the Kiltealy Series since they are derived from an admixture of the dominant components of the parent materials of these two soils. Consequently, they are more coarse-textured than the Clonroche soils and more fine-textured than the Kiltealy soils. Also, many of the inherited chemical characteristics of the Old Ross Series are intermediate between those of the Clonroche and Kiltealy Series (Appendices I and II).

*Generalised profile description*

| | |
|---|---|
| Slope: | 2° |
| Aspect: | West |
| Altitude: | 400 feet O.D. |
| Vegetation: | Old pasture |
| Drainage Class: | Well-drained |
| Parent Material: | Glacial drift of mixed Ordovician shale—granite composition, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–7 | Coarse sandy loam; dark-brown (10 YR 3/3); strong, fine to medium crumb structure; very friable; abundant, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 7–21 | Coarse sandy loam; dark yellowish-brown (10 YR 4/4); strong, fine crumb structure; very friable; plentiful, diffuse roots; abrupt, smooth boundary to: |

* $(A_2)$ denotes a modified $A_2$ horizon

| | | |
|---|---|---|
| A/C | Below 21 | Coarse sandy loam; pale-brown (10 YR 6/3); single grain structure; somewhat firm in-situ, friable ex-situ; few roots |

*Knockroe Series*: The soils of the Knockroe Series are poorly-drained, of loam to sandy loam texture and of low to medium base status and throughout the association occupy the depressions and the less favourable slopes. These soils occupy 0.07 per cent (420 acres) of the county. The poorly-drained nature of these soils is due mainly to the presence of a high water-table. They have been classified as low-humic podzolized Gleys. The profile is characterised by a somewhat organic surface horizon with weak structure and with ochreous staining along root channels. This overlies horizons, which, in general, exhibit a grey and mottled appearance. There is also evidence of podzolisation; an horizon at the 12-15 inch depth, which is obviously leached, overlies an horizon of accumulation of sesquioxides between 15 and 21 inches. This merges with a pale-olive, gleyed and mottled zone. The vegetation consists of rush (*Juncus*) dominated pasture.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 200 feet O.D. |
| Vegetation: | Old pasture with rush (*Juneus*) |
| Drainage Class: | Poorly-drained |
| Parent Material: | Glacial drift of mixed Ordovician shale—granite composition, of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11g}$ | 0–6 | Loam to sandy loam; dark-grey (10 YR 4/1); weak, fine and medium crumb structure, held in sod by roots; sand grains bleached; ochreous mottling along root channels; abundant, diffuse roots; gradual, smooth boundary to: |
| $A_{12g}$ | 6–12 | Sandy loam to loam; dark-grey (5 Y 4/1); weak, fine and medium crumb structure; friable; plentiful diffuse roots; dark-brown (7·5 YR 4/4) mottling along root channels; clear, smooth boundary to: |
| $A_{2g}$ | 12–15 | Sandy loam; light-grey (5 Y 7/1–8/1); weak, fine granular structure; friable; very few roots; many, medium, strong-brown (7·5YR 5/6) mottles along root channels; clear, smooth boundary to: |
| $B_2G$ | 15-21 | Sandy loam; light brownish-grey (2·5 Y 6/2); very weak, medium granular structure; firm *in-situ*, friable *ex-situ*; no roots; gradual, smooth boundary to: |
| CG | 21–35 | Loamy sand; pale-olive (5 YR 6/3); coarse, dark yellowish-brown (10 YR 3/4) nodules of iron present around shaly fragments; single grain structure; firm *in-situ*, friable *ex-situ*; no roots |

**Rathangan Association**

The soils of this association are widely represented and occupy 9.09 per cent (52,620 acres) of the county. They occur mostly in the Rathangan-Bridgetown area but also in the vicinity of Oilgate, Glynn and Tomcoole. The area in general has an elevation of 200 feet O.D. and is typified by flat to gently rolling topography.

These soils are derived from mixed glacial drift material deposited when the ? and Irish Sea components of the Saale glaciation coalesced in this region. The ? composed of predominantly Cambrian shale and quartzite but the Irish Sea ? ponent is responsible for an admixture of calcareous muds and flints. Only ? series, Rathangan, occurs within the association.

*Rathangan Series:* These poorly-drained soils of loam texture and of low to medium base status have been classified as low-humic podzolic Gleys. The profile is characterised by a relatively high silt content, weak structure, and the somewhat indurated nature of the sub-surface horizons. A clay increase is evident in the B horizon. Poor drainage prevails even on favourable slopes. The surface horizon consist of a greyish-brown loam, with ochreous staining along root chhnels. The sub-surface horizons

Plate 14—*Soil profile representative of Rathangan Series*

have a more grey and mottled appearance. At a depth of twenty-eight inches, below the grey and mottled horizons, a brown (more oxidized but still 'gleyed') horizon occurs. This phenomenon, which also exists in the soils of the Macamore Series, is due mainly to a 'perched' water-table. For this reason these soils may be referred to as surface-water Gleys. In general, the profile is somewhat stony. Because of the poor drainage, root penetration is poor. The most common vegetation, in the unimproved state, consists of rush (*Juncus*) dominated pasture.

*Generalised profile description*

| | |
|---|---|
| Slope: | 3° |
| Aspect: | South |
| Altitude: | 200 feet O.D. |
| Vegetation: | Old pasture, mostly rush (*Juncus*) dominant |
| Drainage Class: | Poorly-drained |
| Parent Material: | Dense glacial drift of predominantly Cambrian shale and quartzite composition, intermixed with drift of Irish Sea origin, all of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11g}$ | 0–6 | Loam; greyish-brown (10 YR 5/2); very weak, medium crumb structure; friable; abundant, diffuse roots; dark-red (2·5 YR 3/6) staining on root channels; gradual, smooth boundary to: |
| $A_{12g}$ | 6–11 | Loam; light brownish-grey (10 YR 6/2); very weak, fine to medium crumb structure; friable; plentiful diffuse roots; many, small, distinct dark-red (2·5 YR 3/6) mottles; gradual, smooth boundary to: |
| $B_{21g}$ | 11–18 | Loam; pale-brown (10 YR 6/3); massive, inclined to weak, medium blocky structure; rather firm and cemented; few roots; many, medium, yellowish-brown (10 YR 5/4) mottles; gradual, smooth boundary to: |
| $B_{2t}G$ | 18–28 | Loam to clay loam; grey (5 Y 6/1); massive structure; firm and cemented; few roots; grey colour in root channels; many, coarse strong-brown (7·5 YR 5/6) mottles; diffuse boundary to: |
| CG | 28–40 | Similar to last depth above but with evidence of greater oxidation |

**Screen Association**

The soils of this association occupy 6.23 per cent (36,120 acres) of the county. They stretch from Kilmuckridge to Curracloe on the east coast and inland for a distance of some six to seven miles as far as Ballylucas, Ballykelly and Ballaghkeen. They also occur in small isolated areas in the vicinity of Ballynamuddagh, Scurlocksbush, Polldarrig, Martingale and Garryphelim.

The outstanding feature of these soils is their sandy texture. They are derived from coarse textured, end-morainic deposits of the last (Weichsel) glaciation. The area has all the distinctive characteristics of a young morainic landscape, displaying a definite 'Kame and Kettle' pattern. Elevation varies from 200 to 350 feet O.D., and the topography is moderately to steeply rolling. On moving inland the area becomes less rolling, and at the western extremities of the association the topography is more easy rolling. Textural, topographic and associated vegetational and hydrologic changes are mainly responsible for soil differences within the association. In all, three series have been segregated: Screen, Ballyknockan and Randallsmill.

*Screen Series:* The soils of this series are excessively-drained, of coarse sand texture and of low base status and have been classified as Brown Podzolics. They occupy 4.71 per cent (27,300 acres) of the county. Because of their coarse texture, considerable leaching has taken place in these soils resulting in advanced base depletion. The profile is characterised by very dark greyish-brown upper horizons overlying a yellowish-red horizon in which leached constituents have accumulated. The latter merges with the yellowish-brown, coarse sandy parent material. The entire profile is very friable. It has a weak, fine crumb structure in the surface horizon which gives way, deeper down, to a loose, single grained structure. Because of their coarse texture the moisture holding capacity of these soils is very low. Pastures, if neglected, become bracken (*Pteridium*) and sorrel (*Rumex acetosa*) dominated.

*Generalised profile description*

| | |
|---|---|
| Slope: | 4° |
| Aspect: | West |
| Altitude: | 200 feet O.D. |
| Vegetation: | Old pasture, mostly *Agrostis* spp. with bracken and sorrel |
| Drainage Class: | Excessively-drained |
| Parent Material: | Coarse-textured, end-morainic material of the Weichsel glaciation |

| Horizon | Depth (in) | Description |
|---|---|---|
| $A_{11}$ | 0–8 | Coarse sand; very dark greyish-brown (10 YR 3/2); very weak, fine to medium, crumb structure; very abundant, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 8–16 | Coarse sand; very dark greyish-brown (10 YR 3/2); weak, fine to medium crumb structure; very friable; less abundant roots; clear, smooth boundary to: |
| $B_2(_{ir})$ | 16–23 | Coarse sand; yellowish-red (5 YR4/6); single grain structure; loose; few roots; clear, wavy boundary to: |
| B/C | Below 23 | Coarse sand; yellowish-brown (10 YR 5/4); single grain structure; loose; few roots; deeper in the C horizon, narrow horizontal clay bands occur at varying depths |

*Ballyknockan Series:* These poorly-drained soils, are restricted to the depressional areas within the association. They occupy 0.29 per cent (1,700 acres) of the county. Their poor drainage is due to the presence of a high water-table. These soils of organic, loamy coarse sand texture and of low base status have been classified as low-humic Gleys. The profile is characterised by a very dark greyish-brown surface horizon with weak structure overlying a light brownish-grey and mottled, coarse sandy material at the fifteen inch depth. Under poor management practices pastures on these soils easily become rush (*Juncus*) dominated.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 100 feet O.D. |
| Vegetation: | Old pasture, mostly rush (*Juncus*) dominant |
| Drainage Class: | Poorly-drained |
| Parent Material: | Coarse textured, end-morainic material of the Weichsel Glaciation |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11g}$ | 0–7 | Organic, loamy coarse sand; very dark greyish-brown (10 YR 3/2); very weak, coarse crumb structure, held in sod by abundant roots; friable; gradual, smooth boundary to: |
| $A_{12g}$ | 7–15 | Loamy coarse sand; very dark greyish-brown (10 YR 3/2); very weak, medium crumb structure; friable; abundant roots; abrupt, smooth boundary to: |
| A/CG | 15–36 | Coarse sand to loamy coarse sand; light brownish-grey (2·5 Y 6/2); single grain structure; friable; no roots |

*Randallsmill Series:* The soils of this series are well-drained, of loamy coarse sand texture and of low base status and have been classified as Brown Earths. They occupy 1.23 per cent (7,120 acres) of the county. They occur mostly towards the western extremity of the end-morainic deposits of the Weichsel glaciation from which the soils of the entire Screen Association have developed. Here, the topography is less undulating than that of the Screen area and the parent material is somewhat finer in texture. The profile is characterised by generally uniform brown colours and a rather sandy texture. The entire profile is very friable and rooting depth is good.

*Generalised profile description*

| | |
|---|---|
| Slope: | 2° |
| Aspect: | West |
| Altitude: | 150 feet O.D. |
| Vegetation: | Cultivated |
| Drainage Class: | Well-drained |
| Parent Material: | Coarse textured, end-morainic materials of the Weichsel Glaciation |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{1p}$ | 0–9 | Loamy coarse sand; dark-brown (10 YR 3/3); weak, medium crumb structure; very friable; sand grains bleached; plentiful, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 9–19 | Coarse sandy loam; dark yellowish-brown (10 YR 3/4); moderate, medium crumb structure; very friable; sand grains bleached; plentiful, diffuse roots; abrupt, smooth boundary to: |
| $A_{13}$ | 19–23 | Coarse sand; reddish-brown (5 YR 4/4); single grain structure; very friable; some roots; evidence of good earthworm activity; clear, smooth boundary to: |

| | | |
|---|---|---|
| A/C | 23-30 | Coarse sand; brown (7·5 YR 4/4) to strong brown (7.5 YR 5/6); single grain structure; loose; few roots |

Plate 15—*Soils of the Screen Association are coarse textured and friable*

**Alluvial Soils**

These soils are derived from the various alluvial deposits mentioned in Chapter I. Alluvium is divided broadly into two major types, fresh water and marine, and both are represented in the county. The fresh water type is sub-divided into River and Lake alluvium. The material laid down by rivers is usually found in the vicinity of existing stream and river courses, whilst lacustrine accumulations occur in hollows, originally the sites of post-glacial lakes.

River alluvium is widely distributed throughout the county and occurs to some extent along the basins of almost all rivers and streams. In many instances, where these alluvial deposits are not extensive enough to allow for their segregation on the mapping scale used, they have been mapped generally with the poorly-drained series of the particular association through which the river passes. Where these alluvial deposits are sufficiently expansive, soil associations have been mapped.

Generally, the river alluvium and lake alluvium are related in composition to the geological formations in their vicinity. In some instances, however, the composition of the river alluvium is heterogenous due to the complex geological formations through which the river passes. Most of these alluvial soils show little or no profile development. They can, however, be differentiated mainly on the basis of their texture, drainage and base status.

For the purposes of classification the alluvial soils have been segregated on the basis of the origin of the parent material into Lake, River and Estuarine Alluvial Soils.

## Lake Alluvial Soils

The soils of lake alluvial origin that have been mapped occupy 1.18 per cent (6,890 acres) of the county. They are situated in depressional areas which have a characteristically flat topography. Two main areas of lake alluvial soils occur, one in the vicinity of Ballinaboola, called the Millquarter Association, and the other stretching from Ballaghkeen to Coolnaboy, called the Coolaknick Association. Soils belonging to the latter Association have been mapped also within the general Macamore Association area.

**Millquarter Association**

The soils of this association occur in a depressional area, not far from the granitic area of north-west Wexford and, as a result, there is a considerable granitic influence in the lake alluvium, which constitutes their parent material. These soils occupy 0.22 per cent (1,280 acres) of the county. Only one series, Millquarter, has been segregated within the association.

*Millquarter Series:* These soils of slightly peaty, silty clay loam texture and of low base status have been classified as low-humic Gleys. The profile is characterised by a thin, dark grey, organic surface horizon with weak structure overlying horizons which, for the most part, are light brownish-grey and strongly mottled, with weak to massive structure.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 150 feet O.D. |
| Vegetation: | Rush (*Juncus*) dominated pasture |
| Drainage Class: | Poorly-drained |
| Parent Material: | Lake Alluvium (base-poor) |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11g}$ | 0-4 | Slightly peaty, silty clay loam; dark-grey (10 YR 4/1); weak, medium crumb structure, held in sod by roots; friable; many, medium dark reddish-brown (5 YR 3/4) mottles, especially along root channels; plentiful roots; gradual, smooth boundary to: |
| $A_{12g}$ | 4-8 | Silty clay loam; grey (10 YR 5/1); weak, medium crumb structure, somewhat firm; plentiful roots; gradual, smooth boundary to: |
| $A/C_g$ | 8-18 | Silty clay loam; light brownish-grey (2·5 Y 6/2); very weak, fine and medium sub-angular blocky structure; friable, sticky when wet; few roots except on large vertical cracks; many, coarse, prominent dark reddish-brown (5 YR 3/4) mottles; gradual, smooth boundary to: |
| $C_{1g}$ | 18-23 | Loam; greyish-brown (2·5 Y 5/2); very weak, medium granular structure; friable; few roots; few, medium reddish-brown (5 YR 5/4) mottles; abrupt smooth boundary to: |
| $C_{2g}$ | Below 23 | Very coarse, loose sand |

**Coolaknick Association**

The soils of this association occupy 0.96 per cent (5,610 acres) of the county. They occur in a depressional area, which, for the most part, is surrounded by soils of the Clonroche and Screen Associations. It appears, therefore, that the alluvial parent material has been influenced to some extent by the parent materials of these two associations, *i.e*. Ordovician shale and fine-textured outwash from the end-moraine of the last glaciation. Two series occur within the association, Coolaknick and Oulartleigh. The very fine end-morainic material appears to have influenced the Coolaknick more than the Oulartleigh soils. This may be due to the fact that the latter occur only in the centre of the depressional area and somewhat removed from the surrounding influence of the end-morainic deposits.

*Coolaknick Series*: These poorly-drained soils of slightly peaty, clay loam texture and of medium to high base status have been classified as low-humic Gleys. They occupy 0.70 per cent (4,040 acres) of the county. The profile is characterised by a dark greyish-brown, organic surface horizon, with very weak crumb structure, and by deeper horizons which are mostly grey, strongly mottled and have weak, coarse prismatic structure. Texture varies throughout the profile and becomes generally ‘heavier’ with depth. Root development is poor.

*Generalised profile description*

| | | |
|---|---|---|
| Slope: | | Flat |
| Aspect: | | Nil |
| Altitude: | | 150 feet O.D. |
| Vegetation: | | Rush (*Juncus*) dominated pasture |
| Drainage Class: | | Poorly-drained |
| Parent Material | | Lake alluvium (base-rich) |
| *Horizon* | *Depth* (*in*) | *Description* |
| $A_{11}$ | 0-3 | Slightly peaty clay loam; dark greyish-brown (10 YR 4/2); very weak, fine crumb structure, held in sod by roots; friable; clear, smooth boundary to: |
| $A_{12g}$ | 3-6 | Sandy clay loam to sandy clay; dark greyish-brown (10 YR 4/2); very weak, medium crumb structure, held in sod by roots; friable; rusty staining along root channels; clear, smooth boundary to: |
| $A_{13g}$ | 6-15 | Sandy loam to loam; grey (5 YR 6/1); very weak, coarse, prismatic structure; firm; occasional roots; many, medium, prominent yellowish-brown (10 YR 5/6) mottles; gradual, smooth boundary to: |
| A/CG | 15-27 | Silty clay; grey (5 Y 5/1); weak, coarse, prismatic structure; firm; many, coarse, prominent, dark-brown (10 YR 4/3) mottles; few roots; gradual, smooth boundary to: |
| CG | 27-40 | Silty clay loam; yellowish-brown (10 YR 5/4); grey (5 Y 5/1) along weak structural faces; very weak, coarse prismatic to massive structure; no roots |

*Oulartleigh Series*: The soils of this series are situated in the most low-lying situations within the association and for this reason they are water-logged for long periods of the year. They occupy 0.26 per cent (1,570 acres) of the county. These soils of low to medium base status have been classified as humic Gleys. The profile is characterised by a peaty surface horizon to a depth of 1 to 1½ feet which overlies 5–6 inches of a dark-red and olive loam, and this gives way to a grey, fine gravelly, coarse sandy loam. The water-table is very high and on the date of sampling (June 9) it stood at sixteen inches from the surface.

*Generalised profile description*

| | | |
|---|---|---|
| Slope: | | Flat |
| Aspect: | | Nil |
| Altitude: | | 125 feet O.D. |
| Vegetation: | | Rush (*Juncus*) dominated pasture |
| Drainage Class: | | Very poorly-drained |
| Parent Material: | | Lake alluvium (base-rich) |
| *Horizon* | *Depth* (*in*) | *Description* |
| $A_0$ | 11-0 | Sedimentary peat; abrupt, smooth boundary to: |
| $A_{11}G$ | 0-5 | Loam; dark-red (2·5 YR 3/6) and olive (5 Y 5/3); massive structure; wet, sticky; few roots; clear, smooth boundary to: |
| $A_{12}G$ | Below 5 | Fine gravelly, coarse sandy loam; grey (5 Y 6/1); single grain structure; wet, loose; no roots |

## River Alluvial Soils

As already mentioned, river alluvium occurs along the basins of almost all the rivers and streams of the county, but in many cases these alluvial deposits have not been segregated but have been mapped with the poorly-drained series of the association through which the river passes. Along the courses of the rivers Slaney and Barrow, however, areas of alluvium are sufficiently extensive to warrant mapping and classifying the soils. Two associations have been mapped and these have been named Clohamon and Kilmannock, respectively.

### Clohamon Association

The soils of this association are found along the basin of the river Slaney and extend from Bunclody to Enniscorthy. They occupy 0.39 per cent (2,240 acres) of the county. They are derived mainly from river alluvium but there is an influence in the parent material of outwash terrace gravels of mixed Carboniferous limestone—granite composition. Only one series, Clohamon, has been segregated within the association.

*Clohamon Series:* These well-drained soils of sandy loam to loam texture and of medium base status have been classified as Brown Podzolics. The soil profile is characterised by dark-brown surface horizons, overlying a dark reddish-brown B horizon, in which iron and aluminium oxides and some humus have accumulated.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | — |
| Vegetation: | Pasture |
| Drainage Class: | Well-drained |
| Parent Material: | River alluvium and terrace gravels |

| Horizon | Depth (in) | Description |
|---|---|---|
| $A_{11}$ | 0-6 | Sandy loam to loam; dark-brown (10 YR 3/3); moderate to strong, medium crumb structure; friable; plentiful, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 6-12 | Loam; dark-brown (10 YR 4/3); moderate to strong, fine crumb structure; very friable; plentiful, diffuse roots; gradual, smooth boundary to: |
| $A_{13}$ | 12-19 | Similar to above horizon; roots less plentiful; clear, smooth boundary to: |
| $B_2(_{ir})$ | 19-26 | Silt loam to loam; dark reddish-brown (5 YR 3/4); moderate to strong, fine crumb structure; very friable; light and porous; abundant worm channels; plentiful, diffuse roots; abrupt, smooth boundary to: |
| C | Below 26 | Coarse sands and gravels |

**Kilmannock Association**

The soils of this association occur in rather extensive, muddy flats along the basin of the river Barrow, notably in the vicinity of Kilmannock. They occupy some 0.56 per cent (3,240 acres) of the county. The parent material consists of river alluvium of silt loam texture. These areas are subject to flooding, but in some places banks have been erected which reduce this hazard. Only one series, Kilmannock, has been segregated within the association.

*Kilmannock Series:* These poorly-drained soils of silt loam texture and of very high base status have been classified as low-humic Gleys. The profile is characterised by a very dark greyish-brown surface horizon with weak structure, overlying horizons which in general are dark-grey in colour and have massive structure. Mottling is evident to a depth of twenty-nine inches where it gives way to a uniformly drab, dark-grey colour, indicating permanent water-logging at this depth. Root development is poor.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | 50 feet O.D. |
| Vegetation: | Rush (*Juncus*) dominated pasture |
| Drainage Class: | Very poorly-drained |
| Parent Material: | River alluvium (with marine estuarine influence) |

| Horizon | Depth (in) | Description |
|---|---|---|
| $A_{11g}$ | 0-10 | Silt loam; very dark greyish-brown (10 YR 3/2); weak, medium crumb structure; somewhat sticky when wet; peds somewhat firm; plentiful roots; some, small, distinct yellowish-brown (10 YR 5/4) mottles; clear, smooth boundary to: |
| $A_{12}$g | 10-21 | Silt loam to silty clay loam; greyish-brown (2·5 Y 5/2); massive structure; wet, sticky; rusty stains along root channels; occasional roots; clear, smooth boundary to: |

| | | |
|---|---|---|
| A/CG | 21–29 | Sandy loam; dark-grey (5 Y 4/1); massive structure; wet, sticky; common, coarse, diffuse dark reddish-brown (5 YR 3/4) mottles; no roots; clear, smooth boundary to: |
| CG | 29–36 | Silty clay loam; dark-grey (5 Y 4/1); wet, sticky; no roots |

## Estuarine Alluvial Soils

As mentioned in Chapter 1 there is a number of extensive muddy estuaries bordering the Wexford coastline. Three of these areas have been reclaimed for agriculture by systems which are closely akin to the Dutch system of polder reclamation. The first area is situated north-west of Kilmore Quay and occupies some 0.50 per cent (2,960 acres) of the county. It is known as the Kilmore Slob. The other two areas, which occupy some 0.87 per cent (5,040 acres), are situated on the north and south banks of Wexford Harbour, at the mouth of the river Slaney and are referred to as the North Slob and South Slob, respectively.

### Kilmore Slob Association

The soils of this association are situated in a flat depressional area which has been drained by a sluice and pumping system. The parent material consists of estuarine alluvium which, in general, is of a sandy loam texture. In part of the area, however, especially that which is close to the main drainage channels, the alluvium is of a silty clay texture. The extent of this material is small, however, and therefore the soils could not be shown on the mapping scale used, but are described later as the Kilmore Slob Variant. Only one series, Kilmore Slob, has been segregated within the association.

*Kilmore Slob Series*: These poorly-drained soils of sandy loam texture and of high base status have been classified as low-humic Gleys. The profile is characterised by a relatively coarse texture throughout. The surface horizon, which is dark-brown in colour and of sandy loam texture, has a moderate, medium crumb structure. It overlies horizons which are generally grey and mottled and which display weak, single-grained structure. Root development is poor.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | Below sea-level |
| Vegetation: | Rush (*Juncus*) dominated pasture |
| Drainage Class: | Poorly-drained |
| Parent Material: | Estuarine alluvium (coarse texture) |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11g}$ | 0–6 | Sandy loam; dark-brown (10 YR 3/3); strong, medium crumb structure; friable; few medium, diffuse dark-brown (7-5 YR 4/4) mottles; plentiful roots; gradual, smooth boundary to: |
| $A_{12g}$ | 6–12 | Sandy loam; grey (10 YR 5/1); moderate, medium crumb structure; friable; many, fine, prominent reddish-brown (5 YR 4/4) mottles; plentiful roots; abrupt, smooth boundary to: |

| | | |
|---|---|---|
| A/$C_g$ | 12–20 | Sandy loam to loam; grey (2·5 Y 6/1) and greyish-brown (2·5 Y 5/2); single grain structure; very friable; few roots; gradual, smooth boundary to: |
| $C_1$G | 20–28 | Sand to loamy sand; grey (2·5 Y 6/1) and greyish-brown (2·5 Y 5/2); single grain structure; loose; no roots; clear, smooth boundary to: |
| $C_2$G | 28–36 | Coarse sand; grey (5 Y 5/1); no roots |

**Wexford Slob Association**

The soils of this association are derived from estuarine alluvium. Because of the low-lying position of the area a system of pumps and sluice gates has been used to remove surface water and lower the water-level. The alluvium generally consists of material of a silty, clay loam texture. In part of the area, layers of coarse sand are present in the profile. The latter area, however, is small and could not be shown on the mapping scale used, but the corresponding soil is described later as the Wexford Slob Variant. Only one series, Wexford Slob, has been segregated within the association.

*Wexford Slob Series*: These poorly-drained soils of slightly peaty, silty clay loam texture and of medium to high base status have been classified as low-humic Gleys. The profile is characterised by brown and grey surface horizons with moderate crumb structure, overlying horizons which are generally dark grey and mottled and of massive structure, with sticky consistency when wet. Root development is poor. There is a high silt content throughout the profile.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | Below sea-level |
| Vegetation: | Rush (Juncus) dominated pasture |
| Drainage Class: | Poorly-drained |
| Parent Material: | Estuarine alluvium (fine texture) |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–2 | Slightly peaty, silty clay loam to silt loam; dark-brown (10 YR 3/3); moderate, fine crumb structure, held in sod by roots; friable; clear, smooth boundary to: |
| $A_{12g}$ | 2–12 | Silty clay loam to clay loam; grey (5 Y 6/1); moderate, medium crumb structure; friable; many, coarse, prominent dark reddish-brown (5 YR 3/4) mottles; plentiful roots; gradual, smooth boundary to: |
| A/$C_g$ | 12–30 | Silt loam; grey (5 Y 5/1); massive tending towards weak, coarse prismatic structure; rather firm; many medium, distinct dark-brown (7-5 YR 4/4) mottles; gradual, smooth boundary to: |
| CG | Below 30 | Silt loam to loam; dark-grey (5 Y 4/1); massive structure; sticky in wet state; few, dark-brown (7·5 YR 4/4) mottles on root channels and around marine shells; occasional roots |

## Soil Complexes

### Crosstown Complex

These soils occupy 1.37 per cent (7,960 acres) of the county and are very variable in character, due largely to the complex geological pattern of the area. The underlying solid geology consists mainly of shales and quartzites of Cambrian Age, which are overlain in most places by a mantle of drift of variable origin. A major portion of the area has been influenced by the Irish Sea ice, of the Saale Glaciation, which deposited tenacious, clayey materials as in the Macamore area. The western component of the Saale Glaciation also affected the area and its deposited materials became intermixed with those from the Irish Sea ice. These deposits in turn are overlain, in some places, by solifluction materials of later age. End-morainic materials of the last glaciation are also found in the area, and give rise to soils which are characterised mainly by sandy texture. The pattern is further complicated by the presence of loess-like material throughout parts of the area, giving rise to quite distinctive soils. It is thought that this material originated from the end-morainic deposits in the Screen area, either in the form of aeolian (wind-blown) material or as lake sediments during late glacial times. Related material of a coarser texture, which also occurs, resembles cover-sands rather than loess.

A number of distinct soils occurs within this complex, but the pattern of distribution is so intricate that their separation on the present scale of mapping is difficult. The principal series within the Crosstown Complex have been named as Crosstown, Crossabeg, and Johnstown Series.

Profiles representative of some of the soils of lesser extent (Soil Variants), within this complex area are also described later and are referred to as Whitegate, Sand-Hills, and Deerpark Variants.

*Crosstown Series*: The soils of this series are derived from mixed glacial drift material having a high admixture of 'loess', presumably carried from the Screen end-moraine area. These moderately well-drained soils of sandy loam texture and medium base status have been classified as Grey-Brown Podzolics. The profile is characterised by surface, dark-brown, sandy loam horizons overlying brown horizons of heavier texture, which exhibit clay skins on the surfaces of the structural peds. At approximately the thirty inch depth, these give way to an horizon similar in colour but of slightly coarser texture.

*Generalised profile description*

| | |
|---|---|
| Slope: | 1–2° |
| Aspect: | South |
| Altitude: | 150 feet O.D. |
| Vegetation: | Cultivated |
| Drainage Class: | Moderately well-drained |
| Parent Material: | Mixed drift material with 'loess' influence |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–6 | Sandy loam; dark-brown (7·5 YR 3/2); moderate, fine and medium crumb structure; very friable; abundant, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 6–12 | Sandy loam; dark-brown to brown (7·5 YR 4/2); moderate, fine and medium crumb structure; very friable; plentiful, diffuse roots; clear, smooth boundary to: |

| | | |
|---|---|---|
| $B_1$ | 12–12 | Clay loam; brown (7·5 VR 5/2); moderate to strong, medium, sub-angular blocky structure; somewhat firm; good rooting especially along structural faces; dark-brown (7-5 YR 4/4) colours on inside of broken peds; gradual, smooth boundary to: |
| $B_{2t}$ | 22–33 | Clay loam; brown (7·5 YR 5/2); moderate, coarse and medium, sub-angular blocky structure; somewhat firm; occasional roots; inside of peds dark-brown (7·5 YR 4/4) and some medium mottles of darker colour present; clay skins evident on ped surfaces; gradual, smooth boundary to: |
| B/C | 33–50 | Loam to clay loam; weak, medium sub-angular blocky structure; somewhat firm; no roots |

*Crossabeg Series*: The soils of this series are derived from mixed glacial drift material of Saale Age and have a loess-like influence in the upper part of the solum. They are moderately well-drained, of sandy loam to loam texture and of medium base status and have been classified as Grey-Brown-Podzolics. The profile is characterised by its relatively non-stony nature to approximately the twenty-two inch depth, after which the 'loess' influence falls off and the material becomes more stony, more mottled and less friable. There is a distinct increase in the finer textural fractions below the fourteen inch depth.

*Generalised profile description*

| | |
|---|---|
| Slope: | 2° |
| Aspect: | West |
| Altitude: | 200 feet O.D. |
| Vegetation: | Pasture |
| Drainage Class: | Moderately well-drained |
| Parent Material: | Mixed drift material, with some loess-like influence in the upper part |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–7 | Sandy loam to loam; dark-brown to brown (10 YR 4/3); moderate, fine and medium crumb structure; very friable; sand grains bleached; plentiful, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 7–14 | Similar to above horizon; roots less plentiful; clear, smooth boundary to: |
| $B_1$ | 14–22 | Loam to clay loam; brown (7·5 YR 5/4) to strong brown (7·5 YR 5/6); moderate, medium to coarse sub-angular blocky structure; friable; sparse rooting; gradual, smooth boundary to: |
| $B_{2t}$ | 22–42 | Clay loam; reddish-brown (5 YR 4/3); moderate, coarse sub-angular blocky structure; friable to somewhat firm; many, medium, faint strong-brown (7·5 YR 5/6) mottles; few roots; some clay skins on ped surfaces; gradual, smooth boundary to: |
| B/C | 42–52 | Clay loam; brown (7·5 YR 5/2); weak, coarse, sub-angular blocky structure; friable to firm; many, medium, faint strong-brown (7·5 YR 5/6) mottles; no roots |

*Johnstown Series*: The soils of this series are derived from mixed drift material of predominantly Cambrian shale—quartzite composition, with a slight admixture of loess-like and solifluction materials in the upper part of the solum. They are moderately well-to imperfectly-drained, of sandy loam texture and of medium to high base status and have been classified as Grey-Brown-Podzolics. The profile is friable to the twenty-four inch depth (approximately) but it then becomes somewhat firm and indurated. Root development is restricted at this depth.

*Generalised profile description*

| | |
|---|---|
| Slope: | 1 |
| Aspect: | West |
| Altitude: | 150 feet O.D. |
| Vegetation: | Pasture |
| Drainage Class: | Moderately well-to imperfectly-drained |
| Parent Material: | Mixed drift of predominantly Cambrian shale and quartzite composition, with slight admixture of loess-like and solifluction materials in the upper part |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–7 | Sandy loam; dark greyish-brown (10 YR 4/2); moderate, medium crumb structure; friable; plentiful, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 7–14 | Sandy loam; dark-brown (10 YR 4/3); weak to moderate, medium crumb structure; friable; roots not so plentiful; few, fine, faint strong-brown (7·5 YR 5/6) mottles; gradual, smooth boundary to: |
| $B_1$ | 14–20 | Sandy clay loam to sandy loam; dark yellowish-brown (10 YR 4/4); weak, fine to medium, sub-angular blocky structure; friable; sparse rooting; few, medium, diffuse, strong-brown (7·5 YR 5/6) mottles; gradual, smooth boundary to: |
| $B_{2t}$ | 20–26 | Clay loam; brown (10 YR 5/3); weak, medium, sub-angular, blocky to massive structure; firm; somewhat indurated; many, coarse, faint strong-brown (7·5 YR 5/6) mottles; no roots; some clay skins on vertical ped faces; gradual, smooth boundary to: |
| B/C | 26–32 | Sandy loam to sandy clay loam; brown (10 YR 5/3); massive structure; firm; many, coarse, faint, strong-brown (7·5 YR 5/6) mottles |

**Carrickbyrne Complex**

The soils of this complex occur sporadically throughout the general area occupied by the soils of the Clonroche Association. They occupy about 1.26 per cent (7,300 acres) of the county. They are derived from acid and basic igneous rocks and from Ordovician shale, through which the igneous rocks have penetrated. The acid igneous rocks consist mainly of felstone, felstone porphyry and felspathic ash, while the basic igneous rocks consist mainly of diorite, dolerite, gabbro and felspathic gabbro. Because they occur mostly in dykes and protrusions, these igneous rocks form an intricate pattern with the Ordovician shale and, mostly, they form the higher ground throughout the area. Outcropping rock is common and is associated with thin, skeletal soils.

Because of the intricate geological pattern it was necessary to map the soils as a complex. The components of the complex are (a) soils derived from the underlying Ordovician shale which have been mapped (and already described) as the Slievecoiltia Series of the Clonroche Association in other parts of the county; (b) shallow skeletal soils which are usually not more than a few inches deep and consist mainly of weathered rock debris with some slight admixture of organic matter (Plate 16); (c) soils derived from the various igneous intrusive rocks and mapped as the Carrick-byrne Series.

It was found very difficult to identify and segregate the soils derived from each type of igneous intrusive rock but a typical soil profile from one of these areas (Carrickbyrne Hill) is described below. It is a well-drained soil of organic loam texture and has been classified as a Podzol.

