THE

REGIONAL RESEARCH CENTRE

Department of Soil Science

AT

THE UNIVERSITY OF THE WEST INDIES

TRINIDAD, W.I.

SOIL AND LAND-USE SURVEYS

No. 25

JAMAICA

Parish of Trelawny

April, 1970

A West Indian Soils Research Scheme was initiated in 1947 "for the undertaking of systematic soil surveys together with related researches into the chemistry and physics of the main soil types, including the investigation of the possible role of trace elements in West Indies agriculture." This general objective has been maintained by the Soil Research and Survey Section of the Regional Research Centre which came into being in 1955, and which in 1967 was incorporated in the Department of Soil Science, University of the West Indies.

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JAMAICA

Parish of Trelawny

by

G. H. BARKER

THE REGIONAL RESEARCH CENTRE,

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April, 1970

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FOREWORD

This report from the Soil and Land-Use Section, Department of Soil Science, University of the West Indies, is the twenty-fifth of the Regional Research Centre's Caribbean Series. It deals with the parish of Trelawny, and completes the series of thirteen parishes surveyed in Jamaica.

Field work was carried out during periods of 1968/1969 and 1970 by Mrs. G. H. Barker, the author of the report.

The Department of Soil Science wishes to record its appreciation of the facilities which have been accorded by the Ministry of Agriculture and Fisheries in Jamaica to all soil surveyors involved in this series. The Ministry staff, and particularly those of the Crops and Soils Division, have always been readily available to advise and to give assistance in all aspects of the work. Special thanks are due to Mr. C. W. Hewitt, Acting Director of Crops and Soils who, from the first to the last of the series has given the benefit of his long experience of the soils and agriculture of Jamaica.

S. McCONAGHY,
Professor of Chemistry and Soil Science,
and
Head of Department of Soil Science.

CONTENTS

INTRODUCTION

This report, issued by the Regional Research Centre, Department of Soil Science, of the University of the West Indies, Trinidad, is the thirteenth Survey report, and the last of a series covering Jamaica. It deals with the parish of Trelawny, and follows the same format as the reports already published.

The parish of Trelawny lies on the north coast of Jamaica and is approximately rectangular in shape. It is bounded on the east by the parish of St. Ann, by the Rio Bueno as far south as Stewart Town and thence south westward to Cave River near Bohemia. On the southern side, separating it from the parish of Manchester the boundary follows Hectors River as far as Troy and continues westwards alongside St. Elizabeth to meet the St. James border three miles east of Niagara in that parish. From there the western boundry reaches the north coast at Cockle Bar Point. The parish covers 355 square miles (Fig. 1).

The soil classification which has been adopted was based primarily on profile morphology, taking into account structure, permeability, root room, slope, stoniness and depth of soil. The amount of erosion was estimated. Four new soil types were recognised in the parish, and have been described in detail by Baker (1967) and although no details of soil analyses are published in this report, due consideration has been given to their importance. Profile descriptions of the individual soils appear in the reports of the parish in which they were first encountered.

Field work in Trelawny was carried out over a period of eighteen months, from 1968 to 1970. Grateful acknowledgement of information and assistance received is made to the following in Jamaica :—

The staff of the Ministry of Agriculture and Fisheries.
Geological Survey.
Department of Statistics.
Meteorological Office, Palisadoes.
Kaiser Bauxite Co., Discovery Bay.
Sugar Manufacturers' Association (Research Dept.), Mandeville.
Trelawny Estates Ltd.
Hampden Estates Ltd.
Dr. C. D. Adams, Department of Botany, U.W.I., Mona.
All the planters and cultivators of the parish of Trelawny.

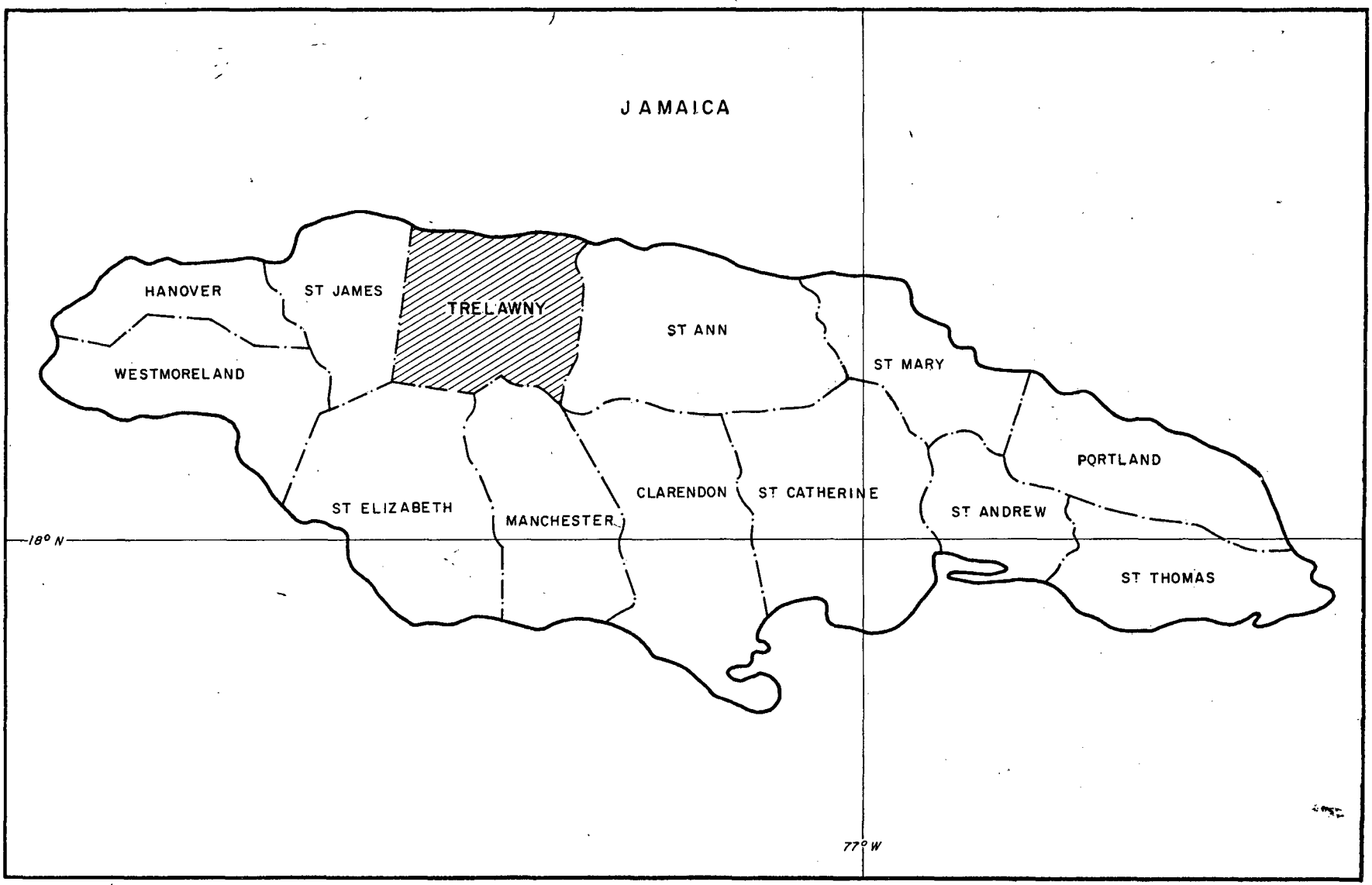
JAMAICA
HANOVER
ST JAMES
TRELAWNY
ST ANN
ST MARY
WESTMORELAND
PORTLAND
ST ELIZABETH
MANCHESTER
CLARENDON
ST CATHERINE
ST ANDREW
ST THOMAS
18° N
77° W

FIGURE 1

PART I

FACTORS AFFECTING LAND-USE IN TRELAWNY

Climate

The 91 year averages obtained from the Meteorological Office, Palisadoes, 1962, give a fair idea of rainfall distribution. Variations in temperature and rainfall are dependent on altitude and season as well as on aspect. "Northers" bringing strong winds and heavy rains with cooler temperatures periodically affect the parish from November to March. These are usually of short duration, of less than a week. Flash floods are liable to bring down limestone rubble to valleys and coastal plains, as at Braco. Hurricanes are always a possibility from June to November.

(i) *Temperature.* By analogy with other parts of the island in similar locations, temperature ranges are given of the Coastal Plains and at a station at 2,800 feet.

		Hottest Month	*Coolest Month*
Coastal Plain	Mean maximum	91°F.	85°F.
	Mean minimum	72°F.	65°F.
Hills	Mean maximum	82°F.	74°F.
	Mean minimum	65°F.	58°F.

(ii) *Rainfall.* From the 91-year averages, three rainfall zones can be recognised :—

(*a*) A long dry season with more than 6 months of less than 4·0 inches rainfall per month. This situation applies to the coastal area and hills southward to the latitude of Perth Town. The annual rainfall is less than 50 inches.

TABLE A

91 year Rainfall Averages, 1870-1960

	Jan	*Feb.*	*Mar.*	*April*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Total*
(*a*)													
Duncans	3·09	1·78	2·24	2·95	4·61	3·69	2·23	3·41	2·56	5·88	7·57	3·30	43·31
Falmouth	3·22	1·97	1·72	2·16	4·35	2·59	1·50	2·63	3·46	5·57	5·46	4·10	38·73
Garredu	1·40	1·84	1·12	0·90	2·75	2·42	1·15	1·65	2·75	4·28	0·63	1·50	22·39
Orange Valley ...	3·42	2·77	1·76	2·26	5·58	3·18	1·74	3·19	4·26	6·61	5·22	5·04	45·03
Harmony Hall ...	3·92	2·27	2·05	2·09	4·25	2·81	1·59	2·45	3·62	5·20	6·17	5·22	41·64
(*b*)													
Wakefield	2·60	2·18	2·16	4·77	9·56	6·68	5·10	5·25	6·52	8·59	7·53	3·70	64·64
Clarks Town	3·34	2·44	2·18	3·87	7·02	4·85	3·89	5·15	4·52	8·31	9·70	4·85	60·12
Hyde and Gibraltar ...	3·55	2·21	1·60	5·16	7·16	4·75	4·98	6·78	5·65	7·29	5·78	6·25	61·16
Stewart Town ...	3·84	2·63	2·70	4·40	7·16	4·06	3·56	6·31	5·70	7·45	6·18	6·56	60·55
Vale Royal	4·63	2·56	2·22	2·89	5·75	4·02	2·52	4·42	4·34	6·38	7·90	7·32	54·95
(*c*)													
Ulster Spring	3·29	3·26	3·73	7·09	11·75	6·67	5·49	8·61	9·72	11·65	7·44	4·05	82·75
Albert Town	2·72	2·96	3·68	6·84	10·99	5·55	4·96	8·92	9·91	11·67	7·63	3·29	79·12
Wait-a-Bit (Forestry) ...	1·58	1·16	5·53	7·37	7·75	6·85	1·98	5·17	5·82	20·61	10·17	3·93	77·92
Warsop	2·27	3·04	3·00	8·80	4·38	6·38	6·82	9·96	9·81	15·22	8·96	3.15	81·79
Troy (P.W.D., Troy)	2·14	3·09	5·23	8·39	14·69	7·94	6·96	10·70	12·65	15·47	7·14	2·78	97·18

