DEPARTMENT OF NATIONAL RESOURCES

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record 1978/63

LAWN HILL 1:100 000 SHEET AREA:

CATALOGUE OF 1:25 000 GEOLOGICAL COMPILATION SHEETS

by

I.P. SWEET and L.J. HUTTON

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FOREWORD

This Record has been compiled to made available the 1:25 000 Compilation sheets of the Lawn Hill 1:100 000 Sheet area, and to provide to users the basic field data.

There has been virtually no data processing or interpretation involved - this will come in later Records or Reports; but in releasing this preliminary field data it is hoped that users will comment and provide the compilers with any additional information or changes that should be made to the compilation sheets reproduced here.

INTRODUCTION

This Record contains reproductions, reduced to about 1:100 000 scale, of the 16 geological compilation sheets which constitute the Lawn Hill 1:100 000 Sheet. The sheets have been released to the public and copies of them, at 1:25 000 scale, are available for purchase from the Copy Service, Australian Government Printer (Production), P.O. Box 84, Canberra, ACT 2600 (enquiries to be marked: "Attention Mrs B. Misins").

The data were obtained during field research in LAWN HILL* and adjacent Sheet areas during the 1976 and 1977 field seasons. The work was carried out as part of a joint BMR/GSQ program, begun in 1969, to reassess the Precambrian geology of northwest Queensland.

Figures 1 and 2 are references for Figures 3 to 18, the geological compilation sheets. Figures 3a to 18a show the points at which geological observations were made.

Mapping and photo-interpretation were carried out using 1:25 000 colour airphotos obtainable from the Division of National Mapping, Canberra.

The compilation sheets are not final and are subject to modification after release.

GEOLOGY

The main Precambrian sequence, of Carpentarian age (Plumb & Derrick, 1975), consists of basic volcanics and sandstone intruded by granite, and overlain unconformably by a sequence of sandstone, siltstone, and dolomite. A younger Precambrian sequence, the South Nicholson Group, lies unconformably on these rocks in the west.

Most of the units shown in the compilation sheets were originally delineated as photogeological units. Much of the fieldwork was directed towards determining whether the photogeological units are mappable lithologic units. The notes below are intended to give the user of the compilation sheets some idea of the criteria used in delineating units.

* 1:100 000 Sheet area names shown in upper case

Carpentarian

$\mathcal{P}b$ and $\mathcal{P}b_s$

The volcanics ($\mathcal{P}b$) have a characteristic reddish-brown photo-pattern, and the interbedded and overlying sandstones ($\mathcal{P}b_s$) stand out as grey and brown ridges. They were mapped previously by Carter & Opik (1961) as Myally Beds, but are more likely to be part of a younger unit, the Fiery Creek Volcanics, recently mapped by Cavaney (1975) in the Camooweal 1:250 000 Sheet area. They are overlain with angular unconformity by the Ploughed Mountain Beds.

Weberra Granite ($\mathcal{P}g$)

Scattered outcrops of weathered leucocratic granite were included by Carter & Opik (1961) in the Weberra Granite, whose main outcrop lies 50 km to the southeast - in the Camooweal 1:250 000 Sheet area. The granite is clearly overlain nonconformably by the Ploughed Mountain Beds. Although there are no actual contacts, $\mathcal{P}g$ probably intrudes $\mathcal{P}b$, as it appears to cut across several flows, and acid dykes and quartz veins do occur in $\mathcal{P}b$. Several small outcrops of quartz-hematite rock and schist within $\mathcal{P}g$ may be sheared granite.

Ploughed Mountain Beds

These were subdivided, on the basis of photo-interpretation, into 13 units, $\mathcal{P}m_1$ to $\mathcal{P}m_{13}$, some of which will be combined into formations at a later date. An angular unconformity at the base of $\mathcal{P}m_1$ (with $\mathcal{P}b$ and $\mathcal{P}b_s$) is clearly visible on airphotos.

$\mathcal{P}m_1$ is a resistant unit which includes conglomerate and malachite-stained sandstone.

$\mathcal{P}m_2$ is distinguished from $\mathcal{P}m_1$ and $\mathcal{P}m_3$ by its recessive weathering, which reflects its silty nature; a lens or tongue of siltstone below the main $\mathcal{P}m_2$ layer is also included.

Pm_3. The prominent scarp above Pm_2 is capped by Pm_3. Other lenses or tongues of ferruginous sandstone within Pm_{4a} are included in Pm_3.

Pm_{4a} is a recessive unit above Pm_3. It is very altered and deeply weathered in most outcrops, and its original lithology is unidentifiable. It is probably silty, and possible dolomitic, at depth.

Pm_{4b} is a light-coloured photogeological unit which is recognised in only a few outcrops. It lies between Pm_{4a} and Pm_4 (elsewhere Pm_4 overlies Pm_{4a}).

Pm_{4a} and Pm_{4b} were photo-interpreted as a part of Pm_4, a predominantly dolomitic unit, but were mapped separately when it was released that the dolomites formed only about half of the total content of Pm_4. The boundary is difficult to map accurately, as the transition from Pm_{4a} and Pm_{4b} outcrop to Pm_4 (dolomite) is often masked by chert rubble. It is assumed that the chert is derived from silicification of dolomite. Pm_4 crops out poorly, and in many outcrops is deeply weathered or silicified.

Pm_5 is a photogeological unit distinguished from the units above and below by its ridge-forming nature. Its main feature is the presence of sandstone, siltstone, and stromatolitic chert which result in its resistance to weathering. It also contains dolomites very similar to the units above and below, and the boundaries of the photogeological unit may need to be modified after fieldwork is completed.

Pm_6 is a thick unit of well-banded dolomite whose boundary with Pm_5 is a distinct break in slope marking the change from sandstone and chert to dolomite. At the base of Pm_6 in the southernmost outcrops is a prominent limonite-chert breccia which is presumably a weathering product of another rock type. It has been shown as Pm_{6a} wherever it can be mapped separately. The breccia in the core of the Ploughed Mountain Anticline (Fig. 4) is not Pm_{6a}, but a tectonic breccia formed by compression in the axial zone of the fold.

Pm_7 is a resistant unit which forms steep ridges, particularly in the south. It is generally an orthoquartzite containing abundant cross-beds, ripple marks, clay galls, and mud-cracks. The Pm_6/Pm_7 boundary is placed at the base of the first prominent orthoquartzite bed. In the south this is overlain by recessive flaggy sandstone and siltstone which are mapped as Pm_{7a}.

Pm_8 to Pm_{12}. In the southern half of LAWN HILL, five photo-geological units, Pm_8, Pm_9, Pm_{10}, Pm_{11}, and Pm_{12}, can be distinguished. Pm_8, Pm_{10}, and Pm_{12} are silty units separated by resistant sandstones, Pm_9 and Pm_{11}. The sandstones lens out northwards and the remaining siltstone is designated Pm_8 (it presumably includes Pm_{10} and Pm_{12}, but they are indistinguishable from it). Pm_9 lenses out both southwards and northwards. It forms a steep ridge with a distinctive, coarse photo-pattern. Pm_{11} thins northwards and lenses out in the same area as Pm_9 does (between Mitton and Archie Creeks - Figs. 8 and 9). Pm_{8S} refers to two other mappable sandstone lenses between Pm_7 and Pm_9; they were not recognized in the original photo-interpretation of the area. Pm_{12} is a silty unit in the south, but contains many thin sandstone interbeds. It also grades northwards into finer siltstone and shale. Its boundaries with Pm_{11} and Pm_{13} are based on changes in slope related to the sandier nature of both other units.

Pm_{13} forms distinctively banded ridges between the recessive-weathering Pm_{12} and plains underlain by the very soft carbonaceous shales of Pl_o. A series of beds of quartz greywacke form a lenticular mappable unit, Pm_{13g}, in about the middle of Pm_{13}. It can be distinguished from Pm_{13} on airphotos by its lighter colour and slightly recessive weathering.

The units of the Ploughed Mountain Beds shown on the compilation sheets will probably be combined to form at least 6 formations:

Pm_1, Pm_2, Pm_3	: sandstone unit
Pm_{4a}, Pm_{4b}	: siltstone(?) unit
Pm_4, Pm_5, Pm_6	: carbonate unit (possibly divisible into three formations)

Pm_7	:	sandstone unit
Pm_{8-12}, Pm_{8s}, Pm_9	:	siltstone unit containing sandstone lenses
Pm_{11}, Pm_{12}, Pm_{13}, Pm_{13g}	:	sandstone unit containing siltstone and greywacke lenses

Lawn Hill Formation

The Lawn Hill Formation is a sequence of siltstone, shale, tuff, and sandstone which conformably overlies Pm_{13}. The photogeological subdivision of the unit is based on the presence of two resistant members in an otherwise easily weathered sequence. Areas underlain by the Lawn Hill Formation are therefore relatively flat, with the exception of two roughly parallel, sinuous ridges up to 80 m high formed of the resistant members. The six members of the formation are :

Pl_0 is a poorly outcropping black shale with a sharp lower contact with Pm_{13}, and a gradational upper one with Pl_1. Where Pl_0 crops out it forms dark grey banded areas on airphotos.

Pl_1. Since Pl_0 shales grade upwards to Pl_1 siltstones, the lower boundary of Pl_1 is approximate. Pl_1 is generally overlain by resistant sandstone, but other lenses of siltstone within Pl_0, regardless of stratigraphic position, are mapped as Pl_1.

Pl_2 is one of the two resistant, ridge-forming members in the Lawn Hill Formation, and generally forms the capping and dip-slope of the ridge. It is a sandstone unit which lenses out eastwards.

Pl_3. Like Pl_0, Pl_3 is a recessive unit which forms plains with poor outcrop. It is largely composed of tuff and siltstone which, when silicified, form ridges. A series of tuffaceous beds near the base of Pl_3 are virtually always silicified, and form the other ridge mentioned above. Like Pl_0, Pl_3 has a sharp lower contact and a gradational upper one.

Pl_4 is a reddish-brown-weathering medium-grained friable sandstone.

Pl_5 is a flaggy siltstone.

Adelaidean or Carpentarian

South Nicholson Group

Psa. Quartz sandstone and siltstone which overlie the Lawn Hill Formation and Ploughed Mountain Beds unconformably west and northwest of LAWN HILL crop out in two areas in western LAWN HILL. The basal unit of the group, the Constance Sandstone (Psa), overlies the Lawn Hill Formation disconformably, although a marked angular unconformity can be observed in MUSSELBROOK and BOWTHORN.

Cambrian

Two units have been shown in the compilation sheets - Thorntonia Limestone (Cmt) and Border Waterhole Formation (Cmo).

Cmt is easily interpreted on airphotos because of its distinctive photopattern, mainly small-scale joint-controlled pinnacle karst. De Keyser (1969) mapped Cmo in outcrops near Lawn Hill homestead, and we have reinterpreted these outcrops, with some modifications, on our compilation sheets. In the southwestern part of LAWN HILL, areas of poor outcrop and chert rubble probably indicate the presence of Cmo marginal to Cmt, and these areas have been delineated.

Mesozoic

Gilbert River Formation (JKg) and Mullaman Beds (JKm) have been delineated. JKg is the basal sandstone in the Mesozoic sequence in the Carpentaria Basin (Grimes, 1974) and all isolated mesas of friable ferruginous sandstone in valleys cut in the Precambrian rocks in northeastern and eastern LAWN HILL are assigned to it.

Similar sandstone and claystone capping hills formed of Precambrian rocks in western and southwestern LAWN HILL are assigned to JKm. Both units are of Late Jurassic and/or Early Cretaceous age.

Cainozoic

Tpf. Plains with ferruginous soil in the northeast may represent laterite surfaces, and are shown as Tpf (Symbol used by Grimes (1974) for laterite in Westmoreland 1:250 000 Sheet area).

Tc. Small mesas of crystalline limestone near the southern margin of LAWN HILL are part of the Carl Creek Limestone, of late Oligocene or early Miocene age (Tedford, 1967). Where the Carl Creek Limestone overlies the Thorntonia Limestone it is virtually impossible to interpret a boundary accurately. Accordingly, any Tc/Cmt boundaries shown (eg, in Fig 16), should be regarded as approximate.

Tr?. Isolated outcrops of flat-lying limestone in the northeast may be part of the Gregory Limestone, thought by Grimes (1974) to be of similar age to Tc.