*Plate 16—Shallow Skeletal Soils within the Carrickbyrne Complex*

*Generalised profile description*

| | |
|---|---|
| Slope: | 8-10° |
| Aspect: | South |
| Altitude: | 400 feet O.D. |
| Vegetation: | Heath vegetation—*Calluna, Erica* with *Pteridium, Ulex, Agrostis* spp. |
| Drainage Class: | Well-drained |
| Parent Material: | Igneous intrusive rock |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_0$ | 1½–0 | Raw, undecomposed organic matter |
| $A_1$ | 0–4 | Organic loam; very dark greyish-brown (10 YR 3/2); moderate, medium crumb structure; friable; roots plentiful; gradual, smooth boundary to: |
| $A_2$ | 4–9 | Loam; dark-brown (10 YR 3/3); moderate, fine crumb structure; friable; roots plentiful; clear, smooth boundary to: |
| $B_2(_{ir})$ | 9–12 | Silt loam to loam; yellowish-red (5 YR 5/6); moderate, fine granular structure; very friable; plentiful, diffuse roots; clear, smooth boundary to: |
| B/C | Below 21 | Loam; yellowish-brown (10 YR 5/4); moderate, fine, granular structure; very friable; stony; occasional roots |

## Other Soils Occurring

### Soil Variants

*Glenbough Variant:* The soils of this variant occupy the most elevated areas within the Screen Association, and are usually found on the tops and steeper slopes of the 'Kames' in the area. Their parent material is somewhat more coarse-textured than that of the Screen Series. In the unimproved state, the vegetation on these soils is mostly heath (*Calluna, Erica* with *Ulex* and *Pteridium* spp.). Because of these factors, stronger leaching has taken place in these soils than in those of the Screen Series. They are excessively-drained, of coarse sandy texture and of very low base status and have been classified as humus-iron Podzols.

The profile is characterised by distinct horizon differences (Plate 4). The surface horizons, which are very dark greyish-brown and contain a considerable amount of undecomposed organic matter, overlie a light brownish-grey, leached $A_2$ horizon. This is underlain by a black $B_{2h}$ horizon, a dark reddish-brown $B_2(_{ir})$ horizon and a reddish-brown $B_3$ horizon. In these B horizons, which are strongly cemented and hard when dry, humus together with iron and aluminium oxides have accumulated to a considerable degree. At a depth of twenty-three inches these overlie the yellowish-brown, loose, coarse sandy parent material. Vertical 'pipe stems' of material similar to that of the B horizons occur in the parent material. Because of the induration of the B horizons root development is restricted in these soils and, due to their very coarse texture, moisture holding capacity is very low.

*Generalised profile description*

| | |
|---|---|
| Slope: | 5° |
| Aspect: | West |
| Altitude: | 250 feet O.D. |
| Vegetation: | Heath Vegetation—*Calluna, Erica* with *Agrostis, Ulex* and *Pteridium* spp. |
| Drainage Class: | Excessively-drained |
| Parent Material: | Coarse-textured, end-morainic material of the Weichsel glaciation |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–7 | Coarse sand; very dark greyish-brown (10 YR 3/2); very weak, fine to medium crumb structure; very friable; abundant, diffuse roots; sand grains bleached; very gradual, smooth boundary to: |
| $A_{12}$ | 7–15 | Coarse sand; very dark greyish-brown (10 YR 3/2); weak, fine to medium crumb structure; very friable; less abundant roots; sand grains bleached; abrupt, smooth boundary to: |
| $A_2$ | 15–19 | Coarse sand; light brownish-grey (10 YR 6/2); single grain structure; loose; few roots; clear, wavy boundary to: |
| $B_{2h}$* | 19–22 | Coarse sand; black (5 YR 2/1); very hard and cemented but, when removed shatters to a single grain structure; rooting horizontal above this layer; sand grains coated; clear, wavy boundary to: |
| $B_2(_{ir})$ | 22–25 | Coarse sand; dark reddish-brown (5 YR 3/3); very weak, medium, granular, breaking easily to single grain structure; cemented and somewhat firm; no roots; sand grains coated; gradual, slightly wavy boundary to: |
| $B_3$ | 25–32 | Coarse sand; reddish-brown (5 YR 4/4); structure ill-defined; friable; no roots; gradual, wavy boundary to: |
| C | Below 32 | Coarse sand; yellowish-brown (10 YR 5/6); single-grain structure: loose: no roots |

*Note:* Pipe-stems of material similar to the $B_2$ horizons occur vertically in the C horizon.

*Kilmore Slob Variant:* In some places within the Kilmore Slob area, especially in the vicinity of the main drainage channels, the soil is much heavier in texture than the normal soil of the area (already described). This soil is named the Kilmore Slob Variant and has been classified as a Gley. It has not been mapped because its small extent would not allow for this on the scale of mapping employed. The profile is characterised by grey surface horizons of loamy coarse sand texture overlying material which is very dark-grey in colour and of silty clay loam to silty clay texture.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | Below sea-level |
| Vegetation: | Rush (*Juncus*) dominated pasture |
| Drainage Class: | Poorly-drained |
| Parent Material: | Estuarine Alluvium (fine textured) |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_0$ | 1–0 | Undecomposed organic matter |

*$B_{2h}$ denotes a B horizon enriched by colloidal humus

| | | |
|---|---|---|
| $A_{11g}$ | 0–10 | Loamy coarse sand to coarse sandy loam; grey (5 Y 6/1); single grain structure; very thin bands of coarse sand present; olive-brown (2·5 Y 4/4) staining on root channels; roots plentiful; gradual, smooth boundary to: |
| $A_{12g}$ | 10–20 | Loam to fine sandy loam; very dark-grey (5 Y 3/1); weak, platy structure; somewhat firm; narrow bands of coarse sand; few roots; some plant remains; gradual, smooth boundary to: |
| $C_1G$ | 20–30 | Silty clay loam; very dark-grey (5 Y 3/1); weak, platy to massive structure; somewhat firm; few roots; some plant remains; clear, smooth boundary to: |
| $C_2G$ | 30–40 | Silty clay loam to silty clay; very dark-grey (5 Y 3/1); massive structure; wet and sticky; some coarse plant remains; clear, smooth boundary to: |
| $C_3G$ | 40–50 | Fine sandy loam; dark-grey (5 Y 4/1); massive structure; wet and sticky; no roots |

*Wexford Slob Variant*: In some places throughout the Wexford Slob Association area, a layer of coarse sand occurs at varying depths in the profile. The soil, which has not been mapped on the scale of mapping employed because of its small extent, is referred to as the Wexford Slob Variant and has been classified as a Gley. The profile is characterised by a surface horizon of organic, silty clay loam texture; at a depth of ten inches a layer of coarse sand occurs to a depth of twenty-one inches where there is an abrupt change to a clay loam. Root development is poor.

*Generalised profile description*

| | |
|---|---|
| Slope: | Flat |
| Aspect: | Nil |
| Altitude: | Below sea-level |
| Vegetation: | Rush (*Juncus*) dominated pasture |
| Drainage Class: | Poorly-drained |
| Parent Material: | Estuarine Alluvium (fine texture but with sandy layers) |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–2 | Organic, silty clay loam; dark-brown (10 YR 3/3); very weak, medium crumb structure, held in sod by roots; friable; clear, smooth boundary to: |
| $A_{12g}$ | 2–10 | Silt loam to silty clay loam; grey (5 Y 5/1); moderate, medium crumb structure; friable; many, coarse, prominent dark-brown (10 YR 3/3) mottles; abrupt, smooth boundary to: |
| $A/C_g$ | 10–15 | Coarse sand; light brownish-grey (2·5 Y 6/2); single grain structure; loose; few roots; clear, wavy boundary to: |
| $C_1G$ | 15–21 | Coarse sand; reddish-brown (5 YR 4/4); single grain structure; loose; no roots |

| | | |
|---|---|---|
| $C_2G$ | 21–31 | Silty clay loam; dark-grey (2·5 Y 4/0); massive structure; wet and sticky; no roots; clear, smooth boundary to: |
| $C_3G$ | Below 31 | Clay to silty clay; dark-brown (10 YR 4/3); massive structure; wet and sticky; no roots |

*Whitegate Variant*: These moderately well-drained soils of sandy loam to loam texture and of medium to high base status have been classified as Grey-Brown Podzolics. They occur within the area of the Crosstown Complex and are derived from soliflucted and loess-like materials. The latter apparently came from the neighbouring end-morainic deposits of the Weichsel Glaciation.

The profile is characterised by a non-stony nature, a silty texture below the surface horizons, and a somewhat mottled appearance. The surface horizon, which contains some small stones, is more coarse-textured than the material below and would appear to have been deposited by solifluction in late glacial times. There is also some clay movement out of the surface horizons and a textural B horizon becomes apparent below the twelve inch depth.

*Generalised profile description*

| | |
|---|---|
| Slope: | 1° |
| Aspect: | West |
| Altitude: | 150 feet O.D. |
| Vegetation: | Pasture |
| Drainage Class: | Moderately well-drained |
| Parent Material: | Soliflucted and loess-like materials |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0–6 | Sandy loam to loam; dark-brown (10 YR 4/3); moderate, fine and medium crumb structure; very friable; plentiful diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 6–12 | Similar to above, less plentiful roots; clear, smooth boundary to: |
| $B_{2t}$ | 12–22 | Loam; mixed brown and pale-brown (10 YR 5/3 and 10 YR 6/3); moderate, medium, sub-angular blocky structure; friable; few, medium yellowish-brown (10 YR 5/6) mottles; plentiful, diffuse roots; some clay skins evident; gradual, smooth boundary to: |
| $B_{22}$ | 22–42 | Silt loam; brown and pale-brown (10 YR 5/3 and 10 YR 6/3); moderate, medium, prismatic structure breaking to medium sub-angular blocky; friable; few roots; abrupt, smooth boundary to: |
| $C_{11}$ | 42–44 | Silty clay to clay; dark-brown (7·5 YR 4/4); massive structure; friable; no roots; abrupt, smooth boundary to: |
| $C_{12}$ | Below 44 | Silt loam; brown and pale-brown (10 YR 5/3 and 10 YR 6/3); weak, medium sub-angular blocky to massive structure; friable; no roots |

Profile is non-stony except in the surface hozrizon

*Sandhills Variant:* These disturbed, excessively-drained soils of loamy sand texture and medium base status have been classified as humus-iron Podzols. They occur generally in the vicinity of the more slightly elevated ground throughout the area and are derived from wind-blown cover sands, which presumably originated from the end-morainic deposits of the Weichsel glaciation in the nearby Screen area.

The profile is characterised by a sandy texture, and by a relatively deep, disturbed surface horizon overlying a strongly leached $A_2$ horizon. This in turn overlies a B horizon, in which humus and oxides of iron and aluminium have accumulated (Plate 6).

*Generalised profile description*

| | |
|---|---|
| Slope: | 2° |
| Aspect: | East |
| Altitude: | 150 feet O.D. |
| Vegetation: | Cultivated |
| Drainage Class: | Excessively-drained |
| Parent Material: | Sand deposits (Age uncertain) |

| *Horizon* | *Depth (in)* | *Description* |
|---|---|---|
| $A_{1p}$ | 0-9 | Loamy sand; dark greyish-brown (10 YR 4/2); weak, fine to medium crumb structure; very friable; sand grains bleached; abundant, diffuse roots; clear, smooth boundary to: |
| $A_{12}$ | 9-15 | Loamy sand; yellowish-brown (10 YR 5/4); weak, fine to medium crumb structure; very friable; roots not so abundant; sand grains bleached; abrupt, smooth boundary to |
| $A_2$ | 15-21 | Coarse sand; light-grey (2·5 Y 7/2); single grain structure; loose; some small black manganese concretions at bottom of horizon; few roots; bleached sand grains; abrupt, wavy boundary to: |
| $B_{2h}$ | 21-31 | Loamy coarse sand; dark-brown (10 YR 4/3); weak, medium granular structure; friable; many, coarse, cemented dusky-red (2·5 YR 3/2) iron nodules; no roots; gradual, smooth boundary to: |
| $B_{2(ir)}$ | 31-43 | Coarse sand; pale-brown (10 YR 6/3); single grain structure; loose; many, faint yellowish-brown (10 YR 5/6) mottles; no roots; many, small, black manganese specks and iron nodules |
| B/C | Below 43 | Similar to above horizon but with less yellowish-brown mottling |

*Deerpark Variant:* These moderately well-to imperfectly-drained soils, of loam to sandy loam texture and of low base status, have been classified as Brown-Earths. They are derived from solifluction and loess-like materials which overlie (at varying depths) tenacious, somewhat indurated drift material of Saale Age and of Cambrian shale and quartzite composition. The profile is characterised by fairly uniform textures and colours and by a friable consistency down to the underlying tenacious drift. This is firm and somewhat cemented, has weak structure and displays prominent mottling.

*Generalised profile description*

| | |
|---|---|
| Slope: | 2° |
| Aspect: | South |
| Altitude: | 200 feet O.D. |
| Vegetation: | Old pasture, bracken (*Pteridium*) dominant |
| Drainage Class: | Moderately well-to imperfectly-drained |
| Parent Material: | Solifluction and loess-like materials, overlying tenacious mixed drift of Saale Age |

| *Horizon* | *Depth* (*in*) | *Description* |
|---|---|---|
| $A_{11}$ | 0-7 | Loam to sandy loam; brown (10 YR 5/3); strong, fine and medium crumb structure; friable; abundant, diffuse roots; gradual, smooth boundary to: |
| $A_{12}$ | 7-14 | Loam to sandy loam; pale-brown (10 YR 6/3); strong, fine and medium crumb structure; friable; abundant, diffuse roots; gradual, smooth boundary to: |
| $A_{13}$ | 14-20 | Similar to above; roots not so abundant; clear, smooth boundary to: |
| A/C | 20-26 | Loam; yellowish-brown (10 YR 5/6); weak, very fine crumb structure; very friable; some diffuse roots; very porous and extremely light; abrupt, smooth boundary to: |
| $C_g$ | Below 26 | Sandy clay loam to loam; brown (7·5 YR 5/2); weak, coarse granular structure; firm when moist, hard when dry; very few roots; many, medium and coarse, prominent, strong-brown (7·5 YR 5/6) mottles; somewhat cemented |

**Peats**

Peat occurs only to a very limited extent within the county. However, the two main types, blanket or climatic peat and basin peat, have been recognised.

*Blanket Peat:* Blanket peat occurs to a very limited extent in the north-western part of the county, in the vicinity of the Blackstairs Mountains. It occupies 0.07 per cent (400 acres) of the county. In this area the majority of the soils consist of iron-pan Podzols with a surface organic horizon, usually less than twelve inches deep. The thickness of the surface organic layer is greatly influenced by the underlying topography, the greater depths occurring in saddles or on level terraces and the lesser depths on the steeper slopes. Where the thickness of the surface organic layer is greater than twelve inches, it is regarded as a peat. The maximum depth of the peat in this area is about six feet.

*Basin Peat:* The few peat deposits in the county can be considered only as poorly developed and consist mainly of the sedimentary type. They occupy 0.24 per cent (1,400 acres) of the county. They are mostly very shallow, rarely exceeding two feet in depth. The basin peats occur mainly in two areas:

(a) In association with the Oulartleigh Series
(b) In the vicinity of Wingfield, due west of Croghan Mountain, in the northern part of the county.

**Alluvium**

Flat stretches of alluvium are found contiguous to almost every river and stream and in some depressions in the landscape. Where this material is sufficiently extensive and of a homogeneous nature it has been separated into soil series (*e.g.* Clohamon, Kilmannock, Millquarter). Where the material varies appreciably in texture, drainage characteristics or base status, however, it has not been possible, at the scale of mapping employed, to separate the different soils occurring so these have been shown on the map as alluvium. This undifferentiated alluvium occupies about 1.64 per cent (9,500 acres) of the county. The texture of this material ranges from sand to clay; the soils developed vary from well-to poorly-drained and the base status from medium to high.

**Aeolian Sands**

Amongst the recent superficial deposits, aeolian (windblown) sands cover limited areas along parts of the county coastline. Although these sands occupy 0.50 per cent (2,920 acres) of the county, they are not agriculturally important.

## Great Soil Groups in the County

In studying and mapping the distribution of soils in any area, it is found that the soils can be classified, on a broad scale, into major or **Great Soil Groups,** each consisting of a collection of closely related soil series. Each **Great Soil Group** then, is comprised of soils having a number of important profile characteristics in common. A certain latitude in profile variation is allowable at this level of classification but the degree of similarity, nevertheless, is of quite a high order. A single great soil group may not be confined to a particular geological parent material, as the basic criteria on which soils are classified at this stage are the characteristics of the soil profile.

Within the Survey area the following **Great Soil Groups** are represented.

*Regosols*

These comprise mineral soils which are immature and show no distinct profile development. They occur mostly in low-lying, flat areas along river courses and at river estuaries, but they are also found on young deposits such as aeolian (wind-blown) sands. Depending on the source of the deposits, such soils may vary in nutrient status and, also, in physical constitution and drainage conditions. Many of the Alluvial soils described, and also those on the coastal wind-blown sands, belong to this group.

*Brown Earths*

These are relatively mature, well-drained, mineral soils possessing a rather uniform profile, with little differentiation into horizons. It follows, therefore, that these soils have not been too extensively leached or degraded, with the result that there are no obvious signs in the profile of removal and deposition of material such as iron oxides, humus or clay. However, in many cases, a certain degree of leaching has taken place resulting in the translocation of soluble constituents, notably carbonates of calcium and magnesium.

In the survey area, most of the Brown Earths occur on lime-deficient parent materials, and are, therefore, acid in nature; these are called Acid Brown Earths or Brown Earths of low to medium base status; some occur on more lime-rich parent materials, are neutral or alkaline in reaction, and are distinguished as Brown Earths of medium to high base status. The former can develop also on lime-rich parent materials under conditions where excessive depletion of bases has taken place.

The Acid Brown Earths are most common in County Wexford, while those of medium to high base status occur more frequently in other areas of the country. The Brown Earths constitute the most widespread Great Soil Group in the county. These soils, in general, possess medium textures (sandy loam, loam, sandy clay loam) and this, together with their friability, desirable structure and drainage characteristics, accounts for the fact that these are amongst the most extensively cultivated soils. Although of relatively low nutrient fertility, they respond well to manurial amendments. Under proper manurial and management practices, they constitute high quality grassland soils also and are ideally suited to a wide range of forest species.

*Brown Podzolics*

These soils are more intensely leached than the Brown Earths and, as a result, the upper horizons are more depleted of bases and other constituents. A characteristic feature of these soils is a sub-surface horizon of strong red-brown or yellowish-brown colour due to enrichment, principally by iron oxides leached from the upper horizons. They are more degraded generally and of a more acid nature than the Brown Earths. This group is of relatively widespread occurrence.

Although the Brown Podzolics are more leached and of lower natural fertility than the Brown Earths, they closely resemble each other in behaviour and productive capacity. On account of their desirable physical conditions, the Brown Podzolics are devoted extensively to cultivated cropping. Highly productive short-term leys can be obtained within the rotation, where attention is given to proper manurial and management practices. Like the Brown Earths, they are ideal forest soils under our climatic conditions.

*Podzols*

These soils are still more intensely leached than any of the foregoing. They display well defined horizons of depletion and accumulation within the profile and may be considered as degraded soils. They are developed from parent materials of very low base reserves or under conditions which tend to deplete the base reserves to a low level. The granite hills provide a situation in which both of these factors are operative in soil development. The acid nature of the geological parent materials and high rainfall in these areas combine to promote a considerable leaching of soil constituents, principally bases, iron and aluminium oxides and humus. In cases of advanced deterioration, the surface becomes very acid, conditions for decomposition by micro-organisms become unfavourable, and a peat-like layer accumulates on the surface, on which a characteristic heath vegetation is usually found.

Podzols are generally poor soils with high lime and fertiliser requirements. In their natural state they usually carry very inferior vegetation. Where they occur in lowland areas, they have been successfully reclaimed for cultivated cropping and other purposes, but unless constantly attended they revert easily. The more extreme forms, which occupy hill and mountain areas throughout the county, have not been ameliorated to any extent. In most cases, the nature of the terrain associated with these soils is such that mechanical means of reclamation and cultivation are not feasible. Here they are devoted mostly to rough grazing or forestry. Considerable improvement in stock carrying capacity is possible by surface regeneration of the rough grazing, through manurial amendments and improved management techniques.

Where an iron-pan occurs within the profile it creates a hindrance to root penetration (an important factor in forestry, and in the agricultural use of these soils) and to water percolation. For the latter reason, the surface horizons may develop very poorly-drained conditions, which are a further unfavourable feature of many of the Podzols. Besides having a low level of major elements, these soils are usually very deficient in trace elements.

Podzols are the most widely available mineral soils for afforestation in the county, and are usually planted to pines. However, with deep ploughing and the application of phosphorous fertiliser, they can support other species, such as Sitka Spruce, with relative success.

*Grey-Brown Podzolics*

The development of these soils is associated with a leaching process also, but in this case the principal constituent accumulated in the B horizon is the finely divided clay fraction. To qualify as a Grey-Brown Podzolic the B horizon must have a significantly higher clay content than either the A or C horizons, in which case it is referred to as a textural B or Bt horizon. The occurrence of clay skins on the ped surfaces, within the $B_t$ horizon, is a further characteristic.

In general, the Grey-Brown Podzolics possess a somewhat ‘heavier’ texture than the Brown Earth group; they are well-to moderately well-drained and are usually moderately acid to neutral in reaction. The organic matter content in the surface is medium to high and the humus is a mull-type.

Under our climatic conditions, the ‘lighter’ textured members of the Grey-Brown Podzolics are good, all-purpose soils and, when adequately manured and well managed, are very productive under most agricultural enterprises. The ‘heavier’ textured members do not compare favourably with the Brown Earths in this regard but are suitable grassland soils, responding well to manurial and management practices. The grey-brown podzolic soils are not generally available for afforestation, but should be highly productive for this purpose.

*Gleys*

Gleys are soils in which the effects of drainage impedance dominate and which have developed under conditions of permanent or intermittent water-logging. The impeded condition may be due to a high water-table level or to a ‘perched’ water-table, due to the relatively impervious nature of the soils and their parent materials and, in many cases, to both of those factors, together with excess run-off from higher slopes. For this reason, gley soils can occur both in depressions and on elevated sites.

Where gley conditions are the result of a high water-table level, the soils are referred to as ground-water gleys. Where the condition is due to the impermeable nature of the soil or of its parent material, or due to run-off from higher slopes, the soils are usually referred to as surface-water gleys.

The mineral horizons of Gleys are usually grey (or bluish-grey, in more extreme cases), with distinct ochreous mottling much in evidence. Relative to the foregoing soil groups, depletion of bases and other constituents, in general, is not so pronounced. However, rooting area is limited, aeration poor, rate of decomposition of organic matter slow and many other unfavourable features prevail. In more extremely gleyed soils, organic matter, in a poorly decomposed state, accumulates in the surface, in which case the soils are referred to as Humic Gleys to distinguish them from the Low-Humic Gleys, in which organic matter accumulation is not abnormally pronounced.

Podzolized Gleys are soils in which there is evidence of a soil formation process similar to that described for Brown Podzolics or Podzols associated with the Gley, whilst Podzolic Gleys refer to soils displaying evidence of Grey-Brown Podzolic characteristics associated with the Gley.

The majority of gleys have weak structure, are not very friable and, in a wet state, tend to become very sticky. Due to poor physical conditions, these soils, except in very favourable seasons, present difficulties in cultivation, especially in the development of a desirable tilth. Due to poor drainage condition, growth is slow early in the season. Even for pasture production, this is a decided disadvantage. Besides poor drainage, the characteristic weak structure renders these soils susceptible to poaching damage by grazing stock, a factor which curtails the length of grazing season and amount of fodder utilized. Despite their physical shortcomings, however, the potential of these soils for pasture production is very high in many cases, provided management and manurial practices are at an adequate level.

Gleys are generally considered as relatively productive forest soils. They are especially suited to Norway Spruce. However, a decided hazard is windthrow due to poor root penetration.

*Lithosols*

These consist of skeletal, stony soils, usually of an organic nature, overlying, in most cases, solid or shattered bedrock. Generally, such soil areas have bare rock outcropping at the surface at frequent intervals. Lithosols are most often associated with Podzols and Climatic Peats at the higher elevations. Their use range is limited to rough grazing or, in less extreme cases, forestry.

*Organic Soils or Peats*

Peats are soils of a highly organic nature and are usually separated on the basis of characteristics related to mode of formation. When successfully ameliorated they can become highly productive.

## Classification of the Soils according to Great Soil Groups

The soils segregated and mapped in County Wexford are classified in Table VII into a number of Great Soil Groups. As far as possible, the area and extent of the county occupied by each group is shown. The Carne Series has been left unclassified, although the soils have many features in common with the Brown Earths of medium to high base status.

In Table VIII the soils occurring within complexes and as variants are classified into Great Soil Groups. In this case, areas of individual Great Soil Groups are not shown.

The Brown Earth and Grey-Brown Podzolic groups, which may be regarded as arable soils, of wide use range, occupy 49 per cent of the county (Table VII). The Brown Podzolics, most of which are good arable soils also, occupy almost a further 12 per cent. Therefore, it can be concluded that about 61 per cent of the soils of County Wexford are well-drained and, despite low nutrient fertility, have a high productive potential, either in agriculture, horticulture or forestry. The poorly-drained soils or Gleys, on the other hand, with their limited use range, occupy 30 per cent. The Podzols, of limited potential, represent a little over 3 per cent and the Peats and Regosols about 2 per cent.

TABLE VII—Classification of the Main Soil Series in County Wexford into Great Soil Groups and the relative extent of each

| Great Soil Groups | Series | Area (acres) | Per cent of County |
|---|---|---|---|
| Brown Earths (medium to high base status) | Ambrosetown, Baldwinstown | 23,790 | 4.10 |
| Brown Earths (low to Medium base status) | Broadway, Killinick, Broomhill, Clonroche, Old Ross, Randallsmill | 254,925 | 44.03 |
| Grey-Brown Podzolics | Bannow, Fethard, Hook Head | 5,790 | 1.00 |
| Brown Podzolics | Ballindaggan, Clohamon, Kiltealy, Screen, Slievecoiltia | 67,660 | 11.68 |
| Podzols | Black Rock Mountain, Blackstairs, Forth Commons, Nethertown | 19,060 | 3.30 |
| Gleys | Ballinruan, Ballyknockan, Ballywilliam, Coolaknick, Kilmannock, Kilmore Slob, Kilpierce, Knockroe, Macamore, Millquarter, Oulartleigh, Rathangan, Templeshanbo, Wexford Slob | 177,340 | 30.64 |
| Peats | — | 1,800 | 0.31 |
| Regosols | — | 12,420 | 2.14 |
| Unclassified Soils | Carne | 960 | 0.17 |

TABLE VIII—Classification into Great Soil Groups of soils occurring as Complexes and Variants in County Wexford

| Complex or Variant | Component Soils | Great Soil Groups |
|---|---|---|
| Carrickbyrne Complex | Carrickbyrne Series | Podzols |
| | Skeletal Soils | Lithosols |
| | Slievecoiltia Series | Brown Podzolics |
| Crosstown Complex | Crosstown Series | Grey-Brown Podzolics |
| | Crossabeg Series | ”””” |
| | Johnstown Series | ”””” |
| Deerpark Variant | — | Brown Earths |
| Whitegate Variant | — | Grey-Brown Podzolics |
| Sandhills Variant | — | Podzols |
| Glenbough Variant | — | Podzols |
| Kilmore Slob Variant | — | Gleys |
| Wexford Slob Variant | — | Gleys |

## CHAPTER V

### DISCUSSION OF ANALYTICAL DATA

Certain laboratory tests were carried out on the samples taken from a representative soil profile in each series. The tests included mechanical analysis, cation exchange capacity, total exchangeable bases, pH, organic carbon, total nitrogen, free iron and total neutralising value. From the cation exchange capacity and total exchangeable bases, the percentage base saturation was calculated. In addition the calcium, phosphorus, potassium and magnesium, soluble in Morgan's extractant (sodium acetate/acetic acid buffered at pH 4.8) were determined for each sample. These results are accepted as an index of the soil's supply of particular plant nutrients and, therefore, are generally referred to as 'available nutrients'.

In the case of the more extensive soil series within the county, trace element levels were determined spectrographically. The results of the trace element investigations are discussed later in this chapter.

X-ray analysis techniques were used to determine the clay mineral composition of some of the more extensive soil series occurring in the county. Findings to date in this study are given later in this chapter.

Before discussing the analytical data (Appendix 1) a short note on the interpretation and significance of the various tests conducted is given.

### General Analyses

*Mechanical Analysis*

In mechanical analysis, the percentages of coarse sand, fine sand, silt and clay in the mineral fraction of the soil are determined. Texture refers to the relative proportions of these soil separates and is discussed in Appendix III. Texture is one of the more important physical properties of the soil; it influences structural development; factors such as moisture retention, drainage and tilling properties, resistance to damage by stock and heavy machinery and earliness of crop growth are conditioned by texture and structure.

*Cation Exchange Capacity*

The cation exchange capacity of the soil, in its simplest terms, is an index of the capacity of a particular soil to adsorb and release cations such as hydrogen, calcium, magnesium, sodium and potassium; it is an indication of the ability of the soil to supply important nutrients to the growing plant. It is governed chiefly by the organic matter and clay contents of the soil. Soils with high organic matter content usually have a high cation exchange capacity (25-40 m.eq./l00 g. of soil). The cation exchange capacity of a soil low in, or devoid of, organic matter is generally less than 12 m.eq./100 g., and is conditioned chiefly by the clay fraction.

Light sandy soils containing little organic matter, or clay, usually have a very low cation exchange capacity and, consequently, have a low potential for retaining applied plant nutrients; hence the necessity for the application of relatively frequent fertiliser dressings on these soils. Heavier textured soils, on the other hand, usually have a high cation exchange capacity and are capable of adsorbing and retaining larger quantities of applied nutrients, especially calcium and potassium, which are slowly released to meet the needs of growing plants. On such soils, therefore, fertiliser and lime applications can be larger and less frequent.

*Total exchangeable bases*

"Total exchangeable bases" is an expression of the amount of bases (plant nutrients such as calcium, potassium, sodium, magnesium) present, and when expressed as a percentage of the cation exchange capacity the base saturation of the exchange complex of the soil is obtained. Where the inherent base status is low, e.g. soils derived from base-poor parent materials, or where depletion of bases has occurred through leaching or cropping, without subsequent replenishment, the base saturation is usually low. Where the soil is derived from a base-rich parent material such as limestone or basalt, and has not been leached to any extent, the exchange complex may be completely saturated with bases.

*pH*

pH is a measure of soil acidity or alkalinity. A soil having a pH value of 7.6-8.3 is moderately alkaline; pH 7.1-7.5, slightly alkaline; pH 7.0, neutral; pH 6.6-6.9, nearly neutral; pH 6.0-6.5, slightly acid; pH 5.3-5.9, moderately acid; pH 4.6-5.2, strongly acid; and pH below 4.5, very acid.

*Total Neutralizing Value (T.N.V.)*

This is an index of the level of carbonates present in a soil. These carbonates modify the solubility of other nutrients. Soils showing positive T.N.V. values in the surface horizons contain adequate or excess neutralizing materials and are not in need of liming.

*Carbon and Nitrogen*

The level of organic carbon indicates the amount of organic matter in the soil ($C \times 1.72$ = organic matter). The content and nature of organic matter are of fundamental importance. The high cation exchange capacity of organic matter enables it to act as an ideal reservoir of plant nutrients, which are gradually released to meet the requirements of the growing plant. At the same time acid humus supplements the supply by influencing the extraction of nutrients from the mineral fraction of soils. Organic matter creates favourable physical conditions for crop growth: promotes granulation of structure by reducing plasticity; influences cohesion and increases the water-holding capacity of the soil. Organic matter in the surface also influences the temperature of soils thus conditioning seasonal growth.

Depending on organic carbon content, soils are classified as follows: over 30 per cent, peats; 20 to 30 per cent, peaty; 10 to 20 per cent, slighty peaty; and those with 6 to 10 per cent organic carbon are usually referred to as 'organic'. In the case of the terms 'peaty', 'slightly peaty' and 'organic', the mineral textural class is included in the definition of the soil, *e.g.* peaty sandy loam; slightly peaty clay loam; organic loam. The surface horizon of mineral soils in Ireland normally contains 3-6 per cent organic carbon.

Nitrogen, which is normally present in soils in relatively small amounts, is extremely important as a plant nutrient. It is easily lost from the soil by leaching, and supplies need to be constantly replenished. The ratio of carbon to nitrogen indicates generally the degree of decomposition of organic matter; a ratio between 8 and 15 is considered satisfactory, and indicates conditions favourable to microbial activity. Ratios higher than 15 are associated with a slower decomposition rate and with the accumulation of raw organic matter or, in more extreme cases, with peat development, and are indicative of unfavourable conditions for microbial activity.

*Free Iron*

A localised accumulation of free iron in a soil profile ($B_{ir}$ horizon) as is evidenced in brown podzolic and podzol soils, indicates that leaching and podzolising processes have been operative to a considerable degree. On the other hand, a uniform distribution of free iron throughout a profile, as is the case in the Brown Earths, indicates that there has been little tendency towards podzolisation.

*Available Nutrients*

The existing levels of available nutrients in the soil are generally taken as a basis for fertiliser recommendations for specific crops. It is not intended that the nutrient analyses for the various soil profiles (Appendix I) be used for this purpose, since detailed random soil sampling and analyses are required before accurate recommendations can be made. However, certain general conclusions can be drawn, and the analyses reveal the variation in nutrient status with soil depth, and between different soils.

## Analytical Data in relation to the main Soil Associations in the County

Since the soils have been segregated into Associations, principally on the basis of parent material characteristics, the analytical data for the main associations are discussed with reference to geologically different parent materials. In this way, the influence of one of the chief soil forming factors, responsible to a large degree for inherited physical and chemical characteristics and also influencing the suitability of the soils for specific land use practices, can be assessed. The findings may also be relevant to similar soils derived from like parent materials elsewhere in the country.

## Soils derived from Parent Materials, mostly of known Geological Composition

*Clonroche Association* (*Ordovician shale drift*)

The texture of the soils derived from this parent material generally falls into the loam or clay loam category. The poorly-drained Kilpierce Series has a somewhat higher content of silt and clay throughout the profile than the well-drained Clonroche Series. The hill or Slievecoiltia Series also has a higher silt content throughout the profile than the Clonroche Series.

Cation exchange capacity of the soils in the association ranges from 15.2 m.eq. in the surface of the Clonroche Series to 20 m.eq./100 g. in the Slievecoiltia, and decreases with depth in all cases in line with decreases in clay and organic matter contents. The highest cation exchange capacity figure is associated with the relatively high organic content of the surface horizon of the Slievecoiltia Series.

The pH of the surface soil ranges from 5.2 to 5.6 throughout the association and increases with depth in each series. Base saturation in the surface soil varies from

25 per cent in the Slievecoiltia Series to 47 in the well-drained Clonroche Series. In the soils of this association, an increase in base saturation with increasing profile depth occurs, except in the case of the Slievecoiltia Series. The close relationship with pH trends is obvious.

Carbon and nitrogen contents are highest in the surface horizon of the Slievecoiltia hill soils (C=8.2 per cent and N=0.63 per cent). The poorly-drained Kilpierce Series has a slightly higher carbon content (4.9 per cent) in the surface soil than the well-drained Clonroche Series (4.4 per cent), and a slightly higher nitrogen content (0.39 compared with 0.36 per cent). The C/N ratio in each case, however, only varies between 12.2 and 12.6, and generally decreases at about an equal rate with depth in both soils.

Free iron content of the soils derived from Ordovician shale drift is comparatively uniform throughout, except for the considerable accumulation in the B horizon of the Slievecoiltia hill soils, a reflection of the greater degree of leaching undergone by the soils of this series.

Available nutrients are inherently low throughout the soils of this association, except for a medium-high potassium level in the surface horizon of the Slievecoiltia Series. This is conceivably due to the influence of the vegetative cover prevailing.