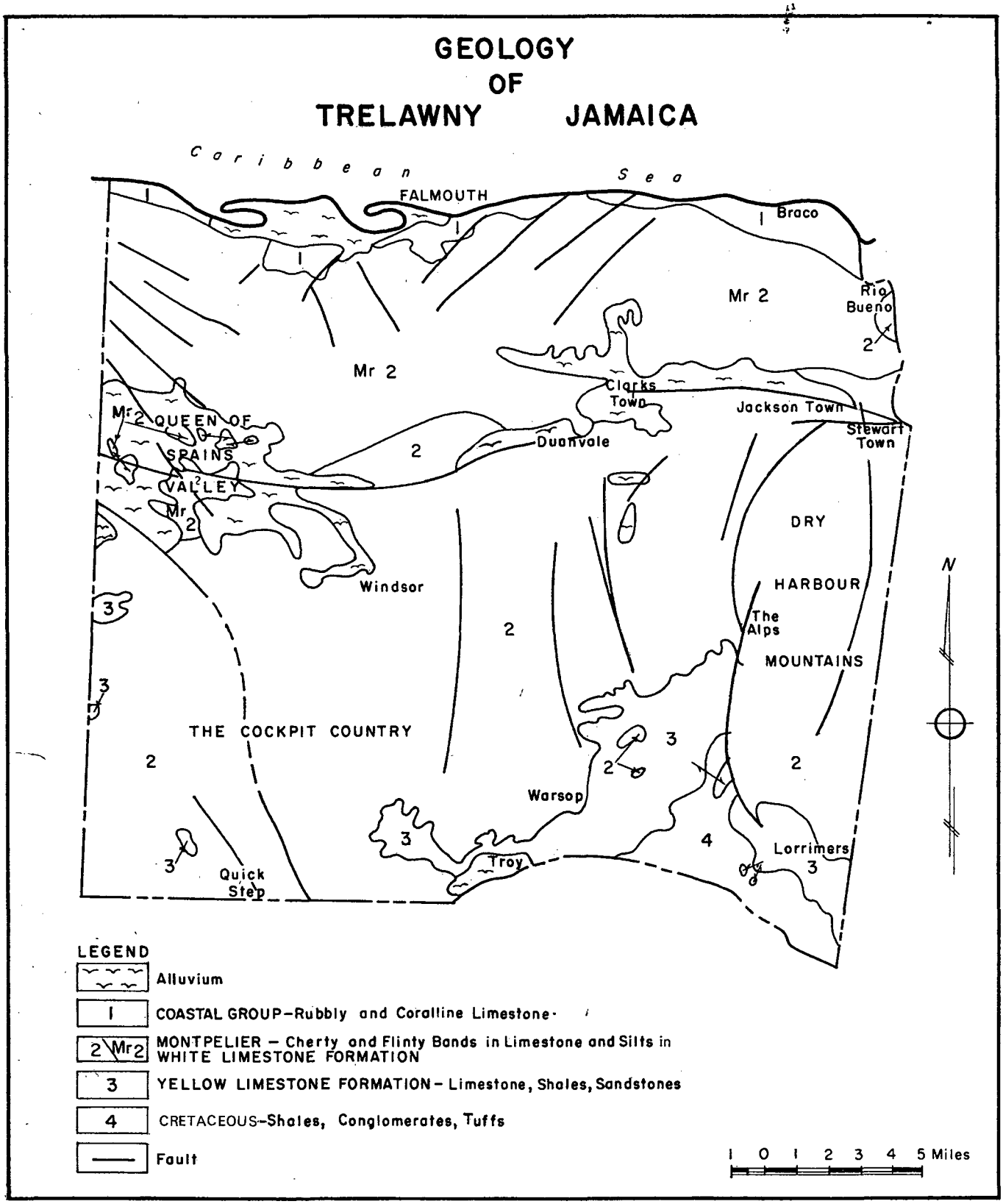
GEOLOGY
OF
TRELAWNY JAMAICA
Caribbean Sea
FALMOUTH
Braco
Rio Bueno
Mr 2
Clarks Town
Jackson Town
Stewart Town
QUEEN OF SPAINS VALLEY
Duanvale
DRY HARBOUR MOUNTAINS
The Alps
Windsor
THE COCKPIT COUNTRY
Warsop
Troy
Lorrimers
Quick Step
N
LEGEND
Alluvium
COASTAL GROUP–Rubbly and Coralline Limestone
MONTPELIER – Cherty and Flinty Bands in Limestone and Silts in WHITE LIMESTONE FORMATION
YELLOW LIMESTONE FORMATION – Limestone, Shales, Sandstones
CRETACEOUS–Shales, Conglomerates, Tuffs
Fault
1 0 1 2 3 4 5 Miles

Figure 2

(*b*) A Moderate Dry Season with 3–5 months of less than 4·0 inches of rainfall per month. The annual rainfall is between 50–75 inches, and applies to the Dry Harbour Mountains and Queen of Spains Valley.

(*c*) A Short Dry Season with 2–3 months with less than 4·0 inches rainfall per month. The annual rainfall is from 75–100 inches plus, and embraces the Cockpit Country and the area south of Ulster Spring.

As seen from the above table there is a significant increase in the May rainfall, and advantage is taken of it by farmers for spring planting. The heavy rainfall occurring in the Ulster Spring Area where shales are easily eroded presents problems of soil conservation. This area comes under the Christiana Land Authority. The amount of rain falling in this region also affects the volume of water which appears at Dornoch Head near Stewart Town to feed the Rio Bueno.

The heavy rains of the Cockpit Country swell the waters of the Martha Brae and increase the flow of the many springs of the Queen of Spains Valley. The fluctuating supply results in the rise and fall of the water table in this large basin giving drainage problems. The incidence of precipitation is of importance in determining the yield of sugar cane which is the main crop of this area. The water potential revealed from wells drilled in the Queen of Spains Valley has not as yet been exploited. Irrigation is used by the sugar estates where water is economically available. Although irrigation would be of benefit used on the droughty bauxite soils of the Dry Harbour Mountains, there is no surface water available. The uncertainty of seasonal distribution of rainfall can spell disaster to the cultivation of catch crops, e.g. maize. Domestic water is captured by the concrete catchment and tank system.

(iii) *Humidity*. There are no humidity records for the parish but it is high at all times, particularly at night. The relative humidity is high during July, August and September. Early morning fogs are frequent in the inland basins and in the south-eastern part of the parish.

Geological Succession and Lithology

(See Fig. 2)

Geologically the parish can be conveniently divided as follows :—

(1) Cretaceous Rocks.

(2) Tertiary Limestones.
  (*a*) Yellow Limestone Formation.
  (*b*) White Limestone Formation.

(3) Coastal Formations—Recent to Pliocene.

(1) *The Cretaceous Rocks* are the oldest exposed in the parish, and are represented by shales, sandstones, conglomerates and tuffs. They appear in the Central Inlier, a part of which occurs in the south-east of the parish within a triangular area with its apex at Freemans Hall. Small areas invade the Cockpit Country from the St. James inlier to the west of the parish.

(2) *Tertiary Limestones.*

(*a*) *The Yellow Limestone Formation* is characterised by the presence of sandstones and shales within the limestone and a conglomerate at the base. The Formation occurs mainly edging part of the Central Inlier in a triangle whose apex is near Ulster Spring in the south-east of the parish. It also is found in an elongation into the Cockpit Country north of Troy.

(*b*) *The White Limestone Formation* covers the major portion of the parish. In general the limestones south of the Duanvale fault zone are massive, well jointed and crystalline. North of the fault zone the gently dipping Montpelier Limestone of this Formation consists of a hard, dense chalky limestone with but few fissures. There are frequent bands of flint and chert occurring in nodules and tabular bodies, though rarely in continuous sheets. Frequently they are coated with a crust of calcium carbonate or of an iron oxide. Occasionally beds of marl and calcareous shales are present. These features are conducive to impeded drainage.

(3) *Coastal Group*. This consists of chalky or rubbly limestone formed from the detritus of the White Limestone, and is succeeded locally by semi-indurated coralline or shelly limestone. Around Falmouth elevated reefs are seen at 6, 11, 16 and 50 feet respectively. The 50 feet level shows the remains of a coral reef developed on a Montpelier surface. Recent deposits of rubbly limestone, deposited as outwash fans occur at Braco. The recent alluvium in the river valleys is of very limited extent but of agricultural importance.

The most significant fault system is that of Duanvale, trending approximately E–W and passing near Wakefield and Stewart Town. South of Stewart Town the fault trend is NNE–SSW and further west in the Cockpit Country it is nearly N–S in the region of Burnt Hill and Ulster Spring, but NNW–SSE nearer the St. James border.

Relief and Drainage

(See Figs. 3 and 4)

The relief of the parish is strongly related to the geology and geological history. Elevations range from sea level to over 3,000 feet in the south-east.

The main physiographic subdivisions are :—

(1) *The Coastal Plain and the Alluvial Areas of River Flood Plains*. The coastline is one of emergence and a series of terrace levels can be traced ranging locally from 2–5 in number and at altitudes of 5–200 feet above sea level. The lowest of the terraces at about 5 feet above sea level extends from Silver Sands to the west and is only broken by the Carrion Crow Cliffs. A cliff undercut by wave action is visible on the roadside near the eastern end of the air-strip at Braco. A bare platform of honeycomb rock between Braco and Rio Bueno also testifies to this emergence. Numerous mangrove swamps are gradually being infilled for urban development. Saline ponds, e.g. Flamingo Pond, shrink or become larger depending on the amount of rainfall. Comparatively small alluvial strips occur along the river valleys of Martha Brae, Rio Bueno and Hectors River.

(2) *The Foothills*. These rise rather steeply to the 250 feet contour except where the Martha Brae River has carved out a valley. A second level of hills rises to over 750 feet. Although they are traversed by a few steep-sided valleys, there are no permanent streams.

(3) *Zone of Hills and Poljes of the Montpelier Limestone*. (See Fig. 2.) This comprises a series of rounded and often elongated hills and poljes. A polje may be defined as a closed hollow in a karst region, more or less flat