TQn (Armraynald Beds; Grimes 1974). Although defined by Smart, Grimes & Doutch (1972) as a lithological unit, the presence of TQn in LAWN HILL has been inferred mainly on geomorphological grounds. The surface of TQn in MOUNT OSCAR consists of black-soil plains with few stream channels, and the southern continuation of these into LAWN HILL has been the main criterion for deducing the presence of TQn. Patches of travertine, apparently within TQn, and sandy soil, are common near Little Archie Creek. Both of these appear to belong to the same phase of deposition as TQn, and are included in them. TQn is slightly above present stream level in most of LAWN HILL, and gullying is occurring in outcrops along creek banks. A terrace of extensively gullied silt and clay with a black-soil surface occurs about 5-8 m above the present level of the Gregory River, and has been included in TQn.

Czg. These are gravels cemented by iron oxides. They may represent the same episode as that resulting in Tpf, but it seems more likely that Czg is younger. The gravels form terraces slightly above present stream level, and appear to be piedmont deposits related to an earlier Quaternary or late Tertiary erosion cycle.

Czt. Several outcrops of travertine have been mapped, some within TQn, others as Czt.

Czs includes a variety of residual soils, colluvium, and possibly also some largely alluvial material, and areas which could be assigned to Czg with more detailed mapping. It probably includes late Tertiary and Quaternary sediments.

Qa Alluvium which is difficult to distinguish from TQn, particularly in the northeast, where boundaries should be regarded as tentative.

Qha. Active stream alluvium in large stream-beds - e.g., Gregory River.

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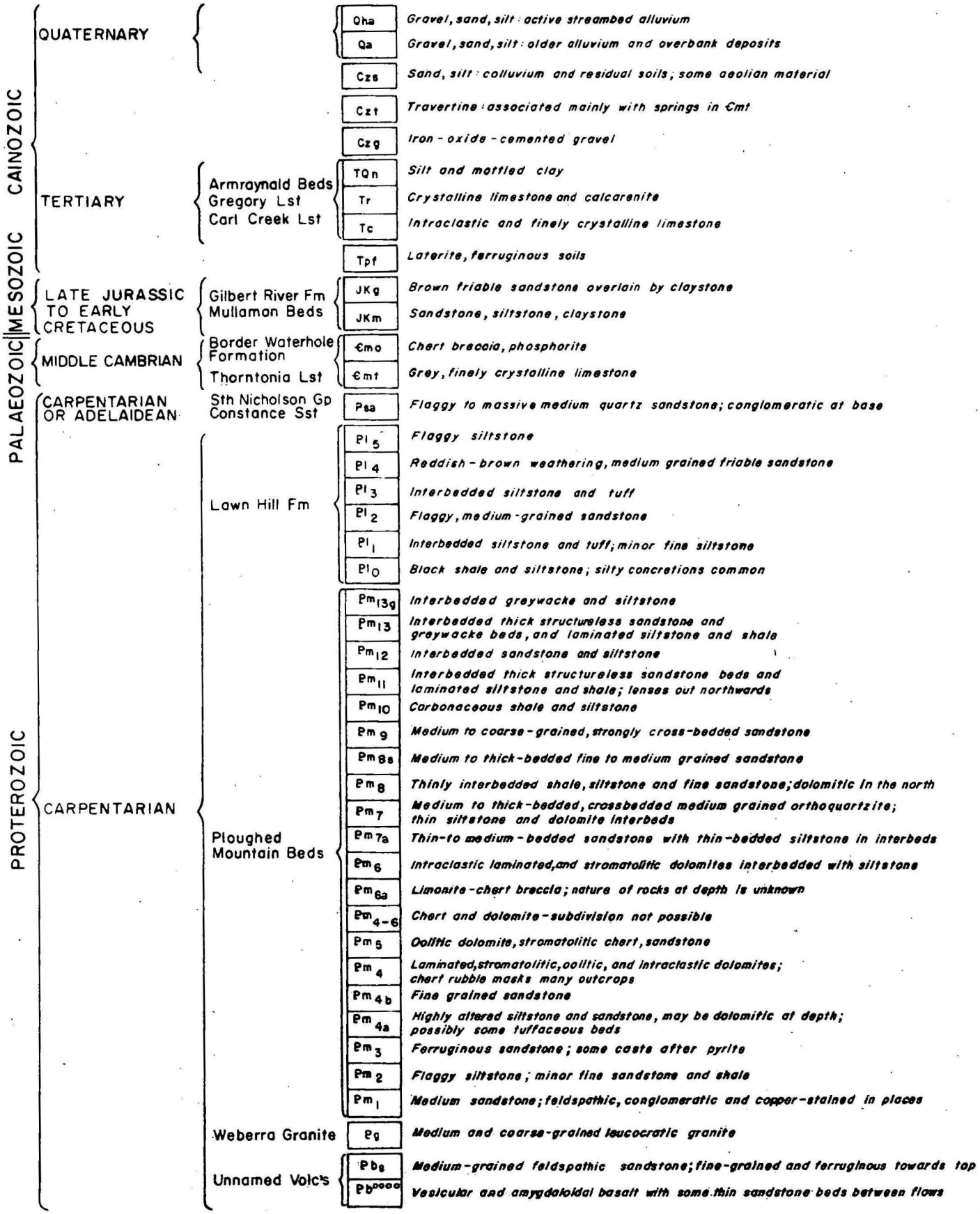


Fig. 1 Geological reference to accompany compilation sheets (Figs. 3-18)

Record 1978/63

E54/A9/52

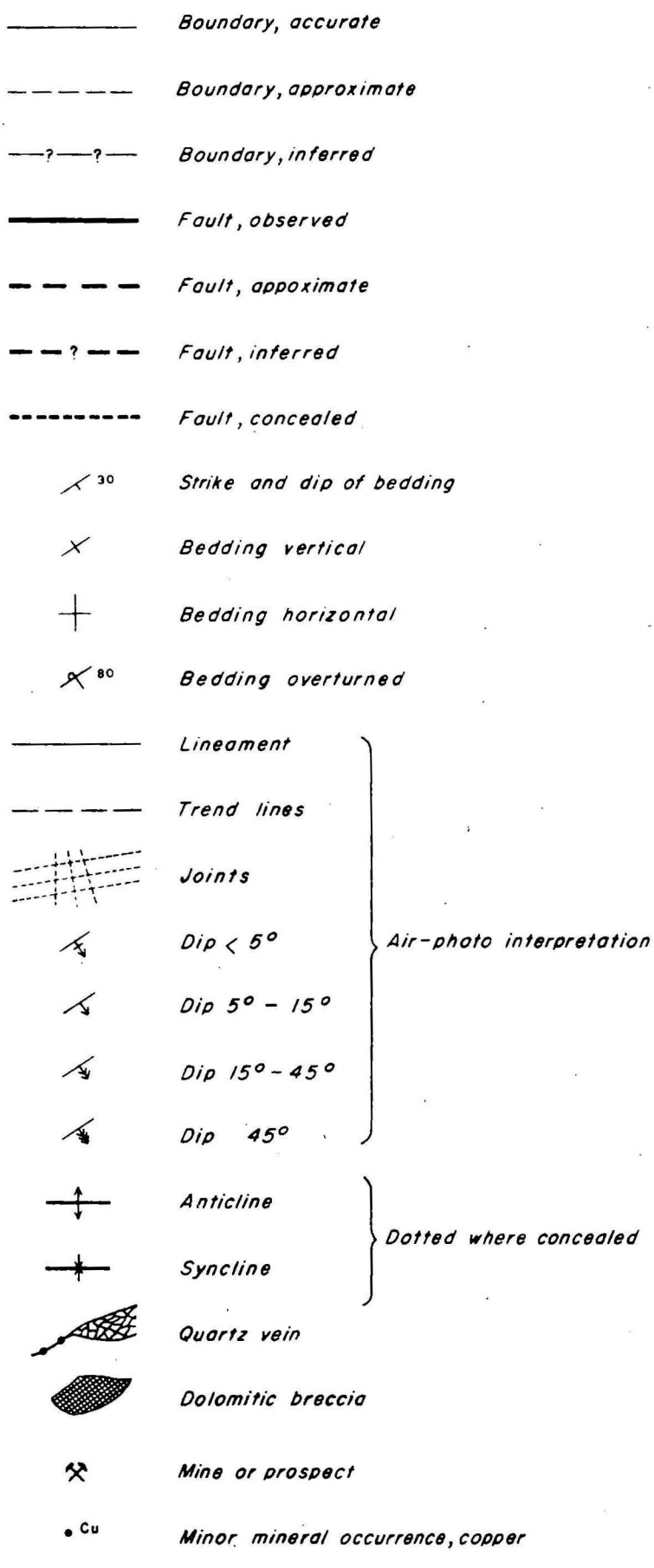


Fig. 2 Symbols used on accompanying compilation sheets (Figs. 3-18)

Record 1978/83 E54/A9/53

RUN 1 0026
L H

RUN 2 0090
L H

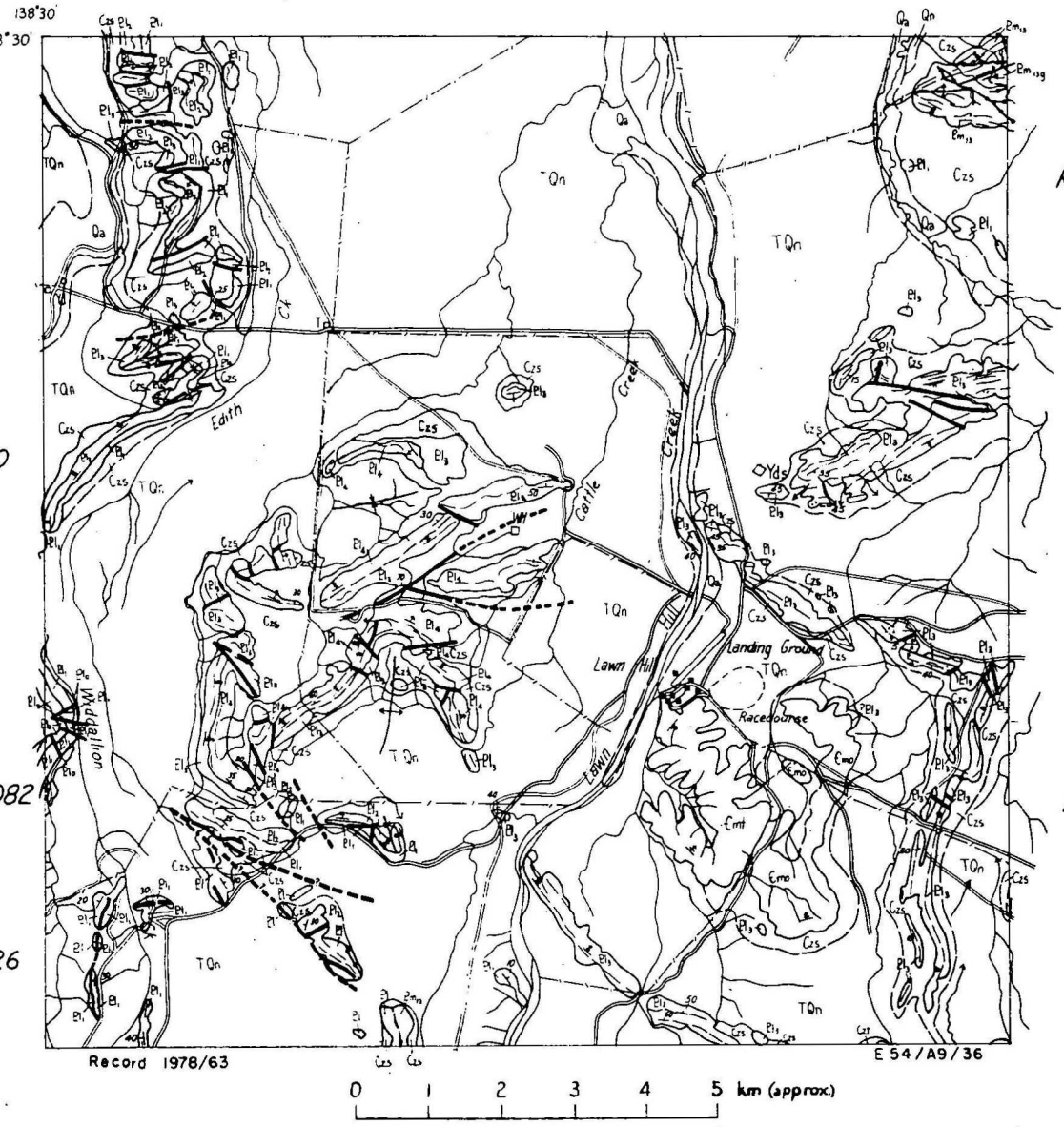
RUN 3 0082
L H

RUN 4 0026
L H

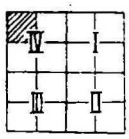
RUN 1 0022
I.S.