*Kiltealy Association* (*Granite and granitic drift*)

The soils of this association have a high proportion of the coarser textured sands which reflect the relative resistance to weathering processes and coarse textured nature of the parent material. Textures generally fall into the loamy coarse sand and coarse sandy loam categories, the coarse sand content ranging between 55.7 and 74.3 per cent, except in the poorly-drained Ballywilliam soils. The much lower coarse sand content, 21.8 per cent in the $A_1$ horizon increasing to 51.3 per cent in the CG horizon, and the relatively higher silt and clay contents of the poorly-drained Ballywilliam profile are notable, and must be regarded as a reflection of a more effective weathering regime obtaining under the poor drainage conditions. Fine sand varies between 10.7 and 23.5 per cent throughout the soils of the association. Clay content in general is low, not exceeding 13.1 per cent in any horizon and falling to 2.6 per cent in the $A_{22}$ horizon of the Blackstairs Series. The silt content, which in general is low in the well-drained soils, shows a remarkable increase in the poorly-drained Ballywilliam Series, where it ranges from 20.6 to 42.2 per cent throughout the profile, compared with a range of 9.2 to 14.9 per cent in the well-drained Kiltealy Series and 11.8 to 17.7 per cent in the Blackstairs hill soils.

Cation exchange capacity of the soils in general is low, except in the case of surface horizons where the increase would appear to be largely due to organic matter influence. The highest cation exchange capacity (33.6 m.eq./100 g.) is associated with the $A_0$ horizon in the hill soils (Blackstairs Series), the surface horizons of the Kiltealy and Ballywilliam Series having much lower values (13.6 and 12.0 m.eq./l00 g. respectively).

Due to the acidic nature of the parent material, soil reaction is strongly to moderately acid throughout all three profiles, with the exception of $A_{11}$ horizon of the Kiltealy Series, where it is only moderately acid (pH 5.9). This series is also characterised by a high degree of base saturation relative to pH throughout the profile in comparison with the poorly-drained Ballywilliam Series, where the base saturation is low, ranging from 23 per cent in the $A_1$ horizon to 55 in the B/CG horizon. The high values for base saturation at moderate to low pH values, within the soils of the Kiltealy Series, are a peculiar feature of soils of this physical nature. This phenomenon is due mainly to the low buffering capacity of the soils as a result of low contents of exchange complex substances such as humus and clay. The exchange complex of the Blackstairs Series is lowly saturated, ranging from 6 per cent in the $A_0$ horizon to 31 in the C horizon.

Carbon and nitrogen contents in the surface horizons are medium. The highest values occur in the $A_0$ horizon in the Blackstairs hill soils (C=9.8 per cent, N=0.50 per cent) and lowest in the $A_{11}$ horizon of the well-drained Kiltealy Series (C=4.5 per cent, N=0.30 per cent). In the poorly-drained Ballywilliam Series the carbon content is 6.7 per cent in the $A_1$ horizon and the nitrogen content 0.4 per cent. In all series, a decrease in carbon and nitrogen contents occurs with depth, except in the hill soils where a slight increase is found in the B horizon as a result of secondary accumulation in the course of a podzolisation process. The C/N ratio in the $A_0$ horizon of the Blackstairs Series is 19.6, in the Ballywilliam Series 16.8, and in the Kiltealy soils 15.0.

Free iron content varies throughout the profile for the different series, being lowest in the hill soils and highest in the poorly-drained-soils. There is an increase in the B horizon in each series of the association, but the most significant accumulation occurs in the B horizon of the Blackstairs soils, indicating a greater degree of leaching and podzolisation.

Available nutrients are very low throughout these soils. The medium-high available potassium level in the surface horizon of the Kiltealy Series is possibly the only evidence forthcoming of the potassium-bearing minerals in the parent material. Figures for total as distinct from available potassium in these soils, however, fully reflect the inheritance in this respect from the parent material. It would appear that the proportion of the total potassium becoming available to plants is very small and that it becomes available only over a considerable period.

*Old Ross Association* (*Ordovician shale-granite drift*)

The soils of this association are derived from a mixed drift of Ordovician shale and granite origin and, consequently, the analytical data tend to be intermediate between those for the Clonroche Association derived from Ordovician shale and those for the granite-derived soils of the Kiltealy Association. The granite influence is seen in the textures, which generally fall into the sandy loam category. Coarse sand increases with depth from 41.6 to 46.4 per cent in the well-drained Old Ross Series, and from 31.6 to 59.6 per cent in the poorly-drained Knockroe Series. The fine sand content is fairly uniform throughout the profiles in this association. Silt content is also quite uniform although an increase is obvious in the $A_{11g}$ and $A_{12g}$ horizons of the poorly-drained profile. The clay content throughout this association is somewhat higher than in the soils of the Kiltealy Association derived from granite drift, and is lower generally than that in the soils of the Clonroche Association derived from shale drift. This is mainly a reflection of the nature and composition of the parent material. In the well-drained Old Ross Series the clay decreases with depth from 12.7 per cent in the surface to 7.8 at the 21 inch depth, while in the poorly-drained Knockroe Series, it decreases from 17.0 per cent in the $A_{11g}$ horizon to 6.4 in the CG horizon.

Cation exchange capacity in both series is very low except in the surface horizons. The pH and base saturation in the $A_1$ horizon of the well-drained soils are quite low, but they increase with depth, and a rather similar pattern exists in the poorly-drained Knockroe soils.

Carbon and nitrogen contents in the surface horizons are generally low. In the Old

Ross Series carbon content is 3.12 per cent and nitrogen 0.20 per cent in the $A_{11}$ horizon, and in the Knockroe Series carbon content is 4.25 per cent and nitrogen 0.28 per cent in the $A_{11g}$ horizon, both decreasing with depth in each series. The C/N ratio is in the medium to high range (15 approximately) in the surface soil in both series.

Free iron content in the Old Ross Series is relatively high, decreasing gradually from 3.14 per cent in the $A_{11}$ horizon to 1.99 in the A/C horizon. The level of free iron is relatively low in the Knockroe Series, ranging from 0.84 per cent in the $A_{11g}$ horizon to 0.22 in the $A_{2g}$ horizon and to 1.09 in the $B_2G$ horizon. Except for some medium-high magnesium levels throughout the profile of the Knockroe Series, available calcium, phosphorus, potassium and magnesium are very low throughout the soils of this association.

*Ballindaggan Association* (*Mica-schist drift*)

In this association, the well-drained Ballindaggan Series is characterised by the highest clay content in the surface, giving a clay loam texture. The texture becomes a sandy loam with depth. Clay content decreases from 29.5 per cent in the surface to 14.4 below the 15 inch depth. Clay content throughout the profile in this series is the highest within the association. The highest total sand content (60.2 per cent) is recorded in the A/CG horizon of the poorly-drained Templeshanbo Series and the lowest (26.5 per cent) in the surface horizon of the same soil. However, it is notable that the poorly-drained Templeshanbo soil has the highest content of silt throughout the profile, varying from 59.4 per cent in the surface to 39 below the 15 inch depth.

Cation exchange capacity decreases from 14.2 m.eq./100 g. in the surface to 4.5 at the 15 inch depth in the well-drained Ballindaggan Series, and is associated with a decrease in clay and organic matter. The highest cation exchange capacity (40 m.eq./100 g.) occurs in the surface horizons of the Black Rock Mountain Series, and is associated largely with the high organic matter content. This figure decreases to 5 m.eq./100 g. at the 23 inch depth. In the poorly-drained Templeshanbo Series a decrease down the profile from 14.4 to 2.0 m.eq./100 g. occurs.

The pH is highest in the Ballindaggan Series, increasing from 5.9 to 6.3 with increasing profile depth, and lowest in the Black Rock Mountain Series, increasing from 4.5 to 5.0. The base saturation is highest in the poorly-drained Templeshanbo Series, increasing from 36 to 95 per cent with profile depth, intermediate in the well-drained Ballindaggan Series (20 to 42 per cent), and lowest in the Black Rock Mountain Series (5 to 22 per cent).

Carbon and nitrogen contents are highest in the surface soil of the Black Rock Mountain Series (C=24 and N=0.67 per cent) which also has the widest C/N ratio (35.8). The poorly-drained Templeshanbo Series has a carbon content of 9.4 per cent, 0.58 per cent nitrogen and a C/N ratio of 16.3 in the surface horizon, while the well-drained Ballindaggan Series has a carbon content of 4.9 per cent, 0.35 per cent nitrogen and a C/N ratio of 14.0 in the surface horizon. Although the Ballindaggan soils have relatively the lowest levels of organic carbon and total nitrogen associated with a lower level of soil organic matter, nevertheless, as indicated by the C/N ratio, the character of the organic matter present is superior.

Free iron content varies, being highest in the surface horizon of the Ballindaggan Series, lowest in the Templeshanbo Series and intermediate in the Black Rock Mountain Series. There is a direct relationship between clay content and free iron level in these three soils. Although an increase in free iron in the colour (B) horizon of the

Ballindaggan soil is not apparent from the analysis, when the free iron figures for the profile are related to the clay figures, an increase in the iron-clay ratio exists in this horizon. A significant increase in free iron occurs in the $B_2$ horizon of the Black Rock Mountain Series indicating considerable translocation as a result of leaching in these soils.

The available nutrient status is low to extremely low throughout the soils of this association, except in the surface soil of the Black Rock Mountain Series where higher levels of phosphorus and potassium prevail. A similar pattern obtains in the Slievecoiltia hill soils of the Clonroche Association for which an explanation has been postulated.

*Ambrosetown Association* (*Cambrian shale-quartzite drift*)

The texture of the soil derived from this parent material falls into the loam to clay loam range, the relative sand, silt and clay contents being fairly uniform throughout the profile. The coarse sand (25.5 per cent) and fine sand (21.3 per cent) contents are highest in the surface horizon, and generally decrease throughout the profile, while the silt (32.2 per cent) and clay (21.0 per cent) are lowest in the surface horizon. Silt increases to a maximum of 37.3 per cent in the (B) horizon at the 10-21 inch depth, and clay increases to 27.3 per cent in each horizon below approximately the 5 inch depth.

Cation exchange capacity throughout the profile is rather low, decreasing from 11.4 m.eq./100 g. in the $A_{11}$ horizon to 8.4 at the 21-36 inch depth.

The pH figures are in the medium range, increasing from 5.9 in the surface to 6.2 with depth; per cent base saturation figures are relatively high and increase from 76 to 90 with depth, except in the (B) horizon where a drop to 58 occurs.

Organic carbon content in the surface is low (2.8 per cent) and it decreases down the profile. Nitrogen level (0.23 per cent) and C/N ratio (12.2) are medium for the county; both decrease with depth.

Free iron content is relatively high for County Wexford soil—1.54 per cent in the surface increasing to a maximum of 2.31 per cent in the (B) horizon.

With the exception of available magnesium which is high in the surface horizon, and available calcium which is medium, levels of the various nutrients are low or very low in the subsoil. Phosphorus and potassium are very low in the surface horizon also.

*Baldwinstown Association* (*Carboniferous limestone-Cambrian shale drift*)

The soils developed from this parent material are closely akin in physical and chemical characteristics to those of the Ambrosetown Association and need not be discussed further here. The only significant difference occurs in pH levels, which are somewhat higher in the Baldwinstown Series owing to the influence of the Carboniferous limestone drift. The pH ranges from 6.0 in the surface to 6.7 at the 36-45 inch depth. Likewise the base saturation levels are generally higher throughout the profile than in the Ambrosetown soil. The relative enrichment of the (B) horizon with free iron is not so pronounced in the Baldwinstown soils.

Available calcium is medium-high throughout the profile, but available phosphorus and potassium are very low. Magnesium level is medium in the surface and low-medium throughout the profile.

*Bannow Association* (*Sands intermixed with Cambrian shale drift*)

The influence of the added sands can be clearly seen in the surface horizons of soils derived from this parent material. Coarse sand in the 0-7 and 7-18 inch depths is 54.5 and 47.4 per cent respectively, and decreases to 20.6 and 29.5 per cent at the lower depths. Fine sand follows the same pattern. Silt and clay, on the other hand, increase from the A to the B horizon, the silt fraction from 18.5 per cent to 39.2 and clay from 12.8 per cent in the surface to 28.8 at the 18-23 inch depth.

Cation exchange capacity throughout the profile is relatively low and decreases with depth from 11.7 to 6.5 m.eq./100 g.

The pH and base saturation for these soils have been considerably increased, in many cases, by frequent applications of calcareous sea sand over the years. The result is that the soil reaction is moderately alkaline with pH ranging from 8.0 to 8.2, and the exchange complex is completely saturated with bases. Carbon and nitrogen contents are low, the former decreasing from 2.7 per cent in the surface to 0.5 below 23 inches, and the latter from 0.26 to 0.04 per cent. The C/N ratios are normal throughout the profile.

Free iron content is low, but there is a significant increase from 0.81 per cent in the surface to 1.73 in the 18-23 inch region. The extra high level of available calcium in this profile is notable. Available phosphorus is medium in the surface, but becomes very low with increasing soil depth. Potassium level is high in the surface and throughout the profile, particularly at the 18-23 inch depth. Magnesium is low-medium throughout the profile.

*Rathangan Association* (*Cambrian shale-quartzite-Irish Sea drift*)

Owing to the complex character of the glacial drift, the soils of the Rathangan Association are derived from parent material of a heterogeneous nature. The relatively high silt contents obtaining throughout the profile are a reflection of the Cambrian shale and Irish Sea components of the drift parent material; the high pH levels in the lower horizons also indicate Irish Sea drift influence.

The texture of the surface horizon of the soils in this association generally falls into the loam category, changing to a clay loam in the CG horizon. Coarse sand content varies between 19.2 and 26.9 per cent, fine sand between 14.0 and 19.6 per cent, and the silt between 38.0 and 43.3 per cent within the profile. Clay content increases from 15.5 per cent in the surface to 25.4 in the $B_{2t}$ horizon at the 18-28 inch depth.

Cation exchange capacity values are low, particularly in the surface (9.2 m.eq./100 g.) while the base saturation increases in line with an increase in the pH, from 43 per cent in the surface to complete base saturation at the 18-28 inch depth.

Carbon and nitrogen contents in the surface are also relatively low (C=3.21; N=0.25 per cent) and decrease rapidly with depth, while the C/N ratio decreases from 12.8 in the surface to 6.0 in the CG horizon.

Free iron content is variable throughout the profile, ranging from 0.88 per cent in the surface to 2.44 in the CG horizon with a pronounced increase to 2.77 per cent in the $B_{21g}$ horizon at the 11-18 inch depth.

Available calcium is generally medium-high throughout the profile, but phosphorus and potassium are very low. Magnesium level is very low in the surface, but becomes very high with increased depth.

*Macamore Association (Irish Sea drift)*

The soils derived from this drift material are poorly-drained, and this condition must be attributed in part to the high clay content particularly in the lower depths.

Clay increases from 18 per cent in the surface horizon to 46.5 at the 15-36 inch depth, and to 50.6 below 36 inches. Parallel to this the coarse sand content decreases from 37.7 to 7.2 per cent with depth. Fine sand and silt levels are somewhat variable throughout the profile; the maximum fine sand content occurs in the $A_{2g}$ horizon and the maximum silt content in the CG horizon.

The calcareous nature of the drift is reflected in the pH values, which increase from 5.5 in the surface to 7.7 below the 36 inch depth. Base saturation figures are relatively high throughout the profile.

The organic matter content is relatively low, organic carbon decreasing from 3.25 per cent in the surface to 0.29 below the 36 inch depth, and nitrogen from 0.27 to 0.07 per cent. The C/N ratio also decreases from 12.0 to 4.1 with depth.

Free iron content is in the medium range, relative to the soils within the county, and increases from 1.14 per cent in the surface to 1.42 below 36 inches. There is, however, a marked increase in the $B_{2t}G$ horizon. This is typical of gleys in general, and is associated with intermittent oxidizing and reducing conditions due to a fluctuating water-table in this zone. The increased clay content in this horizon also influences the level of free iron present.

Available potassium and magnesium are very high throughout the profile, while available phosphorus is very low. Calcium is medium-high and high throughout the profile.

*Hook Head Association* (*Carboniferous limestone drift*)

The texture of the soils derived from this parent material is characterised by a considerable increase in clay content in the $B_{2t}$ horizon at the 20-26 inch depth, and a considerable increase in silt content in the B/C horizon at the 26-36 inch depth. The textures vary accordingly throughout the profile from loam in the $A_{11}$ horizon to clay in the $B_{2t}$ horizon, to silt loam in the B/C horizon.

Cation exchange capacity also varies throughout the profile, ranging from 13.2 m.eq./100 g. in the surface horizon to 14.8 in the $B_{2t}$ horizon, coinciding with the increase in clay content. The A/B and B/C horizons have a cation exchange capacity of 11.2 and 10.0 m.eq./100 g. of soil respectively. Due to the calcareous nature of these soils, pH levels are very high (7.8 to 8.2) throughout the profile. The exchange complex is completely saturated with bases, and the presence of carbonates is indicated by the figures for total neutralizing value, which range from 5.1 per cent in the surface to 21.9 at the 36 inch depth.

Carbon content decreases from 3.36 per cent in the surface to 1.08 at the 36 inch depth. The nitrogen content and C/N ratio also decrease with depth.

Free iron content shows a marked increase in the $B_{2t}$ horizon (2.39 per cent) compared to the A/B (2.01 per cent) and the B/C (0.88 per cent) horizons and coincides with the distinct clay increase in the $B_{2t}$ horizon.

Available nutrient levels are medium in this soil, except for the extra high calcium throughout the profile, and the extra high magnesium in the $B_{2t}$ horizon—a notable feature of these soils.

*Broomhill Association* (*Old Red Sandstone drift*)

The texture of the soils derived from this parent material falls generally into the loam to sandy clay loam category. Coarse sand increases with depth from 26.7 per cent in the surface to 53.3 at the 21 inch depth, while the fine sand, silt and clay contents show a gradual decrease with depth.

Cation exchange capacity is rather high, ranging down the profile from 16.3 to 15.1 m.eq./100 g. This is due principally to the moderate levels of organic matter at the lower depths. The soils of this association, in many cases, have been modified to a considerable extent by liberal applications of sea sand and sea weed. This is reflected in the very high pH levels (7.6 and 7.5) obtaining, and in the fact that the exchange complex throughout the profile is base saturated.

The profile is characterised by unusually high contents of organic carbon and nitrogen in the lower horizons. Both decrease from 4.30 and 0.38 per cent in the surface to 1.8 and 0.15 per cent respectively at the 21 inch depth. The C/N ratios range from 11.3 in the surface to 12.0 at 21 inches. Free iron content is relatively high throughout the profile.

Available calcium is high throughout the profile of this soil. In addition, potassium and magnesium are relatively high, but phosphorus is low. The relatively high levels of most nutrients in these soils is a reflection of the liberal application of organic and inorganic manures.

*Fethard Association* (*Avonian shale-calciferous sandstone drift*)

The soils derived from this parent material fall into the loam to clay loam categories, and are characterised by a marked clay increase in the $B_{2tg}$ horizon. Clay content is relatively high, particularly in the Fethard Series. Silt content in both series is reasonably high, but the poorly-drained soils of the Ballinruan Series have a slightly higher content throughout the profile. The lowest coarse sand contents (6.8 and 8.8 per cent) and the highest levels of fine sand (28.0 and 27.2 per cent) occur in the surface horizons of both series.

Cation exchange capacity in the better drained Fethard soils is comparatively low, considering the clay content, and decreases with depth. A considerable drop in cation exchange capacity below the 4 inch depth is noticeable in the poorly-drained soils of the Ballinruan Series and may be associated with the parallel drop in organic matter.

Due to the calciferous sandstone influence, the pH values are high in all cases, except in the surface horizon of the Ballinruan Series, where the pH is 5.5 and the base saturation 73 per cent. In general, however, under unlimed conditions soil reaction is slightly acid to moderately alkaline, and the exchange complex is highly to completely base saturated.

Carbon and nitrogen contents in the surface of the Fethard Series are lower than in the Ballinruan Series. The C/N ratio is also lower (14.6 compared with 17.4). Free iron content is relatively high (1.8 increasing to 4.7 per cent with depth) in the Fethard Series, but is much lower in the Ballinruan Series.

Available calcium is extra high in the A horizon of the Fethard Series, but changes to medium-high with increasing profile depth. The high surface level is the result of lime application which is reflected also in the T.N.V. values in the surface horizons. Available phosphorus and potassium are very low. Magnesium level, however, is satisfactory throughout the profile. In the Ballinruan Series, calcium content is medium, and phosphorus is very low throughout the profile. Potassium is low-medium in the surface horizon, but is very low in the lower depths. Available magnesium is medium in the upper horizons, becoming extra high below the 28 inch depth.

*Forth Commons Association* (*Cambrian quartzite*)

These soils are generally coarse textured, but physical composition is variable within the profile. A distinct clay accumulation occurs in the $B_{22}$ horizon at the 5-26 inch depth.

Cation exchange capacity varies throughout the profile. The surface horizon ($A_0$) has the highest cation exchange capacity (31.3 m.eq./100 g.) and, with the exception of the $B_{22}$ horizon, which has an exchange capacity of 11.8 m.eq./100 g., the figure for the remaining horizons is very low. The high exchange capacity of the surface horizon is a reflection of the organic matter content in that zone whilst the second high in the $B_{22}$ is conditioned by the distinct clay increase in this horizon.

Owing to the acidic and coarse nature of the parent material, and the somewhat elevated position of the area, the soils are intensely leached. Hence the pH values in the profile are very low with a strong acid reaction throughout. Analytical tests failed to reveal exchangeable bases throughout the profile except in the surface horizon, where the base saturation is 32 per cent.

An horizon of raw organic matter has accumulated on the surface, with a carbon content of 21.4 per cent, 0.68 per cent nitrogen and a C/N ratio of 31.5. Below the surface, a sharp decrease in both carbon and nitrogen occurs. Apart from the iron pan and the $B_{22}$ horizon, the free iron content in the remaining horizons is low.

The levels of major nutrients are relatively satisfactory in the thin $A_0$ horizon of these soils, but in the lower horizons they are very low in all cases.

**Soils Derived from Parent Materials of mixed Geological Composition**

*Screen Association* (*End-morainic deposits*)

The soils of this association are of relatively recent origin and are derived from very coarse-textured parent material. Consequently, they are coarse textured, generally falling into the loamy coarse sand category and containing little by way of fine colloidal material. Throughout the association coarse sand content ranges from 60.9 to 79.1 per cent in the surface horizons, but varies somewhat with depth; the minimum content in any horizon is 54.4 per cent. Fine sand content is relatively low, but remains comparatively uniform throughout the profiles of the three series within the association. Silt and clay contents are very low, particularly in the excessively-drained Screen Series.

Cation exchange capacity, as would be expected, is very low throughout the profile in the Screen and Randallsmill Series, but considerably higher in the Ballyknockan Series due to the higher content of colloidal material, principally organic matter.

pH and base saturation values are generally low, the highest pH (6.2) being found in the 15-36 inch depth of the Ballyknockan Series and the highest base saturation (75 per cent) in the 23-30 inch depth of the Randallsmill Series.

The poorly-drained Ballyknockan soils are highest in organic matter, the organic carbon in the surface being 7.8 per cent, but decreasing to 0.48 at the 15-36 inch depth; nitrogen content decreases from 0.43 per cent to 0.03 with depth. C/N ratios are also relatively high in this profile. The Screen and Randallsmill Series are very low in organic matter, the carbon and nitrogen contents in the surface horizon of the excessively-drained Screen soils being only 1.9 and 0.12 per cent, respectively, but even more notable is the very low level of carbon (0.22 per cent) in the $A_{1p}$ horizon of the Randallsmill Series.

Free iron throughout the soils of this association is low, the highest content recorded being 1.75 per cent in the surface horizon of the Ballyknockan Series.

Available calcium is very low throughout the soil profiles, except in the A horizons of the Ballyknockan and Randallsmill Series where it is low-medium. Both phosphorus and potassium are very low in all cases; magnesium level generally is very low also.

*Broadway Association* (*Outwash sands and gravels*)

The soils developed on this parent material are sandy loams. There is little textural variation with profile depth except in the case of the clay fraction, which increases from 14.0 per cent in the surface to 19.5 in the $(B)_2$ horizon.

Cation exchange capacity is also comparatively low throughout the profile, decreasing from 12.4 in the surface to 6.4 m.eq./100 g. at the 25 inch depth. Soil reaction is slightly acid throughout (pH 6.2), but the exchange complex has a high degree of saturation (81 to 92 per cent).

Carbon and nitrogen levels are low in the surface and decrease with depth. The C/N ratio in the surface is about normal.

Free iron content is medium and shows a slight increase from 1.54 per cent in the surface to 1.67 coinciding with the slight clay increase in the $(B)_2$ horizon.

The extra high potassium and magnesium levels in the surface horizon reflect the practice of applying sea-weed and other manures on many of these soils. Whilst the level of calcium is only slightly less than satisfactory in this soil, phosphorus generally is very low.

*Killinick Association* (*Morainic gravels and sands*)

The soils developed from this parent material are sandy loams. Little textural variation occurs within the profile above the 21 inch depth. Below this depth the considerable increase in coarse sand and corresponding decrease in the remaining size fractions is a reflection of the coarse textured nature of the parent material. In general these soils are more coarse textured than the Broadway soils although both qualify for the sandy loam textural class.

Cation exchange capacity values are very low, decreasing from 9.7 to 4.0 m.eq./100 g. with depth. In this respect these soils have lower values than those prevailing in the soils of the Broadway Association.

pH and base saturation levels are in the medium range; pH increases from 5.7 in the surface horizon to 6.7 below 21 inches; base saturation figures are somewhat variable, the lowest level, 55 per cent, occurring in the surface horizon and total saturation in the C horizon below 21 inches.

Carbon and nitrogen in the surface soil are low, but the C/N ratio is relatively high. Free iron content throughout the profile is in the low-medium range, the highest value of 1.22 per cent occurring in the $A_{13}$ horizon.

Available calcium is medium, potassium is medium-high, and magnesium is very high in the surface horizon of the profile. The levels of these nutrients decrease with increasing soil depth. Available phosphorus is very low throughout the profile.

*Carne Association* (*Outwash sands and gravels with local granite influence, overlying dense drift*)

Texture is remarkably uniform with increasing depth of profile in the Carne Series and is a sandy loam throughout. Cation exchange capacity values are low. Although the surface horizon is moderately acid, reaction becomes nearly neutral with increasing depth. Similarly the exchange complex is relatively unsaturated in the surface, but it becomes highly saturated with depth increase.

Carbon and nitrogen values are low in the surface, and the C/N ratio is medium. Free iron levels are low throughout the profile, and no worthwhile eluviation is indicated.

Available calcium is low-medium, while potassium and magnesium are medium-high throughout the profile. Although phosphorus is medium-high in the surface it is very low in the sub-surface horizons.

In the Nethertown Series, with the exception of the B/C horizon where there is a sizeable increase in the coarse sand fraction, the upper horizons are texturally uniform, and there is a greater proportion of coarse sand and less of the finer fractions than in the Carne Series.

Cation exchange capacity values are somewhat higher in the Nethertown than in the Carne soils, a reflection of the slightly higher organic matter content of the former. Soil reaction is moderately acid and base saturation low throughout the profile of the Nethertown Series. Levels of free iron are low in all except the $B_2$(ir) horizon, which has a decided accumulation.

Available calcium and phosphorus are very low throughout the Nethertown profile, whilst magnesium is medium in the surface but very low in the lower horizons. Available potassium is medium throughout the profile.

### Soils Derived from Parent Materials of Alluvial Origin

*Lake Alluvial Soils*

Two associations within the county, Millquarter and Coolaknick are of lake alluvial origin, but otherwise they bear little resemblance to each other.

The soils of the Millquarter Association have a rather uniform texture throughout the profile, generally falling into the silty clay loam category. The finer silt and clay fractions are in excess of 87 per cent of the mineral fraction except in the $C_{1g}$ horizon. Organic carbon and nitrogen levels are high throughout the profile. Organic carbon varies from 10.4 per cent at the surface to 3.7 at the 18-28 inch depth. Nitrogen decreases from 0.72 per cent in the surface to 0.16 with increasing depth. The C/N ratio is variable throughout the profile. Cation exchange capacity is relatively high, ranging from 22.4 to 7.6 m.eq./100 g. with depth, and is a reflection of the clay and organic matter levels prevailing.

Reaction is strongly acid (pH 4.9) throughout the profile, and the base saturation ranges from 35 to 64 per cent. Free iron content, relatively high in the surface and sub-surface horizons (2.33 and 2.55 per cent, respectively), decreases with depth to 0.74 per cent at the 18-23 inch depth.

Except for the medium-high available potassium level in the $A_{11g}$ horizon, the remaining nutrients are extremely low at all depths.

The Coolaknick Series varies considerably in texture throughout the profile, the surface horizon falling into the slightly peaty, clay loam category. The surface horizon of the third lake alluvial soil, the Oulartleigh Series, is a peat. Cation exchange capacity is also very variable throughout the profiles in these two series, but is highest in the surface horizons.

The pH and base saturation values of the Coolaknick Series are generally high, pH ranging from 5.7 to 7.4 with depth and base saturation from 80 per cent to complete saturation. The Oulartleigh Series, however, has low pH and low base saturation values.

Carbon and nitrogen are very high in both series. Carbon-nitrogen ratios are very wide in the Oulartleigh Series. Free iron is generally medium throughout the two soils.

Available magnesium is extra high throughout the Coolaknick Series, and potassium is high in the surface but very low in the sub-soil. Available calcium is high throughout the profile and phosphorus is low except for a moderate level in the surface. In the Oulartleigh Series, calcium, phosphorus, potassium and magnesium are very low.

*River Alluvial Soils*

Two soils derived from river alluvium have been segregated within the county: Clohamon Series derived from River Slaney alluvium; and Kilmannock Series derived from the River Barrow alluvium.

While the profile of the Clohamon Series has a loam texture, it becomes very coarse below the 26 inch depth. Cation exchange capacity is low throughout the profile except in the $B_{2(ir)}$ horizon (14.7 m.eq./100 g. of soil). pH values are high, ranging from 6.6 in the surface to 6.9 below the 26 inch depth. Base saturation values are variable and exceptionally low for the pH obtaining. Carbon and nitrogen are low throughout the profile, a slight secondary increase in both occurring, however, in the $B_{2(ir)}$ horizon at the 19-26 inch depth.

Free iron is generally high and shows a definite increase in the $B_{2(ir)}$ horizon. Available calcium is low-medium, magnesium is medium, and both phosphorus and potassium are very low.

In the Kilmannock Association the texture of the horizons varies somewhat, but is generally characterised by a very high silt content (70 per cent approximately) except in the A/CG horizon, which is a sandy loam with the sand fraction exceeding 70 per cent. Cation exchange capacity varies from 12.8 in the surface to 9.8 m.eq./100 g. at the 29-36 inch depth, but the A/CG horizon has a much lower value owing to the limited amounts of clay and silt obtaining.

pH values throughout the profile are very high, increasing from 7.3 at the surface to 8.3 at the 29-36 inch depth. The exchange complex is completely saturated throughout the profile due to the presence of large amounts of carbonates. The total neutralizing value ranges from 16.2 per cent in the surface to 84.9 in the CG horizon.

Free iron is uniform throughout the profile and is generally in the medium range relative to the soils of the county. The extra high levels of available calcium and magnesium are notable. Except for the very low level in the A/CG horizon, potassium is extra high in the remainder of the profile. Available phosphorus is low throughout the profile.

*Estuarine Alluvial Soils*

The soils of the Kilmore and Wexford Slob Associations are derived from estuarine alluvium; both associations, however, vary considerably in physical and chemical composition.

The profile of the Kilmore Slob Series is variable in texture, the surface horizons generally falling into the sandy loam category, and the lower horizons into the sand and loamy sand categories. Cation exchange capacity decreases down the profile from 14.0 in the surface to 0.4 m.eq./100 g. at the 28-30 inch depth. pH levels throughout the profile are very high and the exchange complex is completely saturated with bases. Total neutralising values increase from 2.1 per cent in the surface to 11.0 with depth.

Carbon and nitrogen values are low in the surface of the Kilmore Slob soils and in general decrease with depth. The C/N ratio in the surface horizons is medium but becomes low with depth. Free iron is medium to low and decreases with depth. Available calcium and magnesium are extra high throughout the profile. Available phosphorus is low, available potassium is very high in the surface, but it reaches very low levels with increasing soil depth.

The soils of the Wexford Slob Series are characterised by a high content of silt throughout the profile, and the texture generally falls either into the silty clay loam or silt loam categories. Cation exchange capacity throughout the profile is generally high, particularly in the surface horizon. pH values are also high, increasing from 6.3 in the surface to 7.5 at the 30-48 inch depth. Although the exchange complex is relatively unsaturated in the surface, it becomes completely base saturated below the 12-30 inch depth.

Carbon and nitrogen are high in the surface of the Wexford Slob soils but rapidly decrease with depth. The C/N ratio is variable throughout the profile. Free iron contents are in the medium range relative to soils of the county. Available calcium is medium-high in the surface, but becomes extra high in the CG horizon. Available potassium and magnesium are high to extra high throughout the profile. Available phosphorus is medium in the surface but declines considerably in the sub-surface depths.

## Other Soils in the County

As the remaining soils in the county occur as undelineated series within complexes or as variants within associations and complexes, and are too intricate in distribution or too small in extent to map, the analytical data for these are not discussed here. However the data are presented with those for the other soils in Appendix I.

## General Conclusions

From an examination of the laboratory data on the soils developed from different parent materials, under rather similar climatic and topographic conditions, some general conclusions may be drawn.

The well-drained soils derived from glacial drift material rich in components such as Ordovician shale, mica-schist, Cambrian shale, granite and Old Red Sandstone are generally friable with desirable structure and more or less uniform medium texture, which render them suitable for a wide range of land use practices. Their poorly-drained counterparts, however, lack many of these qualities and have a much more limited use range.

Where the drift material is of limestone origin as in the Hook Head Association, or is influenced by calcareous materials as in the Fethard Association, the soils are characterised by the presence of a B horizon relatively enriched with clay. This is also a feature of the surface water podzolic Gleys of the Macamore and Rathangan Associations. Generally, soil texture is on the ‘heavy’ side in these soils. An enrichment in free iron occurs in the region of the $B_t$ horizon. The ground-water gleys, e.g. Temple-shanbo, Kilpierce and Ballywilliam Series, show no increase in free iron content in any horizon, but they are generally higher in silt content than the well-drained series in the corresponding association.

The alluvial soils, except the Clohamon and Kilmore Slob Associations, are generally high in silt content. The soils of ‘lightest’ texture within the county occur on granite drift and on end-morainic sands and gravels, e.g. Kiltealy and Screen Associations. Soils derived from glacial outwash materials, such as the Broadway soils, are intermediate in texture.

The cation exchange capacity of the majority of surface soils in the county ranges between 6 and 18 m.eq./100 g. The Screen Series, being of very sandy texture, however, has a lower value. Soils occupying the more elevated areas, and those of alluvial origin have a cation exchange capacity ranging between 18 and 40 m.eq./100 g. in the surface, due to enrichment with organic matter. In the lower horizons of most soils in the county, cation exchange capacity is low, ranging from 6 to 12 m.eq./100 g. In the soils derived from glacial drift influenced by mica-schist or granite and in those derived from glacial morainic sands and gravels, the cation exchange capacity is less than 6 m.eq./100 g. in the lower horizons. In soils derived from the Irish Sea drift, or drift influenced strongly by Carboniferous limestone or sandstone, and in some of those from lake alluvium, the values are highest and range between 12 and 16 m.eq./100 g. in the lower horizons.

The pH values for most surface soils in County Wexford fall within the 5.0 to 5.9 range. The Podzols and skeletal soils have a lower pH, however, due to more intense leaching. Soils derived from base-rich parent materials, or influenced by constant long-term applications of calcareous sea sand, have pH values ranging from 7.0 to 8.2. Soils of the Baldwinstown Association derived from Carboniferous limestone-Cambrian shale drift, soils of the Broadway Association derived from fluvioglacial sands and gravels and some of the soils of alluvial origin, notably those of the Clo-hamon and Wexford Slob Associations, range from pH 6.0 to 7.0 in the surface.

Base saturation varies widely throughout the surface soils of the county; the lowest values are usually obtained in light textured soils or in soils of the more elevated areas which are subjected to greater leaching; the highest values are obtained in soils derived from base-rich parent materials, e.g. Fethard and Hook Head Associations. However, application of calcareous sea sand, in some cases, has enhanced the natural base saturation status of certain soils, e.g. Bannow and Broomhill Associations.