RELIEF AND DRAINAGE OF TRELAWNY JAMAICA

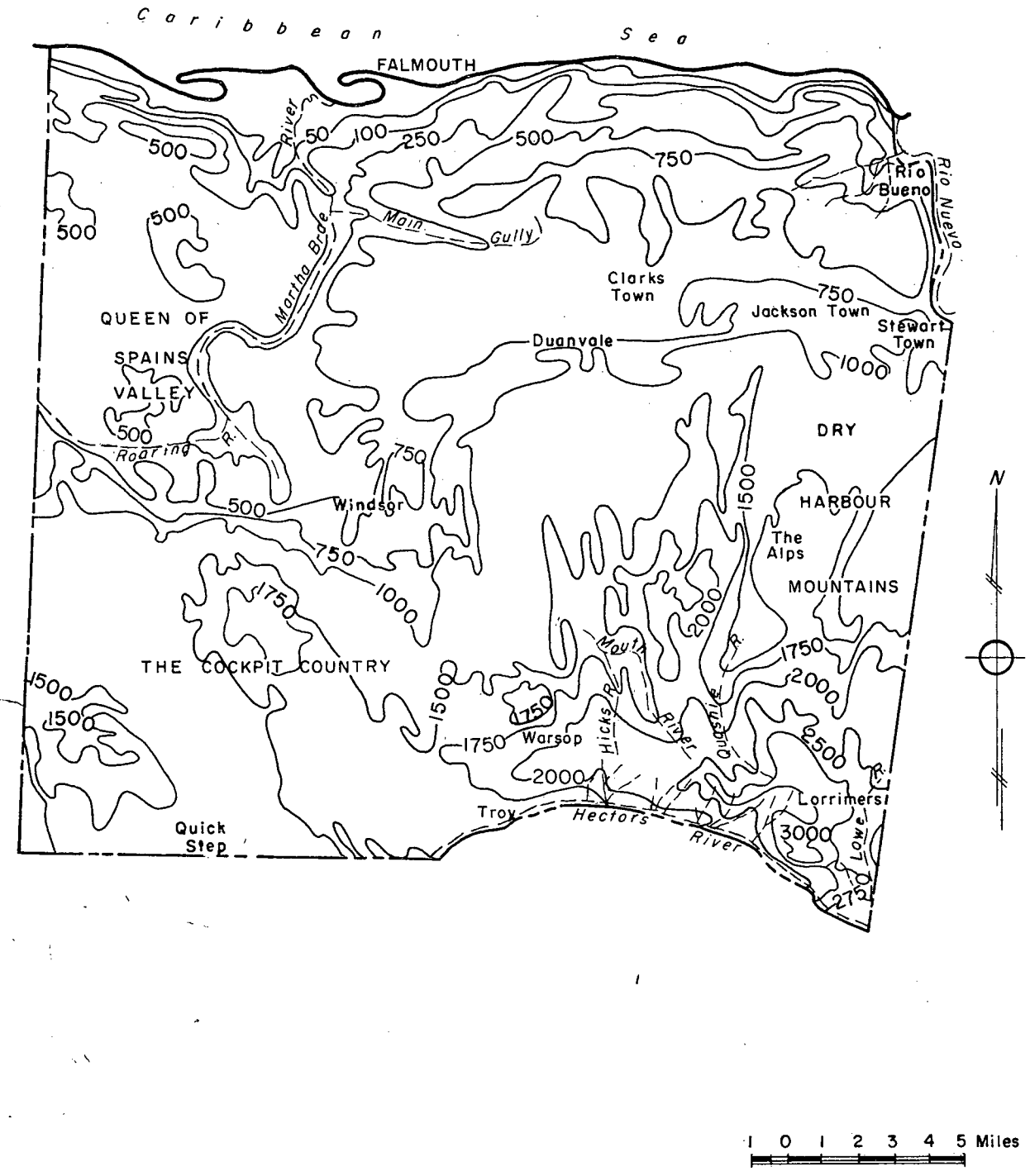

Figure 3

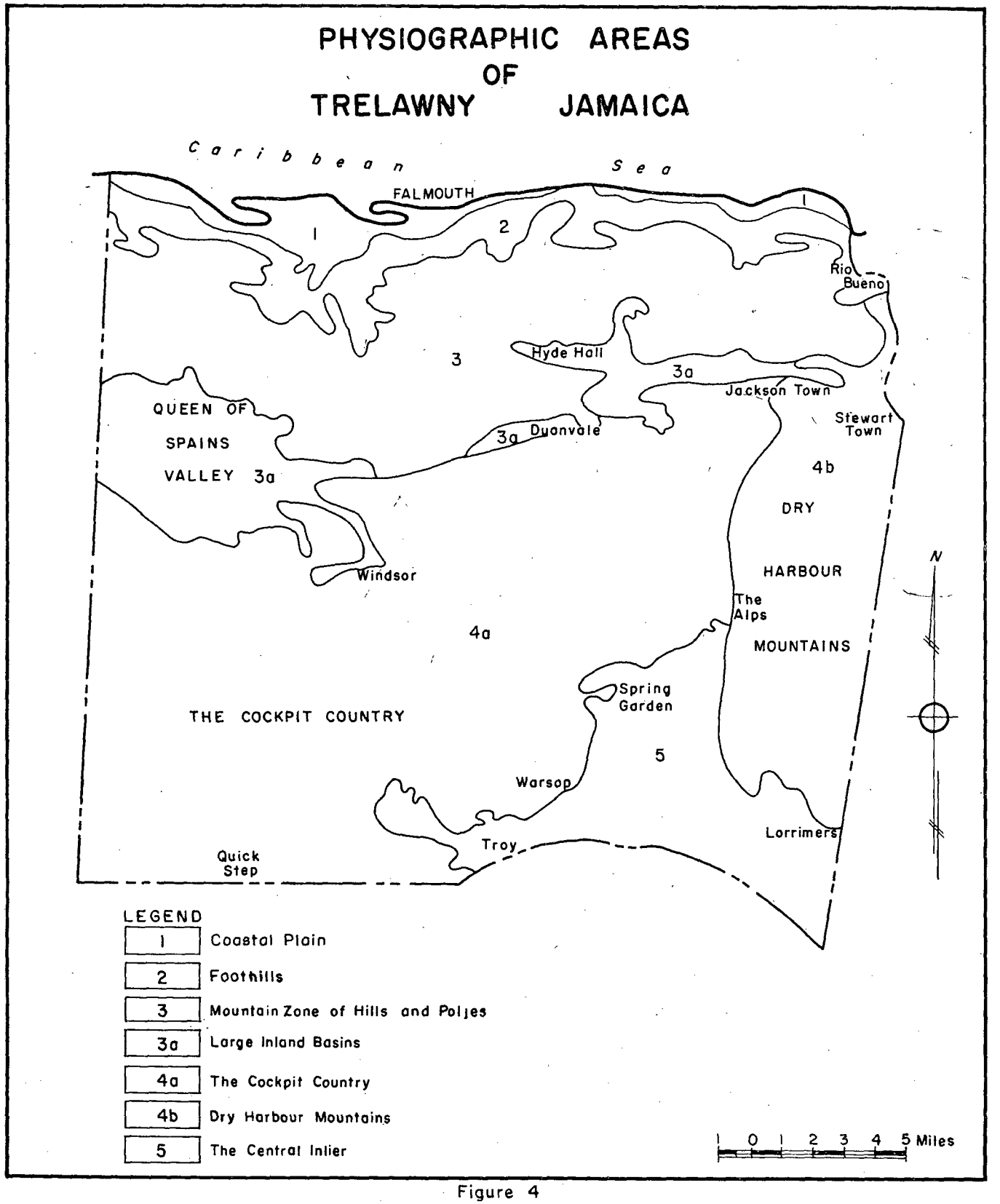
PHYSIOGRAPHIC AREAS
OF
TRELAWNY JAMAICA
Caribbean Sea
FALMOUTH
Rio Bueno
Hyde Hall
Jackson Town
Stewart Town
Duanvale
QUEEN OF SPAINS VALLEY
DRY HARBOUR MOUNTAINS
Windsor
The Alps
THE COCKPIT COUNTRY
Spring Garden
Warsop
Troy
Lorrimers
Quick Step
N
LEGEND
1 Coastal Plain
2 Foothills
3 Mountain Zone of Hills and Poljes
3a Large Inland Basins
4a The Cockpit Country
4b Dry Harbour Mountains
5 The Central Inlier
0 1 2 3 4 5 Miles

Figure 4

bottomed and several miles in length. The largest polje is that of the Queen of Spains Valley which covers about 30 square miles. The other major areas are Hampshire Valley, Hyde Hall and Duanvale, 4, 2½ and 2 square miles respectively. There are numerous other enclosed hollows, more or less flat bottomed but smaller in size. When the surrounding Montpelier limestone hills contain flint boulders these have almost filled the surface of the valleys but when mechanically and manually removed there is usually a deep soil below. The flints are a menace to tyres. The erosion of the Queen of Spains Valley has been facilitated by extensive cross faulting. An examination of the 1961 aerial photographs on a scale of 1 : 25,000 clearly shows the presence of numerous sink holes in a linear arrangement. Particularly in the Queen of Spains Valley there are many springs especially at the foot of the Duanvale Fault scarp. The geological character of the Montpelier limestone contributes to the impeded drainage, typified by the shotty soils in all these poljes.

(4) *The White Limestone Plateau.* This comprises the White Limestone area to the south of the Duanvale fault and may be subdivided into :—

(4*a*) The region to the west of the faulted area from the Alps to Jackson Town and forms a large part of the Cockpit Country which extends westwards and southwards outside the parish. It is typified by conical hills or "Cone Karst" separated only by cockpits, giving an egg box appearance. The northern faulted edge of the area is steep, penetrated by occasional valleys as at Windsor, whereas the southern edge is more accessible as at Quick Step. There are a very few glades e.g. around Dromilly, Windsor and Sherwood Content, and these are associated with steep limestone hills, "Tower Karst" is also developed where the Yellow Limestone is near or at the surface as at Burnt Hill and Ulster Spring. Glade formation in the Cockpit Country is usually restricted to elongation of cockpits along fault lines.

(4*b*) East of (*a*) lie the Dry Harbour Mountains. The conical hills here are separated by more flat valleys filled with bauxite and chemical erosion is less intense. The hills are at a higher elevation than the Cockpit and well above inundation level. Large level areas such as Colchis Pen and Hyde Hall are more common but although suitable for agriculture, drainage is below ground and the difficulty of obtaining a water supply is a hindrance to development.

(5) *The Central Inlier.* This includes the Yellow Limestone and Cretaceous Rocks of the south-eastern part of the parish within the Central Inlier. The former is "Karstified" in some areas, and has sink holes and caves. Normally water is available at a reasonably shallow depth and a "Tower Karst" type of relief develops. Much of the Inlier lies between 1,700 and 2,000 feet, reaching over 3,000 feet in Ayr Hill. The rainfall average is at least 80–90 inches per annum, and a dendritic pattern of drainage has developed. A watershed extends from Warsop to Lorrimers. The Hicks, Mouth and Quashie rivers plunge northward under the Yellow Limestone in the neighbourhood of Spring Garden and Troy probably to reappear at Dornock River Head near Stewart Town. The numerous southward flowing rivers of the watershed are tributaries of Hectors River which runs E–W and sinks into the White Limestone at Troy, emerging to form one of the headwaters of the Black River in St. Elizabeth.

Vegetation

(Contributed by Dr. C. D. Adams, Dept. of Botany, U.W.I., Mona, Jamaica).

The varied geology, topography and rainfall of Trelawny combine to allow a great range of different types of natural and derived vegetation in the parish. In the immediate coastal belt an evergreen thicket of xerophytic type occurs on the raised coral limestone and mangrove and salina occur where the terrain is more nearly at sea level. The thicket formations resemble those described for St. Ann (Asprey & Loveless, 1958), any differences being attributable to the generally lower rainfall of the Trelawny coast which has less than 50 inches annual total and only two months, October/November, with an average of over 5 inches each. This is the driest stretch of the whole north coast. The mangroves are characterised by Red Mangrove (*Rhizophera mangle*), Black Mangrove (*Avicennia germinans*) and Button Mangrove (*Conocarpus erectus*). Where mangrove trees have been cut a common coloniser is the Golden Swamp Fern (*Acrostichum aureum*) and on the open salinas the characteristic species is the creeping fleshy-leaved *Sesuvium portulacastrum.* The raised coral is occupied by a number of low small-leaved shrubs in the forward zones and by Sea Grape (*Coccoloba uvifera*) and Sea Thatch Palm (*Thrinax multiflora*) further back.

Most of the Montpelier limestone lies at elevations from 500 to 1,000 feet above sea level and consists of low hills alternating with depressions. This area is subject to about 50 inches of rainfall per annum. The hills which mostly have very thin poorly drained soil, carry a rather open secondary xerophytic woodland comprising the common more or less deciduous trees of the warm lowlands. These include Logwood (*Haematoxylum campechianum*), Red Birch (*Bursera simaruba*), Braziletto (*Peltophorum linnaei*) and Prickly Yellow (*Fagara martinicensis*, syn. *Zanthoxylum martinicense*). There are also some Pimento trees (*Pimenta dioica*, syn. *P. officinalis*) and numerous smaller woody plants such as Burn Nose (*Daphnopsis* spp.) and members of Euphorbiaceae (cf. Asprey & Robbins, 1953). All the karst basins or poljes in this area are occupied by sugar cane. The formation extends southwards to the Duanvale Fault stretching from Deeside, through Wakefield and Duanvale, south of the Hampshire Lane to Stewart Town. From this line southwards lies the rugged Cockpit country at elevations from 1,000 to 2,000 feet and subject to annual rainfall totals of over 100 inches in the interior.

The hundreds of cockpits and the undisturbed deep valleys of southern Trelawny support a type of natural vegetation known as wet limestone forest. Species-diversity is high because of isolation and differences of aspect and drainage. Trees up to 80 feet high and over include Cedar (*Cedrela odorata*), Broadleaf (*Terminalia latifolia*), Breadnut (*Brosimum alicastrum*), Sweetwood (*Nectandra antillana*), Bullet (*Bumelia* spp., syn. *Dipholis* spp.), Bitter Damson (*Simarouba glauca*) and locally Santa Maria (*Calophyllum calaba*). The structure and floristic content of these forests have been described by Asprey & Robbins (1953, pp. 384–386). Several hundred species of small trees, shrubs, climbers, epiphytes, ferns, mosses and lichens also occur. The range and diversity

of the flora are increased further by the contrasting conditions encountered on the craggy hills where exposure, intense sunlight and rapid drainage from almost bare rocks, provide niches for flora almost entirely different from the flora of the valley bottoms. Some of the high cliffs in the Cockpit country are so exposed that rare species of tank-bromeliads and Cacti are found only there. Taken as a whole this part of Jamaica for its size has probably as rich a natural flora as any part of the tropics yet known.