RUN 2 0096
I.S.

RUN 3 0088
I.S.



Geology 1976-77 by I.P. Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J. Mifsud (BMR)
Fig 3



LAWN HILL

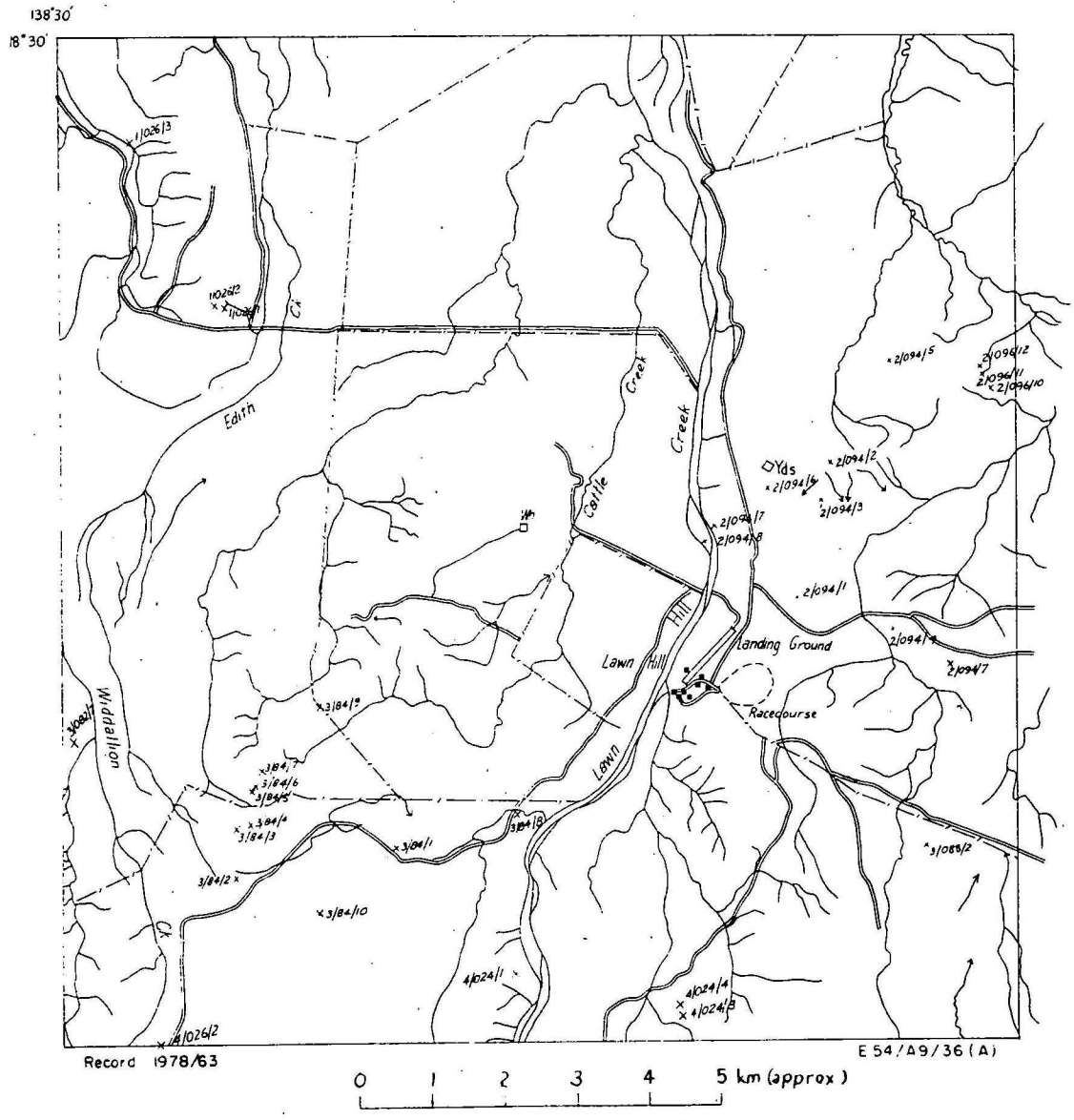

138°30'
18°30'
Edith
Creek
Cattle
Creek
Lawn Hill
Landing Ground
Racecourse
Lawn
Widdallion
Yds
E 54/A9/36 (A)
Record 1978/63
0 1 2 3 4 5 km (approx)
LAWN HILL

Fig 3a

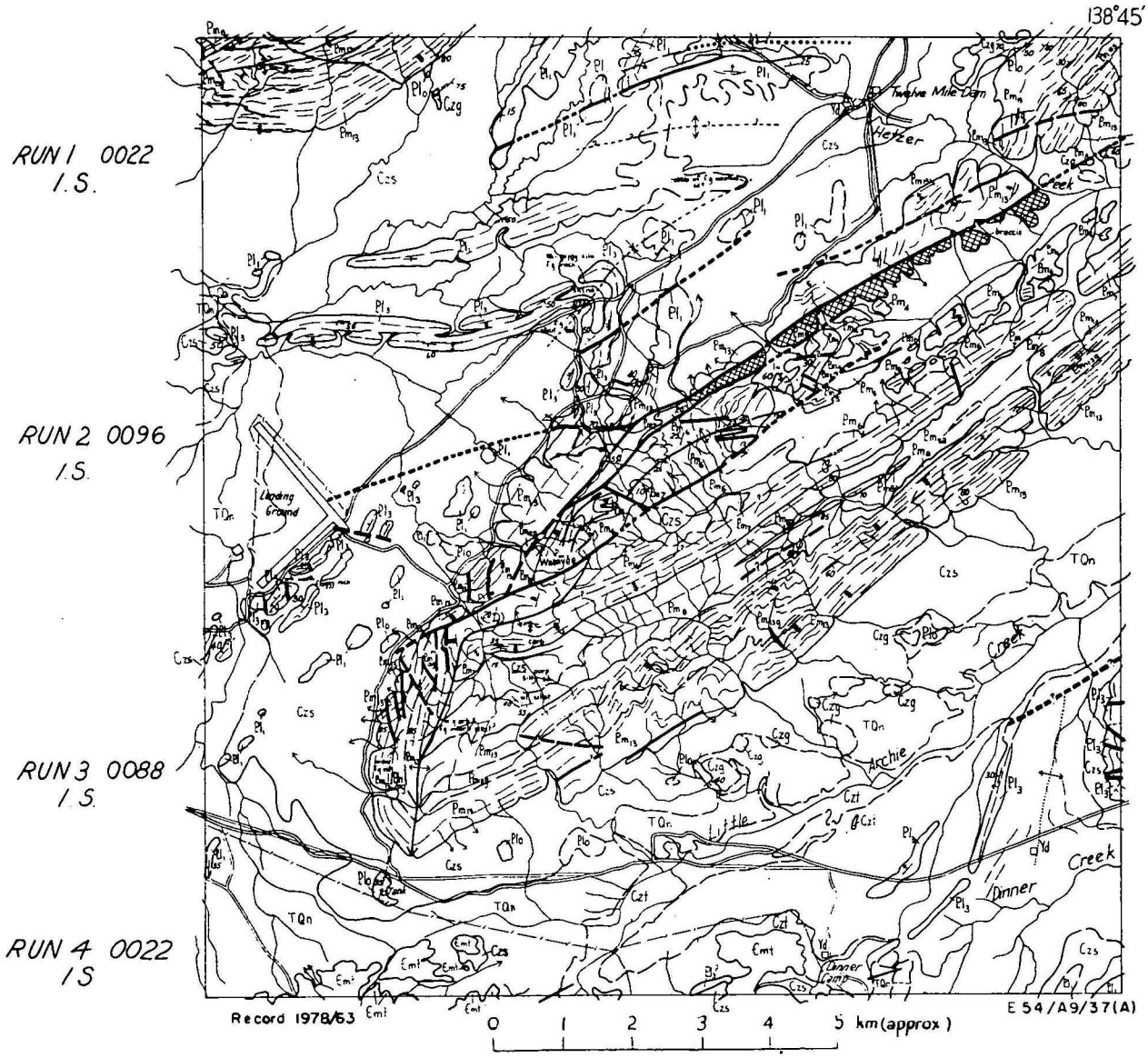


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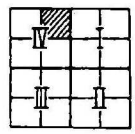
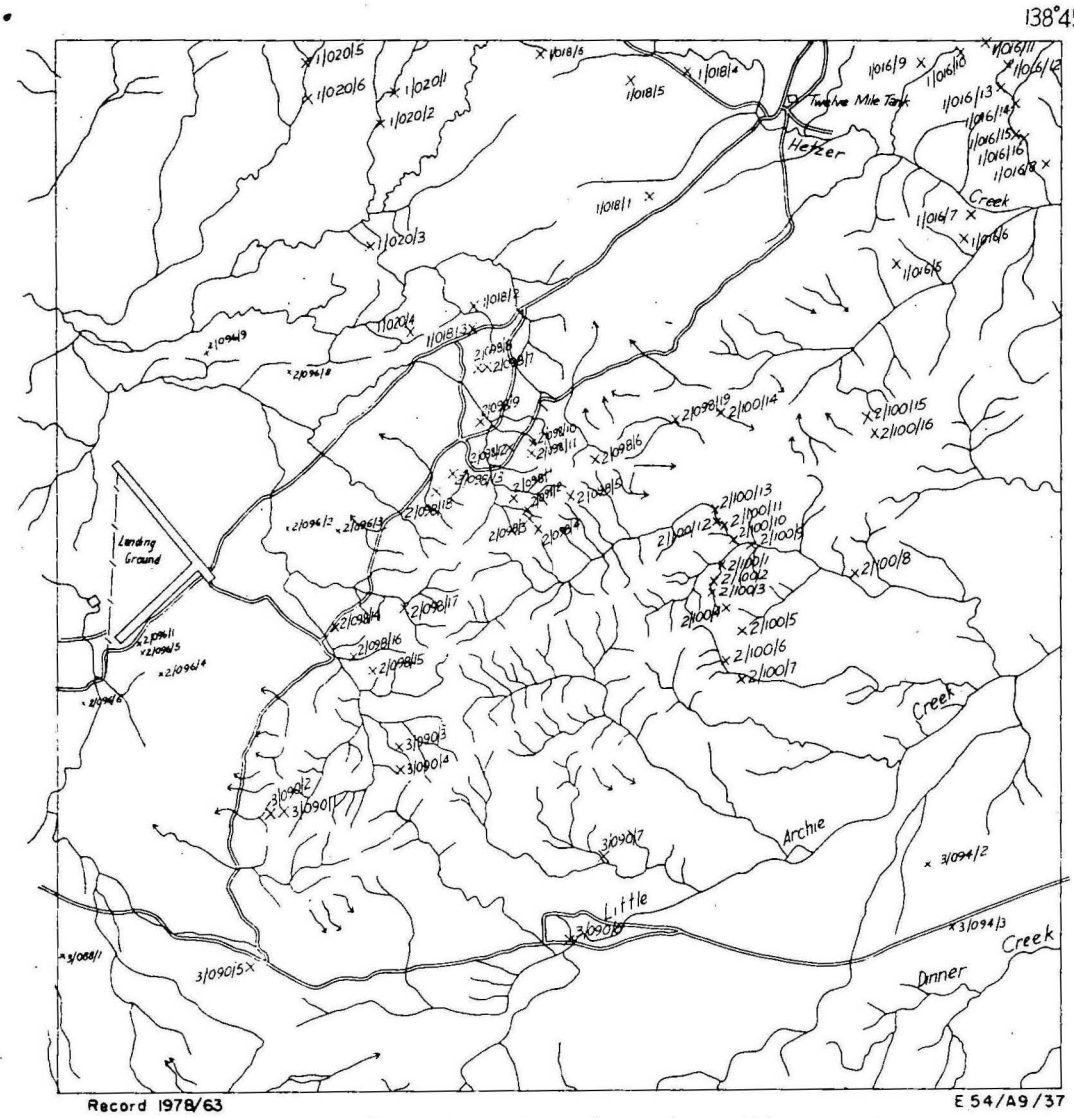
Fig. 4




138°45'
Twelve Mile Tank
Hetzer
Creek
Landing Ground
Archie
Little
Creek
Dinner
Creek
Record 1978/63
E 54/A9/37
0 1 2 3 4 5 km (approx)

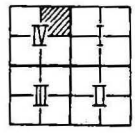

IV
I
III
II

Fig 4a

RUN 1 0016
I.S.