Organic carbon content in the surface soils generally ranges between 2 and 7 per cent. Sandy soils have a somewhat lower content than 2 per cent in the surface, and the organic carbon levels in the surface horizons of Podzols and of some alluvial soils are greater than 7 per cent. The nitrogen content follows a similar pattern, the majority of the soils containing between 0.2 and 0.5 per cent in the surface horizon. Lighter textured soils generally contain less than 0.2 per cent, and alluvial soils more than 0.5 per cent.

The carbon to nitrogen ratios show that the nature of the organic matter in the majority of the soils is reasonably satisfactory. The ratios for surface soils generally range between 10 and 16, except in the case of some poorly-drained and some alluvial soils, or strongly podzolised soils developed on higher elevations, where higher ratios obtain.

### Trace Elements

The trace element status of some of the most extensive soil series in the county was investigated. Several trace elements are known to be of basic importance in the nutrition of plants and animals, and the soil is the main source of supply. Trace elements in the soil have either been inherited from the geological parent material or added in some form or other. Soils, therefore, differ considerably in their trace element content and also in their ability to supply these elements to the plant as required. Deficiency or toxicity levels in the soil greatly influence production, especially of crops or animals which have specific trace element requirements.

In endeavouring to foretell the trace element content of any soil, accurate knowledge of the composition of the soil parent material is of primary importance. Where the parent material is composed of glacial drift of mixed geological origin, the problem becomes more difficult but not necessarily impossible. Analytical data for the soils of the Kiltealy, Old Ross and Clonroche Series, for instance, reflect the influence of variable granitic content in the glacial drift forming their parent materials. From the point of view of practical agriculture, the availability to the plant of a particular trace element is more important than the total content in the soil. Nevertheless, total soil values can be a considerable guide to predicting likely toxicities or deficiencies. Spectrographic methods described later in this chapter were used in determining total and 'available' contents. The total contents of several trace elements in the particular soils investigated are given in Appendix II.

Analyses for a representative profile of the Macamore Series (Table I—Appendix II) indicate that the soil is adequately supplied with the biologically important trace elements, with the possible exception of molybdenum. For this element the total figure is recorded as less than one part per million (ppm) in all horizons, this being the limit of detectability of the spectrographic method employed for analysis. This low level may be adequate, but further work involving availability measurements is necessary before a definite conclusion can be drawn. An interesting feature of the figures for this soil is the lower content of most trace elements in the $A_1$ horizon. Only lead and copper show higher contents in the $A_1$ than in the $(A_2)$ horizon.

The Screen soil is particularly low in all trace elements (Table 2—Appendix II) and under an intensified system of agriculture, crop and animal health problems could become serious here. Copper and manganese deficiency in cereals could easily arise unless preventive or remedial measures were adopted. As in the other soils examined the molybdenum content is low. The amount present, however, may be adequate to meet the needs of most crops with the exception of brassicas, which have a particular requirement for this element.

Cobalt could not be detected in the A horizon of this soil and was scarcely evident in the B and C horizons. It would be natural, therefore, to assume that cobalt deficiency in stock might easily be a problem. While boron analyses have not been carried out, the general level of trace elements in the soil is such that boron deficiency might also be a problem in the production of certain crops. This may be also true of zinc.

Analyses for a profile from the Ballindaggan Series (Appendix II—Table 3) indicate that this soil is adequately supplied with trace elements. The manganese, cobalt and copper contents in the surface are such that deficiencies would not ordinarily be expected. From the pedological point of view the soil is also interesting. The tendency for some elements, rubidium, lithium, barium, nickel, zirconium, beryllium, yttrium and molybdenum, to accumulate in the (B) horizon is apparent. Manganese, on the other hand, tends to fall off here; lead definitely does so. The relatively high manganese and cobalt contents are interesting, and probably reflect little loss of these elements in the course of weathering of the parent material or of the soil itself. In the Clonroche soil, formed from predominantly Ordovician shale drift, the manganese and cobalt contents are also quite high.

The Rathangan soil appears reasonably well supplied with trace elements (Appendix II—Table 4) but the values, in general, are rather lower than those of the Ballindaggan soil. This is not surprising considering the quartzitic influence in the parent material of the former. There is a slight tendency for some elements to increase in the B horizons, notably rubidium, cobalt, nickel and zirconium. The only trace element trouble likely to arise would be cobalt deficiency, particularly where the quartzitic influence in the drift is more pronounced. However, the poorly-drained nature of the soil would counteract this tendency to some extent, cobalt generally being more available under impeded drainage conditions.

The trace element pattern in the soils of the Kiltealy, Old Ross and Clonroche Series has been fully discussed elsewhere (Fleming, G. A., *et al. Irish J. Agr. Res.* 2:37-48, 1963). Here the most interesting feature is the change in trace element content that occurs with decreasing granitic influence of the parent drift material. In the Kiltealy soil the granite influence is most pronounced, least in the Clonroche, and intermediate in the Old Ross. Likewise the influence of the Ordovician shale is most apparent in the Clonroche soil and least in the Kiltealy and is reflected in the trace element figures (Appendix II—Tables 5, 6, and 7) for the respective soils. This is particularly well illustrated by the cobalt and nickel figures, which show a steady rise as the effect of the granite declines and that of the shale increases. From the agricultural standpoint molybdenum, and possibly copper, might be considered low, but the remarks made earlier regarding the former in the Screen soil should be borne in mind.

Some determinations of 'available' trace elements as measured by solubility in 2.5 per cent acetic acid were carried out on these three soils (Appendix II—Table 8). The amounts of cobalt present in the surface horizons of the soils are as follows: Kiltealy 0.24 ppm, Old Ross 0.21 ppm, and Clonroche 0.23 ppm. An interesting observation here is that the higher *total* cobalt in the Clonroche soil is not accompanied by higher available figures as is the case for nickel. Since a level of 0.25 ppm of cobalt or over, by this method of estimation, is generally regarded as adequate from the point of view of providing cobalt-sufficient herbage for grazing stock, the available contents could be regarded as reasonably satisfactory. The possibility of cobalt deficiency occurring in stock is more likely, however, in the Kiltealy and Old Ross soils, as acetic acid-soluble cobalt declines in the sub-surface horizons at a greater rate than in the Clonroche soil where it occurs at a fairly uniform level throughout the profile.

### Clay Mineral Studies

A study of the nature of the clay minerals by X-ray examination in some of the more extensive soils in the county has been commenced, and a brief review of the preliminary findings is given here. Five soil series have been studied so far, and an attempt has been made to correlate the clay mineralogy with parent material and drainage condition.

The soils of the Clonroche Series, which are derived from Ordovician shale drift with some granite influence, have a complex clay mineral composition. The primary minerals, quartz and feldspar, are present as well as the clay minerals illite, vermiculite, chlorite and kaolinite. The illite is dioctahedral and there is no evidence of inter-stratified material in these soils.

The soils of the Kiltealy Series derived from drift of predominantly granite composition contain quartz and feldspar as well as dioctahedral illite, vermiculite, chlorite and kaolinite. The percentage of chlorite is relatively low and decreases with depth.

Interstratified minerals occur to a measurable extent and, although a correlation has been established between these and potassium fixation in some Irish soiis (Brown, G., 1954, *Nature*, *Lond. 173*: 644), there is little other evidence that the Kiltealy soils can be considered to have high fixation powers. X-ray diffraction analysis of the potassium saturated clay in fact indicates that the soils are low potassium fixers (Kunze, G. W. and Jeffries, C. D., 1953, *Soil Sci. Soc. Amer. Proc.* 17:242-244).

The parent material of the Ballindaggan Series is mainly of mica-schist composition. The clay mineralogy of the soils is similar to that of the Clonroche soils, though in the lower layers interstratified material is noted. The clay minerals present are exceptionally well crystallised.

The soils of the Screen Series are derived from glacial outwash sands of Weichsel Age and are coarse textured, containing very little clay. While these soils are of recent origin their clay mineralogy is similar to that of the soils derived from Saale Age glacial drifts in the county. The Macamore soils, which are impermeable and poorly-drained, are derived from dense calcareous drift of Irish Sea origin. Montmorillonite, the presence of which is unusual in Wexford soils, is found in the lower layers of the profile. Here also the chlorite content decreases with depth.

The clay mineral composition of the Wexford soils studied shows very little variation either between those derived from different parent materials or of different drainage characteristics. Further, more detailed study, however, may reveal some differences in the clay mineral pattern. It is well known, of course, that the influence of drainage differences on clay mineralogy is less evident in soils, the parent materials of which are derived from granitic and sedimentary rocks, than in those derived from basic igneous rocks.

An interesting feature of these soils is the widespread occurrence of quartz and feldspar even in the very fine fraction, indicating relatively little weathering, since feldspars break down easily under moderate weathering conditions. In view of the frequent occurrences of kaolinite, the weathering of feldspars to this mineral would appear to be the pattern in these soils.

**Summary of Analytical Methods**

Analytical methods employed in the various laboratory tests were as follows:

*Mechanical Analysis:* Determined by the International Pipette Method as described by Kilmer and Alexander (1949), using sodium hexametaphosphate as dispersing agent.

*Cation Exchange Capacity:* Determined by the method of Metson (1956). Soil was leached with neutral N ammonium acetate and excess ions washed out with alcohol. Cation exchange capacity (C.E.C.) was determined by steam distillation using MgO in distillation flask.

*Total Exchangeable Bases:* Extracted by the method of Metson (1956). The ammonium acetate leachate was dried, ignited, taken up in HC1 and excess HC1 titrated with NaOH.

*pH:* Determined on a 1:2 soil/water suspension using a glass electrode.

*Total Neutralizing Value:* Determined on a HC1 extract using phenolphthalein as indicator and titrating against NaOH. $CaCO_3$ was used as a 100 per cent standard.

*Organic Carbon:* Estimated by the Walkley-Black dichromate oxidation method as described by Jackson (1958) modified for colorimetric estimation. Values were read off on a Spekker Absorptiometer using Orange Filter No. 607. A factor of 1.30 was used.

*Total Nitrogen:* Estimated by a modification of the method of Piper by digesting soil with conc. $H_2SO_4$ using selenium as a catalyst, distilling into boric acid and titrating with HC1.

*Free Iron:* Extracted with sodium hydrosulphite by the method of McKenzie (1954). Fe was determined colorimetrically by the method of Scott (1941), using sodium salicylate.

*Available Nutrients:* Determined by a modification of the method of Peach and English (1944).

*Trace Element Analyses:* Carried out spectrographically by methods described by Mitchell (1948). Total analyses were semi-quantitative in nature, i.e. accurate to about ± 40 per cent of the amount present. This method, which is very rapid, has been used extensively in soil analysis and is of value in revealing major differences between soils. 'Available' trace elements were estimated following extraction with 2.5 per cent acetic acid. This method is fully quantitative, the limits of precision being ±5-10 per cent of the amount present.

*X-ray Diffraction:* The separation of clays for X-ray diffraction analysis was carried out by standard sedimentation methods (Mackenzie, 1956) and the less than 1.4μ, fraction was used. Attempts made to eliminate quartz and feldspars by separating a finer fraction, i.e. less than 0.5μ, resulting in poor quality pictures, indicating poor crystallinity of the clay in this particle size range; also, the primary minerals are still relatively abundant in this fraction. The clays are saturated with magnesium prior to any other treatments since most data for clay minerals are listed for this form.

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# CHAPTER VI

## SOIL SUITABILITY

### Considerations of the General Quality of the Soils*

The general suitability of the various soils in County Wexford to grow the normal range of crops, including pasture and forestry crops, is discussed in this chapter. In Tables IX, X and XI an attempt is made to summarise this information.

Soil suitability classification consists essentially of outlining the range of uses to which a given soil is adaptable, and is based principally on an evaluation of the significance of the more permanent characteristics of the soil. A further step in the suitability classification consists of an assessment of the production potential of each soil for the normal range of farm or forest crops, under defined management standards. The importance of such a classification lies in the fact that it provides the essential link between the physical and economic aspects of the use of soils. The latter approach, however, requires precise quantitative data on the productive capacity of each soil. This can only be provided by adequate experimental findings and yield observations, over a number of years, from sample areas representative of the particular soil. Sufficient information of this nature is not so far available. Therefore, a qualitative, rather than a quantitative, appraisal of the potentialities of the different soils in County Wexford is the purpose of the present system of soil suitability evaluation and classification.

*Ambrosetown Association*

*Ambrosetown Series:* These soils have a wide use-range. They are suited to pasture and to arable cropping. With proper management they are capable of producing a wide range of tillage crops, including wheat, oats, feeding and malting barley, potatoes, sugar beet and other root crops. Their natural nutrient and lime status is somewhat low. Production, however, in both pasture and cultivated crops can be brought to a high level by the application of the appropriate amounts of lime and fertilisers with particular stress on phosphorus, coupled with good management practices. These soils are relatively easily tilled. Although only moderately well-drained, they do not suffer to any considerable degree from poaching by grazing stock. For this reason intensive pasture utilization can be practised.

*Baldwinstown Association*

*Baldwinstown Series:* The soils of this series have a wide use-range. They are suitable for the production of first quality pastures and for a wide range of tillage crops, including wheat, feeding and malting barley, oats, potatoes, sugar beet and other root crops.

These soils are easy to cultivate. The nutrient status is moderately satisfactory but significant responses on most farm crops are obtained from phosphorus, potassium and nitrogen. Lime status is generally adequate, except in some instances, where a surface acidity develops under pasture. Because of their moderately well-drained nature, pastures on these soils can be grazed over a long season.

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*This section was prepared with the assistance of colleagues in the County Advisory Service the Forestry Service and from discussions with local farmers.

*Ballindaggan Association*

*Ballindaggan Series:* These soils have a wide use-range. They are similar in many respects to the soils of the Clonroche series but are somewhat 'heavier' in texture. They are suited to the production of a wide range of tillage crops particularly malting and feeding barley, wheat, oats, potatoes, sugar beet and other root crops, and also soft fruits. Their lime content is low as also is their natural nutrient status, especially with regard to phosphorus and potassium. Productive pastures can be established on these soils by proper manurial and management practices and can be grazed over a long period of the year. Unless properly limed, fertilised and managed, however, pastures deteriorate rapidly, the sown species being replaced by inferior indigenous types.

*Templeshanbo Series:* These soils have a limited use-range. They are poorly drained and the natural vegetation in the unimproved state consists of weedy, rush (*Juncus*) dominated pastures. Their natural lime and nutrient status is low. Even where artificial drainage can be carried out they are generally unsuited to tillage and their optimum use is either in pasture or forestry. Pastures could be improved considerably by the application of the required lime and fertilisers, but management practices would need to be of a high order so that poaching by grazing stock would be kept at a minimum.

*Black Rock Mountain Series:* The soils of this series have a very limited use-range. They occur on the higher elevations and on moderately steep slopes. For these reasons, cultivation is impracticable and they are suited only to forestry or to hill-land grazing. Their nutrient status and lime content are very low and the natural vegetation consists of heather, furze, sedge and inferior grasses. The application of lime in these areas is a problem, but, for hill-grazing purposes, production and stock-carrying capacity could be improved considerably by the application of phosphatic fertilisers with some cobalt, and where feasible by some overseeding. In recent times a considerable acreage of these soils has been planted to forestry, which is proving quite successful.

*Bannow Association*

*Bannow Series:* The soils of this series have a wide use-range. Because of their sandy texture and very friable consistency, they are very easily tilled and rooting depth is good. They are suited to a wide range of tillage crops and to grass production. Their natural nutrient status is only moderate but, in the greater part of the area, fertility levels have been built up considerably by liberal applications of sea-weed and fertilisers over the years. They are noted for their capability to produce excellent yields of sugar beet, wheat, oats, malting and feeding barley, early and main-crop potatoes. Grass production under adequate manurial and management practices is also high and pasture can be utilized over a long grazing season.

*Broadway Association*

*Broadway Series:* The soils of this series have a wide use-range. They are well-adapted to many tillage crops, especially sugar beet, malting and feeding barley, potatoes, oats and wheat. They are also suited to special crops, such as early potatoes, onions, carrots and other market garden crops. Under good management they are capable of producing high quality pastures, especially in the form of short-term leys, which are noted, in particular, for their early season production.

Because of their sandy and friable nature, these soils are very easy to cultivate and their general fertility status is moderately satisfactory. Because of past treatment, including heavy applications of sea-weed, the nutrient status of some of these soils is high and here only moderate fertiliser applications are necessary for many crops.


Plate 17: *Intensive cultivation on Broadway Association at Kilmore Quay*

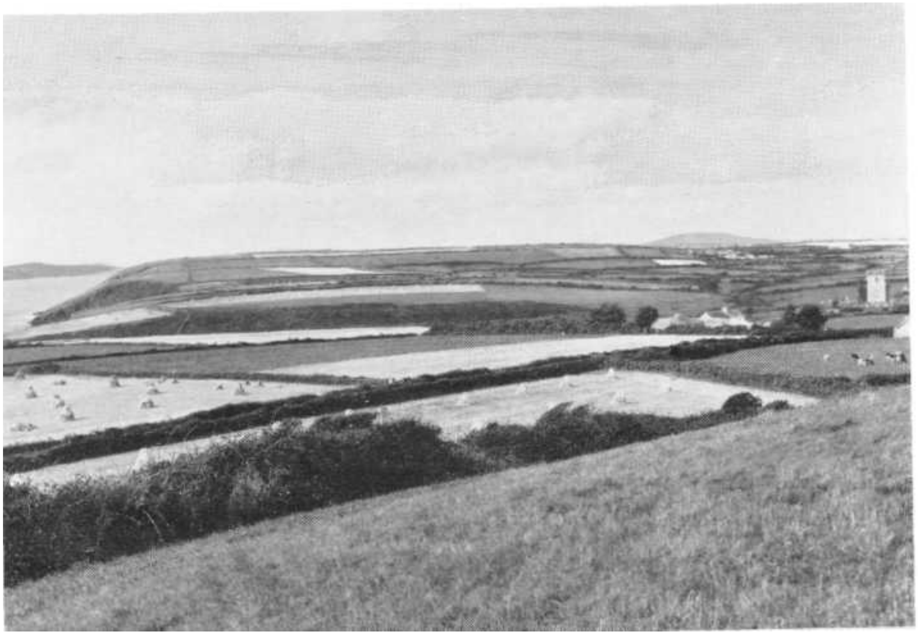
Plate 18: *General view of Broomhill Association*

*Broomhill Association*

*Broomhill Series:* These soils have a wide use-range. They are suited to the cultivation of most of the common tillage crops and to pasture production. They are capable of producing good crops of malting and feeding barley, wheat, oats, early and main-crop potatoes, sugar beet and other root crops. Their natural nutrient status is low, but they respond well to the application of lime and fertilisers. Apart from low fertility, the greatest limiting factor in these soils is their rather shallow nature. Because of this, they are inclined to suffer from drought, especially in dry seasons, and, therefore, may be slightly limiting in pasture production. They are also less than ideal for forest production, especially where the underlying bed-rock approaches the surface.

*Carne Association*

*Carne Series:* The soils of this series have a wide use-range, similar in many respects to the soils of the Broadway Series. They are capable of producing a wide range of tillage crops, are especially noted for the production of early potatoes and are also suitable for the production of special crops such as onions, carrots and other market garden crops. These soils are also capable of growing good quality pastures, but because of their coarse texture, as well as the presence of a hard and somewhat cemented B horizon, which restricts root penetration, production is often affected by mid-season drought. These soils, due to the texture, structure and friable nature of the surface horizons, are very easy to cultivate. Their natural nutrient status is, in general, only moderately satisfactory but because of heavy applications of fertilisers and sea-weed over the years, it has been raised in many parts of the area.

*Nethertown Series:* Because of shallow depth and, in particular, the frequent occurrence of outcropping boulders, the soils of this series have a very limited use-range. Due to their low moisture-holding capacity, these soils tend to suffer from drought in most seasons. Their natural nutrient status is low. Cultivation is impracticable except with hand implements, and this renders the Nethertown soils unsuitable for the production of most cultivated crops, under modern farming practices. Hand cultivation can be carried out but, with such practices excepted, the optimum use of these soils is for grass production, where relatively satisfactory results can be obtained (except in very dry seasons) with the proper manurial and management practices. Depth limitation militates against highly productive forestry on these soils.

*Clonroche Association*

*Clonroche Series:* These soils have a wide use-range. They are excellent for tillage, being well suited to the production of a wide range of farm, fruit and vegetable crops. They are especially noted for their ability to produce high yields of good quality malting barley. Grassland is successful on these soils also, especially in the form of short-term, highly productive leys. It is primarily these soils which have earned for Wexford the title of 'Model County' and the reputation it enjoys for good tillage land. In recent years these soils have assumed a new importance in being very suited to soft fruit growing. Very high yields of these crops, particularly of strawberries, have been obtained under a suitable programme of manuring and management.

The Clonroche soils are easy to cultivate. Their natural nutrient status is low, and phosphorus 'fixation' is a problem. They respond well, however, to management techniques which include adequate lime and phosphorus applications. Potassium

Plate 19—*Landscape view of central County Wexford*
*Foreground area—Soils of Clonroche Association with soils of Slievecoiltia Series in immediate foreground*
*Distant background area—Soils of Kiltealy Association*

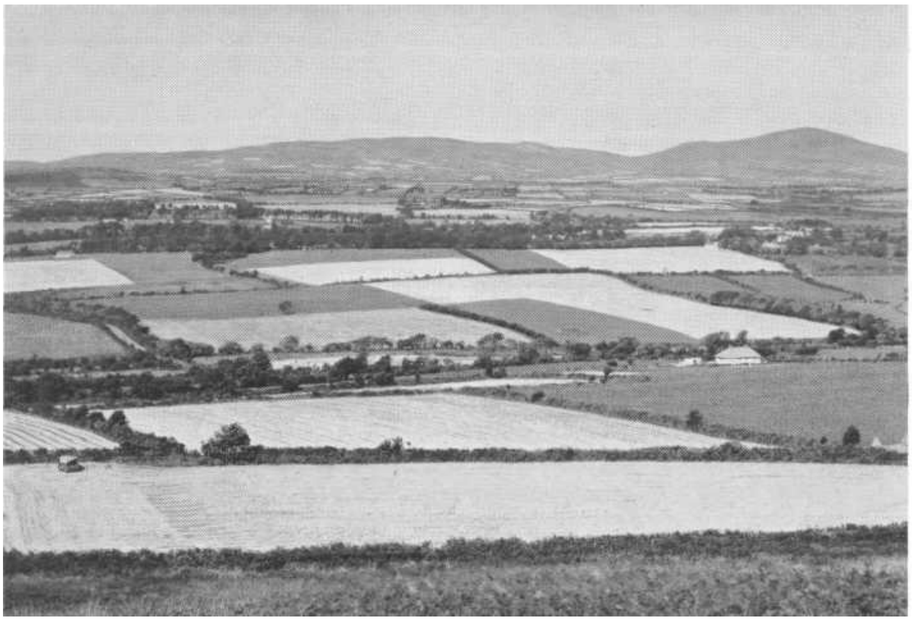

Plate 20—*Harvest time on the Clonroche Association*

Plate 21—*Strawberry crop on the Clonroche Series*

‘fixation’ is low, and penetration from surface application reasonably satisfactory. Under pasture, unless properly limed, fertilised and managed, sown species of grasses are quickly replaced by inferior indigenous types and weeds. The moisture holding capacity of these soils is moderately good but, in some of the more shallow situations, drought may be a problem in dry seasons.

*Kilpierce Series:* These soils have a limited use-range. They have a low lime and nutrient status. In many places they are difficult to drain because of their depressional position. The type of crops and the success with which they can be grown depend largely on drainage improvement. At present these soils mostly support pasture. The pasture, where unimproved, is generally of low feeding value, being weedy and comprised mostly of low quality grasses. Poaching by grazing stock is a serious problem, since the soils are wet for the greater part of the year and, therefore, grazing in many cases must be confined to the summer months. An improvement programme would include soil drainage where possible, together with the use of lime and fertilisers, with emphasis on phosphorus. With such improvements the use-range would still be limited, but pasture output would be increased considerably. Improved grazing management techniques would be necessary, however, in order to utilize the grass properly and to avoid undue poaching by stock. Forestry should be relatively successful on these soils, particularly tree species that are tolerant of high soil moisture levels.

*Slievecoiltia Series:* These soils have a very limited use-range. They are located, for the most part, on elevated ground and on moderately steep slopes. For this reason cultivation is impracticable. The natural nutrient status and lime content are low, and there is a considerable accumulation of organic matter in the surface horizon. Usual vegetation where unimproved consists of furze, bracken, heather and the poorer

Plate 22—*General view of Slievecoiltia Series with Clonroche Series in the foreground*

species of grasses. The soils are best suited either to forestry, to which they are presently devoted in considerable part, or hill grazing. For the latter purpose, production could be improved considerably by raising the nutrient status, particularly with regard to phosphorus.

A striking feature of these soils is their capacity to retain moisture during dry spells. Besides, for hill soils, they are relatively deep and not too degraded by leaching. This is apparently due to the type of underlying rock (Ordovician shale) which allows for fairly rapid weathering and adequate root penetration. For these reasons the Slievecoiltia soils, where forestry is concerned, may be considered amongst the better hill soils in the county.

*Fethard Association*

*Fethard Series:* These soils have a somewhat limited use-range. They are imperfectly drained and are relatively heavy in texture. For these reasons, they are rather difficult to cultivate, particularly in unfavourable seasons. Their optimum use is in pasture production for which purpose they can be considered very successful. Their lime status is generally satisfactory and with adequate application of fertilisers to overcome any deficiencies prevailing, grass production can be of a high order. Because of the imperfect drainage, the grazing season is somewhat limited and, for maximum production and utilisation, improved management techniques, including controlled grazing and the conservation of surplus summer grass for winter feed, are necessary. Although not generally available for afforestation, these soils should be very suitable for this purpose.

*Ballinruan Series:* The soils of this series have a limited use-range. They are poorly-drained and occupy the more lowlying situations in the association area. They are also rather heavy in texture. In their natural state they would best support either pasture or trees. Pastures at present are generally inferior, containing an abundance of low quality grasses, sedges and rushes. Utilization of the pastures is also difficult, since poaching by stock is a serious problem. Natural nutrient status is only moderately satisfactory. Improving the output from these soils involves drainage and the application of fertilisers, with special emphasis on phosphorus and nitrogen. These steps must be followed by proper management techniques, so that poaching by stock is kept at a minimum, and the increased production efficiently utilized.

*Forth Commons Association*

*Forth Commons Series:* The use-range of these soils is very limited. They are shallow and stony and have an extremely low fertility status. They support a very poor type of natural vegetation, which consists mainly of heather, furze and sedge. Root development and water movement are restricted by the presence of an iron-pan at varying depth.

Efforts to farm these soils have met with little success, and large parts of the area are still dominated by the natural vegetation. In recent years, however, afforestation has proved fairly successful. Until the possibility of improving the soils for hill grazing has been studied, forestry will continue to be the optimum land use practice. Besides the general nutrient deficiency prevailing, the soils are extremely deficient in cobalt, an important factor when considering their grazing possibilities.

*Hook Head Association*

*Hook Head Series:* These soils have a wide use-range. Besides being naturally well-

Plate 23—*Landscape view of the Forth Commons Association*

Plate 24—*Landscape view of the Hook Head Association*

drained and of loamy texture, they are friable and possess a very desirable structure. In most cases, lime status is satisfactory, and nutrient levels fairly high. They are easily tilled and can support a wide range of crops, including sugar beet, wheat, malting and feeding barley, oats, early and main-crop potatoes. They are also suitable for the production of high class pasture which can be utilized over a long grazing season. Except for a slight moisture deficit in dry seasons, these soils have very few limitations for a wide range of cropping.

*Killinick Association*

*Killinick Series:* These soils have a wide use-range and are suitable for the production of most tillage crops, including malting and feeding barley, wheat, oats, potatoes, sugar beet and other root crops. Early potatoes are successfully grown in the coastal regions. Because of their rather light texture, desirable structure and friability, the soils are easily tilled. Their general nutrient status, however, is only moderately satisfactory, but they are highly responsive to fertilisers. They are also suitable for grass production and can carry stock over a long grazing season. However, due to their texture, they may surfer from drought in exceptionally dry seasons and pasture output may be somewhat limited on these occasions.

*Kiltealy Association*

*Kiltealy Series:* These soils have a wide use-range. They are especially suited to tillage but are also noted for their general suitability for sheep grazing. Being coarse-textured and friable, with a strong crumb structure, they are very easily tilled and can produce good crops of malting and feeding barley, oats, wheat, potatoes, sugar beet and other root crops. Root development is good, but natural nutrient status is low, particularly with regard to phosphorus. These soils, however, are very responsive to lime and fertilisers.

Cobalt deficiency is a problem in these soils and levels of 2 parts per million (ppm), and even lower, are not uncommon. As a result, pining in sheep is quite widespread, but this condition can easily be alleviated by soil dressings with cobalt sulphate, or by the more recent practice of oral administration of cobalt to the animals.

*Ballywilliam Series:* These poorly-drained soils have a limited use-range. In many instances, they are difficult to drain because of their depressional position. The usual vegetation where unimproved consists of very weedy, rush (*Juncus*) dominant, poor quality pasture. The soils are very acid in their natural state and low in phosphorus, potassium, magnesium, calcium and cobalt. The pastures can be improved considerably by drainage and by the application of lime and fertilisers. Utilization of the pasture, however, still presents a problem, and the grazing season must, of necessity, be limited to avoid undue poaching. These soils are fairly suitable for forestry, particularly where tree species more tolerant of wet soil conditions are planted.

*Blackstairs Series:* These soils have a very limited use-range. They are located in areas of high elevation which, for the most part, have moderately steep slopes. Because of the nature of the parent material (granite) and because of the relatively cold and wet conditions prevailing at such altitudes, the soils have been leached and base depleted. They are, therefore, very acid, and poorly decomposed organic matter has accumulated to a considerable depth on the surface. Rock outcrops and boulders are very common. An iron-pan, which occurs at approximately 1½ to 2 feet deep, is partly responsible for restriction of root penetration and water movement. It is also a serious problem in artificial drainage and in forest establishment. General soil nutrient levels are very low, and the natural vegetation consists of heather, furze, bracken and the poorer types of grasses.

These soils are mainly suitable only for extensive rough grazing, but may be considered of poor to moderate suitability for forestry production. Sheep kept in these areas are a distinct, hardy breed of the Wicklow Mountain type; they have resulted from a cross between native strains and Cheviots. Cobalt deficiency is a serious problem in raising sheep on these soils. Soil cobalt values lower than 1 part per million are not uncommon, while herbage levels are generally in the region of 0.02 to 0.05 ppm. Some improvement in the stock-carrying capacity could be expected from fertiliser application with overseeding, where practicable.

*Macamore Association*

*Macamore Series:* These soils have a somewhat limited use-range. They are naturally poorly-drained, have a weak structure and are 'heavy' in texture. Because of these factors, they are not generally suited to tillage cropping and their optimum use is in grass production. They should also prove relatively suitable soils for forestry. Their dense, slowly permeable nature is evidenced by the extensive occurrence of rush (*Juncus*) in the pastures throughout the area, even on sloping terrain. Examples are also to be seen of the old 'lazy-bed' or 'ridge and furrow' cultural system, by which farmers in the past attempted to overcome the drainage problem by sowing crops in ridges.

Plate 25—*Unless well managed, pastures on the Macamore soils, even on favourable slope, tend to become rush* (Juncus) *infested*

Plate 26—*A Macamore pasture under improved management. Evidence of the old* "*ridge and furrow*" *cultural system still survives*

Contemporary fanning in the area must be restricted mainly to dairying and livestock raising. The natural nutrient status of the soils is moderately satisfactory, but poor drainage, weak structure and poor friability are major limiting factors. With drainage, liming where necessary, and proper manuring, high yields of good quality grass can be produced. Grassland management needs to be of a high standard, however, in order that severe poaching by stock may be avoided, and rush infestation controlled. Seasonal grazing must be strictly followed, and the conservation of surplus summer grass for a long winter period of indoor feeding is necessary.

*Old Ross Association*

*Old Ross Series:* These soils have a wide use-range. They are capable of producing a wide range of crops, including malting and feeding barley, oats, wheat, potatoes, sugar beet and other root crops and also soft fruits, as well as high yielding pastures. Because of their desirable texture, structure, friability and drainage conditions, they are very easily tilled and root development is good. In their natural state, these soils are generally of low lime and nutrient status, but they respond well to lime and fertilisers. Pastures on these soils can be grazed for a long period of the year, but unless adequately manured and managed, the more valuable sown species are rapidly displaced by poorer indigeneous grasses and weeds. Although not devoted to forestry they should be eminently suitable for this purpose.

*Knockroe Series:* These soils have a limited use-range. They are similar in many respects to the soils of the Ballywilliam series, being poorly-drained and of low nutrient fertility, but they are slightly 'heavier' in texture.

These soils are difficult to drain in many instances because of their depressional position. They are generally unsuited to tillage cropping but are moderately suitable for grass production or forestry. The most common vegetation where unimproved is weedy, rush (*Juncus*) infested pasture. Grass production can be improved considerably, however, by drainage where feasible, and by application of lime and fertilisers, with special regard to phosphorus and nitrogen. A high level of pasture management, including restricted grazing, to avoid undue poaching damage by grazing stock and control of rush infestation, is required for best results.

*Rathangan Association*

*Rathangan Series:* These soils have a somewhat limited use-range. They are poorly-drained, and in many cases this condition prevails even on favourable slopes. Poorly developed, weak structure and a relatively high silt content are the major factors influencing drainage impedance. Cultivation and the development of a desirable tilth can prove difficult, unless the soils are at the ideal moisture balance. Their nutrient status in general is low. The profile is stony, and also rather cemented and hard in places, especially following a dry spell.

Plate 27—*Poorly managed pastures on the Rathangan Association*

The optimum land use on these soils is grass production, which can be highly satisfactory where drainage and the application of lime and fertilisers, with particular emphasis on phosphorus and nitrogen, are practised. Like the soils of the Macamore Series, it will be necessary here also for best results to adopt high level management techniques, such as controlled grazing and the conservation of surplus summer grass for a long winter feeding period. These soils should be relatively satisfactory for forest production.

Plate 28—*Even on favourable slopes, rush* (Juncus) *infestation can be a severe problem in poorly managed pastures*

*Screen Association*

*Screen Series*: These soils have a somewhat limited use-range. They are suited mainly to a narrow range of tillage crops and short-term grass leys. Natural lime and nutrient status is very low, and most crops require frequent, liberal applications of lime and fertilisers. The chief limiting factor in these soils, however, is the absence of sufficient moisture in most seasons, due to their very coarse texture and low moisture-holding capacity. Because of their sandy nature, the soils are very easily tilled. High yields of good quality early and main-crop potatoes and carrots can be obtained, but yields from cereal crops (malting barley and oats) are generally disappointing. Because of the freely-drained nature of the soils and the topographic features of the landscape, stock can often be maintained out-of-door over winter. Pastures on these soils are noted for their early growth, but due to the lack of moisture they fail to maintain their growth in drier periods, thus curtailing stock-carrying capacity over the entire season. Cobalt deficiency is a further problem requiring attention. The moisture situation in these soils limits their scope for forest production.

*Ballyknockan Series:* In their natural state these soils are poorly-drained and are usually situated in depressional areas. In general, they have limited use-range and are suited only to grass production or forestry. Because of their lowlying situation artificial drainage is difficult in most cases. The most common vegetation on these soils consists of rush and sedge dominated pasture, with poor grass species. Natural lime and nutrient status is low. Pasture utilization is a problem, especially where artificial drainage is impracticable, and the grazing season is, therefore, short. Where proper drainage can be effected and with the application of adequate lime and fertilisers, these soils are capable of producing a moderately wide range of tillage crops and pasture output and utilization are vastly improved.

*Randallsmill Series:* These soils are similar in many respects to those of the Screen Series but, because of their somewhat ‘heavier’ texture and greater moisture holding capacity, they have a wider use-range. They are most suited to the production of malting and feeding barley, oats, sugar beet, potatoes and carrots. Pastures are noted for their early growth on these soils, but production may fall off in mid-season in drier years due to lack of soil moisture. The soils are very easily tilled. Their natural lime and nutrient status is low, but they respond well to lime and fertilisers.

*Glenbough Variant:* These soils have a very limited use-range. They are coarse textured and of extremely low natural fertility. There is an indurated horizon at a depth of approximately 1½ feet which seriously retards root development and water movement. Natural vegetation consists mainly of furze, heather, bracken and poor grass species. The soils are suited mainly to rough grazing or perhaps certain forest species. Pastures are low yielding, but could be improved by regeneration of the old natural vegetation, including liberal dressings of lime and fertilisers. Even with such practices, however, production will continue to be restricted because of the soil moisture deficit for periods of the year.