The topography of the area east of the Jackson Town to Ulster Spring road can be described as semi-cockpit, supporting on the hills a thin woodland of spindly-trunked trees and in the valley bottoms limited clearings for pasture and cultivation on a bauxite soil. There is an abrupt change in the south-eastern corner of the parish due to the occurrence of Yellow Limestone and Cretaceous Shales as an extension there of the Central Inlier.

The People and Their Agriculture

Sugar cane is the dominant crop grown in Trelawny. Two major companies are involved in this, the Hampden Estates Ltd. and Trelawny Estates Ltd., the latter also producing rum. Both estates maintain pasture. Hitherto the bauxite reserves of the Dry Harbour Mountains that lie within the parish have not been mined. The Cockpit Country has no great potential agriculturally at the moment owing to its inaccessibility. The south-east of the parish that lies within the Central Inlier is mainly devoted to food producing, and comes under the Christiana Land Authority. Extension work within the Authority gives guidance as to management and selection of crops according to soil types and promotes soil conservation practices.

Most of the population of the parish is concentrated on the North Coast, Wakefield and Bunkers Hill in the Queen of Spains Valley, and around Ulster Spring and Albert Town in the Central Inlier. Falmouth is the parish capital. Clarks Town and Jackson Town are other inland market towns. The potential of the tourist trade has not been fully realised. Private development projects are already operating and preparation for the establishment of the New Falmouth resort is under way. The droughtiness of the coast deters intense agricultural development unless irrigated, but the long dry season is an advantage to the tourist trade. The Martha Brae river is a reliable and adequate source of water.

Present Land-Use

(i) FOREST AND WOODLAND : Only the most inaccessible Cockpit areas are likely to have much original vegetation, the remaining hilly country within the parish in general only supporting uneconomic woodland. The inaccessibility of sufficiently large areas with enough soil is a deterrent to the establishment of stands of economic trees in the Cockpit Country. Nevertheless afforestation of valleys penetrating into the Cockpit Country has begun along with the construction of roads. At Peru Mountain Honduras mahogany (*Swietenia macrophylla*) and Broadleaf (*Terminalia latifolia*) have been planted, and Mahoe (*Hibiscus elatus*) at Deeside and Troy. Pine (*Pinus caribaea*), Mahoe and Eucalyptus spp. have been established at Allsides and Lowe. According to the 1961 census there are 41,314 acres of woodland in the parish.

(ii) RUINATE AND BUSH : "Ruinate" is the Jamaican term used for land that has been cultivated and grazed, but due to neglect has been overgrown with weeds and shrubs, e.g. Guava (*Psidium guajava*), *Lantana*, *Eupatorium* and *Cordia*. Most of this could be improved with proper management. The 1961 census quotes 7,700 acres as "ruinate" in the parish. The spiny bush of some of the coastal areas can support only a few goats.

(iii) PASTURE : The total grazing area recorded in the 1961 census is given as 45,545 acres. Much of this is being improved as the raising of good quality cattle is being stressed. A considerable acreage of the large sugar estates is given to pasture. Pangola grass (*Digitaria decumbens*) is grown where the rainfall is adequate. Guinea grass (*Panicum maximum*) when properly managed gives a high yield of fodder and does well on stony soil and droughty areas. Seymour grass (*Bothriochloa pertusa*) is tolerant to drought and grows well on the thin soils of the slab-like limestone of the Montpelier. Para grass (*Brachiara mutica*) can support itself in badly drained areas of high rainfall. Bermuda grass (*Cynodon dactylon*) is suited to the coastal areas and can withstand temporary waterlogging. Piano grass (*Themeda arguens*) was first recognised on Wales Farm, Trelawny, and is now regarded in Jamaica as a weed owing to the damage caused to the muzzle and mouth of cattle grazing on it. Eradication is difficult, and every effort should be made to keep it cropped so as not to allow it to seed.

(iv) CULTIVATED CROPS : The main crop grown in this parish is sugar cane. Other crops include ground provisions, corn, pineapple, coconut, pimento, citrus and food trees. Rice, which at one time was grown at Deeside and Falmouth is no longer cultivated.

Sugar Cane: Trelawny is the third largest producer of cane in Jamaica, nearly 20,000 acres being grown. Most of this is grown by the two large estates, Hampden Estates Ltd. and Trelawny Estates Ltd. About 6,000 acres of cane is grown on farms of less than 25 acres. Other subsidiary crops grown on the estates are corn, ground provisions and sisal.

Corn: The total acreage of corn grown by small farmers is considerable, particularly in the bauxite valleys of the Dry Harbour Mountains, most of it being spring-planted. Unfortunately the uncertainty of the rains is a hazard. The use of appropriate fertilisers, selection of seeds, and better management should give greater yields.

Ground Provisions: The small farmers produce substantial quantities of ground provisions such as yams, cocoes, sweet potatoes, congo peas, carrots and Irish potatoes both in the bauxite valleys of the Dry Harbour Mountains and the Cretaceous area in the south-east of the parish. Yams, particularly yellow yams, are widely grown.

Coconut: Although coconut was once grown extensively, the "Jamaica Tall" has been decimated by the Lethal Yellowing disease, and replanting of the Malayan Dwarf variety has hitherto been on a limited scale. There is a copra factory at Good Hope.

Citrus, Cocoa and Coffee: These crops are of minor importance in Trelawny.

Pimento: Very little is now grown in the parish. Oil is being distilled at Braco from the leaves.

Bananas: These are mainly grown in the south-east of the parish on the soils of the Yellow Limestone and Cretaceous.

Food Trees: Avocado pear, breadfruit, ackee, otaheite apple, naseberry and soursop are usually planted in the vicinity of the house. With improved marketing facilities and packaging, encouragement could be given to grow more trees.

(v) THE USE OF INSECTICIDES AND WEEDICIDES : These are used mostly on the large estates of sugar cane, and within the Christiana Land Authority on bananas. Livestock are also treated against cattle ticks.

(vi) LIVESTOCK, BEEF AND MILK : There are large herds of good stock on the larger estates in Trelawny. The keen interest taken in raising livestock is indicated by the holding of a biennial Livestock Show at Hague near Falmouth. Registered herds of Jamaica Red Poll, Jamaica Black, Jamaica Hope and Jamaica Brahman are shown. Although substantial numbers of cattle are raised on the 0–25 acre group of farms, most are found on the 500+ acre group. As would be expected in a mountainous parish there are large numbers of mules and donkeys used to transport man and produce along the bridle paths particularly in the Dry Harbour Mountains. Pigs and goats are numerous, but seldom bred scientifically. The small farmers raise most of the poultry.

Recent Trends in Land-Use

The 1968 Survey of Agriculture issued by the Department of Statistics gives the number of farms according to Size Groups as follows :—

0–5	acres	...	9,013	farms	occupying	12,497	acres
5–25	,,	...	1,600	,,	,,	13,967	,,
25–100	,,	...	104	,,	,,	4,694	,,
100–500	,,	...	48	,,	,,	11,112	,,
500 plus	,,	...	23	,,	,,	61,245	,,

At least two-thirds of all sizes of farms are owned by the occupier. Government Land Settlements have been successfully established in some areas. Some families have been resettled from the bauxite areas of St. Ann. They have special problems as they are not accustomed to new soil types which are usually heavier and demand the selection of more appropriate crops. Government assistance is available in the way of Credit Loans and subsidies to farmers who qualify for these, and the Agricultural Marketing Corporation will buy surplus foodstuffs from stations being set up in the rural areas. Nevertheless most of the ground provisions from the remoter areas are transported by mules and donkeys.

Soil Erosion: In any inhabited area there are two types of erosion at work, geological erosion and accelerated erosion. The former is the integrated result of the natural forces of climate and gravity acting upon a landscape whereby all elevated areas are reduced to a base level—approximately sea level. Man can do little to arrest this process except perhaps temporarily and on a restricted scale, by such measures as retaining walls. When man enters an area and modifies local conditions by destroying or changing vegetation, by baring the soil with cultivation and building roads, bridges and buildings then the course of geological erosion is altered and almost always accelerated. As land use is unavoidable it is important that aceelerated erosion is reduced to a minimum. Good land use practices and conservation measures are designed to deal with this type of erosion. The steep limestone hills should carry a permanent vegetation cover. The removal of trees for charcoal making and cultivation should be discouraged, and reafforestation schemes started in areas already denuded of vegetation. Where suitable soil and climate permit, semi-permanent crops such as coffee and cocoa could be established, and proven methods of cultivation including soil conservation encouraged particularly when marginal lands are being opened up. Peasant farmers are often unaware that reduced yields follow haphazard tillage.

The limestone plateau is covered by varying thickness of very permeable bauxite soils of low natural fertility. The preservation of the organic matter in the topsoil is essential both as a supply of nutrient, and as a means of retaining soil moisture. Under a farming system requiring bare earth cultivation the organic matter content of the top soil soon deteriorates. To prevent this, mulching should be practised.

In more erodible shale areas of the inliers, where steep slopes and high rainfall prevail the greatest care has to be taken to prevent erosion on a massive scale. Clean weeding of crops such as yams and ginger and the impermeability of the soils cause slumping and gullying, and urgent measures should be taken to forestall this, as rehabilitation programmes are inevitably slow and expensive. Erosion control should form part of an accelerated educational and extension programme.

Present State of Parochial Services Important to Sound Land-Use

(i) *Transport and Roads.* The parish is reasonably well provided with good main roads. The coastal road is being widened in parts, and use is being made of the "marl" removed in the process as a fill-in for the New Falmouth resort which is being built on a reclaimed mangrove swamp. The network of parochial roads is well maintained, and is being extended into the Cockpit Country. The Forest Department is planning to link up roads from north to south within the Cockpit area. Buses serve only the larger districts.

(ii) *Markets.* There are sugar factories at Long Pond and Hampden, and rum is produced at Long Pond. There is a copra factory at Good Hope. Vegetables, ground provisions and fruit are handled by the Agricultural Marketing Corporation, and by "higglers" who traverse the parish on donkey or mule, taking the produce for sale at some central point. Local distribution of these foodstuffs is inadequate. Local beef is sold at the small market towns. Local butchers buy most of the small stock (pigs, goats and calves) but many are bought by travelling buyers from the Montego Bay and Kingston markets.

(iii) *Water Supplies.* Domestic water supply is adequate on the north coast as the Martha Brae river has a sufficient volume of water even in the dry season. The Queen of Spains Valley has a large potential from springs and wells. Capital expenditure is required to use this water for irrgation purposes. Near the coast important springs occur at Stewart Castle and Duncans. The catchment and tank system is used in the mountains for domestic water supply. Water for livestock in the main cattle areas is usually made available in the form of clay-lined ponds.

PART II

THE SOILS OF TRELAWNY AND THEIR CAPABILITIES

Soil Formation in Trelawny

The major variations in soil pattern are a reflection of changes in parent material. Topography also exerts a strong influence on the soils causing variations in depth and degree of erosion. Surface and underground drainage together with subaerial weathering processes have also contributed to the formation of soil, the seasonal rainfall controlling the rise and fall of the water-table. The heavy acid, shotty soils of the Queen of Spains Valley are strongly influenced by these factors.