RUN 2 0102
I S

RUN 4 0016
L.H.

RUN 1 0010
I.S.

RUN 2 0106
L.H.

RUN 3 0100
I.S.

RUN 4 0016
L H

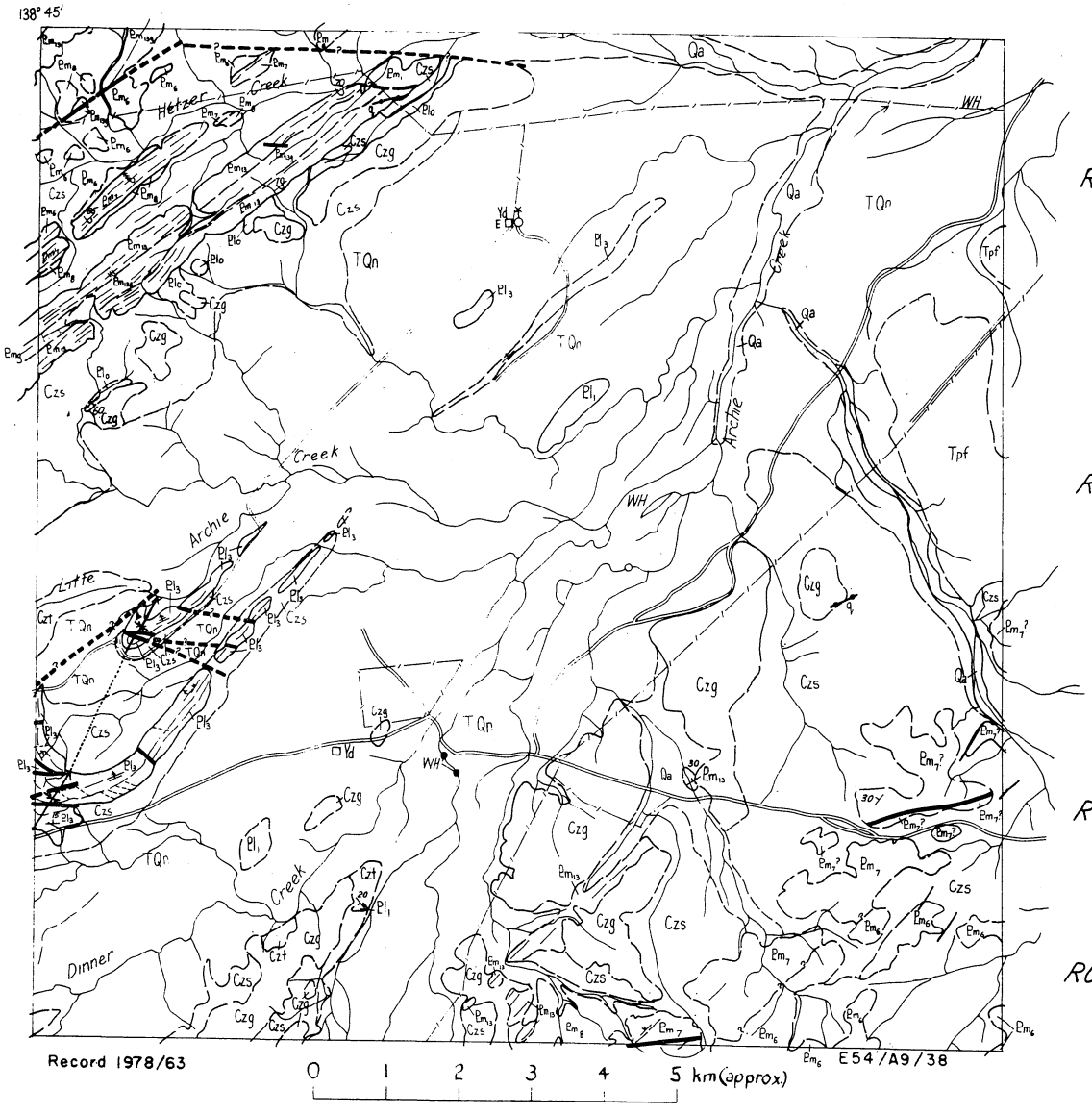


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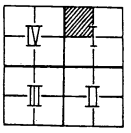
Fig 5



LAWN HILL

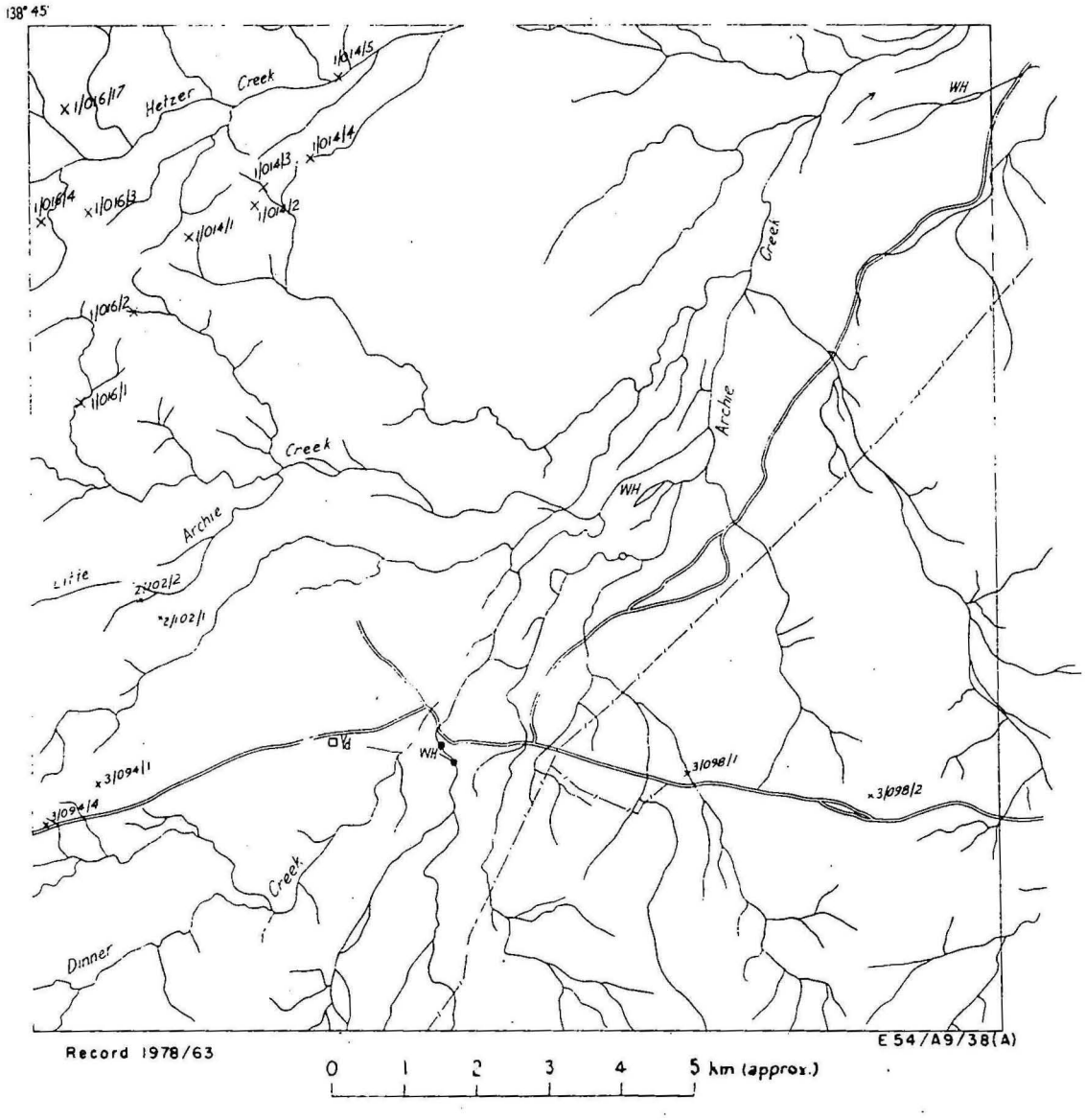

138° 45'
Hetzer Creek
1/1014/5
1/1016/17
1/1014/4
1/1014/3
1/1016/4
1/1016/3
1/1014/2
1/1014/1
1/1016/2
1/1016/1
Archie Creek
Little Archie Creek
2/1102/2
2/1102/1
WH
3/1094/1
3/1094/4
3/1098/1
3/1098/2
Dinner Creek
E 54/A9/38(A)
Record 1978/63
0 1 2 3 4 5 km (approx.)
LAWN HILL

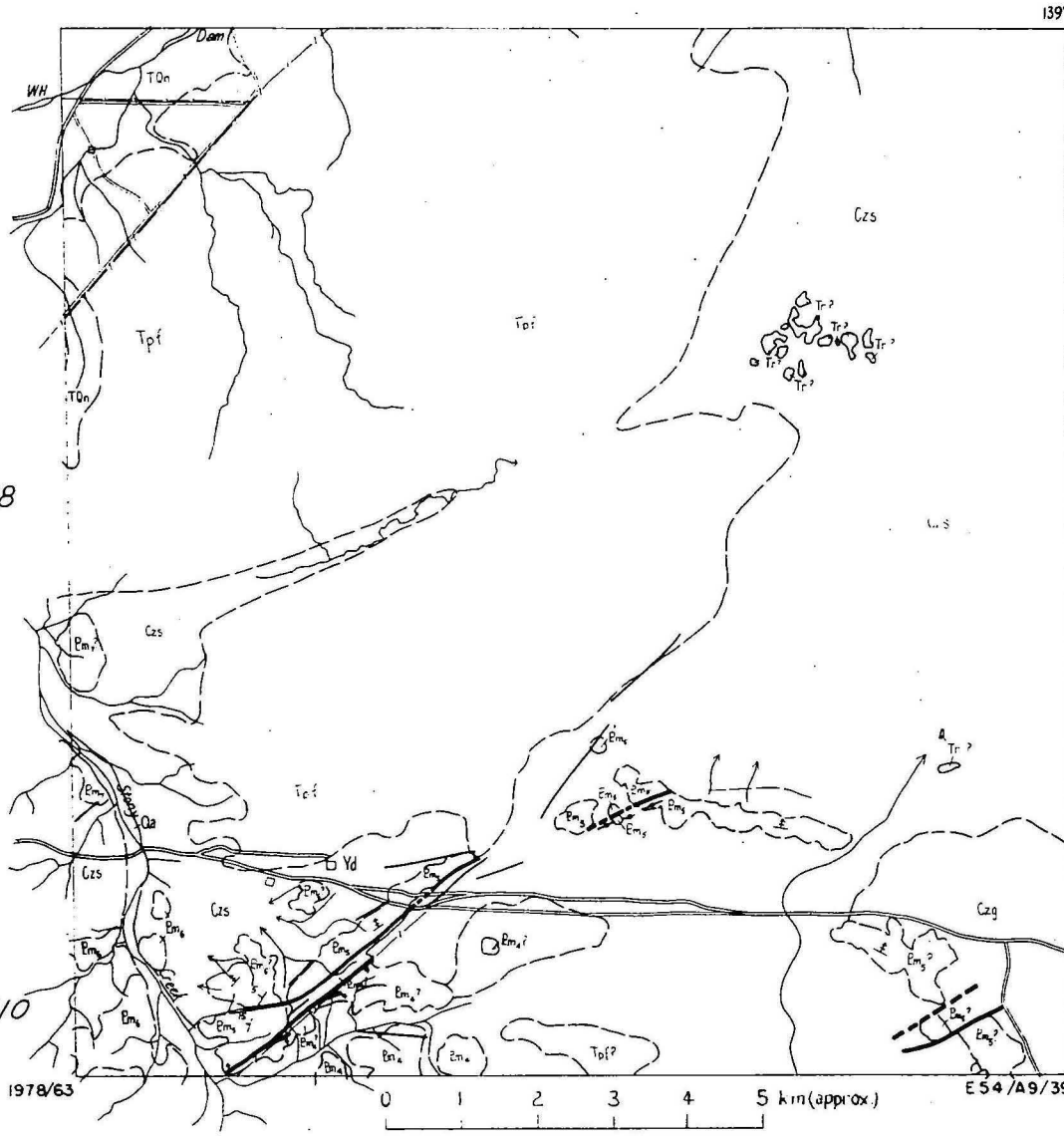
Fig 5a

RUN 1 0010
I.S.