*Millquarter Association*

*Millquarter Series:* These soils have a limited use-range. They are poorly-drained and occupy a large, flat area from which a suitable outfall for an artificial drainage system is difficult to find. Because of this, together with their heavy texture and weak structure, they are unsuitable for cultivation, and their optimum use is in either pasture or forestry. Lime and nutrient status is very low, and liberal applications of lime and fertilisers are required for grass production. Without artificial drainage, pasture utilization creates a serious problem.

*Coolaknick Association*

*Coolaknick Series:* These soils have a limited use-range and are similar in many physical respects to those of the Millquarter Series, but their general lime and nutrient status is higher. They are poorly-drained, and this, combined with the heavy texture, makes these soils generally unsuitable for cultivation. The usual vegetation in the unimproved state consists of rush (*Juncus*) dominated, weedy, unproductive pastures. These could be improved by better management including the application of fertilisers but, again, utilization presents a real problem. These soils, therefore, are best suited to either grass production or forestry and, for the former purpose, skilled management is required in order that reasonable output and utilization can be achieved.

*Oulartleigh Series:* These soils have an extremely limited use-range. They are situated in a basin-like area and are water-logged for very long periods of the year. Artificial drainage of these soils is very difficult. Therefore, their present use, which consists of extensive rough grazing, particularly during the summer months, would appear to be the only one to which they can be generally devoted until major reclamation is justifiable.

*Clohamon Association*

*Clohamon Series:* The soils of this series exhibit many of the desirable characteristics which constitute high quality soils. They have a loamy texture, strong crumb structure, friable consistency, and good drainage, and though of low natural nutrient status generally, their lime status is moderately satisfactory. They could, therefore,

Plate 29—*General view of Clohamon Association in foreground*

be used for the production of a wide range of tillage crops, and high yielding pastures. For forestry production also they have many desirable qualities. However, their use-range is somewhat limited because being situated along the banks of the river Slaney, there is a recurring risk of flooding after periods of heavy rainfall. They are probably best devoted, therefore, to grass production for which they are potentially excellent.

*Kilmannock Association*

*Kilmannock Series:* These soils have a limited use-range. They are poorly-drained and 'heavy' in texture. Occurring as they do along the banks of the river Barrow there is also a flooding hazard. However, a considerable extent of the area has recently been banked to keep out tidal waters. Following such measures these soils have a considerable potential for grass production. Their natural lime and nutrient status is high and, with good management and judicious use of nitrogenous fertilisers, in particular, this inherent fertility can be exploited to produce high yielding pastures. Their physical properties will continue to militate somewhat against their general use for cultivated cropping.

*Kilmore Slob Association*

*Kilmore Slob Series:* Up to recently this area of soils was poorly-drained because of high water-table. There was difficulty in finding an outlet for drainage water because of the low-lying situation, but a system of pumps and sluices has been installed and the water-table can now be controlled. The soils are of a sandy nature and relatively easily tilled. Natural lime content is high and nutrient status is moderately good. The area in its present state has a much wider use range than formerly,

Plate 30—*General view of Kilmore Slob Association*

and is suited to the production of a number of tillage crops and pasture.

*Kilmore Slob Variant:* These soils have a somewhat limited use-range. They are heavy textured and their successful cultivation is a problem. Natural lime content is high and nutrient status is moderately satisfactory. The soils are best suited to grass production, but, due to their susceptibility to poaching, the grazing season is short. For this reason good management techniques are required, and surplus summer grass must be conserved for a long winter feeding period during which grazing must be avoided.

*Wexford Slob Association*

*Wexford Slob Series:* This area has been drained also by a system of pumps and sluices so that the water-table, which was originally very high, can now be controlled. The soils are much 'heavier' in texture, however, than those of the Kilmore Slob Series and also have a somewhat higher nutrient status. Because of their 'heavy' texture, they can be tilled only under optimum moisture conditions, which presents a certain limitation for cultivated cropping. Soft ground conditions at harvest time are also a problem. These soils are capable, in favourable years, of producing good crops of wheat and feeding barley, but their optimum use, however, is in grass production. Under the latter enterprise they are highly productive, provided good management practices are followed. Where internal drainage has been improved sufficiently, the grazing season can be reasonably long, and poaching by stock is not as serious as might be expected. However, stock must be kept off the pastures during periods of heavy rainfall to avoid undue poaching damage, and surplus summer grass should be conserved for the long winter feeding period.

Plate 31—*General view of Wexford Slob Association*

A particular problem encountered on these soils is that of high molybdenum levels. Because of this, grazing stock have been seriously affected in many instances by induced copper deficiency. To counteract these ill-effects it has been found necessary to administer copper sulphate to the animals at regular intervals.

*Wexford Slob Variant:* These soils have a similar use-range to those of the Wexford Slob Series but, because of the presence of a coarse sandy layer within the profile, they are slightly better drained and, therefore, it is possible to graze pastures on them for a longer period of the year with less risk of poaching by stock.

*Carrickbyrne Complex*

As outlined in Chapter IV, three major soils occur within this complex, Carrickbyrne Series, Slievecoiltia Series and skeletal soils. The use-range of the Carrickbyrne and Slievecoiltia Series is rather similar, being suited mainly to forestry production (see Slievecoiltia Series). However, outcropping rock is a common feature where the soils of the Carrickbyrne Series occur, whereas, in general, this is not so in the case of Slievecoiltia. The skeletal soils occurring within this complex are very shallow and hence have an extremely limited use-range; they are generally unsuited to arable crops, pasture, or forestry production.

*Crosstown Complex*

The suitability of the different soils within this complex area for different enterprises varies considerably.

*Crosstown Series:* The Crosstown soils have a wide use-range and are suitable for the production of a number of tillage crops and for pasture. They are easily tilled;

their natural nutrient status in general is low, but they respond well to lime and fertilisers. High output from pastures can be obtained with proper fertiliser use and management practices.

*Crossabeg Series*: The soils of this series are capable of producing good crops of wheat, feeding barley, oats, potatoes, sugar beet and other root crops. They are well drained and rather easily tilled. Their natural nutrient status in general is low, however, and lime and fertilisers are required for optimum production of most crops, including grass. They are well suited to pasture production and can be grazed over a long period of the year.

*Johnstown Series*: The soils of the Johnstown Series are less well-drained than either of the two previous series. For this reason their use-range is somewhat limited. Tillage operations must often be deferred until late spring and sowing of crops is often delayed.

These soils, therefore, are best suited to grass production for which they have shown a high potential. Usually, natural nutrient status is low; with liming, manuring and good management output is high.

*Whitegate Variant*: The soils of the Whitegate Variant are suitable for the production of a relatively wide range of tillage crops and for grass production. Their natural nutrient status is only moderately satisfactory. Despite their slightly impeded drainage condition, cultural operations are not seriously impaired.

*Sandhills Variant*: The soils of the Sandhills Variant have a limited use-range. They are very coarse textured and of low natural lime and nutrient status. They suffer from drought in dry periods and are, therefore, suited only to a limited range of tillage crops. Grass production, which is good during the early part of the year, falls off during the summer because of the moisture deficit. Regular and liberal fertiliser applications with liming are required for successful cropping.

*Deerpark Variant*: The soils of the Deerpark Variant have a somewhat limited use-range. Where the surface loess-like and solifluction material is sufficiently deep, they can be used for a relatively wide range of tillage crops, and for grass production, but where these surface deposits are thin, the use-range becomes more limited. Natural nutrient status is low, and liberal applications of lime and fertilisers, particularly phosphorus, are required for successful cropping.

### Soils—Their General Suitability, Use Range and Major Limitations

In drawing up the soil suitability classification presented in Table IX only the normal or dominant phases of each soil have been considered. For instance, some of the soil series placed in Class A may contain small inclusions of soils that are too shallow, too stony, or have slopes too steep for successful cultivation. Likewise, limited deeper phases of the Slievecoiltia Series or better drained phases of the Fethard, Rathangan and Macamore Series may deserve a higher rating in terms of suitability for cultivated cropping. These enclaves, however, constitute only a small proportion of the entire series. A consideration of such exceptions to each series is beyond the scope of this account and is not feasible at the scale of mapping employed.

**TABLE IX—Soil suitability classification***

| Suitability Class | Use-Range | Type of Limitation** | Soil Series |
|---|---|---|---|
| A<br>Mainly suitable for cultivated crops, pasture or forestry. | Wide use-range. | No serious limitations. | Ambrosetown, Baldwinstown, Ballindaggan, Bannow' Broadway, Broomhill,*** Carne,*** Clonroche, Hook Head, Killinick, Kiltealy, Old Ross, Randallsmill.*** |
| B<br>Mainly of moderate suitability for cultivated crops, pasture or forestry. | Somewhat limited use-range. | Very coarse texture—liable Screen to periodic drought— some steep slopes. | |
| | | Natural drainage imperfect — texture somewhat heavy. | Fethard. |
| | | Drainage problem needing constant attention. | Kilmore Slob. |
| | | Hazard of periodic flooding. | Clohamon. |
| C<br>Mainly of moderate to poor suitability for cultivated crops; mainly of moderate suitability for pasture or forestry. | Somewhat limited use-range. | Natural drainage poor— adverse soil physical conditions. | Macamore, Rathangan. |
| | | Drainage problem needing constant attention— adverse soil physical conditions. | Kilmore Slob Variant. |
| | | Drainage problem needing constant attention— adverse soil physical conditions—high molybdenum levels. | Wexford Slob, Wexford Slob Variant. |
| D<br>Mainly of poor suitability for cultivated crops; mainly of moderate suitability for pasture or forestry. | Limited use-range. | Serious drainage problem. | Ballyknockan, Ballywilliam, Kilpierce, Knockroe, Templeshanbo. |
| | | Serious drainage problem— adverse soil physical conditions. | Ballinruan, Coolaknick, Millquarter. |
| | | Serious drainage problem— hazard of periodic flooding—adverse soil physical conditions. | Kilmannock. |
| E<br>Mainly unsuitable for cultivated crops or intensive grazing; mainly of moderate and poor suitability for extensive grazing or forestry. | Very limited use-range. | Shallow soils—steep slopes. | Slievecoiltia. |
| | | Somewhat shallow soils— outcropping rocks common. | Nethertown. |
| | | Shallow soils—pan formations—some steep slopes. | Black Rock Mountain, Blackstairs, Forth Commons, Glenbough Variant. |

**TABLE IX (continued)**

| | | | |
|---|---|---|---|
| F<br>Mainly unsuitable for cultivated crops or intensive grazing; mainly of poor suitability for extensive grazing or forestry. | Extremely limited use-range. | Very serious drainage problem — adverse soil physical conditions. | Oulartleigh. |
| Unclassified (Variable suitability). | Variable use-range. | Variable limitations from slight to very serious. | Crosstown Complex, Carrickbyrne Complex, Basin Peat, Hill Peat, Alluvium, Aeolian Sands. |

*In making this classification a high standard of management practices (including lime and fertiliser amendments, as required) is assumed.

**Limitations noted here refer mainly to physical soil problems under existing conditions. Inadequate natural nutrient status is a major limitation in most of the soils and many need liming.

***These soils are borderline for Class A and in some respects resemble those in Class B.

Many of the land-use practices, traditional in County Wexford, are those well suited to the nature of the soils. There is a number of exceptions, however, where traditional land-use practices are no longer the most desirable. The concept of land quality has changed radically in recent years with the advent of fertilisers to supplement the soil's supply of essential plant nutrients, but land-use practice has not changed accordingly. With modern fertiliser technology, considerations of natural nutrient fertility in soils have become subordinate to physical problems such as poor drainage, 'heavy' texture and weakly developed structure, which are more difficult and more costly to rectify. Besides, copious farm labour supply has been replaced by mechanization, which has drastically altered the feasible cultural and management practices on many soils.

The soils placed in Class A (Table IX) are well adapted to the new techniques. In these, the major limiting factor to production for a wide range of crops previously has been their low nutrient supply and acid conditions. Appropriate lime and fertiliser applications, based on soil analyses and experience of crop requirements on the various soils, easily overcome these problems. These soils, too, can withstand the impact of heavy machinery; they cultivate easily, allow early growth in spring and are capable of carrying large stocks of grazing animals over a prolonged period of the year without suffering physical damage.

In the soils placed in Class C (Table IX), on the other hand, physical limitations, especially poor natural drainage and weakly developed structure, are foremost. In the days when labour supply permitted constant attention to drainage and systems of hand cultivation (*e.g.*, 'lazy beds' or 'ridge and furrow'), such problems were greatly alleviated. These soils had reasonable levels of natural nutrient fertility so they were less dependent on nutrient supplementation than the soils in Class A. However, the soils of Class C are far less adaptable to modern conditions, where mechanization has largely replaced hand labour. Nevertheless, many of the soils of this Class are still being devoted to cultivated cropping and, whereas crop yields are relatively high in some seasons, the difficulties of cultivation and harvesting in wet years, the slow growth early in the season together with the extra labour and capital inputs required, place production of arable crops from these soils at a distinct comparative disadvantage economically with similar lines of production from the

Class A soils. In like manner, many of the soils in Classes D and E (Table IX) were in part devoted to cultivated cropping under bygone systems of farming, but present-day economic and social conditions have altered considerably the desirable land use practices in such areas.

In certain cases, the possible range of uses on particular soils is wider than is currently practised. It is important to know what are the alternative uses for which particular soils are suitable in order to cope with changing economic circumstances and market demands. On soils such as those in Class A (Table IX), where the possible use-range is wide, the selection of the particular use which should be followed will depend largely on current economic circumstances. For the soils in the lower classes (Classes D, E and F), on the other hand, the use adopted will be largely independent of economic circumstances, since the inherent characteristics of the soils restrict their use possibilities. Apart from economic circumstances, optimum use depends not only on factors of soil quality, such as ability to meet the specific requirements of a certain crop or other land use enterprise, but also on various environmental and related geographic factors.

The use-range and the major limitations of the soils of County Wexford are summarised in Table IX. A number of soil series is included in each suitability class. Even with optimum manurial and management practices, certain differences in overall productive capacity persist between the soil series included in each suitability class, as a result of inherent differences between series. Nevertheless, the soils in any one ? have sufficient characteristics of importance in their use and productive potential in common to warrant their inclusion in the same general suitability class.

*Suitability Class A*

The soils included in this class have a wide use-range and are suited to cultivated cropping, pasture and forestry. Soft fruit production is proving a highly successful enterprise on a number of these soils in recent years.

Apart from low natural nutrient and lime status, they have no other serious limitation. They are well-drained in their natural state, are medium textured, possess a moderate to strong structure, and are readily amenable to the development of a desirable tilth under normal cultural practices. With regular attention to lime and fertiliser requirements, associated with proper management, these soils are capable of supporting high levels of production. The potential for grassland production and utilization is high throughout the season, and early spring grazing is possible, especially on new leys, with the judicious use of fertiliser and with particular emphasis on nitrogen. Phosphorus is generally the most limiting major nutrient, due to ‘fixation’ in the soil.

*Suitability Class B*

The soils included in this class (Table IX) have a more limited use-range than those in Class A and are generally of only moderate suitability for cultivated crops, pasture and forestry. For the four soils included the type of limitations varies.

The low moisture holding capacity of the Screen soils is the main problem limiting production, apart from inherent very low nutrient and lime levels. Steep slopes are an additional problem where cultivated cropping is concerned. Their heavier texture and slightly inferior structure and natural drainage condition disqualify the Fethard soils from inclusion in Class A. The soils of the Kilmore Slob Series are being devoted to cultivated cropping and to pasture production with considerable success, but the constant attention needed to drainage maintenance, together with hazards of flooding and seepage of sea-water, places them at some disadvantage for economic production when compared with the soils of Class A. The Clohamon Series are excellent all-purpose soils, that would easily fall into Class A but for the hazard of periodic flooding.

*Suitability Class C*

The soils included in this class (Table IX) have also a more limited use-range than those in Class A. Their natural texture, structure, consistence and drainage conditions are such that, in general, they are only of moderate to poor suitability for cultivated cropping. Compared with the soils in Class A, the effort required to develop a desirable tilth by cultural operations is much greater. They are slow to warm up in spring due to their moisture retentive properties, with the result that growth is slow early in the season and harvesting by modern mechanical means is often difficult due to soft ground conditions. Economically, therefore, arable crop production is at a comparative disadvantage with production from the soils of Class A. In recent years, some soils in this class are proving successful in producing high yields of blackcurrants.

The soils in Class C are well suited to pasture production for which their potential is very high. However, to attain this potential, they require constant attention to lime and fertiliser requirements, and for optimum utilization the pasture needs specialized management. While these soils are capable of a high output from pasture during the summer they are limited in production of early spring grass. Management practices must allow for resting the pastures during the wetter periods of the season to avoid poaching damage by grazing stock; for this reason the high mid-season production must be exploited to the full by conserving the surplus growth as silage or hay for winter keep.

The inadequate standards of fertiliser use and management presently practised on pastures are reflected in the rush (*Juncus*) dominant condition of many of the swards. A further problem in grazing stock, so far recognized in the Wexford Slob soils only, is the high level of soil molybdenum prevailing, leading to a condition of induced copper deficiency in the animals. Although natural nutrient levels in these soils are somewhat higher than in the soils of Class A, nevertheless, they are inadequate to meet the requirements of increased output. In this regard most attention must be given to phosphorus and to nitrogen, especially early in the season, and to potassium as required.

Although not available for afforestation to any extent, the soils in this class should constitute productive forest soils for particular species that are relatively tolerant of moist soil conditions.

*Suitability Class D*

The soils included in this class (Table IX) have a limited use-range. The main limitations, apart from inherent low fertility, are the poor natural drainage conditions and in some, also, adverse soil physical properties such as heavy texture, weak structure and poor consistence (friability). In addition, in many cases, the position of the soils in depressional locations renders artificial drainage both difficult and costly. The Kilmannock soils suffer the added hazard of periodic flooding.

In general, these soils are of poor suitability for cultivated cropping. They present difficulties in cultivation and harvesting by modern means, to an even greater degree than the soils of Class C. In addition, they provide poor growth conditions early in the season, so the economic feasibility of arable crop production from these soils, compared with those in Class A, is questionable.

The soils in Class D are more suited to pasture production, but the restrictions to output and utilization, and the procedures required to attain maximum returns, are similar or even more pronounced, in certain cases, than those outlined above for the soils of Class C.

Some afforestation is being attempted on these soils and provided species tolerant of poorly-drained soils can be selected, forestry may prove a relatively successful land use enterprise in these areas. Where some artificial drainage is feasible, a wider range of forest species could be grown.

*Suitability Class E*

The soils included in this class (Table IX) are a mixed group and, in general, have a very limited use-range. The main limitations obtaining are the shallow depth of the soils and, in places, the abundance of rock outcrop. Steep slopes prevail in certain cases also, and pan formations in the profile can be a serious problem, restricting water movement and root penetration. Moisture deficit in summer is a further limitation, with the possible exception of the Slievecoiltia soils. The soils, in all but the Glenbough Variant and Nethertown Series, are confined generally to the more elevated hill and mountain regions of the county.

Cultivated cropping and intensive grazing are practised on a limited scale on some of these soils, notably Glenbough, Nethertown and Slievecoiltia, and had been practised more widely in the past, with the cultural practices obtaining. These soils are now considered more suitable for extensive grazing, and with the application of modern technology, in the form of fertiliser use, surface regeneration and improved management, the stock carrying capacity on many of the areas concerned can be greatly increased. In addition to the general low nutrient status of most of these soils, cobalt deficiency is a serious problem where livestock health is concerned. Considerable variation occurs within the soils in this class both in type and degree of physical limitation present, so that some are capable of greater improvement than others.

Forestry has been established on a limited scale on a number of soils in this class, but the range of species grown is restricted by soil and environmental conditions. In this regard, the Slievecoiltia and Black Rock Mountain soils are superior to the others. Some areas, where the bedrock is near the surface or outcropping extensively, or where iron-pan or other indurated layers occur close to ground surface, afforestation can be a very great risk.

*Suitability Class F*

Only the Oulartleigh Series is included in this class (Table IX). The use-range of these soils is extremely limited. They are very poorly-drained and possess many of the adverse physical features outlined for the soils in Class C but in a much more extreme form. Likewise, the procedures discussed for the Class C soils, in terms of improvement measures such as artificial drainage, fertiliser application and management, need to be in more pronounced form in this case.

Since little worthwhile improvement is possible without improved drainage, it is considered that the present use-range of these soils cannot easily be expanded. Therefore, they probably will continue as unsuitable for cultivated crops and intensive pasture, and mainly of poor suitability for extensive grazing and forestry, until such time as economic circumstances warrant the expenditure needed to reclaim them successfully. Limited improvement for extensive grazing and forestry is possible where the drainage problem can be partly overcome.

*Unclassified* (*Soils with variable suitability*)

The remainder of the soils of the county are very complex in their properties and also in their distribution pattern. They are equally variable in terms of suitability for different enterprises and use-range. Some, such as the main series in the Crosstown Complex, are high on the suitability scale and use-range and closely approach the soils in Class A in many respects. Most of the others, however, are much lower on the scale, both for suitability and use-range, the majority falling to the level of Class E or lower.

**Extent and Relative Proportion of the Different Soil Suitability Classes**

The extent and relative proportion of the soils included in the suitability classes and of each class itself relative to the county area are shown in Table X.

The distribution of the classes is shown on the Soil Suitability Map accompanying this Bulletin.

The figures presented (Table X) show that the soils of Class A occupy 54.3 per cent (314,195 acres) of the entire county, with Clonroche and Ballindaggan Series contributing 45.6 per cent. This means that over half of County Wexford may be considered to consist of good arable soils, with a wide use potential, and virtually devoid of any major physical limitation to supporting a high level of production, under any form of agriculture normal to our climate.

Class B occupies 6.2 per cent (36,090 acres), the most extensive component of which is the Screen Series, contributing 4.7 per cent. Class C occupies 19.0 per cent (109,710 acres), with the Macamore and Rathangan soils contributing 18.1 per cent, or roughly 9 per cent each. The soils in Classes B and C are considered to have a somewhat limited use-range (Table IX). In terms of general suitability for normal agricultural enterprises, these soils may be considered as moderately adaptable, so if their extent (25.2 per cent) is added to that of Class A soils (54.3 per cent), then the county may be taken to have approximately 80 per cent of potentially productive soils.

The soils of limited use-range (Class D) represent 10.9 per cent (63,100 acres) of the county. With amelioration of the adverse drainage condition prevalent in the soils in this class, vast improvement in pasture output in particular can be achieved. Improved drainage would also raise their status as potential forest soils.

The remainder of the county (9.6 per cent or 55,910 acres) is occupied by soils in Classes E and F and those unclassified due to their variable suitability and use-range. With few exceptions, as already discussed in the previous section of this chapter, these soils have limited to extremely limited use-range.

**Classification of the Soils according to Drainage Condition**

In Table XI a classification of the soils of the county on the basis of drainage characteristics is made. The different soils have been grouped into five drainage classes: (a) excessively-drained, (b) freely-drained, (c) poorly-drained, (d) very poorly-drained and (e) variable drainage. The peats and the alluvium have not been classified.

The soils in class (a) are not capable of holding sufficient moisture for normal growth of a wide range of crops throughout the average growing season. Soils in

TABLE X—Extent and relative proportion of the soils in each suitability class

| Class | Soils | Area (acres) | Per cent of total county area |
|---|---|---|---|
| A | | | |
| 314,195 acres | Ambrosetown | 2,750 | 0.47 |
| (54.26 per cent) | Baldwinstown | 1,160 | 0.20 |
| | Ballindaggan | 23,580 | 4.07 |
| | Bannow | 1,000 | 0.17 |
| | Broadway | 10,200 | 1.76 |
| | Broomhill | 1,080 | 0.19 |
| | Carne | 960 | 0.17 |
| | Clonroche | 240,265 | 41.49 |
| | Hook Head | 1,200 | 0.21 |
| | Killinick | 9,680 | 1.67 |
| | Kiltealy | 8,740 | 1.51 |
| | Old Ross | 6,460 | 1.12 |
| | Randallsmill | 7,120 | 1.23 |
| B | | | |
| 36,090 acres | Clohamon | 2,240 | 0.39 |
| (6.23 per cent) | Fethard | 3,590 | 0.62 |
| | Kilmore Slob | 2,960 | 0.51 |
| | Screen | 27,300 | 4.71 |
| C | | | |
| 109,710 acres | Macamore | 52,050 | 9.01 |
| (18.97 percent) | Rathangan | 52,620 | 9.09 |
| | Wexford Slob | 5,040 | 0.87 |
| D | | | |
| 63,100 acres | Ballinruan | 2,300 | 0.41 |
| (10.90 per cent) | Ballyknockan | 1,700 | 0.29 |
| | Ballywilliam | 2,940 | 0.51 |
| | Coolaknick | 4,040 | 0.70 |
| | Kilmannock | 3,240 | 0.56 |
| | Kilpierce | 44,800 | 7.74 |
| | Knockroe | 420 | 0.07 |
| | Millquarter | 1,280 | 0.22 |
| | Templeshanbo | 2,380 | 0.41 |
| E | | | |
| 24,860 acres | Black Rock Mountain | 5,300 | 0.92 |
| (4.30 per cent) | Blackstairs | 9,080 | 1.57 |
| | Forth Commons | 4,240 | 0.73 |
| | Nethertown | 440 | 0.08 |
| | Slievecoiltia | 5,800 | 1.00 |
| F | | | |
| 1,570 acres | Oulartleigh | 1,570 | 0.26 |
| (0.26 per cent) | | | |
| (Unclassified (Variable suitability) | | | |
| 29,480 acres | Aeolian Sand | 2,920 | 0.50 |
| (5.08 per cent) | Alluvium | 9,500 | 1.64 |
| | Basin Peat | 1,400 | 0.24 |
| | Carrickbyrne Complex | 7,300 | 1.26 |
| | Crosstown Complex | 7,960 | 1.37 |
| | Hill Peat | 400 | 0.07 |

class (b) are capable of supplying sufficient moisture for normal growth of a wide range of crops throughout the average growing season. In the soils in class (c) the effects of drainage impedance dominate, while in class (d) these effects are more pronounced. The soils in class (e) have variable drainage characteristics as a result of a number of factors. For example, in the Black Rock Mountain, Blackstairs and Forth Commons soils an iron-pan occurs in places. Such soils are usually free draining

TABLE XI—Classification of the soils according to drainage conditions

| Drainage Class | Subclass based on drainage characteristics | Soil Series and Variants | Area in each Sub-class (acres) | Per cent of total area of county |
|---|---|---|---|---|
| Excessively drained. | Rapid permeability. Deep water-table. | Glenbough,* Screen, Aeolian Sands. | 30,220 | 5.22 |
| Freely-** drained. | Moderate permeability. Deep water-table. | Ambrosetown, Baldwinstown, Ballindaggan, Bannow, Broadway, Broomhill, Carne, Clohamon, Clonroche, Fethard, Hook Head, Killinick, Kiltealy, Nethertown, Old Ross, Randallsmill, Slievecoiltia. | 326,265 | 56.35 |
| | Slow permeability. Deep water-table. | Macamore, Rathangan. | 104,670 | 18.10 |
| Poorly-drained. | Moderate permeability. High water-table. | Ballyknockan, Ballywilliam, Kilmannock, Kilpierce, Knockroe, Templeshanbo. | 55,480 | 9.59 |
| | Slow permeability. High water-table. | Ballinruan, Coolaknick, Mill-quarter. | 7,620 | 1.31 |
| | Variable permeability. (Slow to moderate.) High water-table. | Kilmore Slob, Wexford Slob. | 8,000 | 1.37 |
| Very poorly-drained. | Slow permeability. Very high water-table. | Oulartleigh. | 1,570 | 0.26 |
| Variable-drainage. | Complex of (a) moderate permeability and (b) slow permeability due to iron pan. Deep water-table. | Black Rock Mountain, Black-stairs, Forth Commons. | 18,620 | 3.22 |
| | Variable permeability (slow to rapid). Deep water-table. | Soils of the Carrickbyrne Complex and Crosstown Complex. | 15,260 | 2.63 |
| Unclassified | | Alluvium, Basin Peat, Hill Peat. | 11,300 | 1.95 |

*Soil Variant-Area of this is not included in total area of subclass.

**'Freely-drained' includes the well-drained and moderately well-drained soils but also includes the Fethard Series which is moderately well-to imperfectly-drained.

below the iron-pan, but their drainage is restricted above the pan. Soils of the Carrick-byrne and Crosstown Complexes vary also in permeability and general drainage characteristics.

The five drainage classes are divided into subclasses (Table XI) based on the principal cause of the drainage condition obtaining. For example, in the case of the poorly-drained soils, the subclasses define the nature of the factors contributing to the condition. In certain instances, high water-table may be responsible; in other cases, slow permeability due to heavy texture and poor structure; and in others still a combination of these factors. Methods of artificial drainage to improve these soils must be adapted to the factors responsible, if best results are to be attained.

The extent of occurrence of the soils in each drainage class is also given in Table XI. It is interesting to note that 56 per cent of the soils of the county are freely-drained and approximately 31 per cent are poorly-drained. Of the remainder about 5 per cent are excessively-drained whilst the others are of variable drainage.

# CHAPTER VII

## THE AGRICULTURAL PATTERN IN THE COUNTY*

The County Wexford Committee of Agriculture and its technical advisory staff welcome the publication of the findings of the soil survey of the county conducted by the National Soil Survey of An Foras Taluntais (The Agricultural Institute). The survey defines in a factual manner the nature and extent of the various soils occurring in the county and provides a basis for systematic land use planning and practices geared to the most economic returns for different agricultural enterprises. These findings will prove very helpful to present and future advisory officers in the performance of their duties.

In deciding the most suitable farming system to be followed it is necessary to be fully conversant with the character of the natural resources obtaining; the most important of these is the soil itself. For best results from any agricultural enterprise it is important to suit the enterprise to the soil rather than impose a system for which the soil is not inherently suitable.

The farmers of County Wexford are tillage-minded, which is not surprising when one considers the extensive area of soils in the county that are suitable for cultivated cropping. Indeed a feature of Wexford farming is that cash crops, in one form or other, are grown on practically all farms. This tillage impulse, however, results in some farmers carrying on cultivated cropping where soil conditions are not generally suitable; a particular instance is the many farmers who till a high proportion of their land on the retentive, poorly-drained Macamore and Rathangan soils. It is considered that these soils could be more profitably devoted to high quality pastures.

### General Soil Suitability

If the advisory officers were asked, on the basis of their experience, to suggest agricultural enterprises to suit the various soils in the county, region by region, and pre-supposing satisfactory markets for the products, their general recommendations would be along the following lines.

*Region A*

In the extensive western and north-western region of the county, which is dominated by Brown Earths with some Brown Podzolics, a continuation of tillage farming is advisable. These friable, easily worked and free draining soils offer natural advantages under current manurial and management techniques for the production of barley, wheat, oats, sugar-beet and other root and vegetable crops. Soft fruits, especially strawberries, are very suited to these soils also; yields and quality of strawberries are comparable with the best either at home or abroad. A correct crop rotation is, of course, strongly advised. Over-cropping with cereals, where practised, has resulted in diseases such as eye spot and take-all; here as elsewhere the laws of good husbandry must be obeyed.

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*This chapter has been contributed by Mr. M. T. Connolly, M.Agr.Sc., Chief Agricultural Officer, Co. Wexford Committee of Agriculture.

Within this region, high yielding pastures can be established; indeed many such pastures occur, but rather liberal and frequent liming and manuring are required, however, to maintain them in a highly productive state. Where soil acidity is allowed to develop (and these soils are mainly acid by nature) and if manuring is neglected, the sown grass species die out within a few seasons and bent grasses (*Agrostis* spp.) become dominant, resulting in a drastic decrease in productivity. The latter remarks apply particularly to the north-western part of the region and, to a lesser degree, to the south-western part around Campile, Ballycullane and Bannow. Indeed, some of the best grasslands in the county occur in the Bannow district. Closely related to the Brown Earths of high base status, the soils of the Hook Head Series, derived from limestone parent material and occurring in the extreme south-west of the region, are capable of producing excellent permanent pastures and are also suitable for tillage crops.

The pastures in this general region are suitable for sheep, store cattle, milk or beef production.

*Region B*

This region occupies the south-eastern part of the county, and has some very good tillage farms but, in general, the soils are more suited to pasture. Probably the most profitable enterprise for this area is dairying; an extra outlet for milk was provided when a Cheese Factory was established in Wexford town in 1960. Milk from the area is also being supplied to the creamery at Inch. A very substantial change-over to milk production is expected.

The southern coastal area within this region, stretching from Carne to Kilmore and inland for a mile and more in places, possesses friable and easily worked soils. Besides, the climate is mild, being virtually free of frost. Early potato production is a major enterprise; other crops which are grown successfully include barley, wheat and a wide range of vegetables.

A second area within this region merits special mention. It occurs south of Wexford town and is confined more or less to the townlands of Kerlogue, Drinagh, Killiane and Ballykelly. The area is noted for the excellence and high productivity of its permanent pastures, some of which have not been ploughed in living memory. The soils are suitable also for cultivated cropping.

*Region C*

This Screen-Curracloe-Blackwater region has sandy, free draining soils, which are of low natural fertility but respond well to lime and manures. The region is also relatively frost-free so the choice enterprises here are early potatoes and vegetables.

Grass, if adequately limed and manured, does well also; some excellent pastures have been established in recent years, and white clover grows freely and vigorously. Growth here is earliest in the county, providing grazing early in spring and, due to the high resistance to poaching, stock can be carried on these pastures throughout the entire year. It is a very suitable area for outwintering stock; snowfalls are rare and the land is strongly undulating, affording considerable shelter. In dry summers pastures may suffer from drought so mid-season production can be limited.

*Region D*

This Slobland region, occupying slightly more than 5,000 acres, occurs north and south of Wexford town; the Slobs are known as the North and South Slobs, respectively. These were reclaimed from the sea under the Wexford Harbour Embankment Act, 1852, and came into agricultural use about 1860. The area is below sea-level, and drainage is effected by a system of channels and pumps. The soils possess a high natural fertility. They are more suited to grazing than to tillage, and pastures are highly esteemed by local stockmen for their fattening qualities. An animal health problem associated with a molybdenum-copper complex on these soils has been discussed in the previous chapter.

These Sloblands are internationally famous for the large flocks of wild geese and duck, especially the former, which collect here during the winter. The geese arrive in October and leave towards the end of April. Sportsmen from home and abroad enjoy this ‘shooters’ paradise’.

*Region E*

This north-eastern coastal region, known as the Macamores, is considered a problem area. It occupies about 50,000 acres. The soils are heavy and retentive, with weak structure, and at present a large proportion of the area needs to be drained. The land is naturally rather fertile and was rated highly under the Poor Law Valuation relative to other parts of the County. For example, the average Poor Law Valuation per acre of land within seven electoral divisions of typical Macamore land (area 34,202 acres) is 11/8d. per acre as against 8/5d. per acre for seven electoral divisions (area 34,309 acres) located in the Ferns, Ballycarney district, which is one of the best tillage districts in County Wexford.

At the time of the Griffith’s Valuation, over 100 years ago, farming in the Macamores was based on wheat, beans, milk and butter production. The wheat and beans were sown by spade cultivation in ridges, and drainage, therefore, did not present a problem. This ridge or bed type of cultivation persisted in later years when the horse replaced the spade. With the advent of the tractor and power-driven machinery, ridge cultivation was no longer practicable, and soil structure deteriorated due to the use of tractors and heavy implements. Drainage impedance was accentuated and rush growth stimulated. During the wet seasons of 1946, ‘47, ‘54 and ‘58 drainage problems became acute and rush (*Juncus*) spread so rapidly as to outpace any efforts of control. At present many pastures are dominated by vigorous rush growth. A complete drainage project for the whole district is now essential. Field experiments conducted in recent years by the Advisory Officers in conjunction with the Land Rehabilitation Officers of the Department of Agriculture, indicate that rather spectacular results can be obtained by mole draining, manuring and subsequent judicious management of the land.

It is considered that the present system of farming, based extensively on tillage, is not suitable for the district, and farmers are being encouraged to change over to milk and pig production. There is already one creamery in the district. The projected system envisages high quality pastures to provide grazing during the summer and adequate hay and silage for winter keep.

