# SOIL SURVEY OF EAST KIRUP PINE PLANTATION

1936.

### Area.

The subject area consists of six blocks immediately north, north west and north east of the East Kirup mill site. The total area is approximately 1600 acres - stretched out in a U shape along the yalleys of two streams, which run south and join near the base of the U.

Blocks A and D have been planted with conifers.

Blocks A.D.F. and part of E. were surveyed.

# Physiographic Features.

East Kirup is situated on the laterite peneplain at an elevation of about 800 to 1,000 feet. It is about ten miles north east of the fault line, which constitutes the northern side of the great SouthWest Rift Valley.

In this region the streams are slow moving and valleys are not very steep; as they have not yet been subjected to the rejuvenation, consequent upon the fault, like the Balingup River. The streams, with a few exceptions, are dry in the summer.

The subject area is situated in the valley of such a stream as this. In spite, however, of the slowness of downward erosion, it has been sufficient to cut through the laterite capping and to expose the underlying granitic parent rock.

# Geology.

Beneath the Tertiary (probably Miocene) laterites are Pre-Cambrian granitic rocks of plutonic origin. True basic intrusions do not occur on the area. Basic segregations, however, are common within the granite. The granite varies considerably from very acid rock to very basic granite, or basic rock. These types grade one into the other. This is characterictic of basic segregations, since they owe their origin to differentiation of basic and acid constituents during the cooling of the molten magma.

Gneissic structure is common.

The soil types of the area may be divided into the following four main groups:- the granitic, basic, lateritic and the alluvial.

### 1. GRANITIC GROUP.

Actual granite outcrops do not occur commonly on the area, except on the lower slopes of block D. Granitic soil types, however, occupy a considerable portion of the total subject area.

The group contains three main types. They occur usually on mid-slopes being intermediate between the laterite capping and the alluvial types (when they occur) along the streams below. Basic types are erratic in their distribution but occur usually haphazard within the granitic types.

### Type 1A.

This is not a very important type, since it occurs commonly only on blocks A and D, and even there it has not a wide range. It might possibly be better classed as a rocky phase of 1B since it characteristically runs to impenetrable granite rock, but the overlying profile is usually lighter in texture. A deep phase does occur, but it is rare.

Typical Profile	-	
Dark Brown	1"	Sandy loam, and O.M.
Light Brown	24"	light sandy loam, stoney- granite fragments and boulders.
Rsh. Yel/Yel.	30"	sandy clay loam: gritty.
	30"+	Granite rock - impenetrable.

### Type 1B.

This is the common granite type for the area. It is characteristically a mid-slope type. It is important since it includes the bulk of the plantable land on the area. The basic types may be better planting types, but they do not occupy such a large area, while, although some of the laterite types may be plantable, they are of doubtful value for the establishment of conifers: consequently type 1B remains as one of the most importan of the plantable types.

The type includes several phases. In addition to those listed there is also a very micacious phase, but it is rare.

Typical Profile.		
Dark Brown	211	Sandy loam, and O.M.
Light/Yel-Brown	20"	Light sandy loam, occasional gravel.
Yel-Brown/Brown -Yel.	29"	clay loam, very gritty with bits of quartz.
Yel/Red-Yel.	100	clay, gritty with bits of

29" 4

### Phase 1B (1)

mottled.

This is a blackbutt type, and in its general vegetation it closely resembles the basic types nearby: its profile, however, is definitely granitic. It is restricted in distribution to midand upper slopes of block F.

quartz.

Typical Profile.  Dark Brown	1 2" I	sandy loam, O.M.
Ye llow-brown	22"	sandy loam occn. gravel and
10110W-D10W1	acine consequences	quartz.
Brownish Yellow	26"	clay loam: gritty.
Brownish Yellow	26"4	clay: gritty (often micaciou
Phase 1B (2)		

This is a gravelly phase of 1B. It is in many respect like 3A type, but unlike that type gravel does not occur in the "B" horizon. It is restricted to the upper slopes and is in fairly close association with laterite types: consequently gravel may be regarded as a contaminant in the upper horizons (to which it is limited); its presence being due merely to a downhill "creep" This type does not occur on blocks E and F.

### Typical Profile.

-	
1"	Light sandy loam & O.M.
14"	Light sandy loam, medium Grav.
18"	Clay loam, gritty.
24"+	Clay.
	18"

# Phase 1B (3)

Profile like 1B, but "B" horizon has a reddish colour (limited distribution) Block D and South east side block A.