RUN 2 0108
I S

RUN 3 0100
I.S.

RUN 4 0010
L H



RUN 2 0112
I.S.

RUN3 0104
L.H

RUN 4 0004
I.S.

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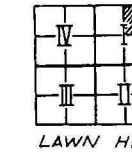
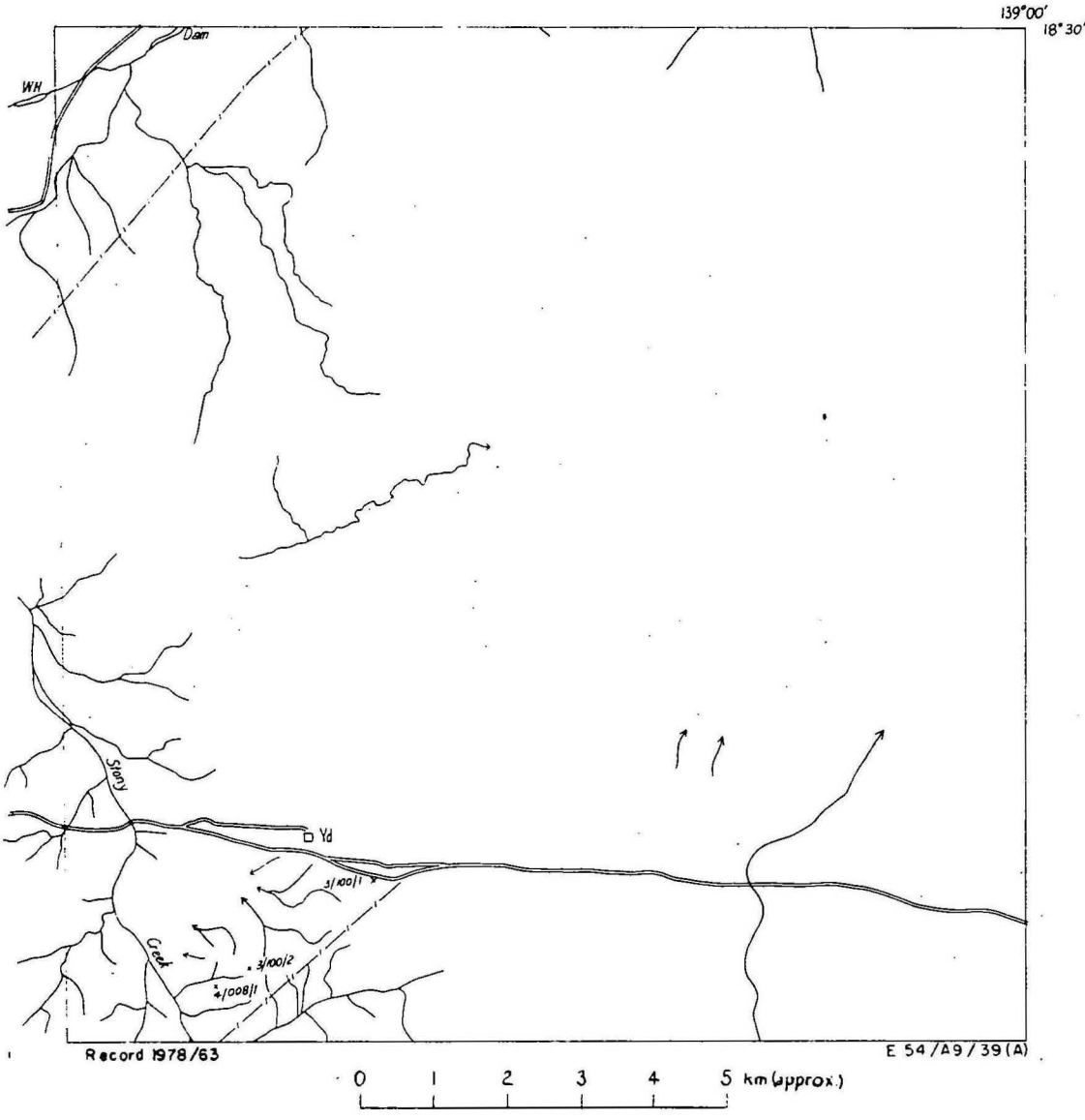
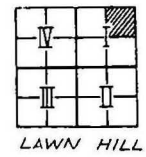
Fig 6



LAWN HILL





LAWN HILL

Fig. 6a

RUN 4 0026
L.H

RUN 5 0026
L.H

RUN 6 0084
L.H

RUN 6 0088
L.H

RUN 7 0088
L.H.

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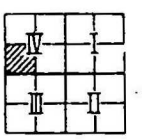
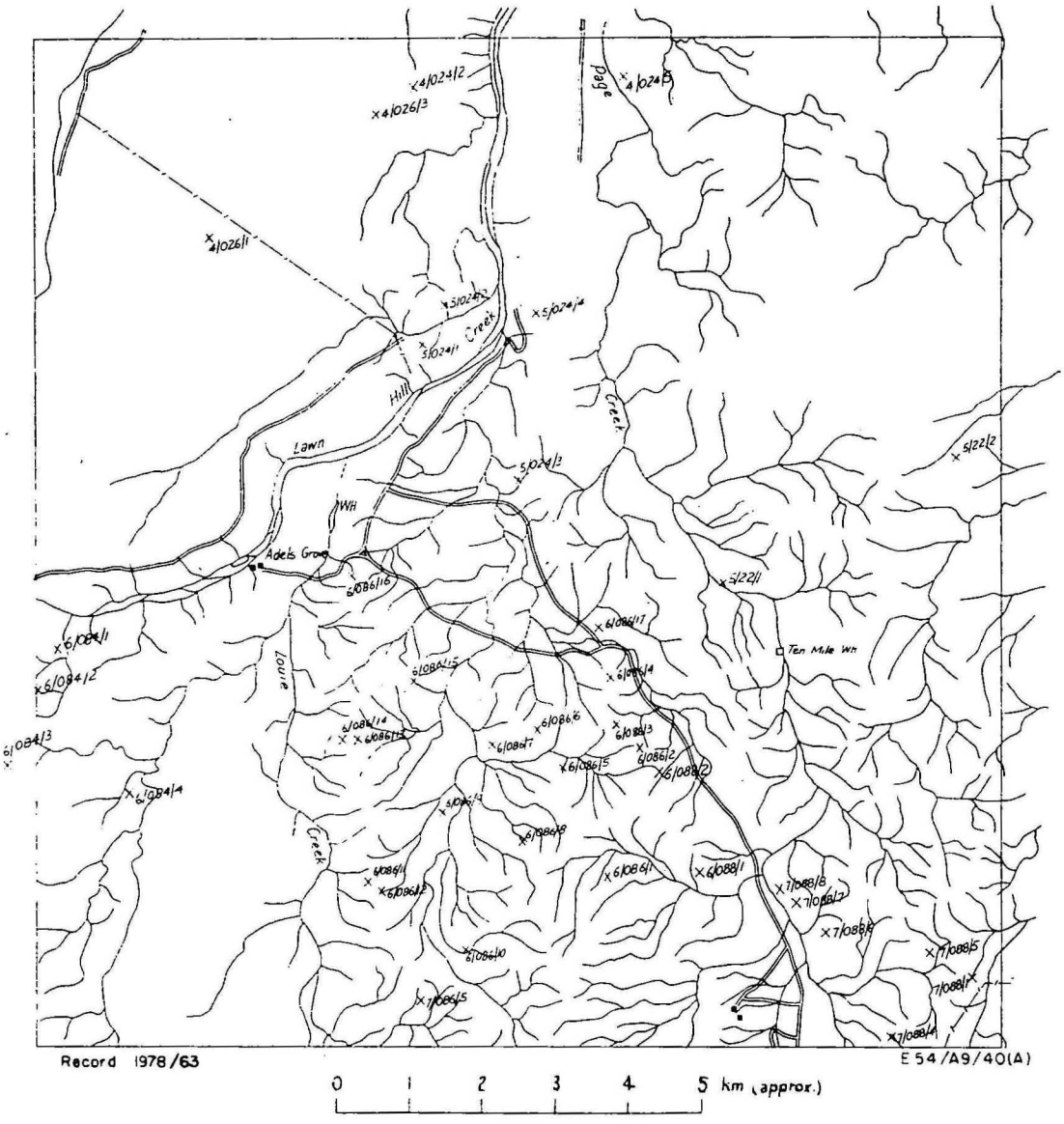
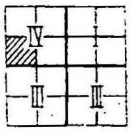
Fig. 7



Lawn Hill

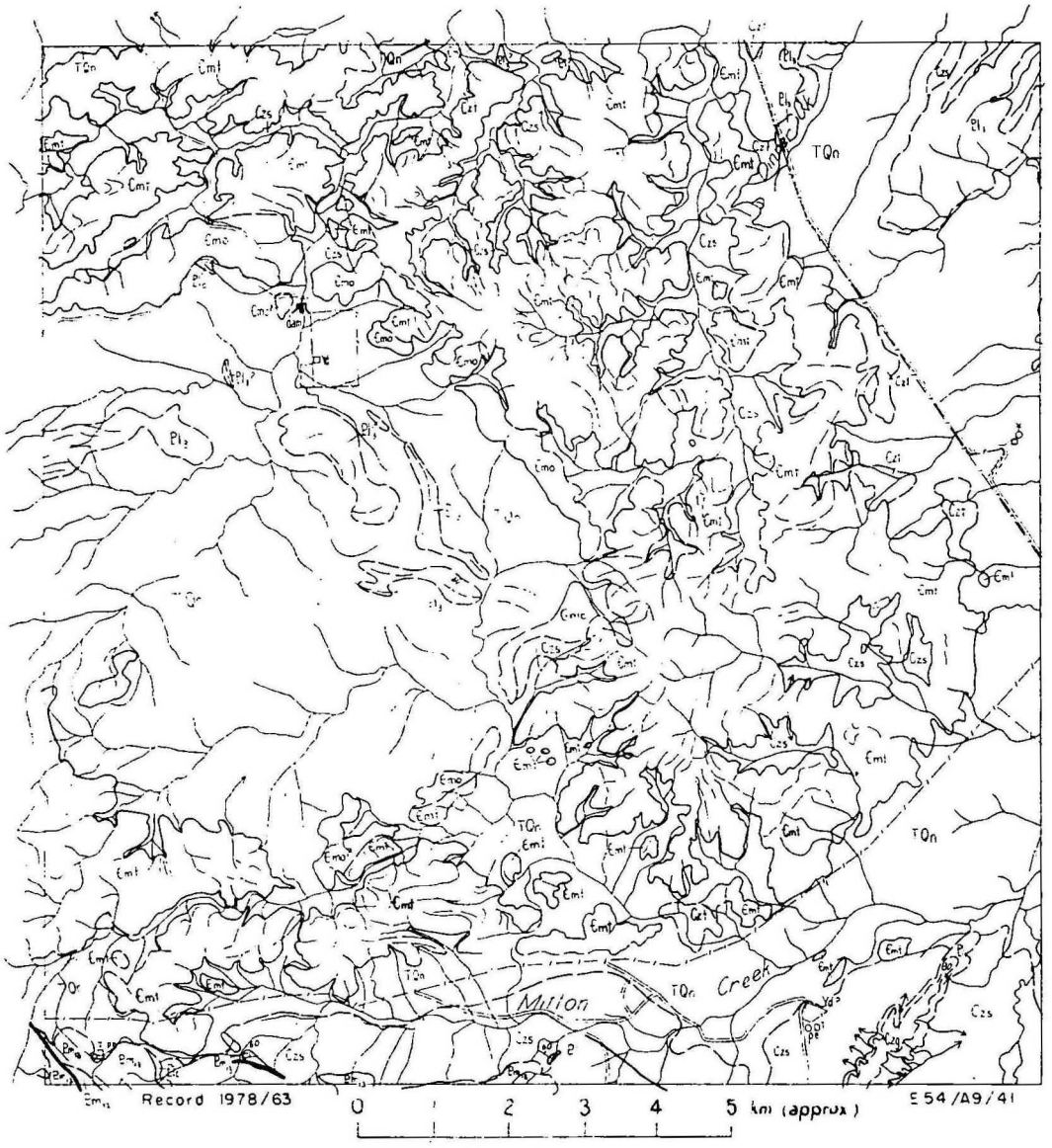




Lawn Hill

Fig 7a

RUN 7 0088
L H



RUN 7 0094
L.H.