Within the parish there are a variety of soils. Those on the coastal plain and foothills are skeletal, and almost non-existent on the "honeycomb" limestone of the raised beach platforms. The numerous inland basins and surrounding hills of Montpelier Limestone are characterised by rounded hills, often bare or with thin soils. The slab-like dense limestone lacks the presence of numerous fissures so that drainage is mostly lateral. The occasional beds of soft chalky limestone result in a varying amount of free lime being present in the soil. The frequent bands and nodules of chalk and flint when present cause the intervening valleys to be very stony, sometimes entirely covering the area, but when these are mechanically and manually removed a deep colluvial soil is revealed. Until these are cleared they are a hindrance to the use of machinery, the sharp flinty edges cutting tyres. When the stones are removed tractor attachments are occasionally used for ripping the edges of the basins resulting in a considerable amount of free lime being introduced into the soil and this is washed downslope by rain a short distance. It is important to recognise the effect of this when deciding on the crop to be grown when lime tolerance is a factor. The soils in the basins are shotty, particularly so in the larger poljes where the shot may form aggregates up to a foot in diameter. The Queen of Spains Valley deserves special mention being an inland basin intersected by many faults, sometimes bringing up small areas of Yellow Limestone. It is the recipient of water from the Cockpit Country appearing in springs, and from the lateral planation of water from the Montpelier Limestone. The whole area is featured by sink holes and residual hillocks.

The Cockpit Country is almost entirely devoid of gentle slopes, and carries very little surface soil and though heavily wooded with much natural forest does not lend itself to afforestation schemes. The "semi-cockpit" Dry Harbour Mountains on the other hand have a considerable acreage of bauxite soils in the valley bottoms and on the hillslopes. These soils occur well above the water table, and are frequently of great depth and heavily cultivated by the small farmer.

The soils of the Central Inlier in the Ulster Spring area are mostly derived from shales and tuffs and are easily erodible. Small areas of alluvium are found along river valleys.

Soil Classification

For the purpose of this report soils have been classified as follows in a form convenient for aligning with land capability criteria:—

A. Soils on Uplands of Shale, Conglomerates and Igneous Rocks

A1. Thin well drained soils on weathered conglomerates, tuffs and hornfels.
- 36. Donnington Gravelly Loam.

A2. Thin well drained soils on partly weathered shale or schist (not in Trelawny).

A3. Moderately deep or deep, fairly well-drained upland soils, mainly on shale (not in Trelawny).

A4. Imperfectly or poorly drained soils with mottled clay subsoils underlain by shale or conglomerates.
- 98. Deepdene Clay.
- 99. Boghole Clay.

A5. Excessively drained light soils over weathered granitic rock or porphyry (not in Trelawny).

A6. Excessively drained light soils underlain by sandstones or gravels.
- 96. Wildcane Sandy Loam.

A7. Heavy soils on deeply weathered conglomerates, tuffs, acid shales and granitic rocks.
- 32. Wirefence Clay Loam.
- 95. Waitabit Clay.

B. Soil of Limestone Uplands.

B1. Red Bauxite Soils.
- 78. St. Ann Clay Loam.

B2. Brown Bauxite Soils.
- 73. Chudleigh Clay Loam.

B3. Moderately deep soils with plastic clay subsoils over hard, fragmented and rubbly limestone.
- 74. Lucky Hill Clay Loam.
- 75. Union Hill Stony Clay.
- 84. Windsor Stony Clay.
- 94. Carron Hall Clay.

B4. Thin brown or reddish soils on hard limestone.
- 77. Bonnygate Stony Loam.

B5. Thin dark coloured soils on soft limestone.
- 91. Killancholly Clay.
- 291. Dunn's River Sandy Clay Loam.

B6. Thin soils on coral limestone, too shallow or too dry for cultivation.
- 80. Seawall Stony Clay.

B7. Dark coloured imperfectly drained soils over soft and rubbly limestone.
- 92. Nonsuch Clay.

C. Soils of Coastal Plains, Inland Basins and Alluvial Valleys.

C1. Moderately drained soils over sandy and gravelly material (not in Trelawny).

C2. Well drained soils in basins or plains, red or brown subsoils nearly free from mottling (not in Trelawny).

C3. Imperfectly or poorly drained acid soils in basins or on plains with mottled red or brown subsoils.
- 71. Linstead Clay Loam.
- 79. Bundo Clay.
- 207. Brysons Clay Loam.

C4. Poorly drained heavy soils on plains or basins with grey or mottled clay subsoils (non-saline). Old alluvium.
- 60. Gales Valley Shotty Cherty Sandy Clay Loam.
- 160. Gales Valley Cherty Clay.
- 163. Gales Valley Clay.
- 167. Tilston Shotty Clay.

C5. Poorly drained saline heavy soils on plains.
- 28. Frontier Clay.

C6. Well drained or fairly well drained light soils on recent alluvium.
- 15. Cave Valley Clay Loam.

C7. Well drained or fairly well drained heavy soils on recent alluvium.
- 25. Fontabelle Clay.

C8. Poorly drained heavy soils on recent alluvium.
- 13. Rosehall Clay.

C9. Shallow soils over ironstone or other rocklike material (not in Trelawny).

C10. Excessively drained soils on sands.
- 29. Crane Sand.

C11. Very poorly drained organic soils (not in Trelawny).

Soil Identification and Map Compilation

The soil groups and type distinctions described in the previous section were achieved by using all available reference material, studying aerial photographs, stereoscopically and making extensive observations in the field. The field survey data and soil boundaries were transferred by eye from the aerial photographs of approximately 1:12,500 to Land Valuation topographic sheets of the same scale. Soil maps of this scale have been made available for field use to the Government of Jamaica at the Agricultural Chemistry Division, M.A.F. The map for this report has been reduced to the scale of 1:50,000. Some of the mapping of the Central Inlier falling within the Parish of Trelawny has been taken from the field work done by Finch in 1959.

Use of Maps

In the larger scale maps tripartite symbols are used to demarcate an identified area, e.g., 94 B2.

The first part of the symbol is a number which is keyed in the map legend to the name chosen for that soil type, e.g., 94 represents Carron Hall Clay.

The second part of each symbol is a letter designating slope class. Steepness of slope directly affects land-use and also the necessity for certain soil conservation practices. The soil map shows, by using the appropriate slope class symbol, the dominant range of steepness enclosed by a particular boundary line. Class of slope was recorded according to the following scheme:—

A	slopes of gradients	...	...	...	...	0°–2°
B	,,	,,	,,	...	...	2°–5°
C	,,	,,	,,	...	...	5°–10°
D	,,	,,	,,	...	...	10°–20°
E	,,	,,	,,	...	...	20°–30°
F	,,	,,	,,	...	...	Over 30°

This scale is very similar to that used by the Soil Conservation Service of Puerto Rico.

The third part of each symbol decides the stage of soil erosion, judged on the following scale:—

\+ Area of accretion (recent alluvial or colluvial deposit).
0 No apparent accretion or erosion.
1 Slight erosion.
2 Moderate erosion—perhaps 50% of topsoil lost.
3 Severe erosion—all topsoil and some subsoil lost.
4 Very severe erosion—all topsoil and most subsoil lost.
5 Extremely severe erosion — eroding parent material.

A General Description of the Soils of Trelawny

A. Soils on Uplands of Shales, Conglomerates and Igneous Rocks

These soils only occur in the south-eastern part of the parish within the Yellow Limestone and Cretaceous inliers. The Wirefence Clay Loam, Donnington Gravelly Loam and Wild Cane Sandy Loam are light textured soils. They cover steep slopes and hence are easily erodible thus preventing any great degree of profile development. They are highly acid, resting on a parent material of tuffs and conglomerates and are only of moderate fertility. The heavier strongly acid Waitabit Clay, Deepdene Clay and Boghole Clay rest on shales of the Yellow Limestone. The Waitabit Clay occurs on slopes up to 30°, and is the best

drained though easily eroded, the hillsides often slumped. It is a brown clay giving way to yellowish red clay sometimes mottled with grey when close to the parent material. The Deepdene soils are highly mottled red, white and grey in depth, and occur on gentler slopes and therefore imperfectly drained. The Boghole Clay is of limited extent and occurs in hollows, and has a very impeded drainage.

B. Soils of Limestone Uplands

Bonnygate Stony Loam is the most prevalent soil in the parish, occurring widely on the White Limestone plateau particularly in the Cockpit Country. In this area the steep nature of the "Tower Karst" Yellow Limestone merits its inclusion in this soil. Where present it is thin, occupying pockets and crevices, easily erodible and has poor water retention. On all steep slopes the natural vegetation of forest should remain untouched. The well fissured raised beaches with caves and sinks have very little soil, and are more suitable for residential development. On the flanks of hills Union Hill Stony Clay is often developed passing into White Limestone at 1–3 feet. It is a dark brown to olive brown stony clay over yellow brown or orange brown stony clay. This may grade into a mottled light grey/yellow brown with shot. Associated with the Montpelier Limestone, Windsor Stony Clay is an acid deep dark greyish brown clay with many angular pieces of flint and chert. In depth it becomes a reddish yellow clay mottled with light grey. Seawall Stony Clay develops over the coastal coral limestone, is variable in depth, seldom deeper than 2 ft. Its dry location and shallowness makes it too dry for cultivation without irrigation, and in any case it is of limited extent.

In small basins and hollows within the White Limestone Formation Lucky Hill Clay Loam is developed. This is an important soil in Trelawny. It is a dark brown clay loam having a good structure over a paler compact stiff clay which may be very deep. Small shot are common in the top soil. It may grade laterally into Newell Clay Loam in a larger basin or into Chudleigh Clay Loam when the texture becomes more friable. St. Ann Clay Loam, the red bauxite soil, occurs mainly in the Dry Harbour Mountains on the White Limestone though is never present on the Montpelier Limestone. It is widely cultivated in food crops, particular attention being required to offset its phosphate deficiency. Chudleigh Clay Loam, the brown bauxite soil, has no such problem. It appears to occur in lower elevations than the St. Ann Clay Loam, and in definite zones. It is important to conserve the topsoil of both these bauxitic soils which have a rapid internal drainage.

Killancholly Clay is a thin alkaline "rendzina" soil, a well structured very dark clay sometimes grading into a brownish yellow gravelly loam at 6 inches passing into Yellow Limestone, or rubbly White Limestone when the yellowish clay is usually missing. It occurs mainly fringing the Central Inlier in the south-east and south of the parish. As previously mentioned the Yellow Limestone may be eroded into "Tower Karst" but is usually found on rounded steep hills, best kept in pasture or planted in tree crops.

Nonsuch Clay is a slightly acid soil occurring on gentle slopes, is a poorly drained black clay over soft rubbly limestone, or derived from an admixture of Yellow and White Limestone.

Carron Hall Clay is a brown clay with good structure over a plastic yellow brown clay formed over Yellow Limestone. In this parish it is a popular banana growing soil of slow to moderate internal drainage, slightly alkaline but increasingly so in depth. Where thin the presence of free lime near the surface restricts the choice of crop.

Dunn's River Sandy Clay Loam is of limited extent and found here on flanks of hills where there is drainage from water that has travelled within the limestone.

C. Soils of the Coastal Plains, Interior Basins and Alluvial Valleys

Linstead Clay Loam, Bundo Clay and Brysons Clay Loam are acid, shotty soils present in many of the interior basins. Brysons Clay Loam is probably a mixture of alluvium and colluvial material from the White Limestone hills. In depth it shows impedence depending on the degree of drainage and season. The surface dries out very quickly especially when on B and C slopes. It resembles Bundo Clay which is more of a colluvial soil, and it is often difficult to differentiate between them in the field. Bundo Clay is frequently associated with the better drained Lucky Hill Clay Loam, and similarly Brysons Clay Loam is associated with Newell Clay Loam. Lucky Hill Clay Loam, Newell Clay Loam and Tilston Shotty Clay appear to occur in a catena.

Tilston Shotty Clay, Gales Valley Clay, Gales Valley Cherty Clay, Gales Valley Shotty Cherty Sandy Clay Loam are all acid soils occurring in the large polje of the Queen of Spains Valley. In depth they all show signs of impedence, grey brown, red or black mottling in various combinations. Aggregates of iron and manganese shot are sporadically found up to 1 foot in diameter. The flints and chert are obviously derived from the Montpelier limestone. These soils are the product of the degradation of the White and Yellow Limestone Formation with their included beds of shales and flagstones. Remnants of the limestones appear as low hillocks associated with sinks. Drainage is the main problem. Newell Loam is a deeper version of Lucky Hill Clay Loam and occurs in the larger basins. It is a dark yellow brown loam to clay loam with good structure, overlying yellow brown clay derived from limestone. Shot occurs in abundance. It gives a slight to medium acid reaction.