### Type 10.

This is not a very common type even on block A: It does not occur on block F; while on Block E, however, it is of equal importance, almost, as type 1B.

It occurs on lower slopes; and is commonly associated with "wash" material. Consequently it is a very deep light type running to a short gritty clay at about 4 feet.

Typical Profile.  Dark Brown	2"	sandy loam, O.M.
Yellow-Brown	20"	very light sandy loam/sag with occasional gravel.
Brownish Yellow	28"	very light sandy clay loam, very gritty.
Yellow	34" =+	ditto with much quartz grit.

### 2. BASIC GROUP

There are no definite basic outcrops on the area. Basic segregations, however, in gneissic granite occur, but they are usually limited in extent; consequently basic types are also limited and usually grade off into the granite types - these basic areas occurring in an irregular manner within the granitic types.

Blackbutt is a characteristic feature of the vegetation of the basic types.

There are three main types.

### Type 2A

This is the main type of the group; and with only a limited distribution as compared with the granitic types - being restricted almost entirely to blocks A and D.

It occurs typically on mid-slopes. It is a Jarrah-Marriblackbutt type, and it is characterised by a reddish "B" horizon.

Typical Profile.

Dark Brown 2"

Light/Yell/Brn. 16"

Rdsh-Yel/Redbrown. 20"

Red-brown 24"

Rsh-Yel. & Red 24+

mottled.

sandy loam and O.M.
sandy loam & light gravel
sandy loam, gritty,ocen.
with heavy basic segregation
clay loam, occn.grit,grav
& basic rock.

clay, gritty.

# Phase 2A (1)

The common basic type on block F, to which it is restricted, occurring there as a ridge down the centre of the block and also on the upper slopes. It is essentially a Blackbutt type - otherwise it differs very little from 2A; although it is perhaps less red in the "B" horizon. The vegetations of these two types, unfortunately, are not comparable - since type 2A occurs almost exclusively on cleared and ploughed land, while 2A (1) occurs in uncleared areas - so consequently it has been considered advisable to keep them as separate phases.

# Typical Profile.

Derk Brown	2"	sandy loam, O.M.
Light Red/Brn.	12"	sandy loam
Rsh-brn/Red- brown.	27"	sandy loam & ocen. bits of decomposing basic material.
Brn-Yel often reddish.	30**	clay loam, gritty.
Rsh Brn-Yel/ yellow	30"+	clay, gritty

# Type 2B

This type has a fairly limited distribution. It does not occur on block F at all. It is restricted to mid-slopes and it carries Blackbutt. It is also characterised by a yellow "B" horizon, in which feature it differs markedly from the last type

# Typical Profile.

Dark Brown	1"	sandy loam, O.M.
Light Brown	10"	" "light gravel
Rsh Yel-Brown	21"	" ocen.grv. & quartz.
Brn. Yel/Yellow	5/1,4	clay loam, gritty,
Yel. & Red mottled	24"+	clay, gritty

### Type 2C.

This is a type with a very limited distribution. It appears to consist largely of basic "wash" material. It occurs in association with other basic types, but usually on lower slopes, which fact supports the "wash" theory. Its distribution is restricted to block F.

Typical Profile.  Dark- Brown	211	sandy loam, O.M.
Reddish Brown	25"	" " fine and gritty.
Rsh/Red-Brown	40"	light sandy clay loam, gritty and light gravel
Reddish Yel-Brn.	40+	light clay

The soils of this group are characteristically restricted to ridge tops and upper slopes; being, as they are, intimately associated with the break down of the laterite peneplain

Their occurrence is limited to the boundaries of the plantable area.

Gravel is a feature of the "A" horizon for all types; often also it occurs in the "B" horizon, but not to such an extent. Surface outcrops of laterite are not common; hardpans are rare. Soil profiles characteristically run to yellow gritty clay - tending in turn to decomposing granitic material at depth.

These types bear good quality Jarrah.

There are three types with several phases in the group.

### Type 3A.

This is a type characteristic of the upper slopes, on the boundaries of the plantable area. It covers a fair area. Gravel is a characteristic of the profile, but, apart from this, depths and textures compare favourably with granitic types - so, consequently, it alone amongst laterite types, may present possibilities for the planting of exotic conifers.

Typical Profile.		
Dark Brown	100	sandy loam, O.M.
Yellow-Brown	17"	" " Heavy/Medium gravel
Yellow	23"	clay loam, gritty, medium-light gravel
Yellow	27"	Clay, gritty, ocen.
Red & Yellow Mottled	27" +	clay, gritty.