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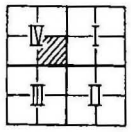
Fig. 8



LAWN HILL

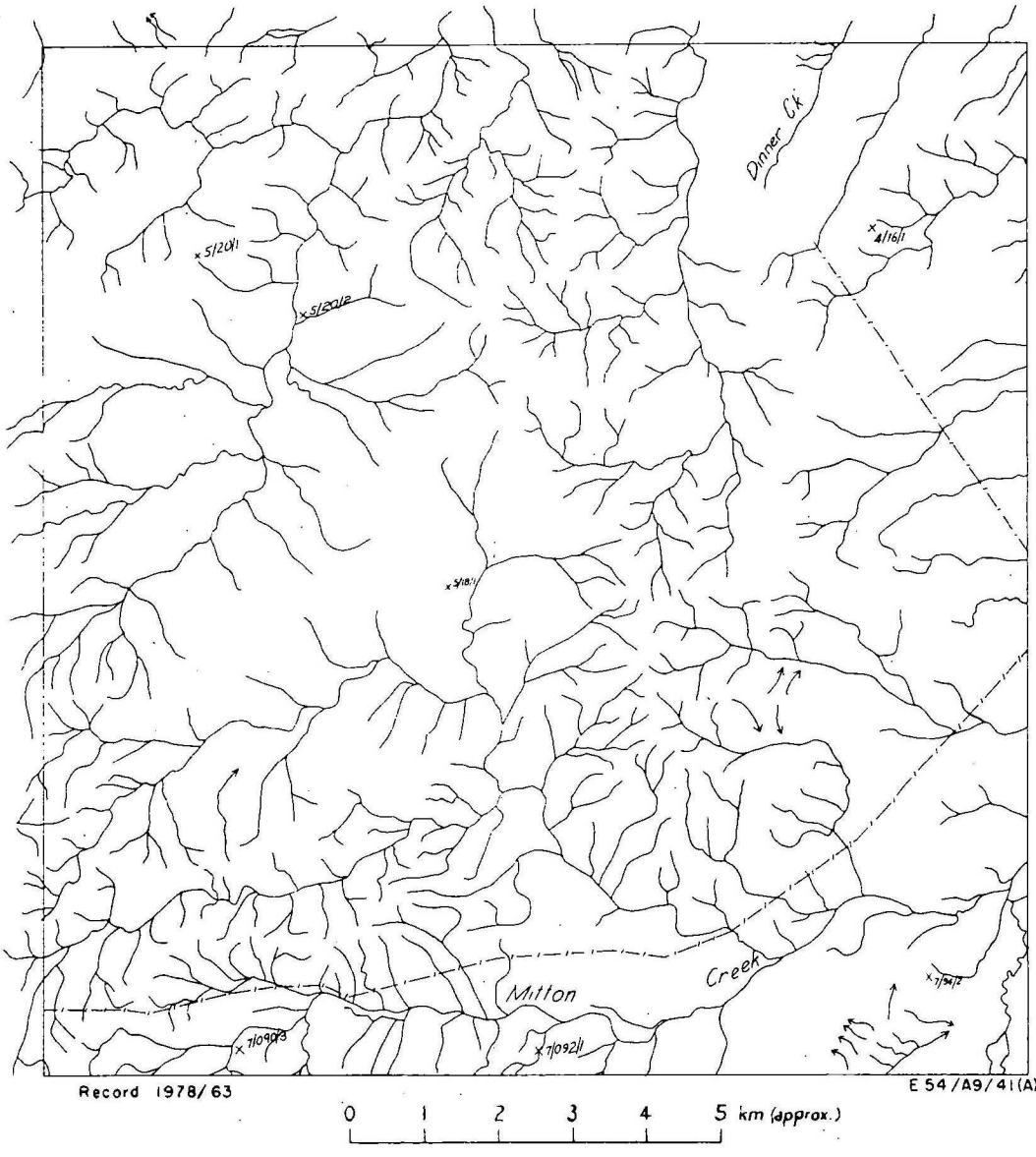
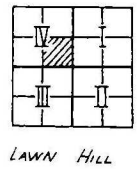
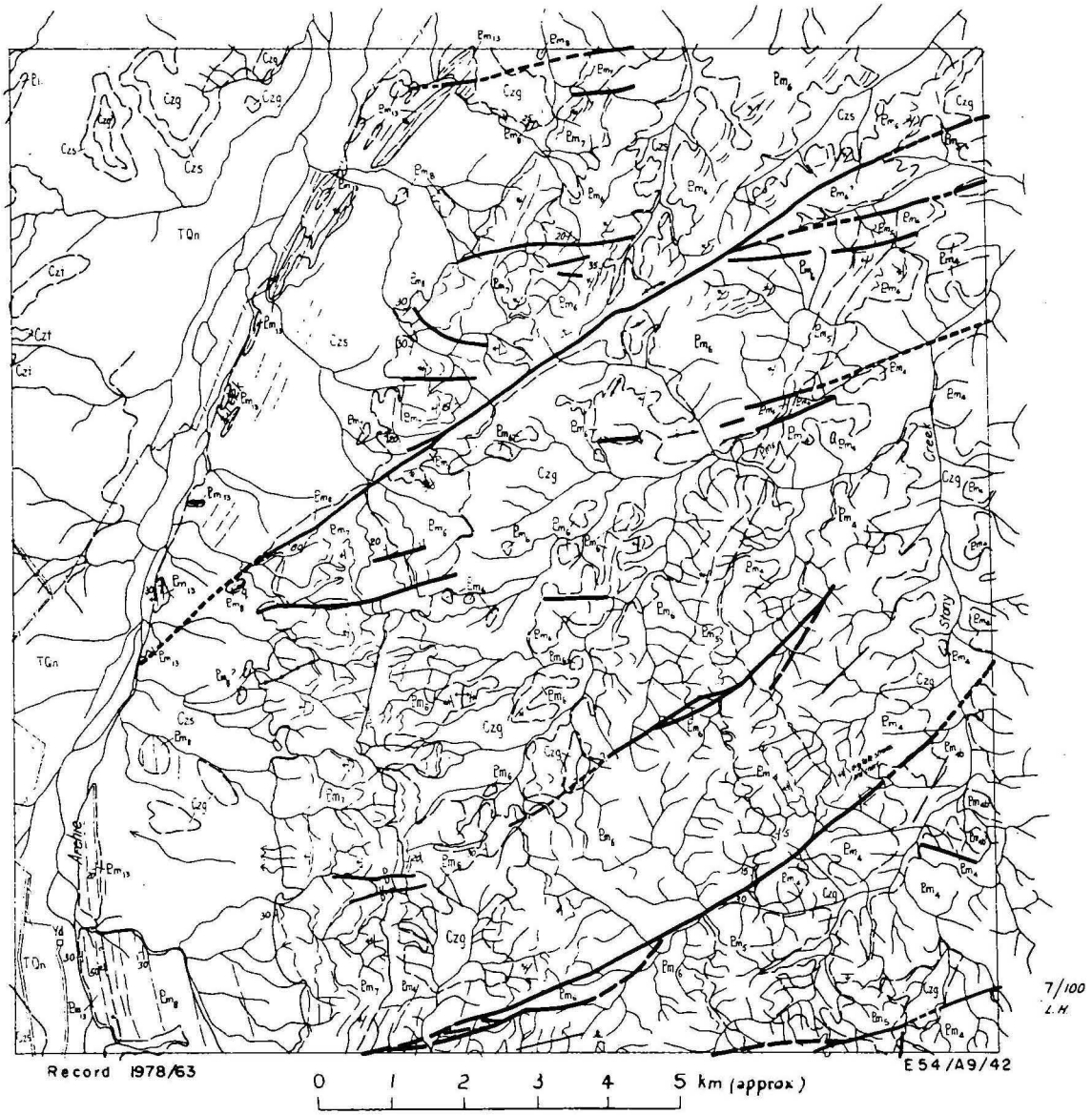


Fig. 8a

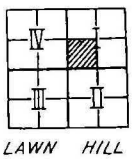


LAWN HILL



RUN 7 0094
L. H

Geology 1976-77 by I. P Sweet (BMR), L J Hutton (GSQ)
Drawn 1976-77 by J. Mitsud
Fig 9



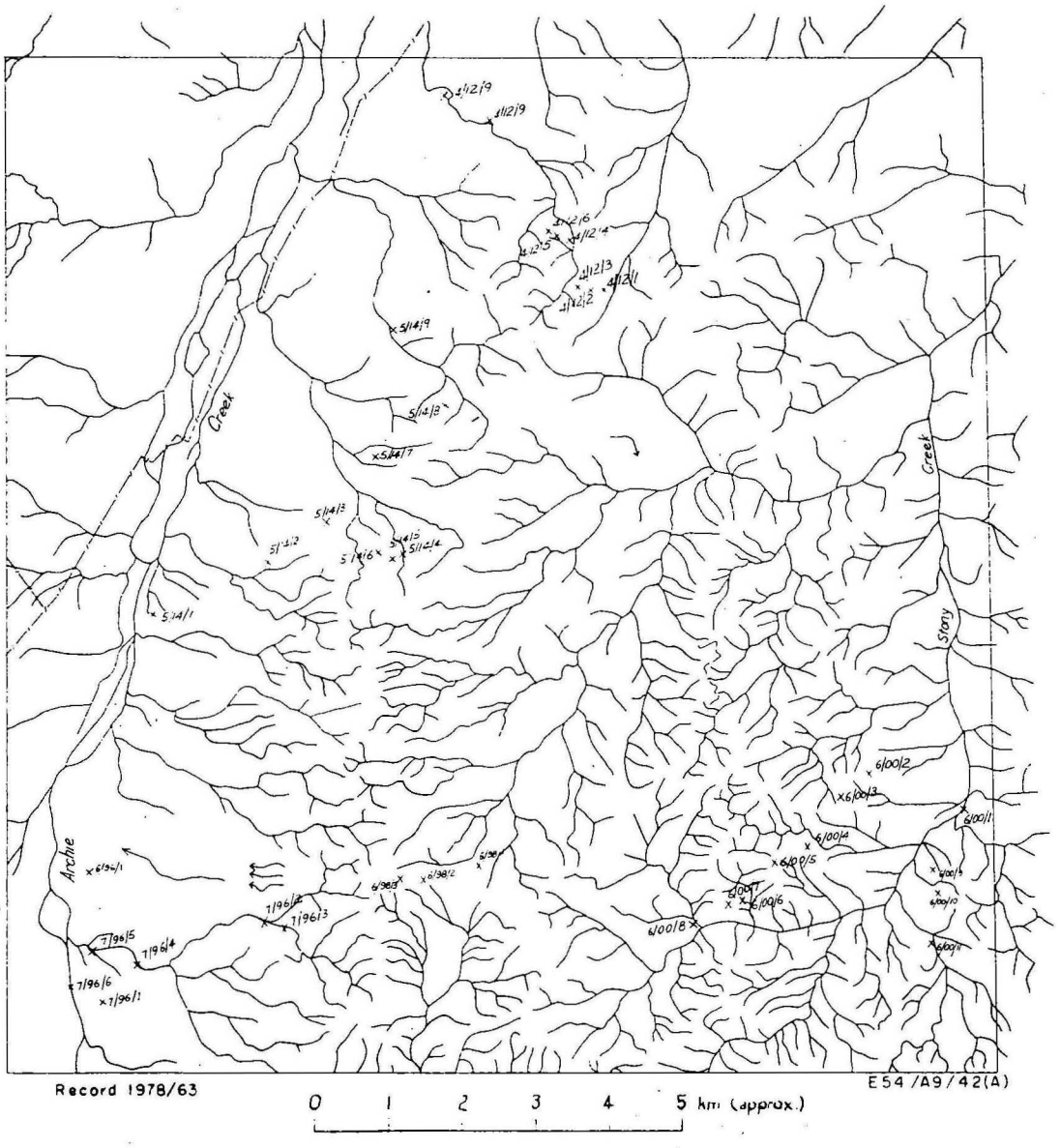
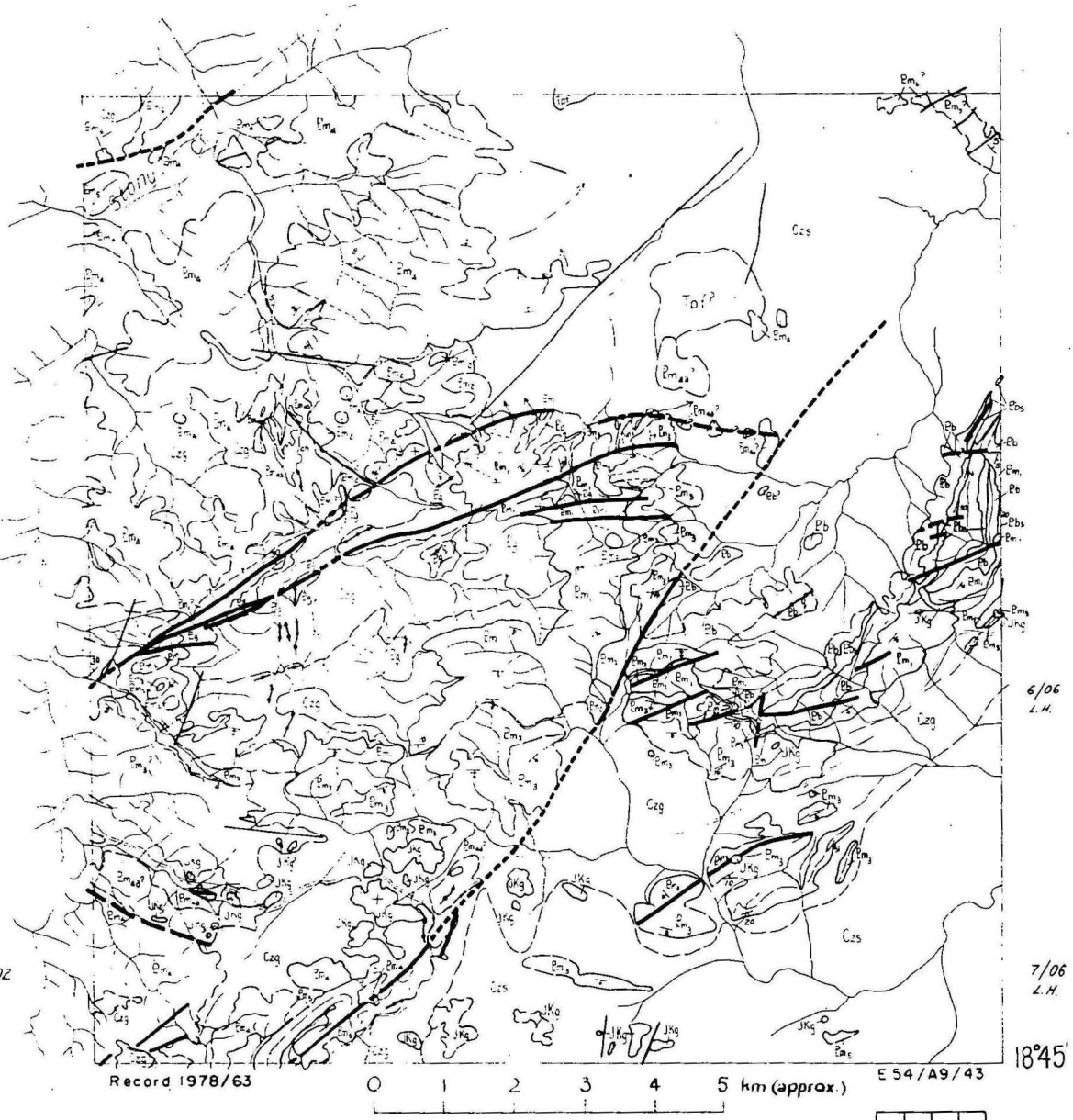