A limited acreage of barley would supply straw for bedding purposes, and grain to supplement the winter feed for cows and also the pig ration throughout the year. Cattle would be housed in yards or sheds during the winter so as to avoid damage to soil structure by poaching. This is akin to the system practised with success in the Netherlands under similar soil conditions.

*Region F*

This region, north and north-west of Gorey town, contains a high proportion of hilly and marginal land. The soils are acid and of low natural fertility. Prior to the expansion of liming and manuring during the 1950s, the tillage crop range here was confined almost entirely to oats and potatoes. Ware potatoes were, and still are, produced in considerable quantities for the Dublin market. Certified seed potatoes are also produced.

The farming pattern has changed considerably in recent years. Application of lime and fertilisers has widened the choice of crops to include barley and wheat. Pastures also have shown considerable improvement. The net result is that output from the farms in the form of tillage crops, sheep and milk, has increased sharply. Milk produced in the district is sold to the local creamery and is also channelled into the Dublin liquid milk trade.

### Agricultural Holdings in the County

There are 9,156 holdings of over one acre in County Wexford. Holdings generally are larger than the national average: 43 per cent are over 50 acres, compared with 26 per cent for the entire country; 18 per cent are over 100 acres and 4 per cent over 200 acres, compared with 9 per cent and 2 per cent, respectively, for the country. In addition, there are some 4,000 holdings of one acre and under, comprising almost entirely cottages built throughout the rural districts by the Local Authority. This liberal provision of good class housing accommodation for rural workers results in a satisfactory supply of labour throughout the county.

### Numbers Engaged in Farming

The total population of County Wexford according to the 1961 Census of Population was 83,259, of which 22,923 resided in the towns of Wexford, Enniscorthy, New Ross and Gorey. The total number of males over 18 years of age engaged in farm work in the County in 1962 was 12,800, of which 8,400 were members of the family and 4,400 hired. A further 900 males between 14 and 18 years of age, of which 500 were family members, were also engaged (*Irish Trade Jour.*, Dec. 1962). In the five year period 1957/62 there was a reduction of 380 in the number of family workers and 1,320 in the number of hired workers; these reductions followed the pattern of other counties and other countries in this respect.

### Farming Pattern in the County

The type of farming practised is mainly mixed with emphasis on tillage: 25 per cent of the arable land in County Wexford is under tillage compared with approximately 15 per cent for the entire country. The total area under tillage in 1962 was 150,900 acres, made up of 112,300 acres of cereal crops and 38,600 of root crops. The actual acreage under the various crops was: wheat, 50,200; oats, 17,900; barley, 43,800; beans and peas, 300; potatoes, 6,400; turnips, 15,200; mangels and fodder beet, 4,100; sugar beet, 8,500; kale and cabbage, 2,100; horticultural crops, 1,400; other root and green crops, 800. All the sugar-beet, wheat, malting barley, and some of the potatoes, oats and feeding barley are grown as cash crops. The remainder of the crops are consumed on the farms.

Wexford's contribution to the National Food Pool is high: in 1962 relative to the national acreage the county produced one-sixth of the wheat, one-fifth of the malting barley, and one-ninth of the sugar-beet.

A distinctive and progressive feature of farming in County Wexford in recent years is the relatively large and continually increasing acreage of soft fruits being grown as field crops. These fruits, mainly strawberries, raspberries and blackcurrants, are grown under contract for commercial firms, both Irish and British, for the manufacture of jam preserves and fruit juices. In 1962 there was a total of 1,522 tons of these fruits produced, realising £156,000 to the growers.

*Livestock*

Numbers of livestock of the various classes in County Wexford in 1962 were: cattle, 155,900; sheep, 253, 900; pigs, 67,600; horses, 7,300.

*Cattle:* The foundation breed is mainly Shorthorn but in recent years Friesians are being introduced on a larger scale. The best of the cows are crossed with dairy breeds for herd replacements, the remainder with beef breeds, mainly Hereford. The majority of the cattle sold are for export as forward stores at 1½ to 2½ years old. Stall-feeding during the winter months is practised, but to a much lesser extent now than in former years. Large numbers of calves and young stores are bought-in from the neighbouring dairying counties of Waterford, Kilkenny and Tipperary.

*Sheep:* A feature of recent farming is the large increase in sheep numbers. Since World War II these have increased by 101,000, or 66.3 per cent. The prices prevailing in the past decade enticed flock owners to increase their sheep numbers and others to take up sheep farming for the first time. Most popular breeds include Border Leicester, Suffolk-Border Leicester crosses and Border Leicester-Cheviot crosses.

*Horses:* Wexford is noted for the production of high class hunters. In spite of the sharp reduction in the number of horses kept on farms in recent years, there are still many farmers who keep good class half-bred and Irish Draught mares for breeding purposes. These are mated to thorough-bred sires for the production of hunters. On the smaller farms the progeny of such matings are sold as one, two, or three-year-olds to larger farmers within the county or to dealers from other parts. The larger farmers keep the young horses to breed from them or sell them as 'hunted' animals. There are four packs of fox-hounds in the county, the majority of followers being local farmers.

County Wexford farmers are well-known and successful exhibitors at the annual Horse Show of the Royal Dublin Society and at smaller local shows. In recent years they have won many of the major awards, including the Supreme Hunter Championship of the Dublin Show.

## Increase in Agricultural Output in Recent Years

Wexford farmers have played a foremost part in the Irish agricultural resurgence of the past 15 years. The years following World War II found our soils in a very low state of fertility, resulting in low output. The 1949 Annual Report of the County Committee of Agriculture had this to say of the Wexford soils at that time.

*Land Asleep*

*The plain fact is that the majority of our lands, especially our pastures, are asleep and are thus for years. They are asleep, not from overwork, not from age, not from laziness, but from neglect and starvation. They sleep for nine months per year, they awaken grudgingly for the other three, during which time 'they produce as little as possible under an Irish sky'. This inactivity is not of their choice, it is natural for a soil* *to be active, to be alive, to produce and keep producing, but to be so, they must contain lime, phosphorus, potassium and nitrogen in certain quantities.*

*The soils under tillage in County Wexford are reasonably active, and remain so for about two years after being sown down with grass seeds; during these early post-tillage years they are green in March, and produce good quality growth until late autumn. After a few seasons the fertility of the soil drops, and immediately the good grasses, like perennial, cocksfoot and timothy die out, as does also white clover; their place is taken by late unproductive species like yorkshire fog, sweet vernal and bent grass, particularly the latter, and so, the land's asleep again. In September, every year, it dons a heavy white 'fur' coat, which it will keep on until the following May, when in a half-hearted manner it changes to dull green for a few months. It remains thus until the next rotation.*

*In the past our soils were not getting the treatment they deserved. Agricultural production in this country is, and has been, low, and it is only by stepping up the fertility of our soils that we can bring it to what it should be. The land is our only worthwhile source of wealth, but what a great source it is, and what a wonderful one it could be.*

It was not known then, but a radical change was imminent. Up to and including 1949, the amount of lime being applied annually in the county was very small; for example, in 1949 the total amount applied was the equivalent of 9,000 tons of ground limestone. From 1951 to 1957 inclusive, there were over 600,000 tons of ground limestone applied on Wexford farms, which incidentally was one-eighth of the total quantity used during that period for the whole country. In 1956 alone, 100,536 tons were used in County Wexford. From 1950 onwards fertilisers were applied to cereals on the majority of farms and for the first time on many farms annual applications to grassland became a common practice. The bent grass has largely disappeared and most pastures are green from March to December.

Since 1949 the tillage area has increased from 142,143 to 149,300 acres (5 per cent), and cereal yields have increased by as much as 50 per cent. Sheep numbers have increased from 103,200 in 1949 to 253,900 in 1962 (146 per cent); cattle from 136,000 to 156,000 (15 per cent); pigs from 34,000 to 67,500 (98 per cent).

The total agricultural output of the county has shown a remarkable upward trend over the past 15 years and this trend is most likely to continue and possibly accelerate in the years ahead. Despite the vast improvement, it is certain that most soils in the county are still capable of higher production, since present output is below their potential.

## APPENDIX I

### Mechanical and Chemical Analyses

TABLE 1—Ambrosetown Association—Ambrosetown Series

| Horizon<br>Depth (in.) | $A_{11}$<br>0—5 | $A_{12}$<br>5—10 | (B)<br>10—21 | B/C<br>21—36 |
|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 25.5 | 18.6 | 16.9 | 20.6 |
| Fine sand | 21.3 | 19.3 | 18.6 | 18.1 |
| Silt | 32.2 | 34.7 | 37.3 | 34.0 |
| Clay | 21.0 | 27.4 | 27.2 | 27.3 |
| pH | 5.9 | 6.1 | 6.2 | 6.2 |
| C.E.C. m.eq./100 g. | 11.4 | 11.0 | 8.6 | 8.4 |
| T.E.B. m.eq./100 g. | 8.7 | 8.4 | 5.0 | 7.6 |
| Per cent base saturation | 76 | 76 | 58 | 90 |
| Per cent carbon | 2.80 | 1.80 | 0.70 | — |
| Per cent nitrogen | 0.23 | 0.18 | 0.12 | — |
| C/N ratio | 12.2 | 10.0 | 5.8 | — |
| Per cent free iron | 1.54 | 2.12 | 2.31 | 2.10 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 2,000 | 2,000 | 1,600 | 1,700 |
| Phosphorus | 2.0 | 0.5 | 0.5 | 0.5 |
| Potassium | 80 | 40 | 25 | 70 |
| Magnesium | 235 | 170 | 100 | 70 |

Coarse Sand 2.0-0.2 mm; Fine Sand 0.2-0.05 mm; Silt 0.05-0.002 mm; Clay <0.002 mm diameter size.

C.E.C.=Cation Exchange Capacity; T.E.B.=Total Exchangeable Bases; C/N Ratio=Carbon: Nitrogen Ratio; T.N.V.=Total Neutralising Value.

TABLE 2—Baldwinstown Association—Baldwinstown Series

| Horizon | $A_{11}$ | $A_{12}$ | $A_{13}$ | (B) | B/C |
|---|---|---|---|---|---|
| Depth (in.) | 0—9 | 9—18 | 18—27 | 27—36 | 36—45 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 25.9 | 22.6 | 22.1 | 18.2 | 23.1 |
| Fine sand | 19.3 | 19.2 | 20.2 | 21.3 | 20.5 |
| Silt | 31.8 | 33.9 | 33.9 | 34.5 | 32.1 |
| Clay | 23.0 | 24.3 | 23.8 | 26.0 | 24.3 |
| pH | 6.0 | 6.4 | 6.5 | 6.6 | 6.7 |
| C.E.C. m.eq./100 g. | 11.9 | 9.2 | 9.0 | 8.6 | 10.2 |
| T.E.B. m.eq./100 g. | 8.9 | 7.6 | 7.6 | 7.9 | 9.3 |
| Per cent base saturation | 75 | 83 | 84 | 92 | 91 |
| Per cent carbon | 2.64 | 1.32 | 0.96 | 0.36 | 0.24 |
| Per cent nitrogen | 0.23 | 0.12 | 0.10 | 0.05 | 0.04 |
| C/N ratio | 11.5 | 11.0 | 9.6 | 7.2 | 6.0 |
| Per cent free iron | 2.07 | 2.07 | 2.11 | 2.21 | 2.20 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 3,300 | 2,300 | 2,500 | 3,000 | 3,000 |
| Phosphorus | 4.0 | 0.5 | 1.5 | 0.5 | 0.5 |
| Potassium | 60 | 30 | 30 | 50 | 60 |
| Magnesium | 160 | 110 | 120 | 120 | 110 |

TABLE 3—Ballindaggan Association—Ballindaggan Series

| Horizon | $A_{11}$ | $A_{12}$ | (B) | B/C |
|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—11 | 11—15 | Below 15 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 21.0 | 26.6 | 36.1 | 45.8 |
| Fine sand | 7.5 | 6.8 | 7.8 | 8.6 |
| Silt | 42.0 | 39.4 | 37.0 | 31.2 |
| Clay | 29.5 | 27.2 | 19.1 | 14.4 |
| pH | 5.9 | 6.0 | 6.1 | 6.3 |
| C.E.C. m.eq./100 g. | 14.2 | 12.8 | 6.7 | 4.5 |
| T.E.B. m.eq./100 g. | 2.9 | 3.0 | 1.3 | 1.9 |
| Per cent base saturation | 20 | 23 | 19 | 42 |
| Per cent carbon | 4.90 | 3.60 | 1.60 | 0.70 |
| Per cent nitrogen | 0.35 | 0.28 | 0.11 | 0.06 |
| C/N ratio | 14.0 | 12.9 | 14.5 | 11.7 |
| Per cent free iron | 2.66 | 2.43 | 2.20 | 0.90 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 200 | 200 | 100 | 100 |
| Phosphorus | 1.0 | 1.0 | 0.5 | 1.0 |
| Potassium | 35 | 25 | 15 | 35 |
| Magnestium | 90 | 80 | — | 40 |

TABLE 3 (CONTD.)—Ballindaggan Association—Templeshanbo Series

| Horizon | $A_{11}$ | $A_{12g}$ | A/CG | CG |
|---|---|---|---|---|
| Depth (in.) | 0—4 | 4—9 | 9—15 | 15—21 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 13.3 | 28.9 | 42.0 | 38.8 |
| Fine sand | 13.2 | 15.5 | 18.2 | 16.4 |
| Silt | 59.4 | 45.4 | 36.4 | 39.0 |
| Clay | 14.1 | 10.2 | 3.4 | 5.8 |
| pH | 5.0 | 5.2 | 5.5 | 5.6 |
| C.E.C. m.eq./100 g. | 14.4 | 7.0 | 2.2 | — |
| T.E.B. m.eq./100 g. | 5.2 | 2.6 | 1.5 | — |
| Per cent base saturation | 36 | 37 | 68 | — |
| Per cent carbon | 9.44 | 4.51 | 0.48 | 0.36 |
| Per cent nitrogen | 0.58 | 0.25 | 0.04 | 0.05 |
| C/N ratio | 16.3 | 18.0 | 12.0 | 7.2 |
| Per cent free iron | 0.84 | 0.68 | 0.31 | 0.41 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 400 | 100 | 100 | 100 |
| Phosphorus | 3.0 | 1.0 | 1.0 | 7.0 |
| Potassium | 80 | 50 | 20 | 25 |
| Magnesium | 40 | 10 | 10 | 20 |

TABLE 3 (CONTD.)—Ballindaggan Association—Black Rock Mountain Series

| Horizon | $A_0$ | $A_1$ | $A_2$ | $B_{22}$ | B/C |
|---|---|---|---|---|---|
| Depth (in.) | 2—0 | 0—10 | 10—12 | 12—23 | Below 23 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | — | 14.8 | — | 26.0 | 28.8 |
| Fine sand | — | 22 4 | — | 17.1 | 19.0 |
| Silt | — | 42.3 | — | 42.6 | 41.0 |
| Clay | — | 20.5 | — | 14.3 | 11.2 |
| pH | — | 4.5 | 5.1 | 5.0 | 5.0 |
| C.E.C. m.eq./100 g. | — | 40.0 | 10.8 | 14.2 | 5.0 |
| T.E.B. m.eq./100 g. | — | 1.9 | 1.5 | 1.8 | 1.1 |
| Per cent base saturation | — | 5 | 14 | 13 | 22 |
| Per cent carbon | — | 24.00 | 2.28 | 2.88 | 0.72 |
| Per cent nitrogen | — | 0.67 | — | 0.18 | 0.06 |
| C/N ratio | — | 35.8 | — | 16.0 | 12.0 |
| Per cent free iron | — | 1.54 | 1.43 | 3.64 | 1.32 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | — | 100 | 100 | 100 | 100 |
| Phosphorus | — | 3.5 | 1.0 | 1.0 | 1.0 |
| Potassium | — | 142 | 60 | 25 | 20 |
| Magnesium | — | 10 | 10 | 20 | 10 |

TABLE 4—Bannow Association—Bannow Series

| Horizon | $A_{1p}$ | $A_{12}$ | $B_{2t}$ | C |
|---|---|---|---|---|
| Depth (in.) | 0—7 | 7—18 | 18—23 | 23—36 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 54.5 | 47.4 | 20.6 | 29.5 |
| Fine sand | 14.2 | 17.2 | 11.4 | 10.2 |
| Silt | 18.5 | 21.4 | 39.2 | 36.1 |
| Clay | 12.8 | 14.0 | 28.8 | 24.2 |
| pH | 8.0 | 8.0 | 8.0 | 8.2 |
| C.E.C. m.eq./100 g. | 11.7 | 11.4 | 8.6 | 6.5 |
| T.E.B. m.eq./100 g. | — | — | — | — |
| Per cent base saturation | Sat. | Sat. | Sat. | Sat. |
| Per cent carbon | 2.70 | 1.70 | 0.80 | 0.50 |
| Per cent nitrogen | 0.26 | 0.13 | 0.08 | 0.04 |
| C/N ratio | 10.4 | 13.1 | 10.0 | 12.5 |
| Per cent free iron | 0.79 | 0.90 | 2.26 | 2.40 |
| Per cent T.N.V. | 2.7 | 3.9 | 0.5 | 0.0 |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 20,000+ | 20,000+ | 10,000 | 3,000 |
| Phosphorus | 6.0 | 2.0 | 1.0 | 1.0 |
| Potassium | 56 | 50 | 66 | 70 |
| Magnesium | 260 | 180 | 96 | 120 |

TABLE 5—Broadway Association—Broadway Series

| Horizon | $A_{1p}$ | $(B)_1$ | $(B)_2$ | B/C |
|---|---|---|---|---|
| Depth (in.) | 0—7 | 7—16 | 16—25 | 25—40 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 37.5 | 33.6 | 32.9 | 37.4 |
| Fine sand | 23.3 | 23.2 | 23.0 | 23.7 |
| Silt | 24.3 | 26.0 | 24.6 | 25.6 |
| Clay | 14.9 | 17.2 | 19.5 | 13.3 |
| pH | 6.2 | 6.2 | 6.2 | 6.3 |
| C.E.C. m.eq./100 g. | 12.4 | 9.4 | 8.4 | 6.4 |
| T.E.B. m.eq./100 g. | 11.4 | 8.4 | 6.8 | 5.8 |
| Per cent base saturation | 92 | 89 | 81 | 91 |
| Per cent carbon | 2.52 | 1.08 | 1.08 | 0.48 |
| Per cent nitrogen | 0.22 | 0.12 | 0.07 | 0.04 |
| C/N ratio | 11.5 | 1.9 | 15.4 | 12.0 |
| Per cent free iron | 1.54 | 1.32 | 1.67 | 1.57 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 3,600 | 2,100 | 2,000 | 1,400 |
| Phosphorus | 5.0 | 1.0 | 1.0 | 1.5 |
| Potassium | 215 | 75 | 55 | 65 |
| Magnesium | 510 | 294 | 265 | 225 |

TABLE 6—Broomhill Association—Broomhill Series

| Horizon | $A_{1p}$ | $A_{12}$ | A/C |
|---|---|---|---|
| Depth (in.) | 0—8 | 8—15 | 15—21 |
| **Mechanical analysis of mineral fraction (per cent)** | | | |
| Coarse sand | 26.7 | 34.5 | 53.3 |
| Fine sand | 19.6 | 15.7 | 12.8 |
| Silt | 28.7 | 25.0 | 14.2 |
| Clay | 25.0 | 24.8 | 19.7 |
| pH | 7.6 | 7.5 | 7.5 |
| C.E.C. m.eq./100 g. | 16.3 | 16.5 | 15.1 |
| T.E.B. m.eq./100 g. | — | — | — |
| Per cent base saturation | Sat. | Sat. | Sat. |
| Per cent carbon | 4.30 | 1.55 | 1.80 |
| Per cent nitrogen | 0.38 | 0.13 | 0.15 |
| C/N ratio | 11.3 | 11.9 | 12.0 |
| Per cent free iron | 2.06 | 2.47 | 2.33 |
| Per cent T.N.V. | 0.0 | 0.0 | 0.0 |
| **Available nutrients, lb./ac.** | | | |
| Calcium | 8,600 | 6,800 | 5,800 |
| Phosphorus | 5.0 | 2.0 | 2.0 |
| Potassium | 350 | 125 | 142 |
| Magnesium | 190 | 160 | 150 |

TABLE 7—Carne Association—Carne Series

| Horizon | $A_{1p}$ | $A_{12}$ | $B_{21}$ | $B_{22}$ | B/C |
|---|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—12 | 12—19 | 19—26 | 26—47 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 38.3 | 38.0 | 40.3 | 34.9 | 33.2 |
| Fine sand | 29.0 | 24.2 | 25.4 | 29.1 | 28.9 |
| Silt | 22.3 | 27.9 | 22.7 | 23.3 | 23.7 |
| Clay | 10.4 | 9.9 | 11.6 | 12.7 | 14.2 |
| pH | 5.6 | 6.5 | 6.7 | 6.7 | 6.6 |
| C.E.C. m.eq./100 g. | 10.4 | 9.2 | 9.8 | 8.8 | 6.4 |
| T.E.B. m.eq./100 g. | 5.2 | 8.4 | 8.7 | 7.6 | — |
| Per cent base saturation | 50 | 91 | 89 | 86 | Sat. |
| Per cent carbon | 2.60 | 2.00 | 1.40 | 1.20 | 0.50 |
| Per cent nitrogen | 0.21 | 0.15 | 0.08 | 0.06 | 0.02 |
| C/N ratio | 12.4 | 13.3 | 17.5 | 20.0 | 25.0 |
| Per cent free iron | 0.84 | 0.65 | 0.96 | 0.76 | 1.00 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 1,700 | 2,000 | 2,400 | 1,400 | 1,900 |
| Phosphorus | 16.0 | 2.0 | 1.5 | 1.0 | 1.0 |
| Potassium | 280 | 195 | 200 | 200 | 90 |
| Magnesium | 160 | 215 | 170 | 160 | 294 |

TABLE 7 (CONTD.)—Carne Association—Nethertown Series

| Horizon | $A_{11}$ | $A_{12}$ | $B_{2(ir)}$ | B/C |
|---|---|---|---|---|
| Depth (in.) | 0—8 | 8—15 | 15—21 | Below 21 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 60.6 | 53.3 | 58.2 | 73.1 |
| Fine sand | 15.5 | 18.1 | 14.2 | 11.4 |
| Silt | 15.1 | 22.0 | 18.1 | 11.8 |
| Clay | 8.7 | 6.5 | 9.5 | 3.7 |
| pH | 5.7 | 5.7 | 5.6 | 6.0 |
| C.E.C. m.eq./100 g. | 11.3 | 10.5 | 14.1 | 4.2 |
| T.E.B. m.eq./100 g. | 4.4 | 4.0 | 2.9 | 1.3 |
| Per cent base saturation | 39 | 38 | 21 | 31 |
| Per cent carbon | 3.40 | 2.90 | 2.20 | 0.40 |
| Per cent nitrogen | 0.28 | 0.24 | 0.16 | 0.03 |
| C/N ratio | 12.1 | 12.1 | 13.8 | 13.3 |
| Per cent free iron | 1.03 | 1.08 | 1.72 | 0.99 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 500 | 500 | 100 | 100 |
| Phosphorus | 1.0 | 1.0 | 2.0 | 3.0 |
| Potassium | 175 | 142 | 240 | 142 |
| Magnesium | 185 | 185 | 80 | 30 |

TABLE 8—Clonroche Association—Clonroche Series

| Horizon | $A_{11}$ | $A_{12}$ | A/C |
|---|---|---|---|
| Depth (in.) | 0—6 | 6—14 | 14—36 |
| **Mechanical analysis of mineral fraction (per cent)** | | | |
| Coarse sand | 26.2 | 29.4 | 42.3 |
| Fine sand | 11.7 | 19.4 | 14.5 |
| Silt | 36.8 | 26.4 | 28.4 |
| Clay | 25.3 | 24.8 | 14.8 |
| pH | 5.3 | 5.8 | 6.4 |
| C.E.C. m.eq./100 g. | 15.2 | 11.9 | 5.9 |
| T.E.B. m.eq./100 g. | 7.1 | 7.5 | 4.4 |
| Per cent base saturation | 47 | 63 | 75 |
| Per cent carbon | 4.38 | 2.93 | 0.51 |
| Per cent nitrogen | 0.36 | 0.25 | 0.07 |
| C/N ratio | 12.2 | 11.7 | 7.3 |
| Per cent free iron | 2.30 | 2.48 | 2.04 |
| Per cent T.N.V. | — | — | — |
| **Available nutrients, lb./ac.** | | | |
| Calcium | 400 | 1,200 | 1,600 |
| Phosphorus | 0.5 | 0.0 | 0.0 |
| Potassium | 70 | 22 | 45 |
| Magnesium | 25 | 50 | 50 |

TABLE 8 (CONTD.)—Clonroche Association—Kilpierce Series

| Horizon<br>Depth (in.) | $A_{11}g$<br>0—6 | $A_{12}g$<br>6—10 | $A_{13}g$<br>10—16 | A/CG<br>16—24 |
|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 22.7 | 25.2 | 27.0 | 24.0 |
| Fine sand | 9.8 | 11.1 | 10.3 | 10.2 |
| Silt | 37.2 | 35.3 | 38.5 | 38.8 |
| Clay | 30.3 | 28.3 | 24.2 | 27.0 |
| pH | 5.6 | 5.6 | 5.9 | 6.0 |
| C.E.C. m.eq./100 g. | 15.6 | 13.1 | 6.6 | 6.8 |
| T.E.B. m.eq./100 g. | 5.3 | 4.8 | 3.8 | 4.5 |
| Per cent base saturation | 34 | 37 | 58 | 66 |
| Per cent carbon | 4.90 | 2.70 | 0.80 | 0.20 |
| Per cent nitrogen | 0.39 | 0.24 | 0.09 | 0.06 |
| C/N ratio | 12.6 | 11.3 | 8.9 | 3.3 |
| Per cent free iron | 2.07 | 1.78 | 1.78 | 1.91 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, Ib./ac.** | | | | |
| Calcium | 1,000 | 800 | 1,200 | 1,800 |
| Phosphorus | 0.5 | 1.5 | 0.5 | 0.5 |
| Potassium | 95 | 40 | 10 | 20 |
| Magnesium | 40 | 70 | 100 | 90 |

**TABLE 8 (CONTD.)—Clonroche Association—Slievecoiltia Series**

| Horizon<br>Depth (in.) | $A_1$<br>0—10 | $B_2$(ir)<br>10—20 | C<br>Below 20 |
|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | |
| Coarse sand | 28.0 | 33.2 | — |
| Fine sand | 5.4 | 8.8 | — |
| Silt | 37.7 | 38.8 | — |
| Clay | 28.9 | 19.2 | — |
| pH | 5.2 | 5.6 | — |
| C.E.C. m.eq./100 g. | 20.0 | 10.6 | — |
| T.E.B. m.eq./100 g. | 4.9 | 1.2 | — |
| Per cent base saturation | 25 | 11 | — |
| Per cent carbon | 8.20 | 3.40 | — |
| Per cent nitrogen | 0.63 | 0.22 | — |
| C/N ratio | 13.0 | 15.5 | — |
| Per cent free iron | 2.68 | 4.21 | — |
| Per cent T.N.V. | — | — | — |
| **Available nutrients, Ib./ac.** | | | |
| Calcium | 600 | 100 | — |
| Phosphorus | 3.5 | 1.0 | — |
| Potassium | 235 | 60 | — |
| Magnesium | 145 | 10 | — |

TABLE 9—Fethard Association—Fethard Series

| Horizon | $A_{11}$ | $A_{12}$ | A/B | $B_{2t}g$ | B/Cg |
|---|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—12 | 12—20 | 20—27 | 27—34 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 6.8 | 5.7 | 19.7 | 17.7 | 20.5 |
| Fine sand | 28.0 | 24.1 | 13.1 | 10.6 | 10.2 |
| Silt | 39.0 | 42.2 | 40.8 | 36.4 | 38.4 |
| Clay | 26.2 | 28.0 | 26.4 | 35.3 | 30.9 |
| pH | 7.3 | 7.5 | 7.6 | 7.7 | 7.8 |
| C.E.C. m.eq./100 g. | 12.0 | 10.0 | 10.0 | 8.8 | 3.0 |
| T.E.B. m.eq./100 g. | — | — | — | — | — |
| Per cent base saturation | Sat. | Sat. | Sat. | Sat. | Sat. |
| Per cent carbon | 3.36 | 1.68 | 1.44 | 0.60 | 0.36 |
| Per cent nitrogen | 0.23 | 0.14 | 0.13 | 0.07 | 0.07 |
| C/N ratio | 14.6 | 12.0 | 11.1 | 8.6 | 5.1 |
| Per cent free iron | 1.80 | 2.70 | 3.20 | 3.90 | 4.70 |
| Per cent T.N.V. | 11.8 | 6.7 | 1.5 | 1.3 | 0.3 |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 20,000+ | 20,000+ | 10,000 | 4,300 | 4,200 |
| Phosphorus | 3.0 | 0.5 | 1.0 | 0.5 | 1.0 |
| Potassium | 60 | 50 | 60 | 50 | 40 |
| Magnesium | 200 | 200 | 135 | 135 | 185 |

**TABLE 9 (CONTD.)—Fethard Association—Ballinruan Series**

| Horizon | $A_{11}g$ | $A_{12}g$ | $A_2g$ | $B_{2t}G$ | CG |
|---|---|---|---|---|---|
| Depth (in.) | 0—4 | 4—13 | 13—15 | 15—28 | Below 28 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 8.8 | 12.7 | 17.5 | 13.5 | 34.9 |
| Fine sand | 27.2 | 19.3 | 15.1 | 17.8 | 15.9 |
| Silt | 40.9 | 44.6 | 47.3 | 43.4 | 32.1 |
| Clay | 23.1 | 23.4 | 20.1 | 25.3 | 17.1 |
| pH | 5.5 | 6.4 | 7.0 | 7.5 | 7.1 |
| C.E.C. m.eq./100 g. | 17.0 | 9.4 | 5.0 | 5.2 | 8.0 |
| T.E.B. m.eq./100 g. | 12.4 | — | — | — | — |
| Per cent base saturation | 73 | Sat. | Sat. | Sat. | Sat. |
| Per cent carbon | 7.30 | 1.32 | 0.60 | 0.36 | 0.36 |
| Per cent nitrogen | 0.42 | 0.16 | 0.07 | 0.05 | 0.06 |
| C/N ratio | 17.4 | 8.3 | 8.6 | 7.2 | 6.0 |
| Per cent free iron | 0.88 | 0.95 | 0.70 | 1.13 | 1.63 |
| Per cent T.N.V. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 2,000 | 2,900 | 1,600 | 2,000 | 1,600 |
| Phosphorus | 3.0 | 1.0 | 0.5 | 0.5 | 1.0 |
| Potassium | 120 | 40 | 30 | 40 | 50 |
| Magnesium | 135 | 110 | 100 | 145 | 376 |

TABLE 10—Forth Commons Association—Forth Commons Series

| Horizon<br>Depth (in.) | $A_o$<br>$1_{1/2}$—0 | $A_{2g}$<br>0—5 | $B_{22}$<br>6—26 | $C_1$<br>26—37 | $C_2$<br>Below 37 |
|---|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 51.0 | 24.6 | 28.0 | 27.2 | 34.9 |
| Fine sand | 25.6 | 27.1 | 12.2 | 19.6 | 27.6 |
| Silt | 17.5 | 40.4 | 33.4 | 36.8 | 27.6 |
| Clay | 5.9 | 7.9 | 26.2 | 16.4 | 9.9 |
| pH | 4.5 | 4.4 | 4.7 | 4.9 | 4.9 |
| C.E.C. m.eq./100 g. | 31.3 | 6.6 | 11.8 | 3.7 | 2.5 |
| T.E.B. m.eq./100 g. | 9.9 | 0 | 0 | 0 | 0 |
| Per cent base saturation | 32 | 0 | 0 | 0 | 0 |
| Per cent carbon | 21.40 | 1.43 | 1.14 | 0.32 | 0.16 |
| Per cent nitrogen | 0.68 | 0.06 | 0.07 | 0.05 | 0.02 |
| C/N ratio | 31.5 | 23.8 | 16.3 | 6.4 | 8.0 |
| Per cent free iron | 0.20 | 0.04 | 2.92 | 0.87 | 0.30 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available Nutrients, lb./ac.** | | | | | |
| Calcium | 1,200 | 400 | 100 | 100 | 100 |
| Phosphorus | 9.0 | 2.0 | 1.0 | 2.0 | 1.0 |
| Potassium | 250 | 25 | 20 | 25 | 40 |
| Magnesium | 313 | 50 | 40 | 60 | 20 |

TABLE 11—Hook Head Association—Hook Head Series

| Horizon<br>Depth (in.) | $A_{11}$<br>0—7 | A/B<br>7—20 | $B_{2t}$<br>20—26 | B/C<br>26—36 |
|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 31.0 | 28.2 | 18.3 | 0.1 |
| Fine sand | 15.8 | 17.1 | 18.8 | 10.6 |
| Silt | 32.4 | 29.9 | 18.0 | 63.4 |
| Clay | 20.8 | 24.8 | 44.9 | 25.9 |
| pH | 7.8 | 7.7 | 7.7 | 8.2 |
| C.E.C. m.eq./100 g. | 13.2 | 11.2 | 14.8 | 10.0 |
| T.E.B. m.eq./100 g. | — | — | — | — |
| Per cent base saturation | Sat. | Sat. | Sat. | Sat. |
| Per cent carbon | 3.36 | 2.16 | 1.56 | 1.08 |
| Per cent nitrogen | 0.29 | 0.23 | 0.16 | 0.13 |
| C/N ratio | 11.6 | 9.4 | 9.8 | 8.3 |
| Per cent free iron | 1.67 | 2.01 | 2.39 | 0.88 |
| Per cent T.N.V. | 5.1 | 5.5 | 11.1 | 21.9 |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 20,000+ | 20,000+ | 15,000 | 20,000+ |
| Phosphorus | 15.5 | 2.0 | 0.5 | 0.0 |
| Potassium | 105 | 60 | 65 | 65 |
| Magnesium | 163 | 147 | 570 | 163 |

TABLE 12—Killinick Association—Killinick Series

| Horizon | $A_{11}$ | $A_{12}$ | $A_{13}$ | A/C | C |
|---|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—11 | 11—16 | 16—21 | Below 21 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 44.6 | 42.2 | 40.1 | 41.3 | 78.5 |
| Fine sand | 17.7 | 18.6 | 22.2 | 24.5 | 3.8 |
| Silt | 22.2 | 23.2 | 26.6 | 22.2 | 9.0 |
| Clay | 15.5 | 16.0 | 11.1 | 12.0 | 8.7 |
| pH | 5.7 | 6.0 | 6.0 | 6.6 | 6.7 |
| C.E.C. m.eq./100 g. | 9.7 | 9.3 | 4.4 | 3.2 | 4.0 |
| T.E.B. m.eq./100 g. | 5.3 | 5.3 | 3.1 | 2.9 | — |
| Per cent base saturation | 55 | 57 | 70 | 91 | Sat. |
| Per cent carbon | 2.25 | 1.00 | 0.75 | 0.44 | 0.10 |
| Per cent nitrogen | 0.14 | 0.13 | 0.06 | 0.04 | 0.02 |
| C/N ratio | 16.1 | 7.7 | 12.5 | 11.0 | 5.0 |
| Per cent free iron | 1.03 | 1.03 | 1.22 | 0.89 | 0.66 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 2,300 | 1,900 | 1,000 | 1,100 | 1,100 |
| Phosphorus | 3.0 | 1.0 | 1.0 | 1.0 | 0.0 |
| Potassium | 245 | 210 | 115 | 115 | 130 |
| Magnesium | 245 | 150 | 120 | 145 | 90 |