# Type 3B

This is a ridge top type, and the type characteristic of the old laterite peneplain. It is a deep sandy and gravelly type; probably more mature than any other type on the area. This maturity would account for the greater degree of podsolisation apparent.

It carries good quality Jarrah, but is quite unsuited for the growth of conifers, consequently, it constitutes the limiting factor in the development of the area as a pine plantation since the subject area is a basin, lying wholly within the laterite plateau, bounded on all sides by this type.

The type is a true "laterite" soil, and it was probably formed in situ, while the 3A and 3C types possibly owe their formation to the break down of the laterite at a later date.

# Typical Profile

TABTOST LIGITIE		
Dark Brown	1"	sandy loam, O.M.med.
Yellow-Brn/Yel.	19"	Sand-very light sandy loam (loose and rubbly)
Yel/Reddish Yel.	21"	H. gravel. sandy clay loam, gritty, medium gravel.
Yellow	28"	clay, gritty
Red & Yellow mottled	28"4	clay

### Phase 3B (1)

This is a very uncommon phase - characterised by black gravel, with heavy gravel in the clay and also some quartz.

# Phase 3B (2)

Also a rare phase - a deep sand with heavy gravel running to a hardpan.

### Type 3C.

This is a common laterite type on block F. It is very like 3A, but it usually carries Blackbutt as a characterisitic feature of the vegetation; whereas this is rare in 3A. It occurs in association with 3A on block F, so possibly it should have been considered as a phase of 3A; but on the grounds of a difference in vegetation and a slightly deeper profile, it has been given type rank.

### Typical Profile

Dark Brown	"2"	light sandy loam, O.M.
Yellow-Brown	24**	" " heavy gravel
Reddish-Brown- Yellow	27"	sandy clay loam, med. gravel
Yellow	27"+	sandy clay, gritty, light ocen. gravel.

### Phase 30 (1)

This is a deep phase with sandy loam to 30". It has a limited range on block F.

# 4. ALLUVIAL GROUP

In this group little uniformity of profile is to be found, almost every hole dug was different from its neighbours - having in common with them, only their mode of formation and their close proximity to a watercourse - the alluvial areas being usually in the form of narrow strips along creeks. Out of this confusion it was only possible to select broad groups. Four such groups were defined, no one of these is of any great importance, since the total area of alluvium is itself very limited.

### Type 4A.

A type with a restricted distribution - mainly limited to block A.

Typical Profile.	apad the last	
Black	2**	sandy loam/light loam, much
Light Brown	22"	silty sandy loam, Fine.
Brown-Yellow	36"	light sandy clay loam/clay loam, gritty, bits quartz.
Yel-brn.& grey mottled.	40**	heavy clay, gritty, wet.

### Type 4B

This is a very limited type. The profile is variable but consists essentially of - a black, light loam/grey clay-sand/grey and yellow mottled, heavy clay, wet.

### Type 4C.

This type, although very limited in its distribution is more common on block A than elsewhere. It is characterised by sand underlying heavier textures.

Typical profile.		
Black	2"	light loam, O.M.
Dark Brown/Brn.	20"	sandy loam, some O.M.
Yellow Brown	27"	sandy clay loam
Yellow & grey	42"	clay sand

### Type 4D.

Another type with a limited distribution; it is restricted, almost entirely to block A. The profile is essentially: - black to gray clay-loam/brown light sandy-loam/yellow and grey clay.

### Туре ЦЕ.

This type is restricted to block F, where it is limited to a small sandy flat; it runs to recemented sand or a form of soft sandstone at depth, i.e. yellow sand to 42" yellow sandy clay loam to 47" / ditto compacted to 65"/65"+ soft sandstone.

# APPENDIX

# Vegetation of Uncleared Areas - East Kirup

It was explained earlier, that since the blocks A and D were cleared, the vegetation of these areas was of little use for comparison with uncleared areas, on account of the modification due to clearing. Therefore, lists of the vegetation for these blocks have not been given.

On the subject area the only areas of uncleared land which were surveyed were blocks E and F.

The types 1A, 2A and 2B have such a limited distribution on this area, that a description of a "typeical" vegetation is not warranted. A description of the remainder is attached:-

### Typical Vegetation

Type 1B

Tree Species.

Jarrah, Marri, Blackbutt.

Understory

Occasional - Banksia grandis, Macrozamia Reidlei.

Rare - Persoonia longifolia, Kanthorrhoea Preissii.

Ground Flora.