Creek
Creek
Stony
Archie
Record 1978/63
E54/A9/42(A)
0 1 2 3 4 5 km (approx.)
LAWN HILL

Fig 9a



Geology 1976-77 by I.P Sweet (BMR), L J Hutton (GSQ)
Drawn 1976-77 by J Mitsud (BMR)
Fig. 10

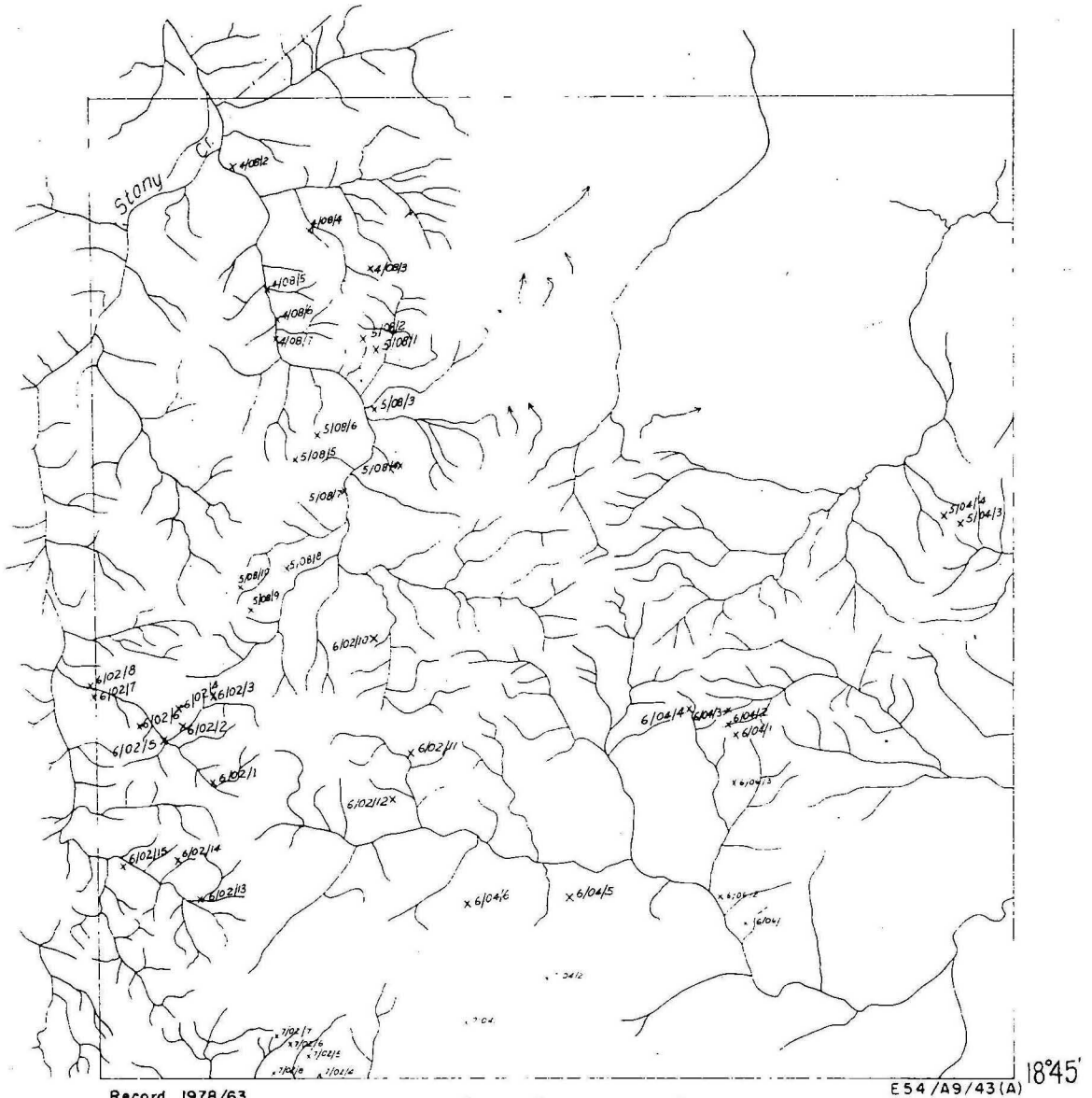

Stony Ck.
4/08/12
4/08/4
4/08/13
4/08/5
4/08/6
4/08/7
5/08/12
5/08/11
5/08/3
5/08/6
5/08/5
5/08/10
5/08/7
5/08/8
5/08/9
5/08/10
6/02/10
6/02/8
6/02/7
6/02/6
6/02/3
6/02/5
6/02/2
6/02/1
6/02/11
6/02/12
6/02/15
6/02/14
6/02/13
6/04/6
6/04/5
5/04/4
5/04/3
6/04/4
6/04/3
6/04/2
6/04/1
7/02/7
7/02/6
7/02/5
7/02/8
7/02/12
18°45'
Record 1978/63
E54/A9/43(A)
0 1 2 3 4 5 km (approx.)
LAWN HILL
IV
I
III
II

Fig. 10a

RUN 7 0084
L.H

RUN 8 0004
L.H

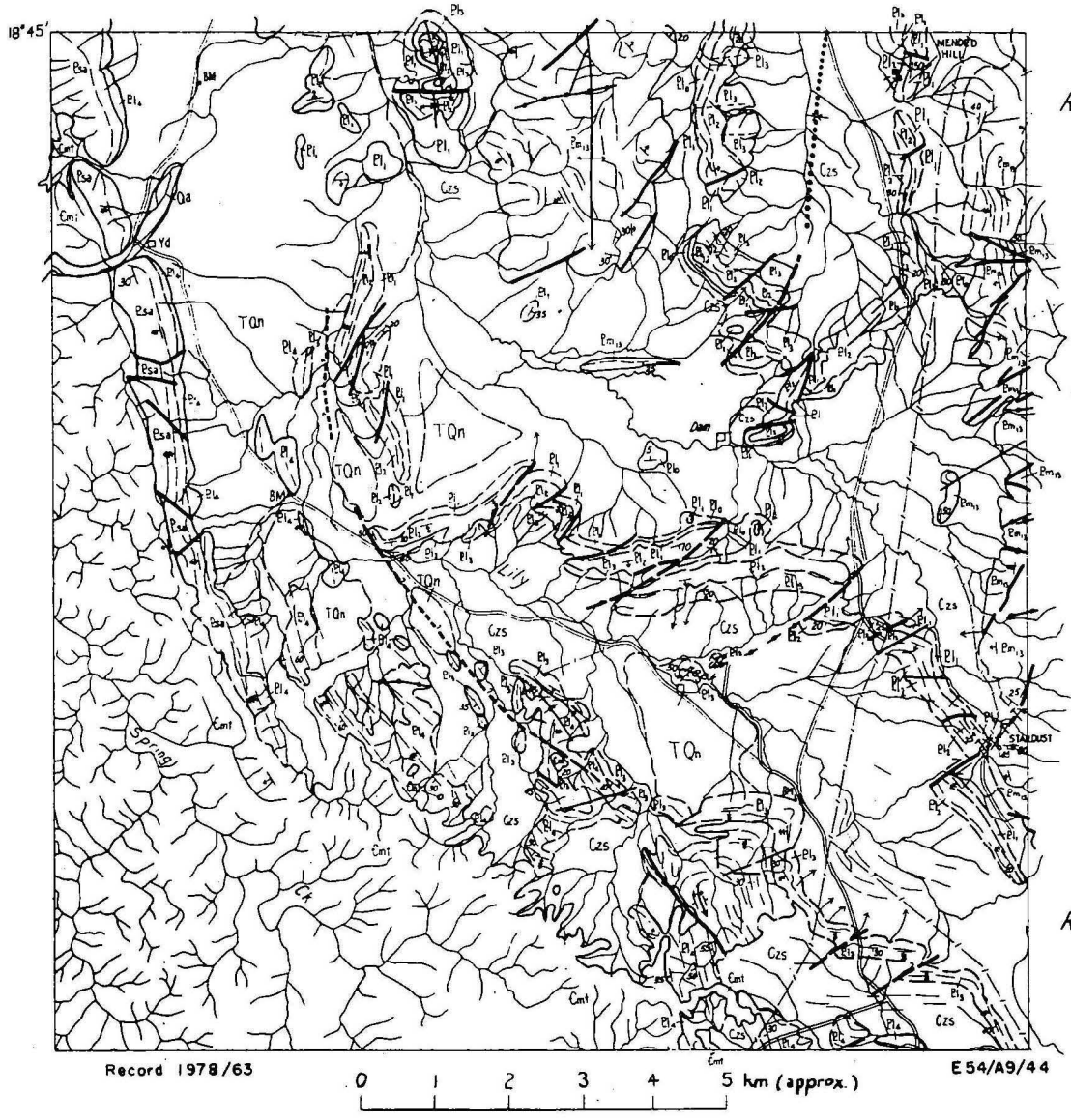
RUN 9 0058
L.H

RUN 7 0088
L.H

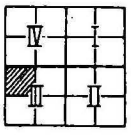
RUN 8 0010
L.H.