TABLE 13—Kiltealy Association—Kiltealy Series

| Horizon | $A_{11}$ | $A_{12}$ | $B_2$(ir) | B/C |
|---|---|---|---|---|
| Depth (in.) | 0—8 | 8—18 | 18—26 | Below 26 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 65.8 | 60.8 | 66.0 | 74.3 |
| Fine sand | 14.0 | 18.6 | 16.8 | 10.7 |
| Silt | 9.2 | 14.9 | 10.3 | 12.9 |
| Clay | 11.0 | 5.7 | 6.9 | 2.1 |
| pH | 5.9 | 5.5 | 5.2 | 5.6 |
| C.E.C. m.eq./100 g. | 13.6 | 8.7 | 3.7 | 3.7 |
| T.E.B. m.eq./100 g. | — | 8.6 | 2.9 | 2.7 |
| Per cent base saturation | — | 99 | 78 | 73 |
| Per cent carbon | 4.51 | 2.28 | 0.60 | 0.36 |
| Per cent nitrogen | 0.30 | 0.16 | 0.03 | 0.03 |
| C/N ratio | 15.0 | 14.3 | 20.0 | 12.0 |
| Per cent free iron | 1.50 | 0.31 | 1.33 | 0.93 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 800 | 400 | 100 | 100 |
| Phosphorus | 5.5 | 1.0 | 1.0 | 1.0 |
| Potassium | 182 | 100 | 30 | 30 |
| Magnesium | 50 | 70 | 50 | 30 |

### TABLE 13 (CONTD.)—Kiltealy Association—Ballywilliam Series

| Horizon<br>Depth (in.) | $A_1$<br>0—14 | $A_{2g}$<br>10—14 | $B_{2g}$<br>14—17 | B/CG<br>17—23 | CG<br>23—36 |
|---|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 21.8 | 29.8 | 58.3 | 47.9 | 51.3 |
| Fine sand | 23.5 | 23.1 | 13.7 | 18.3 | 13.3 |
| Silt | 42.2 | 34.0 | 20.6 | 28.2 | 26.7 |
| Clay | 12.5 | 13.1 | 7.4 | 5.6 | 8.7 |
| pH | 4.9 | 5.0 | 5.0 | 5.3 | 5.5 |
| C.E.C. m.eq./100 g. | 12.0 | 4.0 | 4.4 | 2.2 | 2.9 |
| T.E.B. m.eq./100 g. | 2.8 | 1.8 | 1.8 | 1.2 | 1.3 |
| Per cent base saturation | 23 | 45 | 41 | 55 | 45 |
| Per cent carbon | 6.70 | 1.80 | 1.68 | 0.36 | 0.24 |
| Per cent nitrogen | 0.40 | 0.09 | 0.08 | 0.02 | 0.02 |
| C/N ratio | 16.8 | 20.0 | 21.0 | 18.0 | 12.0 |
| Per cent free iron | 2.07 | 1.67 | 2.33 | 1.64 | 1.87 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 100 | 100 | 100 | 100 | 100 |
| Phosphorus | 2.0 | 1.5 | 1.0 | 0.5 | 0.5 |
| Potassium | 60 | 35 | 30 | 25 | 35 |
| Magnesium | 0 | 0 | 10 | 70 | 150 |

### TABLE 13—Kiltealy Association—Blackstairs Series

| Horizon<br>Depth (in.) | $A_0$<br>16—0 | $A_1/A_{21}$<br>0—15 | $A_{22}$<br>15—19/27 | $B_{22}$<br>19/27—39 | C<br>Below 39 |
|---|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 59.7 | 55.7 | 64.1 | 62.9 | 68.6 |
| Fine sand | 16.8 | 22.1 | 21.5 | 15.2 | 13.7 |
| Silt | 17.7 | 17.1 | 11.8 | 17.6 | 12.8 |
| Clay | 5.8 | 5.1 | 2.6 | 4.3 | 4.9 |
| pH | 4.3 | 5.0 | 5.3 | 5.4 | 5.6 |
| C.E.C. m.eq./100 g. | 33.6 | 13.2 | 5.8 | 5.8 | 3.2 |
| T.E.B. m.eq./100 g. | 1.9 | 1.8 | 1.1 | 1.1 | 1.0 |
| Per cent base saturation | 6 | 14 | 19 | 19 | 31 |
| Per cent carbon | 9.80 | 3.36 | 0.84 | 1.32 | 0.86 |
| Per cent nitrogen | 0.50 | 0.17 | 0.07 | 0.09 | 0.06 |
| C/N ratio | 19.6 | 19.8 | 12.0 | 14.7 | 14.3 |
| Per cent free iron | 0.37 | 0.39 | 0.33 | 0.91 | 0.59 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 100 | 100 | 100 | 100 | 100 |
| Phosphorus | 2.0 | 1.5 | 5.5 | 2.0 | 3.0 |
| Potassium | 90 | 40 | 25 | 20 | 15 |
| Magnesium | 40 | 20 | 10 | 10 | 10 |

TABLE 14—Macamore Association—Macamore Series

| Horizon<br>Depth (in.) | $A_g$<br>0—8 | $(A_2)_g$<br>8—15 | $B_{2t}G$<br>15—36 | CG<br>Below 36 |
|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 37.7 | 34.1 | 11.3 | 7.2 |
| Fine sand | 17.6 | 22.7 | 11.3 | 10.1 |
| Silt | 26.7 | 21.6 | 30.9 | 32.1 |
| Clay | 18.0 | 21.6 | 46.5 | 50.6 |
| pH | 5.5 | 5.9 | 6.8 | 7.7 |
| C.E.C. m.eq./100 g. | 16.6 | 14.0 | 16.1 | 13.1 |
| T.E.B. m.eq./100 g. | 10.1 | 7.3 | 10.8 | 11.1 |
| Per cent base saturation | 61 | 52 | 67 | 85 |
| Per cent carbon | 3.25 | 1.60 | 0.51 | 0.29 |
| Per cent nitrogen | 0.27 | 0.16 | 0.07 | 0.07 |
| C/N ratio | 12.0 | 10.0 | 7.3 | 4.1 |
| Per cent free iron | 1.14 | 1.23 | 2.09 | 1.42 |
| Per cent T.N.V. | 0.0 | 0.0 | 0.0 | 0.0 |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 2,700 | 2,900 | 4,300 | 5,000 |
| Phosphorus | 4.5 | 1.0 | 1.0 | 1.0 |
| Potassium | 355 | 415 | 480 | 182 |
| Magnesium | 358 | 430 | 640 | 640 |

TABLE 15—Old Ross Association—Old Ross Series

| Horizon<br>Depth (in.) | $A_{11}$<br>0—7 | $A_{12}$<br>7—21 | A/C<br>Below 21 |
|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | |
| Coarse sand | 41.6 | 42.1 | 46.4 |
| Fine sand | 20.0 | 17.7 | 19.7 |
| Silt | 25.7 | 27.6 | 26.1 |
| Clay | 12.7 | 12.6 | 7.8 |
| pH | 5.2 | 5.2 | 5.5 |
| C.E.C. m.eq./100 g. | 10.6 | 7.8 | 2.6 |
| T.E.B. m.eq./100 g. | 2.6 | 2.3 | 2.0 |
| Per cent base saturation | 25 | 29 | 77 |
| Per cent carbon | 3.12 | 1.68 | 0.36 |
| Per cent nitrogen | 0.20 | 0.12 | 0.03 |
| C/N ratio | 15.6 | 14.0 | 12.0 |
| Per cent free iron | 3.14 | 2.82 | 1.990 |
| Per cent T.N.V. | — | — | — |
| **Available nutrients, lb./ac.** | | | |
| Calcium | 100 | 100 | 100 |
| Phosphorus | 4.5 | 1.0 | 1.0 |
| Potassium | 80 | 20 | 25 |
| Magnesium | 80 | 30 | 30 |

TABLE 15 (CONTD.)—Old Ross Association—Knockroe Series

| Horizon | $A_{11g}$ | $A_{12g}$ | $A_{2g}$ | $B_2G$ | CG |
|---|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—12 | 12—15 | 15—21 | 21—35 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 31.6 | 37.0 | 46.0 | 46.7 | 59.6 |
| Fine sand | 18.4 | 15.3 | 16.0 | 18.3 | 16.9 |
| Silt | 33.0 | 31.2 | 26.9 | 26.2 | 17.1 |
| Clay | 17.0 | 16.5 | 11.1 | 8.8 | 6.4 |
| pH | 5.3 | 5.6 | 6.0 | 6.1 | 6.1 |
| C.E.C. m.eq./100 g. | 17.6 | 6.8 | 2.4 | 2.6 | 2.4 |
| T.E.B. m.eq./100 g. | 4.9 | 3.9 | 1.3 | 2.0 | 1.0 |
| Per cent base saturation | 28 | 57 | 54 | 77 | 42 |
| Per cent carbon | 4.25 | 1.80 | 0.36 | 0.12 | 0.12 |
| Per cent nitrogen | 0.28 | 0.13 | 0.03 | 0.03 | 0.02 |
| C/N ratio | 15.2 | 13.8 | 12.0 | 4.0 | 6.0 |
| Per cent free iron | 0.84 | 0.59 | 0.22 | 1.09 | 0.95 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 100 | 100 | 100 | 100 | 100 |
| Phosphorus | 2.5 | 1.0 | 1.0 | 0.5 | 0.5 |
| Potassium | 100 | 35 | 30 | 30 | 40 |
| Magnesium | 50 | 225 | 190 | 235 | 185 |

TABLE 16—Rathangan Association—Rathangan Series

| Horizon | $A_{11g}$ | $A_{12g}$ | $B_{21g}$ | $B_{2t}G$ | CG |
|---|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—11 | 11—18 | 18—28 | 28^0 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 21.6 | 26.9 | 22.5 | 21.4 | 19.2 |
| Fine sand | 19.6 | 17.4 | 16.6 | 14.0 | 17.5 |
| Silt | 43.3 | 38.3 | 38.0 | 39.1 | 39.2 |
| Clay | 15.5 | 17.4 | 23.0 | 25.4 | 24.1 |
| Ph | 5.7 | 5.8 | 6.4 | 7.2 | 7.5 |
| C.E.C. m.eq./100 g. | 9.2 | 7.4 | 8.8 | 10.4 | 9.6 |
| T.E.B. m.eq./100 g. | 4.0 | 3.6 | 8.0 | — | — |
| Per cent base saturation | 43 | 49 | 91 | Sat. | Sat. |
| Per cent carbon | 3.21 | 1.60 | 0.51 | 0.24 | 0.24 |
| Per cent nitrogen | 0.25 | 0.15 | 0.05 | 0.04 | 0.04 |
| C/N ratio | 12.8 | 10.7 | 10.2 | 6.0 | 6.0 |
| Per cent free iron | 0.88 | 1.02 | 2.77 | 1.32 | 2.44 |
| Per cent T.N.V. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 4,000 | 1,000 | 2,000 | 2,900 | 4,300 |
| Phosphorus | 1.0 | 1.0 | 0.5 | 0.5 | 0.5 |
| Potassium | 60 | 35 | 50 | 50 | 60 |
| Magnesium | 50 | 100 | 150 | 215 | 265 |

TABLE 17—Screen Association—Screen Series

| Horizon<br>Depth (in.) | $A_{11}$<br>0—8 | $A_{12}$<br>8—16 | $B_{2(ir)}$<br>16—23 | B/C<br>Below 23 |
|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 79.1 | 75.9 | 81.0 | 83.9 |
| Fine sand | 14.4 | 16.4 | 13.9 | 14.4 |
| Silt | 4.4 | 5.3 | 1.2 | 0.7 |
| Clay | 2.1 | 2.3 | 3.8 | 1.0 |
| Ph | 5.0 | 4.9 | 5.5 | 5.8 |
| C.E.C. m.eq./100 g. | 4.5 | 4.1 | 2.9 | 1.4 |
| T.E.B. m.eq./100 g. | 1.7 | 1.7 | 0.9 | 0.5 |
| Per cent base saturation | 38 | 41 | 31 | 36 |
| Per cent carbon | 1.90 | 1.46 | 0.51 | 0.22 |
| Per cent nitrogen | 0.12 | 0.09 | 0.05 | 0.02 |
| C/N ratio | 15.8 | 16.2 | 10.2 | 11.0 |
| Per cent free iron | 0.74 | 0.78 | 1.86 | 0.76 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 100 | 100 | 100 | 100 |
| Phosphorus | 1.5 | 2.0 | 2.5 | 1.0 |
| Potassium | 85 | 40 | 20 | 5 |
| Magnesium | 40 | 10 | 20 | 2 |

TABLE 17 (CONTD.)—Screen Association—Ballyknockan Series

| Horizon<br>Depth (in.) | $A_{11g}$<br>0—7 | $A_{12g}$<br>7—15 | A/CG<br>15—36 |
|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | |
| Coarse sand | 65.8 | 69.0 | 75.5 |
| Fine sand | 10.4 | 9.6 | 11.1 |
| Silt | 16.4 | 15.1 | 10.6 |
| Clay | 7.4 | 6.3 | 2.8 |
| pH | 5.4 | 5.8 | 6.2 |
| C.E.C. m.eq./100 g. | 17.4 | 10.5 | 3.0 |
| T.E.B. m.eq./100 g. | 6.2 | 7.7 | 2.1 |
| Per cent base saturation | 36 | 73 | 70 |
| Per cent carbon | 7.80 | 3.99 | 0.48 |
| Per cent nitrogen | 0.43 | 0.19 | 0.03 |
| C/N ratio | 18.1 | 21.0 | 16.0 |
| Per cent free iron | 1.75 | 0.53 | 0.45 |
| Per cent T.N.V. | — | — | — |
| **Available nutrients, lb./ac.** | | | |
| Calcium | 1,400 | 1,700 | 400 |
| Phosphorus | 3.0 | 1.0 | 1.0 |
| Potassium | 45 | 25 | 25 |
| Magnesium | 80 | 120 | 90 |

TABLE 17 (CONTD.)—Screen Association—Randallsmill Series

| Horizon | $A_{1p}$ | $A_{12}$ | $A_{13}$ | A/C |
|---|---|---|---|---|
| Depth (in.) | 0—9 | 9—19 | 19—23 | 23—30 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 60.9 | 54.4 | 72.4 | 78.7 |
| Fine sand | 19.2 | 15.2 | 15.7 | 12.3 |
| Silt | 12.6 | 20.5 | 7.1 | 5.0 |
| Clay | 7.3 | 9.9 | 4.8 | 4.0 |
| pH | 6.0 | 5.3 | 5.8 | 5.8 |
| C.E.C. m.eq./100 g. | 7.0 | 6.8 | 3.2 | 1.6 |
| T.E.B. m.eq./100 g. | 2.4 | 3.6 | 2.0 | 1.2 |
| Per cent base saturation | 34 | 53 | 63 | 75 |
| Per cent carbon | 0.22 | 0.96 | 0.12 | 0.24 |
| Per cent nitrogen | 0.02 | 0.10 | 0.04 | 0.02 |
| C/N ratio | 11.0 | 9.6 | 3.0 | 12.0 |
| Per cent free iron | 0.79 | 1.24 | 1.01 | 1.09 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 1,100 | 1,100 | 400 | 100 |
| Phosphorus | 0.5 | 0.5 | 0.5 | 2.5 |
| Potassium | 25 | 115 | 50 | 25 |
| Magnesium | 10 | 160 | 100 | 40 |

TABLE 18—Millquarter Association—Millquarter Series

| Horizon | $A_{11g}$ | $A_{12g}$ | $A/C_g$ | $C_{1g}$ |
|---|---|---|---|---|
| Depth (in.) | 0—4 | 4—8 | 8—18 | 18—23 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 6.2 | 2.7 | 1.0 | 11.9 |
| Fine sand | 6.7 | 10.2 | 5.3 | 22.7 |
| Silt | 51.4 | 50.7 | 55.7 | 44.1 |
| Clay | 35.7 | 36.4 | 38.0 | 21.3 |
| pH | 4.9 | 4.9 | 4.9 | 5.0 |
| C.E.C. m.eq./100 g. | 22.4 | 17.6 | 15.4 | 7.6 |
| T.E.B. m.eq./100 g. | 7.9 | 10.0 | 7.6 | 4.9 |
| Per cent base saturation | 35 | 57 | 49 | 64 |
| Per cent carbon | 10.40 | 5.80 | 4.50 | 3.70 |
| Per cent nitrogen | 0.72 | 0.42 | 0.28 | 0.16 |
| C/N ratio | 14.4 | 13.8 | 16.1 | 23.1 |
| Per cent free iron | 2.33 | 2.55 | 0.77 | 0.74 |
| Per cent T.N.V. | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 100 | 0 | 0 | 0 |
| Phosphorus | 4.5 | 2.0 | 1.5 | 2.0 |
| Potassium | 175 | 60 | 25 | 15 |
| Magnesium | 20 | 10 | 0 | 10 |

TABLE 19—Coolaknick Association—Coolaknick Series

| Horizon<br>Depth (in.) | $A_{11}$<br>0—3 | $A_{12g}$<br>3—6 | $A_{13g}$<br>6—15 | A/CG<br>15—27 | CG<br>27—40 |
|---|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 14.2 | 12.5 | 22.4 | 3.8 | 2.2 |
| Fine sand | 16.9 | 40.9 | 29.7 | 5.1 | 9.1 |
| Silt | 36.4 | 11.4 | 33.1 | 46.5 | 52.2 |
| Clay | 32.6 | 35.4 | 14.9 | 44.6 | 36.5 |
| Ph | 5.7 | 6.3 | 7.0 | 7.2 | 7.4 |
| C.E.C. m.eq./100 g. | 28.0 | 20.4 | 8.0 | 16.8 | 12.0 |
| T.E.B. m.eq./100 g. | 22.5 | 16.1 | — | — | — |
| Per cent base saturation | 80 | 79 | Sat | — | — |
| Per cent carbon | 11.00 | 5.14 | 0.60 | 0.84 | 0.60 |
| Per cent nitrogen | 0.69 | 0.27 | 0.05 | 0.07 | 0.05 |
| C/N ratio | 15.9 | 19.0 | 12.0 | 12.0 | 12.0 |
| Per cent free iron | 2.20 | 1.15 | 0.61 | 1.57 | 1.15 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 3,600 | 4,700 | 3,300 | 6,400 | 4,000 |
| Phosphorus | 6.5 | 1.0 | 0.5 | 0.5 | 2.0 |
| Potassium | 228 | 50 | 15 | 50 | 100 |
| Magnesium | 430 | 510 | 472 | 800 | 800 |

TABLE 19 (CONTD.)—Coolaknick Association—Oulartleigh Series

| Horizon<br>Depth (in.) | $A_0$<br>11—0 | $A_{11}G$<br>0—5 | $A_{12}G$<br>5—15 |
|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | |
| Coarse sand | — | 26.1 | 46.5 |
| Fine sand | — | 11.2 | 17.2 |
| Silt | — | 43.2 | 25.2 |
| Clay | — | 19.5 | 11.1 |
| pH | 5.5 | 5.6 | 5.8 |
| C.E.C. m.eq./100 g. | 85.2 | 26.6 | 4.0 |
| T.E.B. m.eq./100 g. | 23.0 | 7.1 | 1.1 |
| Per cent base saturation | 27 | 27 | 28 |
| Per cent carbon | 23.30 | 3.86 | 0.84 |
| Per cent nitrogen | 1.30 | 0.20 | 0.05 |
| C/N ratio | 17.9 | 19.3 | 16.8 |
| Per cent free iron | 1.38 | 0.69 | 1.81 |
| Per cent T.N.V. | — | — | — |
| **Available nutrients, lb./ac.** | | | |
| Calcium | 400 | 600 | 1,000 |
| Phosphorus | 5.0 | 2.5 | 4.0 |
| Potassium | 15 | 50 | 45 |
| Magnesium | 50 | 55 | 40 |

TABLE 20—Clohamon Association—Cloha mon Series

| Horizon | $A_{11}$ | $A_{12}$ | $A_{13}$ | $B_{2(ir)}$ | C |
|---|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—12 | 12—19 | 19—26 | Below 26 |
| Mechanical analysis of mineral fraction (per cent) | | | | | |
| Coarse sand | 30.6 | 14.5 | 7.7 | 18.7 | 95.0 |
| Fine sand | 21.0 | 28.6 | 30.3 | 9.0 | 1.4 |
| Silt | 30.4 | 37.3 | 41.3 | 51.0 | 1.5 |
| Clay | 18.0 | 19.5 | 20.6 | 21.3 | 2.1 |
| pH | 6.6 | 6.6 | 6.8 | 6.8 | 6.9 |
| C.E.C. m.eq./100 g. | 9.9 | 9.5 | 8.6 | 14.7 | 2.2 |
| T.E.B. m.eq./100 g. | 5.3 | 2.2 | 3.8 | 4.9 | 1.3 |
| Per cent base saturation | 54 | 23 | 44 | 33 | 59 |
| Per cent carbon | 2.80 | 1.50 | 1.40 | 2.00 | 0.50 |
| Per cent nitrogen | 0.27 | 0.17 | 0.14 | 0.23 | 0.02 |
| C/N ratio | 10.4 | 8.8 | 10.0 | 8.7 | 2.5 |
| Per cent free iron | 1.89 | 2.12 | 2.31 | 3.89 | 0.56 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 2,300 | 1,500 | 1,700 | 1,900 | 1,200 |
| Phosphorus | 0.5 | 0.5 | 0.0 | 0.5 | 1.0 |
| Potassium | 60 | 30 | 37 | 40 | 47 |
| Magnesium | 190 | 135 | 120 | 120 | 70 |

TABLE 21—Kilmannock Association—Kilmannock Series

| Horizon | $A_{11g}$ | $A_{12g}$ | A/CG | CG |
|---|---|---|---|---|
| Depth (in.) | 0—10 | 10—21 | 21—29 | 29—36 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 0.1 | 0.3 | 34.5 | 0.6 |
| Fine sand | 1.4 | 2.9 | 39.1 | 2.1 |
| Silt | 74.6 | 69.9 | 17.1 | 68.8 |
| Clay | 23.9 | 26.9 | 9.3 | 28.5 |
| Ph | 7.3 | 7.8 | 8.0 | 8.3 |
| C.E.C. m.eq./100 g. | 12.8 | 10.8 | 3.6 | 9.8 |
| T.E.B. m.eq./100 g. | — | — | — | — |
| Per cent base saturation | Sat | Sat | Sat | Sat |
| Per cent carbon | 3.86 | 1.68 | 1.08 | 1.56 |
| Per cent nitrogen | 0.26 | 0.15 | 0.07 | 0.17 |
| C/N ratio | 14.8 | 11.2 | 15.4 | 9.2 |
| Per cent free iron | 1.12 | 1.33 | 1.08 | 1.34 |
| Per cent T.N.V. | 16.2 | 15.6 | 12.3 | 84.9 |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 20,000+ | 20,000+ | 8,200 | 20,000+ |
| Phosphorus | 8.0 | 4.0 | 2.0 | 4.0 |
| Potassium | 307 | 535 | 50 | 640 |
| Magnesium | 640 | 1,472 | 1,888 | 1,176 |

TABLE 22—Kilmore Slob Association—Kilmore Slob Series

| Horizon | $A_{11g}$ | $A_{12g}$ | $A/C_g$ | $C_1G$ | $C_2G$ |
|---|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—12 | 12—20 | 20—28 | 28—36 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 32.3 | 30.0 | 13.9 | 34.5 | 57.9 |
| Fine sand | 36.7 | 32.8 | 40.6 | 53.3 | 35.7 |
| Silt | 18.4 | 24.4 | 36.4 | 7.9 | 4.3 |
| Clay | 12.6 | 12.8 | 9.1 | 4.3 | 2.1 |
| pH | 7.8 | 7.8 | 8.2 | 8.2 | 7.7 |
| C.E.C. m.eq./100 g. | 14.0 | 10.8 | 2.6 | 1.6 | 0.4 |
| T.E.B. m.eq./100 g. | – | – | – | – | – |
| Per cent base saturation | Sat. | Sat. | Sat. | Sat. | Sat. |
| Per cent carbon | 3.24 | 2.28 | 0.12 | 0.36 | 0.36 |
| Per cent nitrogen | 0.27 | 0.21 | 0.04 | 0.04 | 0.04 |
| C/N ratio | 12.0 | 10.9 | 3.0 | 9.0 | 9.0 |
| Per cent free iron | 1.63 | 1.63 | 0.74 | 0.74 | 0.40 |
| Per cent T.N.V. | 2.1 | 3.6 | 6.4 | 8.4 | 11.0 |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 8,600 | 20,000+ | 20,000+ | 20,000+ | 20,000+ |
| Phosphorus | 3.0 | 1.5 | 1.5 | 3.0 | 4.0 |
| Potassium | 510 | 260 | 60 | 50 | 60 |
| Magnesium | 320 | 320 | 320 | 320 | 580 |

**TABLE 23—Wexford Slob Association—Wexford Slob Series**

| Horizon | $A_{11}$ | $A_{12g}$ | $A/C_g$ | CG |
|---|---|---|---|---|
| Depth (in.) | 0—2 | 2—12 | 12—30 | 30—48 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | |
| Coarse sand | 4.0 | 3.5 | 3.8 | 2.2 |
| Fine sand | 13.8 | 13.9 | 10.0 | 27.4 |
| Silt | 54.0 | 50.1 | 64.8 | 50.0 |
| Clay | 28.2 | 32.6 | 21.2 | 20.3 |
| pH | 6.3 | 6.6 | 7.7 | 7.5 |
| C.E.C. m.eq./100 g | 35.1 | 14.9 | 11.6 | 8.8 |
| T.E.B. m.eq./100 g. | 19.3 | 13.0 | – | – |
| Per cent base saturation | 55 | 87 | Sat. | Sat. |
| Per cent carbon | 11.72 | 2.80 | 1.92 | 2.45 |
| Per cent nitrogen | 1.15 | 0.20 | 0.13 | 0.09 |
| C/N ratio | 10.2 | 14.0 | 14.8 | 27.2 |
| Per cent free iron | 1.14 | 1.81 | 1.10 | 1.86 |
| Per cent T.N.V. | – | – | – | – |
| **Available nutrients, lb./ac.** | | | | |
| Calcium | 3,100 | 4,000 | 13,100 | 20,000+ |
| Phosphorus | 16.0 | 0.5 | 3.0 | 6.0 |
| Potassium | 575 | 267 | 285 | 535 |
| Magnesium | 313 | 235 | 450 | 860 |

TABLE 24—Crosstown Complex—Crosstown Series

| Horizon | $A_{11}$ | $A_{12}$ | $B_1$ | $B_{2t}$ | B/C |
|---|---|---|---|---|---|
| Depth (in.) | 0—6 | 6—12 | 12—22 | 22—33 | 33—50 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 35.2 | 42.5 | 18.9 | 14.3 | 16.0 |
| Fine sand | 31.4 | 23.5 | 20.6 | 16.2 | 17.7 |
| Silt | 21.7 | 22.0 | 27.4 | 32.2 | 40.3 |
| Clay | 11.7 | 12.0 | 33.1 | 37.3 | 26.0 |
| pH | 5.3 | 5.7 | 5.9 | 6.4 | 6.4 |
| C.E.C. m.eq./100 g. | 8.5 | 7.7 | 12.8 | 13.4 | 12.2 |
| T.E.B. m.eq./100 g. | 4.9 | 4.1 | 7.6 | 10.9 | 11.5 |
| Per cent base saturation | 58 | 53 | 59 | 81 | 94 |
| Per cent carbon | 2.50 | 1.10 | 0.50 | 0.30 | 0.10 |
| Per cent nitrogen | 0.18 | 0.12 | 0.05 | 0.04 | 0.04 |
| C/N ratio | 13.9 | 9.2 | 10.0 | 7.5 | 2.5 |
| Per cent free iron | 1.67 | 1.32 | 1.34 | 1.77 | 1.38 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 600 | 800 | 2,000 | 4,200 | 3,700 |
| Phosphorus | 1.5 | 1.0 | 0.5 | 0.5 | 0.5 |
| Potassium | 80 | 55 | 70 | 90 | 85 |
| Magnesium | 160 | 160 | 245 | 390 | 450 |

TABLE 24 (CONTD.)—Crosstown Complex—Crossabeg Series

| Horizon | $A_{11}$ | $A_{12}$ | $B_1$ | $B_{2t}$ | B/C |
|---|---|---|---|---|---|
| Depth (in.) | 0—7 | 7—14 | 14—22 | 22-42 | 42—52 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 27.0 | 26.5 | 6.0 | 10.5 | 19.7 |
| Fine sand | 26.9 | 27.7 | 30.4 | 19.6 | 20.5 |
| Silt | 29.2 | 27.7 | 38.5 | 37.9 | 30.8 |
| Clay | 16.9 | 18.1 | 25.1 | 32.0 | 29.0 |
| pH | 5.4 | 5.7 | 5.8 | 5.3 | 5.5 |
| C.E.C. m.eq./100 g. | 7.4 | 7.0 | 6.6 | 9.4 | 8.9 |
| T.E.B. m.eq./100 g. | 4.9 | 5.3 | 4.9 | 5.2 | 6.3 |
| Per cent base saturation | 66 | 76 | 74 | 55 | 71 |
| Per cent carbon | 1.90 | 1.60 | 0.80 | 0.10 | 0.10 |
| Per cent nitrogen | 0.16 | 0.12 | 0.05 | 0.03 | 0.03 |
| C/N ratio | 11.9 | 13.3 | 16.0 | 3.3 | 3.3 |
| Per cent free iron | 1.41 | 1.54 | 2.00 | 2.37 | 2.81 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 400 | 600 | 1,000 | 1,000 | 1,400 |
| Phosphorus | 1.0 | 1.0 | 0.5 | 1.0 | 1.0 |
| Potassium | 105 | 45 | 50 | 85 | 75 |
| Magnesium | 190 | 185 | 215 | 320 | 340 |

TABLE 24 (CONTD.)—Crosstown Complex—Johnstown Series

| Horizon | $A_{11}$ | $A_{12}$ | $B_1$ | $B_{2t}$ | B/C |
|---|---|---|---|---|---|
| Depth (in.) | 0—7 | 7—14 | 14—20 | 20—26 | 26—32 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | 28.4 | 27.7 | 25.3 | 18.0 | 24.0 |
| Fine sand | 32.0 | 33.5 | 27.9 | 21.1 | 34.0 |
| Silt | 21.6 | 21.6 | 24.7 | 28.9 | 22.5 |
| Clay | 18.0 | 17.2 | 22.1 | 32.0 | 19.5 |
| pH | 6.5 | 6.7 | 6.3 | 6.2 | 6.5 |
| C.E.C. m.eq./l00 g. | 8.2 | 7.4 | 4.2 | 5.8 | — |
| T.E.B. m.eq./l00 g. | 7.4 | 3.4 | 2.5 | 5.6 | — |
| Per cent base saturation | 90 | 46 | 60 | 97 | — |
| Per cent carbon | 2.60 | 1.00 | 0.60 | 0.40 | 0.40 |
| Per cent nitrogen | 0.18 | 0.09 | 0.05 | 0.04 | 0.04 |
| C/N ratio | 14.4 | 11.1 | 12.0 | 10.0 | 10.0 |
| Per cent free iron | 0.99 | 0.80 | 0.74 | 1.00 | 1.29 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 3,600 | 1,900 | 1,200 | 2,400 | 2,900 |
| Phosphorus | 1.0 | 1.0 | 1.0 | 1.0 | 0.5 |
| Potassium | 95 | 85 | 50 | 65 | 65 |
| Magnesium | 80 | 100 | 145 | 265 | 305 |

TABLE 25—Carrickbyrne Complex—Carrickbyrne Series

| Horizon | $A_0$ | $A_1$ | $A_2$ | $B_{2(ir)}$ | B/C |
|---|---|---|---|---|---|
| Depth (in.) | 1½—0 | 0—4 | 4—9 | 9—21 | Below 21 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | |
| Coarse sand | — | 15.4 | 20.9 | 22.4 | — |
| Fine sand | — | 14.0 | 14.4 | 13.4 | — |
| Silt | — | 47.0 | 43.5 | 52.1 | — |
| Clay | — | 23.6 | 21.2 | 12.1 | — |
| pH | — | 4.6 | 4.7 | 5.0 | — |
| C.E.C. m.eq./100 g. | — | 21.0 | 15.4 | 18.4 | — |
| T.E.B. m.eq./100 g. | — | 4.4 | 3.9 | 3.6 | — |
| Per cent base saturation | — | 21 | 25 | 20 | — |
| Per cent carbon | — | 7.80 | 5.00 | 4.30 | — |

| | | | | | |
|---|---|---|---|---|---|
| Per cent nitrogen | — | 0.45 | 0.29 | 0.21 | — |
| C/N ratio | — | 17.3 | 17.2 | 20.5 | — |
| Per cent free iron | — | 2.17 | 0.82 | 3.35 | — |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | — | 0 | 0 | 0 | — |
| Phosphorus | — | 2 | 2 | 1 | — |
| Potassium | — | 125 | 110 | 55 | — |
| Magnesium | — | 30 | 20 | 10 | — |

**Carrickbyrne Complex—Slievecoiltia Series**

Results given in Table 8 with soils of the Clonroche Association

TABLE 26—Screen Association—Glenbough Variant

| Horizon | $A_{11}$ | $A_{12}$ | $A_2$ | $B_{2(h)}$ | $B_{2(ir)}$ | $B_3$ | C |
|---|---|---|---|---|---|---|---|
| Depth (in.) | 0—7 | 7—15 | 15—19 | 19—22 | 22—255 | 25—32 | Below 32 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | | | |
| Coarse sand | 84.6 | 82.2 | 84.7 | 80.3 | 83.3 | 96.8 | 99.1 |
| Fine sand | 9.2 | 9.6 | 11.7 | 12.0 | 10.4 | 0.7 | 0.9 |
| Silt | 6.0 | 7.4 | 3.6 | 5.9 | 4.3 | 0.2 | 0.0 |
| Clay | 0.2 | 0.7 | 0.0 | 1.8 | 2.0 | 2.2 | 0.0 |
| pH | 5.3 | 5.5 | 5.3 | 5.0 | 5.4 | 5.5 | 5.7 |
| C.E.C. m.eq./100 g g. | 5.4 | 5.0 | 1.0 | 16.6 | 5.0 | 2.2 | 1.2 |
| T.E.B. m.eq./l00 g. | 2.4 | 2.5 | 0.0 | 3.3 | 0.9 | 0.9 | 0.9 |
| Per cent base saturation | 44 | 50 | — | 20 | 18 | 41 | 75 |
| Per cent carbon | 2.00 | 1.76 | 0.36 | 3.29 | 1.30 | 0.22 | 0.30 |
| Per cent nitrogen | 0.15 | 0.14 | 0.04 | 0.16 | 0.07 | 0.03 | 0.03 |
| C/N ratio | 13.3 | 12.6 | 9.0 | 20.6 | 18.6 | 7.3 | 10.0 |
| Per cent free iron | 0.56 | 0.40 | 0.44 | 0.29 | 1.18 | 0.80 | 0.53 |
| Per cent T.N.V. | — | — | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | | | |
| Calcium | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Phosphorus | 0.5 | 1.0 | 1.5 | 0.5 | 0.5 | 1.5 | 1.0 |
| Potassium | 30 | 60 | 40 | 20 | 15 | 60 | 45 |
| Magnesium | 10 | 30 | 10 | 10 | 0 | 0 | 0 |

TABLE 27—Kilmore Slob Association—Kilmore Slob Variant

| Horizon | $A_0$ | $A_{11g}$ | $A_{12g}$ | $C_1G$ | $C_2G$ | $C_3G$ |
|---|---|---|---|---|---|---|
| Depth (in.) | 1—0 | 0—10 | 10—20 | 20—30 | 30—40 | 40—50 |
| **Mechanical analysis of mineral fraction (per cent)** | | | | | | |
| Coarse sand | — | 70.6 | 2.3 | 1.6 | 1.4 | 2.5 |
| Fine sand | — | 2.9 | 48.6 | 17.3 | 5.6 | 54.4 |
| Silt | — | 23.2 | 37.2 | 48.8 | 53.3 | 32.1 |
| Clay | — | 3.3 | 11.9 | 32.3 | 39.7 | 11.0 |
| pH | — | 7.3 | 6.7 | 5.7 | 6.7 | 7.8 |
| C.E.C. m.eq./l00 g. | — | 5.8 | 8.2 | 21.2 | 23.4 | 2.8 |
| T.E.B. m.eq./100 g. | — | — | — | 15.2 | 15.2 | — |
| Per cent base saturation | — | Sat. | Sat. | 72 | 65 | Sat. |
| Per cent carbon | — | 1.56 | 3.00 | 6.22 | 6.94 | 0.96 |
| Per cent nitrogen | — | 0.08 | 0.17 | 0.31 | 0.35 | 0.05 |
| C/N ratio | — | 19.5 | 17.6 | 20.0 | 19.8 | 19.2 |
| Per cent free iron | — | 0.83 | 0.74 | 0.96 | 0.68 | 0.34 |
| Per cent T.N.V. | — | 8.5 | 0.0 | 0.0 | 0.0 | 11.5 |
| **Available nutrients, Ib./ac.** | | | | | | |
| Calcium | — | 20,000+ | 16,800 | 13,700 | 16,800 | 20,000+ |
| Phosphorus | — | 4.5 | 1.5 | 3.0 | 3.0 | 3.0 |
| Potassium | — | 368 | 550 | 936 | 1,000 | 387 |
| Magnesium | — | 900 | 1,432 | 2,180 | 2,040 | 1,132 |