Small areas of free draining Crane Sand and gleyed Frontier Clay occur on the coast. The reclaimed mangrove swamp will probably develop into the latter. Along the few river valleys, e.g., Rio Bueno, Martha Brae and Hectors River, Fontabelle Clay and Cave Valley Clay Loam are fertile, deep, slightly alkaline soils with high moisture retention and moderate to good drainage. Rosehall Clay is found mainly along some parts of the Martha Brae River and is a recent alluvial and colluvial soil derived from inland basin soils. It is usually mottled, has few small shot and very poor drainage.

The characteristics of the soils of Trelawny, which are primarily of agricultural importance, are given in tabulated form in Appendix A of this report. The soils are listed in alphabetical order. Approximate acreages are given in Appendix B, while profile descriptions are given in Appendix C.

Miscellaneous Land Types

Urban area, Mangrove Swamp and River Wash are self-explanatory terms. The "Limestone Rubble Land,"

with 90% of limestone and flint boulders, can vary from 1 to 6 feet in thickness having been deposited as outwash fans during times of heavy floods.

Land Capability

Soil surveys are primarily to provide fundamental information about the land surveyed, the nature of the soils, slope classes and erosion status, and a soil map pictorially records these facts within the area surveyed. With this information, additional knowledge of the climate, and a thorough knowledge of the local agriculture, we can integrate our data into a classification of any type of land according to the capability for use in producing crops, forage plants, tree crops and forest trees.

We recognise seven broad land capability classes based on assessments of overall suitability for use, including the risk of soil erosion or other damage and the difficulties of management. These capability classes are summarised in the following chart:—

The Most Intensive Suitable Uses for Land in Each Land Capability Class

Land Capability Class	*Most Intensive Suitable Use*
I A and B slopes of good soils	Suitable for cultivation (tillage) with no limitations.
II Mainly C slopes of good soils	Suitable for cultivation (tillage) with moderate limitations.
III Mainly D slopes, some gentler slopes of less favourable soils	Suitable for cultivation (tillage) with strong limitations.
IV Mainly E slope, some D slopes	Suitable for tree crops, grasses and very limited cultivation.
V Mainly E and F slopes ...	Not suitable for cultivation, but suitable for planted forest, tree crops or improved grass.
VI Mainly steep rocky land or dry climate	Not suitable for cultivation, suitable for poor forest.
VII Rock, outcrops, riverwash, etc.	Little or no productive use.

A broad grouping of the land in this manner into seven land capability classes is useful for some purposes such as determining a country's available arable acreages. It is not, however, adequate for specific land management recommendations. Between the extreme generalisation into seven broad land classes and the extreme detail of the soil survey, certain intermediate groupings are necessary in order to compile a complete land capability classification.

Slope class in many cases, is the primary factor in determining land capability but in order to allow for the other factors revealed by the detailed soil survey further subdivision is necessary within each land capability class. Four principal limiting factors are counted significant in this respect and they are shown by a small letter following the land capability numeral: "e" if the principal limiting factor is slope and erosion risk; "w" if it is excess water in the soil, seasonally or otherwise, giving poor natural drainage; "s" if it is a soil factor, implying usually shallow or droughty soil; and "c" for the climate factors in Jamaica principally a combination of low annual rainfall and a long dry season. For the parish of Trelawny we then obtain the following complete set of Land Capability Classes:—

Land Capability Classes

I. Level with a deep fertile soil with no factors limiting the use for agriculture.

IIe. Land suitable for cultivation with moderate limitations. The risk of erosion is the chief factor limiting its use.

IIw. Land suitable for cultivation with moderate limitations. Naturally wet land on which drainage is the main factor limiting its use.

IIs. Land suitable for cultivation with moderate limitations. Soil fertility or some other factor is the main limitation to its use.

IIIe. Land suitable for cultivation with strong limitations. Must be cultivated carefully to prevent erosion of the soil. Rotational strip cropping is advised for this land.

IIIw. Land suitable for cultivation with strong limitations. Naturally wet land needing much attention to drainage. Contour drains are necessary to remove water and prevent erosion of the soil.

IIIs. Land suitable for cultivation with strong limitations imposed by adverse soil factors.

IVe. Land marginal for cultivation due to extreme danger of erosion. Improved grassland, or tree crops should be established on this land. Some cultivation with extreme precautions.

Ve. Land not suitable for cultivation, steeply sloping with extreme danger of erosion. Tree crops, food or forest trees should be established on this land.

Vs. Land not suitable for cultivation due to adverse soil factors. Usually steep land that should be used for forest or food trees.

VIs. Land not suitable for cultivation. Thin rocky soils on steeply sloping land that should never be cleared of its natural vegetation.

VIc. Land not suitable for cultivation due to combination of adverse factors usually dominated by dry climate. Should never be cleared of its natural vegetation.

VII. Rock outcrops, riverwash, etc., of little or no productive use.

At this stage it is possible to superimpose the system of Land Capability Classes on to the detailed Soil Classification developed in the ground survey. Thereby the detailed facts of the soil survey are arranged into a form for easy reference and direct translation into practical application. The data for Trelawny organised in this way are presented in the following table:—

Land Capability Classification of the Soil Groups and Slope Classes

Soil Group	*Slope Class*					
	A	B	C	D	E	F
Soils on Shale, conglomerates or igneous rocks:						
A1. Thin well drained soils on weathered conglomerates or igneous rocks	—	—	IIe	IIIe	IVe	Ve
A4. Imperfectly or poorly drained soils with mottled subsoils on shales and conglomerates	IIw	IIw	IIe	IIIe	IVe	—
A6. Sandy excessively drained soils on sandstones ...	—	—	IIIe	IVe	Ve	Ve
A7. Clay soils on deeply weathered tuffs and conglomerates	—	IIs	IIIe	IVe	Ve	Ve
Soils on limestone:						
B1. Red Bauxite	IIIs	IIIs	IIIe	IIIe	IVe	Ve
B2. Brown Bauxite...	IIs	IIs	IIe	IIIe	IVe	Ve
B3. Moderately deep brown soils on limestone	—	IIw	IIe	IIIe	IVe	Ve
B4. Thin brown or reddish soils on hard limestone ...	IVs	IVs	Vs	Vs	Vs	VIs
B5. Thin dark soils on soft limestone	IIs	IIw	IIe	IIIe	Ve	Ve
B6. Thin soils on coral limestone, too shallow or too dry for cultivation	IIe	IIe	—	—	—	—
B7. Dark imperfectly drained soils on soft or rubbly limestones	IIw	IIw	IIe	IIIe	—	—
Soils of coastal plains, inland basins and alluvial valleys:						
C3. Imperfectly drained soils in basins	IIw	IIw	IIe	—	—	—
C4. Poorly drained heavy soils on plains or basins with grey or mottled clay subsoils	IIIw	IIIw	IIIw	—	—	—
C5. Poorly drained saline clay	IIIw	IIIw	IIIw	—	—	—
C6. Well drained light soils on recent alluvium... ...	I	I	IIe	—	—	—
C7. Well drained heavy soils on recent alluvium ...	I	I	IIe	—	—	—
C8. Poorly drained heavy soils on recent alluvium ...	IIIw	IIIw	IIIw	IIIe	—	—
C10. Excessively drained soil on sands	IIIs	IIIs	IIIs	—	—	—
Miscellaneous Lands:						
Swamp, urban land, limestone rubble land, etc.	VII	VII	VII	VII	VII	VII

Soil Classes not mentioned do not occur in Trelawny.

PART III

RECOMMENDATIONS

Interpretation of Soil Profiles and Environmental Factors—A Land Capability Programme for Optimum Land-Use

Misuse of land in the past has arisen from inappreciation of the importance of many factors which we now understand more fully. Correction of damage to the land incurred during this period of misuse is, however, not attained quickly. There must follow a period of progressive replenishment of losses over, what may be in cases of extreme misuse, a very lengthy interval. When starting a programme of land regeneration sound technical advice and direction is essential and is best obtained from a systematic study of the area considered. From this study the critical problems of the area are precisely defined and sensible answers to them recommended. An administration established to initiate and foster rural improvement requires such a foundation on which to base its policy of improvement. The ultimate goal can then be appreciated and confidence is established that the end is a justifiable and worthy achievement.

In the earlier sections of this report we have described those salient features of environment in Trelawny which have an influence on soil development and soil behaviour. From this foundation, we differentiated the main soils on the basis of profile, slope and erosion characteristics, using these characters to assess the capabilities of these soils for sustained productivity. Our final contribution must then be to recommend soil management practices which encourage fullest expression of the soil capabilities.

In this report the following tables are self-explanatory.

The details incorporated in these tables are conveniently summarised according to those regions which are defined by physiographic boundaries.

(1) *The Coastal Plain and Alluvial Areas of River Flood Plains.* The droughty coastal plain with its skeletal soils is of little agricultural use except for a small area at Braco, and is best used for housing or resort development. The mangrove swamps are being reclaimed as at New Falmouth. Salt ponds fluctuate in size according to season and are not put to commercial use. Alluvial areas of river flood plains are fertile, though flooding has to be taken into consideration in the management of the soils.

(2) *The Foothills.* These are relatively steep and dry, and where rocky are best left in woodland and fruit trees, or put into pasture where the slopes are not too steep.

(3) *Zone of Hills and Poljes of the Montpelier Limestone.* The rounded hills with scanty alkaline soils and much exposed rock are not suitable for tree crops on a commercial scale. Sisal is being cultivated experimentally and there is some pasture. The poljes are almost exclusively devoted to the cultivation of sugar-cane. Any change of crop must take into consideration the special conditions relating to these soils as described under the section on Relief and Drainage.

(4) *The White Limestone Plateau.* On the predominantly steep rocky mountainsides an effort must be made to reduce cultivation to a minimum. Cultivation of the bauxite soils should be restricted to moderately sloping land and strict conservation methods practised. On moderately sloping lands improved pasture, coffee and food trees seem to be the best form of land-use, crops such as yam and corn requiring heavy tillage being reserved for the more level areas. The Cockpit area of almost bare steep limestone slopes should be strictly left covered by heavy natural forest, as it is not feasible to plant it in stands of timber trees.

(5) *The Central Inlier.* Fortunately most of this area is under the direction of the Christiana Area Land Authority which was set up to rehabilitate this highly erodible area, and at the same time direct the management of the steep slopes. The tuffaceous shales are subject to slumping. This management must be maintained and developed if the area is not to revert to its previous state.