Abundant - Bracken

Mod. abundant- Grasses, Hypochoeris radicata,

Occasional - Hibbertia perfoliata, Leucopogon capitallatus, Leucopogon verticillatus, Hakea amplexicaulis, Opercularia vaginatu Lasiopetalum membranaceum, Scaevola striata, Hibbertia montana, Acacia pulchella.

Rare

- Hibbertia inconspicua, Hovia trisperma,

Phase LB (1)

Tree species - Blackbutt, Marri, occasional Jarrah.

Understory

Occasional - Banksia grandis, Macrozamia Reidlei,
Acacia urophylla.

Rare - Xanthorrhoea Preissii.

Ground Floor

Abundant - Bracken.

Mod. abundant - Lasiopetalum membranacium, Hypochoeris

radicata, Karri Blue Grass (?)

- Hovia tisperma, Hakea amplexicaulis,
Hibbertia perfoliata, Opercularia
vaginatus, Scaevola striata, Tetrarrhena

laevis.

Rare - Leucopoigon verticillatus, Leucopogon propinquus, Clematis pubescens, Oxalis corniculata, Hemiandra sp., Hibbertia montana, Geranium sp., Maiden Hair fern.

# TYPE 1C.

Tree Species

- Jarrah, Marri, Blackbutt.

Understory

Mod. Abundant

- Banksia grandis, Macrozamia Reidlei.

Occasional

- Zanthorrhoea Preissii.

Rare

- Persoonia longifolia.

Ground Flora

Abundant

- Bracken, Hypochoeris radicata.

Mod. Abundant

e.g. (K.B.G., Poa sp., Festuca sp.)

Occasional

- Scaevola Striata, Dampiera triloba, Leucopogon capitellatus, Leucopogon propinquus, Hibbertia perfoliata, Lasiopetalum membranacium, Hibbertia inconspicua, Opercularis vaginatus, Chovizema illicifolia, Hovia trisperma Tetrarrhena laevis.

Rare

- Hakea amplexicaulis, Trachymene compressa, Pattersonia xanthina, Hakea bipinatifidia, Leptomeria Preissii.

### TYPE 2A (1)

Tree Species

- Blackbutt, Jarrah, Marri.

Understory Occasional

- Banksia grandis, Macrozamia Reidlei, Acacia urophylla.

Rare

- Persoonia longifolia.

### Ground Flora

Abundant

- Bracken

Mod. abundant

- Lasiopetalum membranacium, Hypochoeris radicata.

Occasional

- Grasses (K.B.G., Poa sp., Tetrarrhena laevis etc.) Leucopogon propinquus, Opercularia vaginatus, Hibbertia perfol iata, Hakea amplexicaulis.

Rare

- Hovia tisperma, Chorizema illicifolia, Leucopogon capitellatus, Hibbertia montana, Scaevola striata.

### TYPE 2C.

Tree Species

- Blackbutt, Marri, Flooded Gum.

Understory

Mod. abundant

- Banksia grandis.

Occasional

- Macrozamia Reidlei, Xanthorrhoea Preissii.

Ground Flora

Abundant

- Bracken, Grasses

Occasional

Hib. perfoliata, Ac. pulcheella, Hovia trisperma.

### TYPE 3A.

Tree Species

- Jarrah, Marri, rare Blackbutt.

### Understory

Mod. abundant

- Macrozamia Reidlei, Xanthorrhoea Preissii.

Occasional

- Banksia grandis.

Rare

- Persoonia longifolia, Xanthorrhoea gracilis.

### Ground Flora.

Abundant

- Bracken

Mod. Abundant

- Hypochoeris radicata.

Occasional

- Leucopogon capitellatus, Leucopogon propinquus, Hibbertia perfoliata, Leucopogon verticillatus, Lasiopetalum membranaceum, Hibbertia inconspicua, Pattersonia xanthina.

Rare

- Hakea amplexicaulis, Scaevola striats
Hovia trisperma, Opercularia vaginatus, Tetrarrhena laevis, Clamtis
pubescens, Hakea bipinatifidia.

### TYPE 3B.

Tree Species

- Jarrah, Marri occasional Blackbutt.

Banksia grandis, Macrozamia Reidlei.

### Understory

Mod. abundant

- Xanthorrhoea Preissii.

Occasiona1

- Persoonia longifolia.

Rare

# Ground Flora.

Abundant

- Bracken

Mod. Abundant

- Hypochoeris radicata, Grasses, Leucopogon verticillatus, Leucopogon capitellatus.