TABLE 28—Wexford Slob Association—Wexford Slob Variant

| Horizon<br>Depth (in.) | $A_{11}$<br>0—2 | $A_{12g}$<br>2—10 | $A/C_g$<br>10—15 | $C_1G$<br>15—21 | $C_2G$<br>21—31 | $C_3G$<br>Below 31 |
|---|---|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | | | |
| Coarse sand | 2.9 | 8.8 | 91.0 | 92.8 | 6.2 | 5.2 |
| Fine sand | 4.7 | 10.1 | 5.5 | 4.2 | 12.8 | 10.6 |
| Silt | 53.3 | 54.8 | 3.5 | 3.0 | 41.4 | 38.0 |
| Clay | 39.2 | 26.3 | 0.0 | 0.0 | 39.7 | 46.2 |
| pH | 5.9 | 5.6 | 6.3 | 6.5 | 8.3 | 8.6 |
| C.E.C. m.eq./100 g. | 21.6 | 14.1 | 1.0 | 1.0 | 10.4 | 10.4 |
| T.E.B. m.eq./100 g. | 9.1 | 8.3 | 0.5 | 0.8 | — | — |
| Per cent base saturation | 42 | 59 | 50 | 80 | Sat. | Sat. |
| Per cent carbon | 7.90 | 2.60 | 0.50 | 0.50 | 2.50 | 1.20 |
| Per cent nitrogen | 0.69 | 0.26 | 0.04 | 0.04 | 0.07 | 0.04 |
| C/N ratio | 11.4 | 10.0 | 12.5 | 12.5 | 35.7 | 30.0 |
| Per cent free iron | 1.57 | 2.71 | 0.00 | 0.54 | 0.43 | 1.20 |
| Per cent T.N.V. | 0.0 | 0.0 | 0.0 | 0.0 | 16.5 | — |
| **Available nutrients, lb./ac.** | | | | | | |
| Calcium | 1,900 | 2,000 | 600 | 800 | 20,000+ | 20,000+ |
| Phosphorus | 2.5 | 0.5 | 0.5 | 0.5 | 1.0 | 1.0 |
| Potassium | 280 | 267 | 95 | 90 | 860 | 717 |
| Magnesium | 283 | 255 | 60 | 20 | 1,368 | 1,800 |

TABLE 29—Crosstown Complex—Whitegate Variant

| Horizon<br>Depth (in.) | $A_{1P}$<br>0—6 | $A_{12}$<br>6—12 | $B_{2t}$<br>12—22 | $B_{22}$<br>22—42 | $C_{11}$<br>42—44 | $C_{12}$<br>Below 44 |
|---|---|---|---|---|---|---|
| **Mechanical analysis of mineral fraction (per cent)** | | | | | | |
| Coarse sand | 22.8 | 26.9 | 5.0 | 0.8 | 0.9 | 0.3 |
| Fine sand | 32.5 | 27.2 | 36.4 | 18.2 | 6.6 | 25.3 |
| Silt | 31.9 | 31.8 | 40.6 | 63.8 | 40.7 | 61.7 |
| Clay | 12.8 | 14.1 | 18.0 | 17.2 | 51.8 | 12.7 |
| pH | 6.1 | 6.8 | 6.3 | 6.7 | 6.9 | 6.8 |
| C.E.C. m.eq/100 g. | 9.4 | 8.8 | 6.4 | 7.4 | 19.0 | 9.5 |
| T.E.B. m.eq./100 g. | 6.2 | 7.5 | 4.7 | 5.0 | 14.4 | 7.6 |
| Per cent base saturation | 66 | 85 | 73 | 68 | 76 | 80 |
| Per cent carbon | 2.50 | 1.70 | 0.40 | 0.20 | 0.30 | 0.20 |
| Per cent nitrogen | 0.19 | 0.15 | 0.05 | 0.03 | 0.07 | 0.05 |
| C/N ratio | 13.2 | 11.3 | 8.0 | 6.7 | 4.3 | 4.0 |
| Per cent free iron | 1.00 | 1.01 | 0.89 | 0.83 | 0.94 | 2.07 |
| Per cent T.N.V. | — | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | | |
| Calcium | 2,100 | 2,700 | 1,700 | 2,100 | 2,000 | 5,600 |
| Phosphorus | 2.5 | 2.0 | 1.0 | 1.0 | 1.5 | 0.5 |
| Potassium | 60 | 40 | 60 | 65 | 60 | 70 |
| Magnesium | 160 | 150 | 235 | 283 | 265 | 545 |

TABLE 29 (CONTD.)—Crosstown Complex—Sand Hills Variant

| Horizon | $A_{1p}$ | $A_{12}$ | $A_2$ | $B_{2(h)}$ | $B_{2(ir)}$ | B/C |
|---|---|---|---|---|---|---|
| Depth (in.) | 0—9 | 9—15 | 15—21 | 21—31 | 31—43 | Below 43 |
| **Mechanical analysis of mineral fraction (per** | | | | | | |
| Coarse sand | 53.7 | 54.3 | 64.2 | 55.7 | 57.1 | 53.3 |
| Fine sand | 27.4 | 29.1 | 21.2 | 24.2 | 30.5 | 42.7 |
| Silt | 14.6 | 14.4 | 14.6 | 15.8 | 11.7 | 4.0 |
| Clay | 4.3 | 2.2 | 0.0 | 4.3 | 0.7 | 0.0 |
| pH | 5.9 | 6.1 | 6.4 | 6.4 | 6.4 | 6.4 |
| C.E.C. m.eq./l00 g. | 7.2 | 3.7 | 0.4 | 5.5 | 2.1 | 1.8 |
| T.E.B. m.eq./l00 g. | 4.9 | 2.5 | 0 | 4.1 | 0.95 | 0.9 |
| Per cent base | 68 | 68 | 0 | 75 | 45 | 50 |
| Per cent carbon | 1.90 | 0.60 | 0.10 | 0.80 | 0.20 | 0.20 |
| Per cent nitrogen | 0.17 | 0.07 | 0.02 | 0.07 | 0.04 | 0.03 |
| C/N ratio | 11.2 | 8.6 | 5.0 | 11.4 | 5.0 | 6.7 |
| Per cent free iron | 0.88 | 0.40 | 0.00 | 1.28 | 1.77 | 0.20 |
| Per cent T.N.V. | — | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | | |
| Calcium | 1,000 | 4,000 | 100 | 600 | — | — |
| Phosphorus | 5.0 | 1.0 | 0.5 | 0.0 | 0.5 | 3.0 |
| Potassium | 105 | 135 | 55 | 65 | 30 | 15 |
| Magnesium | 110 | 80 | 40 | 70 | 50 | 60 |

TABLE 29 (CONTD.)—Crosstown Complex—Deerpark Variant

| Horizon | $A_{11}$ | $A_{12}$ | $A_{13}$ | A/C | C |
|---|---|---|---|---|---|
| Depth (in.) | 0—7 | 7—14 | 14—20 | 20—26 | 26—36 |
| **Mechanical analysis of mineral fraction (per** | | | | | |
| Coarse sand | 22.9 | 23.4 | 22.9 | 27.4 | 35.0 |
| Fine sand | 28.0 | 27.5 | 28.5 | 24.7 | 18.4 |
| Silt | 31.3 | 30.8 | 30.6 | 29.4 | 24.3 |
| Clay | 17.8 | 18.3 | 18.0 | 18.5 | 22.3 |
| Ph | 4.9 | 5.0 | 5.1 | 5.4 | 5.8 |
| C.E.C. m.eq./100 g. | 10.7 | 7.0 | 5.7 | 4.9 | 5.7 |
| T.E.B. m.eq./l00 g. | 4.2 | 1.7 | 3.2 | 2.6 | 3.2 |
| Per cent base saturation | 39 | 24 | 56 | 53 | 56 |
| Per cent carbon | 4.00 | 1.90 | 1.40 | 1.00 | 0.40 |
| Per cent nitrogen | 0.32 | 0.16 | 0.14 | 0.11 | 0.04 |
| C/N ratio | 12.5 | 11.9 | 10.0 | 9.1 | 10.0 |
| Per cent free iron | 1.54 | 1.68 | 1.84 | 1.70 | 1.84 |
| Per cent T.N.V. | — | — | — | — | — |
| **Available nutrients, lb./ac.** | | | | | |
| Calcium | 400 | 400 | 400 | 400 | 400 |
| Phosphorus | 1.0 | 0.5 | 0.5 | 0.5 | 0.5 |
| Potassium | 195 | 39 | 17 | 6 | 12 |
| Magnesium | — | — | — | — | — |

## APPENDIX II

### Spectrographic Semi-Quantitative Soil Analyses

TABLE 1—Macamore Series—trace elements—total content (ppm)

| Horizon | Depth (in.) | Rb | Li | Ba | Sr | Mn | Cr | Co | Ni | Zr | Pb | Ge | Ga | Be | Mo | Y | Cu | Ag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_{1g}$ | 0—8 | 30 | 15 | 200 | 30 | 200 | 20 | 5 | 15 | 150 | 10 | <10 | 3 | 10 | <1 | 8 | 30 | <1 |
| $(A_2)_g$ | 8—15 | 200 | 25 | 270 | 60 | 600 | 50 | 15 | 40 | 350 | 6 | <10 | 8 | 15 | <1 | 12 | 20 | <1 |
| $B_{2t}G$ | 15—36 | 270 | 80 | 320 | 100 | 100 | 200 | 20 | 70 | 320 | 8 | <10 | 15 | 20 | <1 | 20 | 30 | <1 |
| CG | Below 36 | 270 | 80 | 320 | 250 | 250 | 200 | 15 | 40 | 400 | 8 | <10 | 12 | 15 | <1 | 40 | 30 | <1 |

Sn, Bi, Zn, Te not detected; limits of detection (ppm) Sn 3, Bi 30, Zn 300, Te 10. < = less than. Ppm = parts per million.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rb | Rubidium | Ni | Nickel | Mo | Molybdenum | | |
| Li | Lithium | Zr | Zirconium | Y | Yttrium | | |
| Ba | Barium | Pb | Lead | Cu | Copper | | |
| Sr | Strontium | Sn | Tin | Bi | Bismuth | | |
| Mn | Manganese | Ge | Germanium | Ag | Silver | | |
| Cr | Chromium | Ga | Gallium | Zn | Zinc | | |
| Co | Cobalt | Be | Beryllium | Te | Thallium | | |

TABLE 2—Screen Series—trace elements—total content (ppm)

| Horizon | Depth (in.) | Rb | Li | Ba | Sr | Mn | Cr | Co | Ni | Zr | Pb | Ge | Ga | Be | Mo | Y | Cu | Ag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_{11}$ | 0— 8 | N.D. | 5 | 20 | 2 | 60 | <1 | N.D. | N.D. | 20 | <1 | <10 | <1 | 15 | <1 | 5 | <10 | <1 |
| $A_{12}$ | 8—16 | N.D. | 3 | 25 | 5 | 80 | <1 | N.D. | <1 | 60 | <1 | <10 | <1 | 6 | <1 | 5 | <10 | <1 |
| $B_{2(ir)}$ | 16—23 | N.D. | 5 | 70 | 10 | 80 | <1 | <1 | 3 | 60 | <1 | <10 | <1 | 6 | <1 | 5 | <10 | <1 |
| B/C | Below 23 | N.D. | 8 | 20 | 6 | 60 | <1 | <1 | <1 | 30 | 1 | <10 | <1 | 15 | <1 | 3 | <10 | <1 |

N.D.=not detected. Sn, Bi, Zn, Te not detected; limits of detection (ppm) Sn 3, Bi 30, Zn 300, Te 10.

TABLE 3—Ballindaggan Series—trace elements—total content (ppm)

| Horizon | Depth (in.) | Rb | Li | Ba | Sr | Mn | Cr | Co | Ni | Zr | Pb | Ge | Ga | Be | Mo | Y | Cu | Ag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_{11}$ | 0— 6 | 340 | 170 | 1000 | 25 | 6000 | 130 | 20 | 35 | 250 | 20 | <10 | 12 | 12 | <1 | 25 | 10 | <1 |
| $A_{12}$ | 6—11 | 250 | 150 | 1000 | 40 | 4500 | 50 | 15 | 20 | 250 | 25 | <10 | 20 | 12 | <1 | 20 | 20 | <1 |
| (B) | 11—15 | 300 | 200 | 1200 | 50 | 4000 | 100 | 20 | 40 | 400 | 7 | <10 | 15 | 20 | 1 | 40 | 25 | <1 |
| B/C | Below 15 | 250 | 100 | 600 | 50 | 5000 | 250 | 20 | 80 | 400 | 25 | <10 | 15 | 10 | <1 | 30 | 30 | <1 |

Sn, Bi, Zn, Te not detected; limits of detection (ppm) Sn 3, Bi 30, Zn 300, Te 10.

TABLE 4—Rathangan Series—trace elements—total content (ppm)

| Horizon | Depth (in.) | Rb | Li | Ba | Sr | Mn | Cr | Co | Ni | Zr | Pb | Ge | Ga | Be | Mo | Y | Cu | Ag |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_{11g}$ | 0— 6 | 25 | 15 | 200 | 30 | 200 | 15 | 5 | 15 | 200 | 5 | <10 | 6 | 10 | <1 | 25 | 10 | <1 |
| $A_{12g}$ | 6—11 | 50 | 25 | 200 | 25 | 300 | 40 | 7 | 20 | 200 | 1 | <10 | 6 | 10 | <1 | 15 | <10 | 1 |
| $B_{21g}$ | 11—18 | 100 | 25 | 250 | 25 | 320 | 30 | 15 | 30 | 400 | 2 | <10 | 6 | 10 | <1 | 10 | 10 | <1 |
| $B_{2t}G$ | 18—28 | 150 | 40 | 250 | 40 | 700 | 50 | 12 | 40 | 350 | 3 | <10 | 10 | 10 | <1 | 15 | 10 | <1 |
| CG | 28—40 | 150 | 40 | 250 | 30 | 400 | 40 | 10 | 30 | 350 | 3 | <10 | 10 | 10 | <1 | 20 | 10 | <1 |

Sn, Bi, Zn, Te not detected; limits of detection (ppm) Sn 3, Bi 30, Zn 300, Te 10.

TABLE 5—Kiltealy Series—trace elements—total content (ppm)

| Horizon | Depth (in.) | Rb | Li | Ba | Sr | Mn | Cr | Co | Ni | Zr | Pb | Sn | Be | Cu | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_{11}$ | 0—8 | 230 | 55 | 300 | 100 | 600 | 20 | 1 | 5 | 100 | 45 | 10 | 10 | 10 | <1 |
| $A_{12}$ | 8—18 | 190 | 55 | 300 | 100 | 750 | 20 | 1 | 5 | 100 | 35 | 10 | 25 | 10 | <1 |
| $B_{2(ir)}$ | 18—26 | 240 | 95 | 300 | 100 | 750 | 20 | 5 | 10 | 250 | 50 | 10 | 25 | 10 | <1 |
| B/C | Below 26 | 290 | 150 | 300 | 100 | 750 | 15 | 5 | 10 | 100 | 50 | 10 | 80 | 10 | <1 |

TABLE 6—Old Ross Series—trace elements—total content (ppm)

| Horizon | Depth (in.) | Rb | Li | Ba | Sr | Mn | Cr | Co | Ni | Zr | Pb | Sn | Be | Cu | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_{11}$ | 0—7 | 180 | 90 | 350 | 50 | 1000 | 30 | 7 | 10 | 100 | 70 | 10 | 10 | 10 | <1 |
| $A_{12}$ | 7—21 | 160 | 90 | 300 | 30 | 750 | 30 | 5 | 10 | 100 | 50 | 10 | 5 | 10c | <1 |
| A/C | Below 21 | 290 | 70 | 300 | 30 | 750 | 30 | 9 | 20 | 200 | 50 | 8 | 20 | 20o | <1 |

TABLE 7—Clnroche Series—trace elements—total content (ppm)

| Horizon | Depth (in.) | Rb | Li | Ba | Sr | Mn | Cr | Co | Ni | Zr | Pb | Sn | Be | Cu | Mo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_{11}$ | 0—6 | 130 | 80 | 350 | 25 | 4000 | 60 | 17 | 25 | 200 | 35 | 5 | <5 | 10 | 1 |
| $A_{12}$ | 6—14 | 170 | 90 | 450 | 25 | 4000 | 75 | 15 | 25 | 300 | 25 | 5 | <5 | 10 | 1 |
| A/C | 14—36 | 190 | 95 | 500 | 30 | 7500 | 95 | 15 | 70 | 250 | 20 | 5 | <5 | 10 | 1 |

TABLE 8—Elements soluble in 2.5 per cent acetic acid (0.5 N; pH 2.5) and expressed as ppm on original soil

| Horizon | Depth (in.) | Co | Ni | Sn | Pb | Mo | V | Ti | Cr | Zn | Fe |
|---|---|---|---|---|---|---|---|---|---|---|---|
| KILTEALY PROFILE | | | | | | | | | | | |
| $A_{11}$ | 0—8 | .24 | .22 | <.03 | .13 | <.03 | .06 | <.05 | .09 | 2.5 | 8.0 |
| $A_{12}$ | 8—18 | .10 | .15 | <.03 | .08 | <.03 | .07 | .23 | .09 | <2.5 | 15.0 |
| $B_{2(ir)}$ | 18—26 | .11 | .12 | .09 | .18 | <.03 | .08 | .22 | .19 | <2.5 | 14.3 |
| B/C | Below 26 | .14 | .08 | .10 | .08 | <.03 | .04 | .08 | .50 | <2.5 | — |
| OLD ROSS PROFILE | | | | | | | | | | | |
| $A_{11}$ | 0—7 | .21 | .55 | .07 | .30 | <.03 | .04 | .07 | .08 | 3.4 | 5.6 |
| $A_{12}$ | 7—21 | .12 | .27 | .09 | .08 | <.03 | .05 | .09 | .15 | <2.5 | 11.1 |
| A/C | Below 21 | .14 | .17 | <.04 | .10 | <.03 | .11 | .12 | .13 | 21.0 | 9.8 |
| CLONROCHE PROFILE | | | | | | | | | | | |
| $A_{11}$ | 0—6 | .23 | .80 | .05 | .25 | <.03 | .02 | <.05 | .11 | 5.0 | 4.7 |
| $A_{12}$ | 6—14 | .21 | .70 | <.05 | .13 | <.03 | <.02 | <.05 | .08 | 4.0 | 6.0 |
| A/C | 14—36 | .20 | .80 | <.05 | .19 | <.03 | <.02 | .30 | .12 | 2.5 | 3.8 |

## APPENDIX III

DEFINITION OF TERMINOLOGY*

### Texture

Soil texture refers to the relative proportions of the various size particles in the mineral fraction of a soil. More specifically, it refers to the relative proportions of clay, silt and sand in the mineral material of less than 2 millimeters in diameter. Texture, which is one of the more important of the soil's physical characteristics, influences such factors as moisture retention, drainage and tilling properties of soils, their resistence to damage by stock and heavy machinery, and earliness of crop growth.

Classes of texture are based on different combinations of sand, silt and clay; the proportions of these are determined by mechanical analyses in the laboratory. The basic textural classes in order of increasing proportions of the finer separates are sand, loamy sand, sandy loam, loam, silt-loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay and clay. Definitions of the basic classes in terms of clay (less than 0.002 mm.), silt (0.002 to 0.05 mm.) and sand (0.05 to 2.0 mm. diameter size) are presented in graphic form (Figure 12).

*Field Estimation of Soil Textural Class*

The estimation of soil textural class is made in the field by feeling the moist soil between the fingers. The field estimation is checked in the laboratory. In arriving at an estimation in the field the following considerations are taken into account.

*Sand:* Sand is loose and single grained. The individual grains can readily be seen and felt. Pressed when moist, a weak cast may be formed which easily crumbles when touched.

*Sandy loam:* A sandy loam contains much sand but has adequate silt and clay to make it somewhat coherent. If squeezed when moist, a cast can be formed that bears careful handling without breaking.

*Loam:* A loam has roughly equal proportions of sand, silt and clay. If squeezed when moist, a cast is formed which can be handled quite freely without breaking.

*Silt loam:* A silt-loam comprises a moderate amount of sand, a relatively small amount of clay with over half the particles of silt size. A cast can be formed which can be freely handled without breaking, but when moistened and squeezed between thumb and finger it does not "ribbon" but gives a broken appearance.

*Clay loam:* A clay loam contains more clay than a loam and usually breaks into clods or lumps that are hard when dry. In the moist state it is plastic and can be formed into a cast which can withstand considerable handling. When kneaded in the hand, it does not crumble readily, but tends to work into a heavy compact mass.

*Clay:* A clay has a preponderance of the finer particles, contains more clay than a clay loam and usually forms hard lumps or clods when dry, but is quite plastic and sticky when wet. When pinched out between thumb and finger in the moist state it forms a long, flexible "ribbon".

*General Grouping of Soil Texture Classes*

Often it is convenient to refer to texture in terms of broad groups of textural classes. Although the terms "heavy" and "light" have been used for a long time in referring

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*The terms and definitions used here are essentially those of the Soil Survey Manual, U.S.D.A. Handbook No. 18, Washington, D.C., 1951.

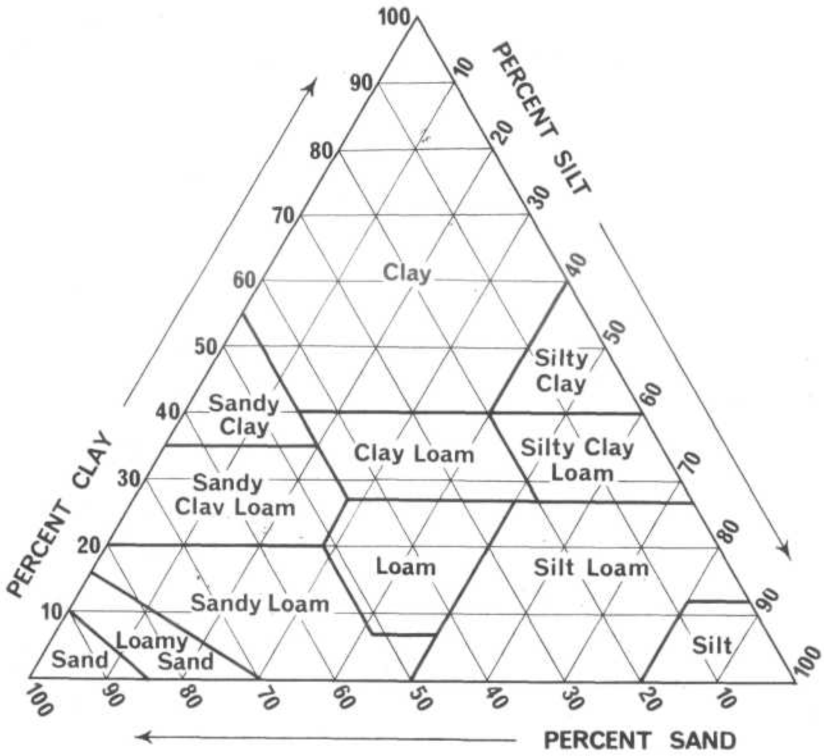


Fig. 12—*Chart showing the percentages of clay (less than 0.002 mm.) silt (0.002 to 0.05 mm.) and sand (0.05 to 2.0 mm.) in the basic soil texture classes (After Soil Survey Manual, U.S.D.A. Handbook No. 18, Washington, D.C., 1951).*

to fine and coarse textured soils, respectively, the terms are confusing as they do not bear any relation to the weight of soil; the terms arose from the relative traction power required for ploughing. An outline of acceptable terms is as follows:

| *General terms* | | *Basic soil texture class* |
|---|---|---|
| Sandy Soils | Coarse textured soils | Sands Loamy sands |
| | Moderately coarse-textured soils | Sandy loams |
| | Medium-textured soils | Loams Silt loams Silt |
| Loamy Soils | | |
| | Moderately fine-textured soils | Clay loams Sandy clay loams Silty clay loams |
| | Fine-textured soils | Sandy clays Silty claysClays |

## Structure

Soil structure refers to the aggregation of primary soil particles into compound particles, which are separated from adjoining aggregates by surfaces of weakness. An individual natural soil aggregate is called a ped.

The productivity of a soil and its response to management depend on its structure to a large extent. Soil structure influences pore space, aeration, drainage conditions, root development and ease of working. Soils with aggregates of spheroidal shape have a greater pore space between peds, are more permeable, and are more desirable generally than soils that are massive or coarsely blocky.

Field descriptions of soil structure note the shape and arrangement, the size, and the distinctness and durability of the aggregates. Shape and arrangement of peds are designated as **type** of soil structure; size of peds, as **class**; and degree of distinctness, as **grade**.

*Type*

There are four primary types of structure:

(a) Platy—with particles arranged around a plane and faces generally horizontal.

(b) Prismlike—with particles arranged around a vertical line, and bounded by relatively flat vertical surfaces.

(c) Blocklike—with particles arranged around a point and bounded by relatively flat or curved surfaces giving a general block-like appearance. The ped surfaces here are accommodated to adjoining aggregates.

(d) Spheroidal—with particles arranged around a point and bounded by curved or very irregular surfaces that are not accommodated to the adjoining aggregates.

Each of the last three types has two subtypes.

Under prismlike, the two subtypes are prismatic (without rounded upper ends) and columnar (with rounded ends). The two subtypes of block-like are angular blocky (with sharp-angled faces) and subangular blocky (with rounded faces). Spheroidal is subdivided into granular (relatively non-porous) and crumb (very porous).

*Class*

Five size classes are recognised in each type. The size limits of these vary for the four primary types given. A type description is generally qualified by one of the following class distinctions: very fine, fine, medium, coarse, very coarse.

*Grade*

Grade is the degree of aggregation or strength of the structure. In field practice, it is determined mainly by noting the durability of the aggregates and the relative proportions of aggregated and non-aggregated material when the aggregates are disturbed or gently crushed.

Terms for grade of structure are as follows:

0. *Structureless*—No observable aggregation. This condition is described as massive if coherent, and single grain if noncoherent.

1. *Weak*—Poorly formed indistinct peds which when disturbed break down into a mixture comprising some complete peds, many broken units and much non-aggregated material.

2. *Moderate*—Many well-formed, moderately durable peds that are not so apparent

in the undisturbed soil. ?
some broken peds and a?

3. *Strong*—Structure c?
soil, and that survive disp?
consists mainly of entire ped?

The appropriate terms des?
in that order to give the stru?
blocky; weak, fine crumb. ?

Porosity of a soil is conditioned?
crevices, passages and other soil cav?
of soil pores. In this bulletin, poros?
structural units which is strictly thes?
gely by type of structure; it is also?
earthworms and other soil macro-organ. ?

Porosity determines, to a large extent, ?
to water ratio prevailing and is thus of co?
aeration and drainage regime.

**Consisted?**

Soil consistence is an expression of the degree? cohesion and adhesion, or the resistance to deformation and rupture tha? in a soil. Interrelated with texture and structure, and strongly influenced by the moisture condition of the soil this characteristic is most important in developing a good tilth under cultivation practices. On account of the strong influence of moisture regime, the evaluation of soil consistence is usually considered at three levels of soil moisture—wet, moist and dry.

*Consistence When Wet*

**A**. *Stickiness*: Stickiness expresses the extent of adhesion to other objects. To evaluate this feature in the field soil material is pressed between thumb and finger and its degree of adhesion noted. Degrees of stickiness are expressed as follows.

0. Non-sticky: On release after pressure, practically no soil material adheres to thumb or finger.

1. Slightly sticky: After pressure, soil material adheres to thumb and finger but comes off one or the other rather clearly.

2. Sticky: After pressure, soil material adheres to both thumb and finger and tends to stretch somewhat and pull apart rather than pulling free from either digit.

3. Very sticky: After pressure, soil material adheres strongly to both thumb and finger and is decidedly stretched when they are separated.

**B**. *Plasticity*: Plasticity is the ability to change shape continuously under applied stress, and to retain the impressed shape on removal of the stress. To evaluate in the field, the soil material is rolled between thumb and finger to form a “wire”.

0. Non-plastic—no wire formable.

1. Slightly plastic—wire formable; soil mass easily deformed.

2. Plastic—wire formable; moderate pressure required to deform soil mass.

3. Very plastic—wire formable; much pressure required to deform soil mass.

*Consistence When Moist*

To evaluate in the field, an attempt is made to crush in the hand a mass of soil that appears moist.

0. Loose—Non-coherent.

1. Very friable—Soil material crushes under very gentle pressure but tends to cohere when pressed together.

2. Friable—Soil material crushes easily under gentle to moderate pressure between thumb and finger, and tends to cohere when pressed together.

3. Firm—Soil material crushes under moderate pressure between thumb and finger, but resistance is distinctly noticeable.

4. Very firm—Soil material crushes under strong pressure; barely crushable between thumb and finger.

*Consistence When Dry*

To evaluate, an air-dry mass of soil is broken in the hand.

0. Loose—Non-coherent.

1. Soft—Soil is fragile and breaks to powder or individual grains under very slight pressure.

2. Hard—Soil can be broken easily in the hands but it is barely breakable between thumb and finger.

3. Very hard—Can normally be broken in the hands, but only with difficulty.

*Cementation*

Cementation of soil material refers to a brittle, hard consistence caused by various cementing substances. Different degrees of cementation occur.

1. Weakly cemented: Cemented mass is hard but brittle and can be shattered in the hand.

2. Strongly cemented: Cemented mass is brittle but harder than that which can be shattered in the hand; it is easily shattered by hammer.

3. Indurated: Very strongly cemented; brittle; does not soften when moistened and is so extremely hard that a sharp blow with a hammer is required for breakage.

## APPENDIX IV

### CLASSIFICATION OF COUNTY WEXFORD SOILS ACCORDING TO AMERICAN SYSTEM OF CLASSIFICATION (7th APPROXIMATION)

In. presenting the information collected in the course of the soil survey, it is desirable that the characteristics of the different soils and their relationships to one another be set forth in a systematic manner. In devising a system of soil classification, the requirements of those who apply the information in a practical manner in various land use practices and of those interested in the scientific study of soils must be kept in mind.

In an attempt to meet the requirements of practical users, the main criterion followed in this Bulletin has been that of choosing a system of soil classification and nomenclature with which practical users are most familiar. For this reason, the system used is that which has been evolved principally in Europe and which has been commonly used in this country.

Scientific interests require more exact principles. The criteria used to distinguish classes of soils and the names used to identify these must be rigidly defined. While the older systems of classification satisfy these requirements in many cases, nevertheless, difficulties arise since the definitions and names of classes are often incomplete and can vary from country to country. In addition, the nomenclature used can be rather ambiguous; due to lack of precise definition and correlation, similar soils may be named differently or different soils may be included under the same class name.

In recent years a system of soil classification has been developed in the United States* in which it was attempted to correlate soils as a broad spectrum, to select and define the criteria to be used in distinguishing soil classes, to define the limits of any property in a particular class and to establish a new terminology based on classical Greek and Latin roots. On account of the explicit definitions of soil classes, the new system provides a useful framework for correlating the soils with those of other countries and also for correlating the soils of County Wexford with those of other counties in the future.

The classification of the soils of County Wexford according to the new American system (7th Approximation) is shown in Table 1. Soil complexes and soil variants are not included.

The soils of the county are confined to four Orders: Inceptisol, Spodosol, Alfisol and Entisol. These are further divided into Sub-Orders, Great Groups and, in most cases, Sub-Groups. Definitions of the various classes are available elsewhere* and are not given here.

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*Soil Classification—A Comprehensive System (7th Approximation) 1960. Soil Survey Staff, Soil Conservation Service, U.S. Dept. Agric, Washington 25, D.C.

TABLE XII—Classification of Soils according to American System: 7th Approximation

| Order | Sub-Order | Great Group | Sub-Group | Series |
|---|---|---|---|---|
| Inceptisol | Aquept | Umbraquept | Orthic Umbraquept | Ballyknockan. |
| | | | Orthic Ochraquept | Kilpierce, Knockroe, Ballywilliam. |
| | | | Umbreptic Ochraquept | Templeshanbo. |
| | Umbrept | Haplumbrept | Entic Haplumbrept | Randallsmill. |
| | Ochrept | Eutrochrept | Dystric Eutrochrept | Broomhill. |
| | | | Rendollic Eutrochrept | Clohamon. |
| | | Dystrochrept | Orthic Dystrochrept | Ballindaggan, Old Ross. |
| | | | Eutric Dystrochrept | Killinick, Clonroche, Baldwins- town, Ambrosetown |
| Spodosol | Aquod | Placaquod | | Forth Commons, Blackstairs, Black Rock Mountain. |
| | Orthod | Typorthod | Orthic Typorthod | Slievecoiltia, Nethertown, Kiltealy. Screen. |
| | | | Entic Typorthod | |
| Alfisol | Aqualf | Albaqualf | Orthic Albaqualf | Macamore. |
| | | Ochraqualf | Orthic Ochraqualf | Ballinruan. |
| | | Fragaqualf | Orthic Fragaqualf | Rathangan. |
| | Udalf | Typudalf | Orthic Typudalf | Hook Head |
| | | | Mollic Typudalf | Broadway. |
| | | | Aquic Typudalf | Fethard. |
| | | | Agric Typudalf | Bannow. |
| Entisol | Aquent | Haplaquent | — | Wexford Slob, Kilmore Slob, Kilmannock, Coolaknick, Mill quarter. |
| | | Hydraquent | — | Oulartleigh. |

The Order Inceptisol includes soils which, elsewhere in this bulletin, have been called Gley, Podzolised Gley and Brown Earth; the various series included are separated at lower levels in the classification. The Order also includes two series, Ballindaggan and Clohamon, which have been called Brown Podzolic. These two series have yellowish **B** horizons but since laboratory analyses show very little increase in iron or carbon content, the **B** horizons are considered to be **Cambic** rather than **Spodic**. They are excluded, therefore, from the Spodosols and included with the Inceptisols.

The Order Spodosol includes three series, namely, Kiltealy, Slievecoiltia and Screen, which have been previously called Brown Podzolic and, also, all the soils which have been classed as Podzol. The brown podzolic soils in this Order are in one Great Group, Typorthod, but the Kiltealy and Slievecoiltia Series are placed in the Orthic Sub-Group while the Screen series, because of its poorly developed Spodic horizon, is placed in the Entic Sub-Group. The soils previously called Podzols fall into two Great Groups: Placaquod and Typorthod. The Placaquod Great Group includes those podzols having an iron-pan (Forth Commons, Blackstairs and Black Rock Mountain Series), whereas the Typorthod Great Group includes Podzols without an iron-pan (Nethertown Series).

The Order Alfisol includes those soils previously called Grey-Brown Podzolic and some which were called Gley. All the soils in this Order are characterised by a clay accumulation in the **B** horizon. In this Order drainage differences are distinguished at the Sub-Order level, the poorly-drained Macamore, Rathangan and Ballinruan

Series falling into the Sub-Order Aqualf and the free-draining series into the Sub-Order Udalf. Further subdivision is made at the Great-Group and Sub-Group levels to cater for other differences obtaining.

The alluvial soils of recent origin are classified as Entisols at the Order level. Oulartleigh is separated from the others in this Order at the Great-Group level. Due to a lack of precise data on the bearing properties of the soils of this Order, sub-division below the Great-Group level is not attempted. Although the soils of the Screen Association may be considered to be transitional to the Psamments, it was decided to exclude them from the Order Entisol, thus retaining only the alluvial soils of recent origin in this Order.

One of the criteria by which the validity of a soil classification scheme can be tested is the extent to which the soils which are likely to behave in a similar manner are grouped together to form classes. It is significant that the soils in any one sub-Group (Table XII) belong, in general, to the same soil suitability class (Table IX, page 122). This results from the emphasis given to the morphology of the soil profile in forming soil classes.