Suggested Improvements in Land-Use in the Parish

Every effort should be made to assist farmers in the selection of crops, the management of soils and problems of tillage, especially during the establishment of new Land Settlements. Farmers resettled from bauxite areas are frequently unfamiliar with the handling of heavy soils, their fertiliser requirements, etc., and find it hard to break away from their traditional methods of farming and need appropriate guidance. Consideration could be given to the zoning of similar soils occurring in areas of the same elevation and climatic conditions with a view to resolving common problems. Extension work would be simpler and fertilisers selected relating to the requirements of the soil could be made readily available to the farmer. Marketing of produce, availability of a common pool of machinery could lead to a certain measure of co-operative farming which would benefit the working of a number of small farms as a diversified economic unit. Rotation of

TABLE D

Recommended Crops for Soils

Soil Type	*Cane*	*Bananas*	*Food Crops*	*Vegetables*	*Improved Pasture*	*Tobacco*	*Pineapple*	*Citrus*	*Coconut*	*Coffee*	*Cocoa*	*Food Trees*	*Timber or Farm Woodlands*	*Natural Forest*	*Rice*
13	xx	—	x	x	x	—	—	—	—	—	—	x	—	xx	x
15	xx	xx	xx	xx	x	xx	—	xx	xx	x	—	—	—	—	—
29	—	—	—	—	—	—	—	—	xx	—	—	—	—	—	—
25	xx	xx	xx	xx	xx	—	—	—	xx	—	—	x	—	—	—
28	x	—	x	—	xx	—	—	—	xx	—	—	—	—	—	—
79, 98	xx	—	x	x	xx	—	—	x	—	x	—	x	—	—	—
61	x	—	x	—	xx	—	xx	xx	—	xx	x	xx	—	—	—
207	xx	—	x	—	xx	—	—	xx	—	—	xx	x	—	—	—
92	xx	—	x	x	xx	—	—	—	—	—	x	x	—	—	—
91, 291	x	—	x	—	xx	—	—	—	—	—	—	x	x	x	—
77	—	—	—	—	x	—	—	—	—	x	—	x	xx	xx	—
75, 84	x	—	x	—	xx	—	—	x	—	x	—	xx	x	x	—
74	xx	x	x	xx	xx	—	x	—	x	—	—	—	—	—	—
73, 78	—	—	x	xx	xx	—	x	xx	—	x	—	x	x	—	—
95, 32	xx	xx	xx	x	xx	—	x	x	—	xx	x	xx	x	—	—
96	x	—	x	—	x	—	—	—	—	xx	—	xx	x	—	—
99	x	—	x	—	xx	—	—	—	—	—	x	—	—	—	xx
36	x	—	x	—	xx	—	x	x	x	xx	xx	xx	x	—	—
67	xx	—	x	xx	xx	x	—	x	—	x	—	x	—	—	—
80	x	—	x	x	xx	—	—	—	x	—	—	x	—	—	—
60, 160	xx	—	x	—	x	—	—	x	x	—	x	x	—	—	—
94	xx	xx	x	x	xx	—	—	—	—	x	—	x	x	—	—
163, 167	xx	—	x	x	xx	—	—	xx	—	—	—	—	—	—	x

xx Highly suitable. x Suitable. — Not suitable.

crop patterns could usefully be worked out within the zone and experimental and demonstration plots established.

The potential of well water available for irrigation in the Queen of Spains Valley should be exploited as soon as feasible. Useful research could be undertaken to attempt to eradicate "Piano Grass" which is rapidly spreading.

The value of community centres for the social, educational and recreational benefit of farmers would reduce isolation and stimulate interest in rural life. The building of technical schools will develop skills which it is hoped will aid in promoting a more scientific approach to farming and perhaps stimulate the introduction of subsidiary industries.

Recommended Cultivation Practices

Soil Group and Soil Types	*Slope Categories*					
	A	B	C	D	E	F
A1. 36	—	—	P ND Ch	P S/2 ND Ch	P S/3 ND V	P T ND
A4. 98, 99	P D/1 Ch	P D/1 Ch	P D/1 Ch B V	P S/2 Ch V	P S/3 ND V	—
A6. 96	—	—	P S/2 ND Ch B V	P S/3 ND V	P T ND	P T ND
A7. 32, 95	P D/1 Ch B	P D/1 Ch B	P S/2 ND Ch B V	P S/3 ND V	P T ND	P T ND
B1. 78	P ND B	P ND Ch B	P S/2 ND Ch B V	P S/2 ND B V W	P S/3 ND V W	P T ND
B2. 73	P ND B	P ND B	P ND Ch B	P S/2 ND V W	P S/3 ND V W	P T ND
B3. 74, 75, 94, 84	P D/1 Ch	P D/1 Ch	P D Ch	P S/2 D Ch V W	P S/2 D V W	P T ND
B4. 77	P T ND	P T ND	P T ND	P T ND	F	F
B5. 91, 291	—	P ND Ch	P S/2 ND Ch V	P S/2 ND Ch V	P S/3 ND Ch W	P T ND
B6. 80	—	—	—	—	—	—
B7. 92	P D/2 Ch	P D/2 Ch	P D/2 Ch	P S/2 D/2 Ch V	—	—
C3. 79, 61, 207	P D/1 Ch	P D/1 Ch	P D/1 Ch V	P S/2 D/1	—	—
C4. 60, 160, 163, 167	P D/2 Ch	P D/2 Ch	P D/2 Ch	P S/2 D/2 Ch V	—	—
C5. 28	P D/2 Ch	P D/2 Ch	P D/2 Ch	—	—	—
C6. 15	P ND Ch B	P ND Ch B	P ND Ch B	—	—	—
C7. 25	P D/1 Ch	P D/1 Ch	P D/1 Ch	—	—	—
C8. 13	P D/1 Ch B	P D/1 Ch B V	P S/2 D/1 Ch B V	—	—	—
C10. 29...	—	—	—	—	—	—

References

F=Forest.
P=Contour Planting.
D/1=Contour Drains.
D/2=Graded Drains.
Ch=Diversion Channels.
T=Tree Crops (no cultivation).
W=Stone Walls.
B=Earth Bunds.
V=Vegetative Barriers.
S/2=Strip cropping, 1 strip in crop and 1 strip in cover.
S/3=Strip cropping, 1 strip in crop and 2 strips in cover.
ND=No Drains.

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APPENDIX A

Soils of Trelawny. Some Important Characteristics

Map Symbol	*Soil*	*Dominant Slope Range*	*Drainage Through Soil*	*Any High Water Table*	*Moisture Supplying Capacity*	*Layer, if any, Limiting root Penetration*	*Erosion Hazard*	*Natural Fertility*	*Any Special Soil Management Problem*
99	Boghole Clay	0–5°	Very slow	At 6″ in the wet season	High	Watertable or impeded layer at 6–10″	Almost none	Low to medium. Highly acidic	Internal and external drainage.
77	Bonnygate Stony Loam	All slopes but mainly over 20°	Extremely rapid	—	Very low	Bedrock at from 1–12″	Very great if cultivated	Medium	Extreme shallowness and stoniness. Steepness and erodibility.
207	Brysons Clay Loam	0–5°	Rapid to variable depth, then slow	—	Fair to low	—	Very slight	—	In arid area.
79	Bundo Clay	0–5°	Very slow	Impedence to near the surface in wet season	High	Impeded layer at 6–9″ of compact acid subsoil	Very slight	Moderate with very low phosphate. Highly acidic	Internal and external drainage. High acidity.
94	Carron Hall Clay	5–30°	Moderate but slow in subsoil	—	High	Bedrock at 18–48″	Moderate to slight	Very high to high. Medium to low phosphate. Slightly alkaline increasing with depth	Content of stones, where present. May be shallow to bedrock. Excess water disposal.
15	Cave Valley Clay Loam	0–5°	Good	—	High	—	Very slight	High. Slightly acidic	Occasional drainage problems due to flooding.
29	Crane Sand	0–20°	Extremely rapid	—	Very poor	—	Very slight	Very low	Low fertility. Preservation of humus, poor moisture retentivity.
73	Chudleigh Clay Loam	None	Very rapid	—	Low to very good	—	Moderate	Medium to low	Low fertility. Preservation of topsoil.
98	Deepdene Clay	2–10°	Very slow	—	High	Impeded layer from 6–10″	Moderate	Medium to low. Highly acidic	Drainage impedence. Acidity.
36	Donnington Gravelly Loam	2–10°	Extremely rapid to rapid	—	Fair	Shattered bedrock at 12–36″	High	Medium. Acidic	Shallowness, steepness, erodibility.
291	Dunn's River Sandy Clay Loam	2–10°	Rapid	—	Fair	Highly alkaline subsoil or parent material at 12–18″	Moderate to high	Medium. Alkaline	Shallowness over highly alkaline parent material.
25	Fontabelle Clay Loam	0–2°	Moderate	—	High	—	Almost none	Medium to high alkaline	Maintenance of structure.
28	Frontier Clay	0–2°	Almost none	Fluctuates between 10″ and surface	High	Saline water table	Almost none	Medium. Acidic	Internal and external drainage. Salinity.
160	Gales Valley Cherty Clay	5–10°	Moderately rapid to moderately slow at 24″	Fluctuates according to season	Moderate	May reach bedrock at 24″	Slight	Medium to low acidic	Stoniness, drainage, acidity. May be shallow.
163	Gales Valley Clay	0–2°	Slow	Fluctuates according to season	High	Impeded layer at 9–12″ of acid subsoil	Slight	Highly acidic	Internal and external drainage, acidity.
60	Gales Valley Shotty, Cherty Sandy Clay Loam	5–10°	Moderately rapid to moderately slow	Fluctuates according to season	Moderate	Impedence at 12″ acid subsoil	Slight	Medium to low, acidic	Stoniness, drainage, acidity.
91	Killancholly Clay	10–30°	Rapid	—	Fair	Highly alkaline subsoil or parent material at 12–18″	Moderate	Medium, alkaline	Shallowness over highly alkaline parent material, erodibility.
61	Linstead Clay Loam	5–10°	Very slow in subsoil	—	Fair	Compact impeded subsoil	Moderate	Low to medium low. Highly acidic	Safe removal of excess water, erosion control.
74	Lucky Hill Clay Loam	0–5°	Very slow in subsoil	—	Fair to high	Compact clay subsoil at 8–15″	Very slight	Medium high. Slightly acidic	Drainage in compact subsoil.
92	Nonsuch Clay	2–10°	Slow	—	High	At 12″ where subsoil is slow draining	Slight	Fairly high, slightly to markedly acidic	Drainage. Alkalinity of subsoil.
13	Rosehall Clay	0–2°	Very slow	Often in rainy season at 12–36″	High	Impeded clay subsoil or rainy season water table	Almost nil	Low, acidic	Drainage.
80	Seawell Stony Clay	2–10°	Rapid to moderate	—	Low to fair	Bedrock at 8–18″	Slight	Low, acidic	Shallowness, droughtiness, and subject to sea winds.

APPENDIX A (continued)

Map Symbol	*Soil*	*Dominant Slope Range*	*Drainage Through Soil*	*Any High Water Table*	*Moisture Supplying Capacity*	*Layer, if any, Limiting root Penetration*	*Erosion Hazard*	*Natural Fertility*	*Any Special Soil Management Problem*
78	St. Ann Clay Loam	None	Extremely rapid	—	Low to very low	Bedrock if shallow or in stony phase	Moderate to high	Low. Acidic	Low fertility. Preservation of topsoil. Poor water retention. Phosphate fixation.
167	Tilston Shotty Clay	0–5°	Very slow in subsoil	Fluctuates according to season	High	Impeded clay subsoil or rainy season water table	Slight	Low. Acidic	Internal and external drainage, acidity.
75	Union Hill Stony Clay	10–30°	Rapid to moderate	—	High to fair	Bedrock often 12–20″	Moderate to slight	Medium. Neutral to alkaline below	Stoniness, and often steepness.
95	Waitabit Clay	5–30°	Rapid	—	Moderate	—	High	Low. Very acidic	Steep slopes. Erodible subsoil.
96	Wild Cane Sandy Loam	10–30°	Extremely rapid	—	Poor	Parent material at 12–18″	Very high	Low to very low. Acidic	Shallow, steep. Erodible.
84	Windsor Stony Clay	10–30°	Moderate	—	Good	—	Moderate	Medium to low. Highly acidic	Steepness, stoniness, acidity.
32	Wirefence Clay Loam	5–30°	Moderate	—	Fair	Very acid subsoil	High	Low. Very highly acidic	Drainage. Erodible subsoil.

APPENDIX B

TABLE 1

Approximate acreages* of Soils of Trelawny

Soil	*Acres*
Boghole Clay	133
Bonny Gate Stony Loam	135,552
Brysons Clay Loam	1,372
Bundo Clay	3,366
Carron Hall Clay	4,735
Cave Valley Clay Loam	2,925
Crane Sand	59
Chudleigh Clay Loam	8,240
Deepdene Clay	110
Donnington Gravelly Loam	1,217
Dunn's River Sandy Clay Loam	26
Fontabelle Clay Loam	173
Frontier Clay	102
Gales Valley Cherty Clay	253
Gales Valley Clay	599
Gales Valley Shotty Cherty Sandy Clay Loam	68
Killancholly Clay	5,796
Linstead Clay Loam	2,211
Lucky Hill Clay Loam	24,326
Newell Loam	3,445
Nonsuch Clay	170
Rosehall Clay	293
Seawall Stony Clay	316
St. Ann Clay Loam	17,356
Tilston Shotty Clay	890
Union Hill Stony Clay	70
Waitabit Clay	5,584
Wild Cane Sandy Loam	19
Windsor Stony Clay	86
Wirefence Clay Loam	2,817

TABLE 2

Approximate acreages* of Slope Categories in Trelawny

Slope	*Acres*
A	4,085
B	23,790
C	36,868
D	33,720
E	36,496
F	84,626
Miscellaneous Land	4,908

* Acreages planimetrically computed from 1 : 12,500 Land Valuation Sheets.