Occasional

- Acacia pulchella, Hakea amplexicauli Hakea bipinatifidia, Hibbertia perfoliata, Hibbertia montana, Dryandra nivea, Leucopogon propinquu

Rare

- Opercularia vaginatus, Phyllanthus calycinus, Scaevola striata, Pattersonia xanthina, Tetrarrhena laevis.

### TYPE 3C.

### Trea Species

# Understory

Mod. abundant

- Banksia grandis. Macrozamia Reidlei.

Jarrah, Marri, Blackbutt.

Occasional

- Xanthorrhoea Preissii, Persoonia longifolia.

- Xanthorrhoea gracilis.

### Rare

### Ground Flora

Abundant Mod. abundant - Bracken.

- Lasiopetalum membranaceum, Grasses, Hypochoeris radicata.

Hibbertia. montana, Hib.perfoliata, Leucopogon capitellatus, Leucopogon Occasional propinquus, Leucopogon verticillatus Hakea amplexicaulis, Opercularia vaginatus.

Hovea trisperma, Scaevola striata, Rare Tetrarrhena laevis, Hakea bipinatifidia, Conistylis sp., Poa sp.

# PHASE 3C (1)

Jarrah, Marri. Tree Species

Understory

Banksia grandis, Macroxamia Reidlei. Mod. abundant

Xanthorrhoea Preissii Occasional

Persoonia longifolia. Rare

Ground Flora

Bracken, annual grasses Abundant

Scaevola striata, Hypochoeris Mod. abundant

radicata.

Hibbertia montana, Hibbertia Occasional perfoliata, Leucopogon propinquus, Leucopogon verticillatus.

Opercularia vaginatus, Pattersonia xanthina, Acacia urophylla, Leucopogon capitellatus, Hovia trisperma, Pattersonia xanthina, Hakea amplexicaulis. Rare

# ALLUVIAL GROUP

The alluvial types for the purpose of a "typical" vegetation have all been grouped together. The result is an average rather than a typical list for the alluvial areas of blocks E and F. This list includes some definitely hydrophytic species, as well as a few commonly associated with ridge types.

Blackbutt, Flooded Gum, occasional Tree Species Marri.

Understory

Agonis linearifolia Abundant n

Banksia grandis, Trymalium Mod. abundant spathulatum

Xanthorrhoea Preissii, Macrozamia Occasional Reidlei.

Albizzia lophanta. Rare

Ground Flora

Rushes, Bracken, Grasses Abundant

Maiden Hair Fern, Thomasia Occasional solanacea (?) Hibbertia perfoliata, Chroizem illicifolia, Hakea bipinatifidia, Leucopogon propinquus

Ranunculus lappaceus, fetrariopsis octandra, Haloragis foliosa (?) Rare Scaevola striata, Hovia trisperma, Opercularis vaginatus.

# SOIL SURVEY.

	1A	Yellow brown sandy loam, rocky, leading to impenetrable granite.
	1B	-B Light Yellow-Brown sandy loams.
	1B2.	Profile like 1B. but with gravel in surface sandy loam.
	183.	Phase of 1B. with reddish colouration of "B" horizon.
	10	Yellow-Brown, light-textured, gritty and deep sandy loams/clay loams
1		
	2A	Light Brown to Red-brown sandy loam, Blackbutt type.
	2A1	Closely resembles 2A (see vegetation)
	2B.	horizon, instead of red.
	20.	Deep, light, fine and silty sandy loams.
	131	Yellow brown sandy loams: grantic type, veg- etation, however, like basic types.
	3A.	Yellow-brown sandy loam with heavy/medium gravel.
	<b>3</b> B	- Yellow to Yellow-brown very light sandy loam/ sand, heavy gravel.
	3B1.	-E Black gravel phase of 3B: rare: see Block A
	3C.	Like 3A; but carries Blackbutt as a character- istic feature of the vegetation unlike 3A.
	301.	A deep phase sandy loam to 30"+.
	4A.	Black light loam/brown silty sandy loam/brown to yellow clay loam/yellow-brown andgrey clay,
		heavy wet.
	4B.	Black light loam/grey clay sand/grey and yellow clay, wet heavy.
	lic	Dark brown sandy loam/yellow brown sandy clay
	40.	loam/yellow and grey clay sand.
	4D.	Black and grey clay loam/brown light loam/ Brown sandy loam/ yellow and grey clay, wet.
	4E.	Yellow sand/yellow sandy clay loam/soft
		ferruginous sandstone 65" : Blackbutt.

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