TABLE 3

Approximate acreages* of Land Capability Classes in Trelawny

Classes of Land	*Acres*
I	432.5
II	41,659.0
III	25,956.5
IV	11,293.0
V	39,521.0
VI	107,202.5

* Acreages planimetrically computed from 1 : 12,500 Land Valuation Sheets.

APPENDIX C

Soil Profile Descriptions

The 4 new soils described are from the Queen of Spains Valley and the pit details taken from Baker's report (1967). Descriptions of the other soils occurring within the parish can be found in Soil and Land-Use Surveys Nos. 7, 8, 10, 11, 14, 24, dealing with Clarendon, St. James, St. Mary, St. Catherine, St. Elizabeth, and St. Ann, respectively, and also the Soil Report of the Christiana Land Authority.

Map Symbol 60

Soil Type	Gales Valley Shotty Cherty Sandy Clay Loam.
Location	Chambers Piece No. 1, Hampden Estates.
Parent Material	Inland Basin deposits, associated with Montpelier Limestone.
Topography	Gently sloping.
Moisture	Moist.
Erosion	1.
Vegetation or Crop	Sugar cane.
Physiography	Alluvial Plain.
Drainage	Moderately rapid surface, to moderately slow below.
Stoniness	1.
Permeability	Moderately slow.

Sample Depth	
0–10″	10YR 4/4 (moist), dark yellowish-brown ; Texture : CL ; Structure : F2SBK ; Consistence : ML ; abundant irregular and rounded shot and coarse chert fragments. No free lime throughout profile.
10–18″	10YR 5/6, yellowish-brown ; Texture : C ; Structure : F2SBK ; Consistence : ML ; abundant shot.
18–44″	7·5YR 5/8, strong brown mottled with 2·5YR 2/0, black and 5YR 4/6, yellowish-red ; abundant shot. Texture : C ; Structure : F2ABK ; Consistence : MFR.
44–56″ +	10R 4/8, red intermottled with 7·5YR 6/8, reddish-yellow and 10YR 7/1, light grey ; abundant shot. Texture : C ; Structure : MABK ; Consistence : MFR.

Map Symbol		
160	*Soil Type*	Gales Valley Cherty Clay.
	Location	250 yards west of pond at Wakefield.
	Parent Material	Inland Basin deposits associated with Montpelier Limestone.
	Topography	Gently sloping.
	Moisture	Moist throughout.
	Erosion	1.
	Vegetation or Crop	Sugar cane.
	Physiography	Hillside benches and foot-slopes.
	Drainage	Medium.
	Stoniness	1.
	Permeability	Moderately rapid grading to moderately slow below 27″.

Sample Depth	
0–9″	10YR 4/4, dark yellowish-brown ; Texture : C or CL ; Structure : F2SBK ; Consistence : ML ; some hard shot. Coarse chert throughout profile but no free lime.
9–15″	10YR 5/8, yellowish-brown with faint red mottles and and fewer shot. Texture : C ; Structure : F2SBK ; Consistence : NVFR.
15–27″	10R 4/6, red with faint intermottles of 10YR 4/6 dark yellowish-brown. Texture : C ; Structure : F2SBK ; Consistence : MFR ; few shot.
27–54″ +	7·5R 3/8, dark red intermottled with 10YR 8/1, white, macro-reticulate. Texture : C ; Structure : F2ABK; Consistence : MFR.

Map Symbol		
163	*Soil Type*	Gales Valley Clay.
	Location	500 yards West of Gales Valley Cross Roads.
	Parent Material	Inland Basin deposits associated with the White Limestone Formation.
	Relief	Flat.
	Moisture	Moist throughout.
	Erosion	0.
	Vegetation or Crop	Sugar cane.
	Physiography	Flat of Inland Basin and head of valleys.
	Drainage	Poor.
	Stoniness	0.
	Permeability	Moderately slow to slow.

Sample Depth	
0–18″	10YR 3/2, very dark grey-brown ; Texture : C ; Structure : F2SBK ; Consistence : MVF ; few large and small shot. No free lime throughout.
18–30″	Intermottle of 10YR 5/6, yellow-brown with 10YR 3/2 dark grey-brown, with 10R 4/8 red. Shot less than above.
30–36″	7·5YR 5/6, mottled with 7·5YR 7/1 light grey, and 7·5R 3/8 dark red.
36–66″	10YR 7/1, white, mottled with 7·5YR 7/1 light grey, and 7·5R 3/8 dark red.

Map Symbol		
167	*Soil Type*	Tilston Shotty Clay.
	Location	600 yards South-west along the road from Tilston house to Gales Valley.
	Parent Material	Inland Basin deposit associated with the White Limestone Formation.
	Topography	Very gentle slopes.
	Moisture	Moist throughout.
	Erosion	1.
	Vegetation or Crop	Sugar cane.
	Physiography	Usually on A or B slopes on the downside of Newell Clay Loam or Lucky Hill Clay Loam.
	Drainage	Slow.
	Stoniness	0.
	Permeability	Moderate to slow in depth.

Sample Depth	
0–11″	10YR 3/2 very dark grey-brown ; Texture : C ; Structure : VF2SBK ; Consistence : MFR ; abundant shot.
11–30″	10YR 5/6 yellowish-brown intermottled with 10YR 6/2 light brownish-grey, and few faint reddish mottles. Texture : C ; Structure : MISBK ; Consistence : MFL ; some small rounded hard shot.
30–48″	7·5YR 3/2 dark brown and 2·5Y 7/2 light grey with lesser amounts of 10YR 2/1 black and 2·5YR 4/6 red. Small hard shot. Texture : C ; Structure : CIPR ; Consistence : WP.

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SOIL MAP
TRELAWNY JAMAICA

Scale: 1/50,000

1 0 1 2 3

REFERENCE

- Permanent Rivers or Streams
- Intermittent Streams
- Ponds
- Roads
- 25 Soil Type Number and Boundary

SOILS OVER RECENT ALLUVIA

- 13 Rosehall Clay
- 15 Cave Valley Clay Loam
- 25 Fontabelle Clay Loam
- 28 Frontier Clay
- 29 Crane Sand

SOILS OF COASTAL PLAINS INLAND BASINS AND ALLUVIAL VALLEYS

- 60 Gales Valley Shotty Cherty Sandy Clay Loam
- 61 Linstead Clay Loam
- 67 Newell Loam
- 160 Gales Valley Cherty Clay
- 163 Gales Valley Clay
- 167 Tilston Shotty Clay
- 207 Brysons Clay Loam

SOILS OVER CONGLOMERATES TUFFS TUFFACEOUS SHALES AND NON CALCAREOUS SHALES

- 32 Wirefence Clay Loam
- 36 Donnington Gravelly Loam
- 95 Waitabit Clay
- 86 Wild Cane Sandy Loam
- 98 Deepdene Clay
- 99 Boghole Clay

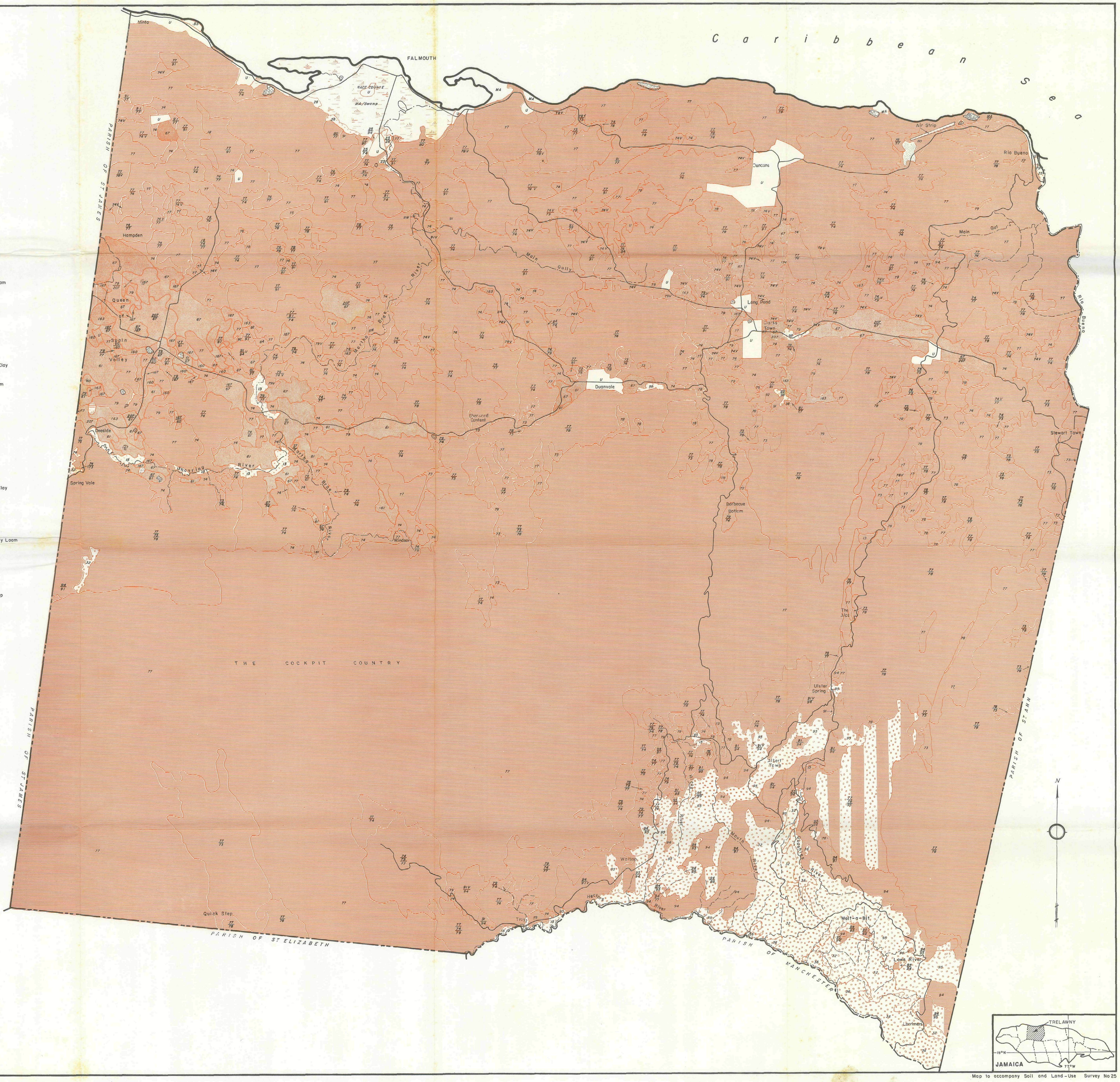
SOILS OVER LIMESTONE OR LIMESTONE COLLUVIA

- 73 Chudleigh Clay Loam
- 74 Lucky Hill Clay Loam
- 75 Union Hill Stony Clay
- 77 Bonny Gate Stony Loam
- 78 St. Ann Clay Loam
- 79 Bundo Clay
- 80 Seawall Stony Clay
- 84 Windsor Stony Clay
- 91 Killancholly Clay
- 92 Nonsuch Clay
- 94 Carron Hall Clay
- 291 Dunn's River Sandy Clay Loam

MISCELLANEOUS LAND TYPES

- Limestone Rubble Land
- U Urban Area
- RW River Wash
- Swamp
- BS Beach Sand
- MA Mangrove Swamp

Note: V indicates stony phase of Soil Type



Compiled and drawn by Soil Survey and Research Department, Regional Research Centre, University of the West Indies, (I.C.T.A.) Trinidad, W.I. December, 1970.

Map to accompany Soil and Land-Use Survey No 25