RUN 9 0052
L.H.

RUN 10 0070
L.H.



Geology 1976-77 by I P Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J Milsud (BMR)
Fig. 11



LAWN HILL

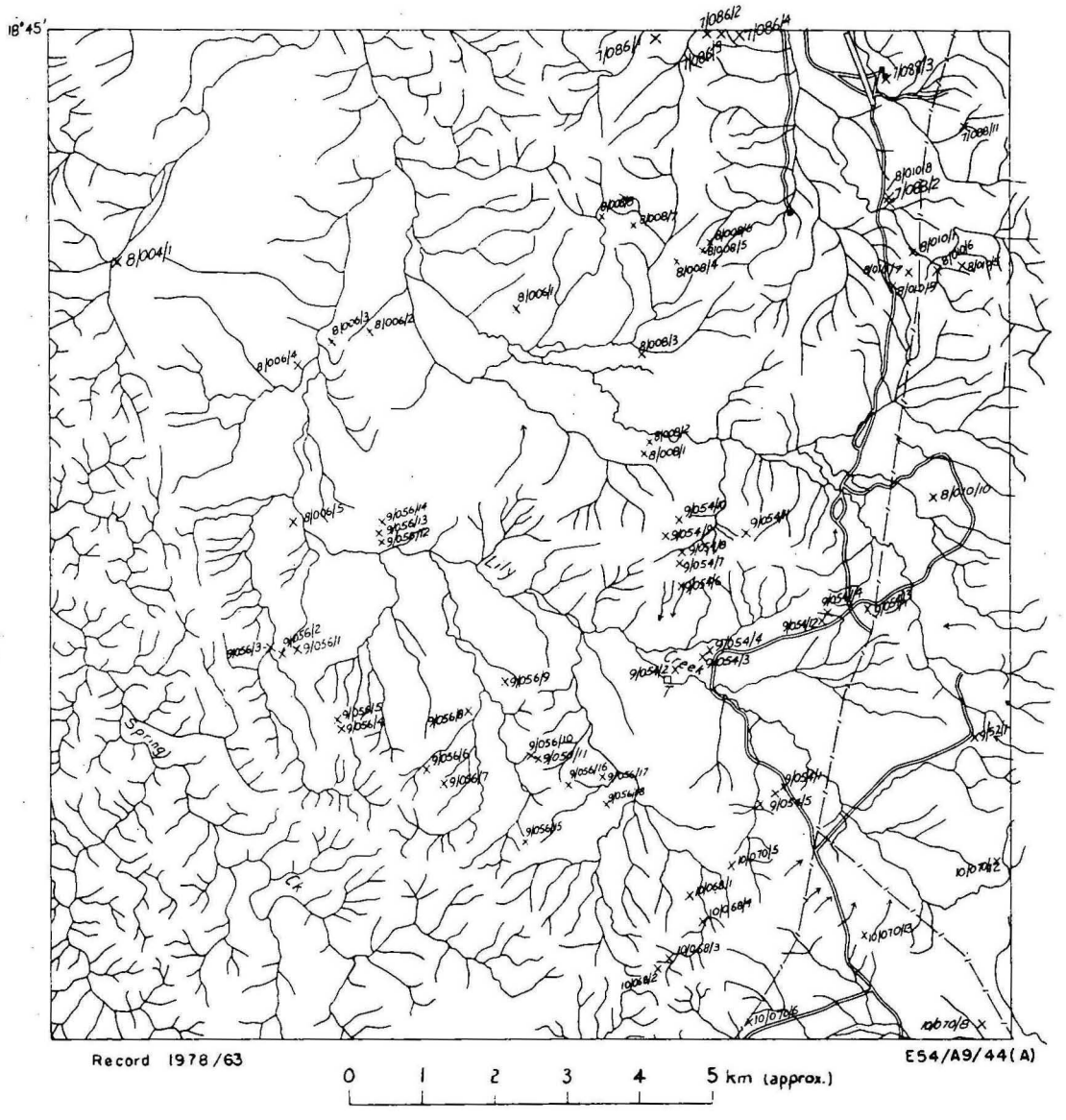

18°45'
Record 1978/63
E54/A9/44(A)
0 1 2 3 4 5 km (approx.)
Lily
Creek
Spring
Ck
LAWN HILL

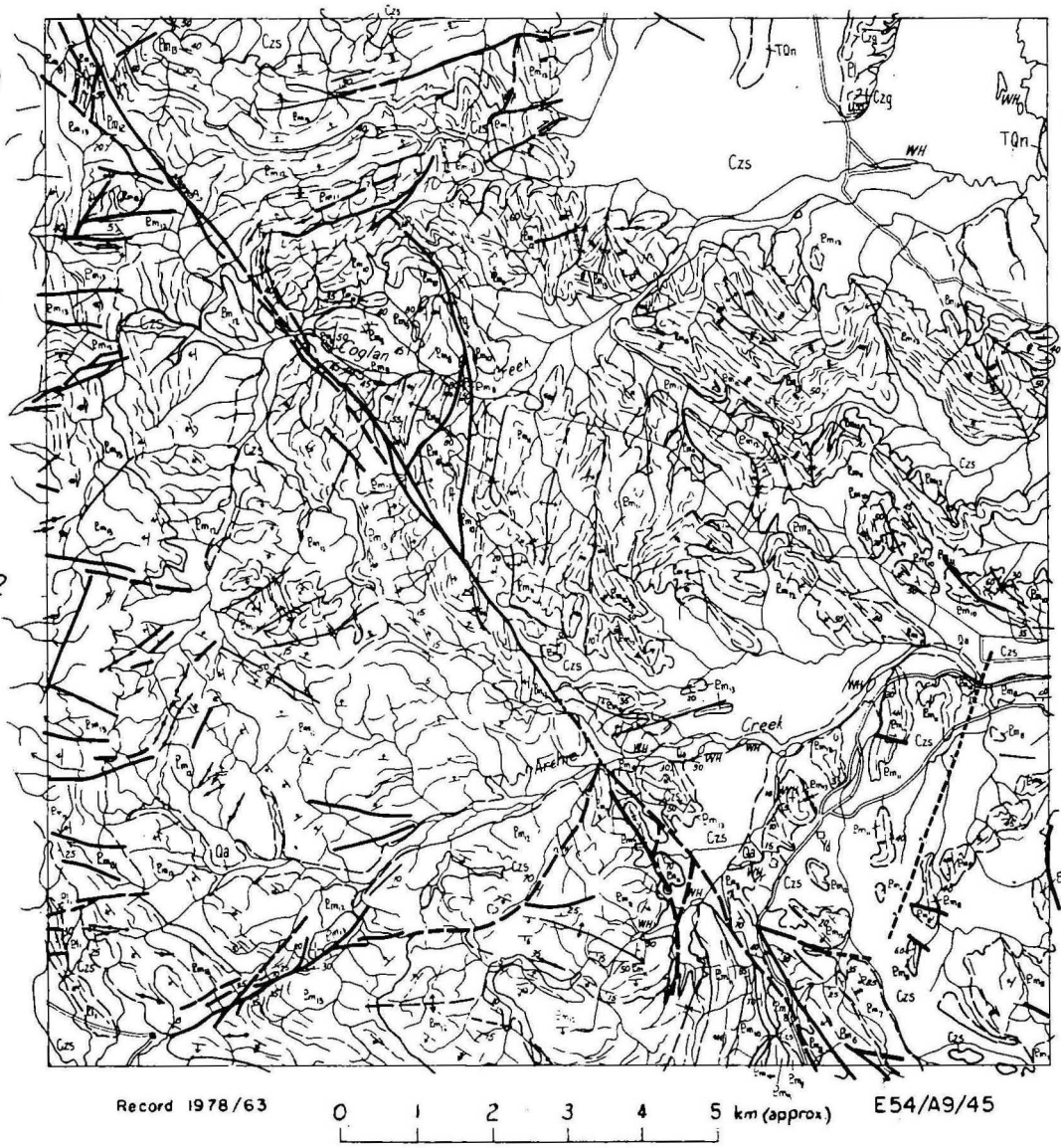
Fig. 11a

RUN 7 0088
L.H

RUN 8 0010
L.H.

RUN 9 0052
L.H.

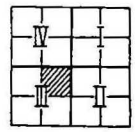
RUN 10 0070
L.H.



RUN 7 0094
L.H

RUN 10 0076
I.S.

Geology 1976-77 by I.P. Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J. Mifsud (BMR).
Fig 12



LAWN HILL

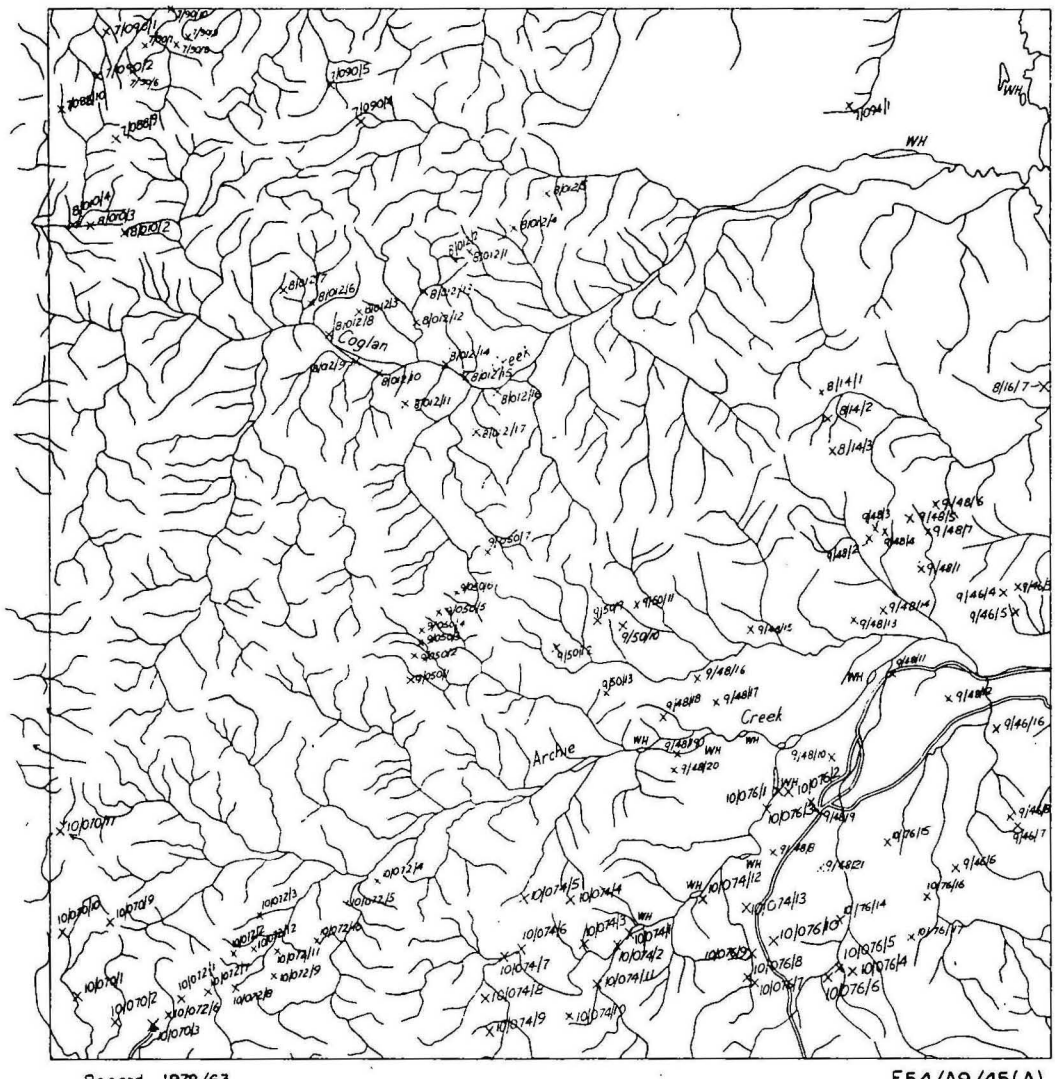
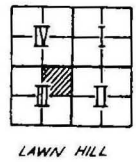
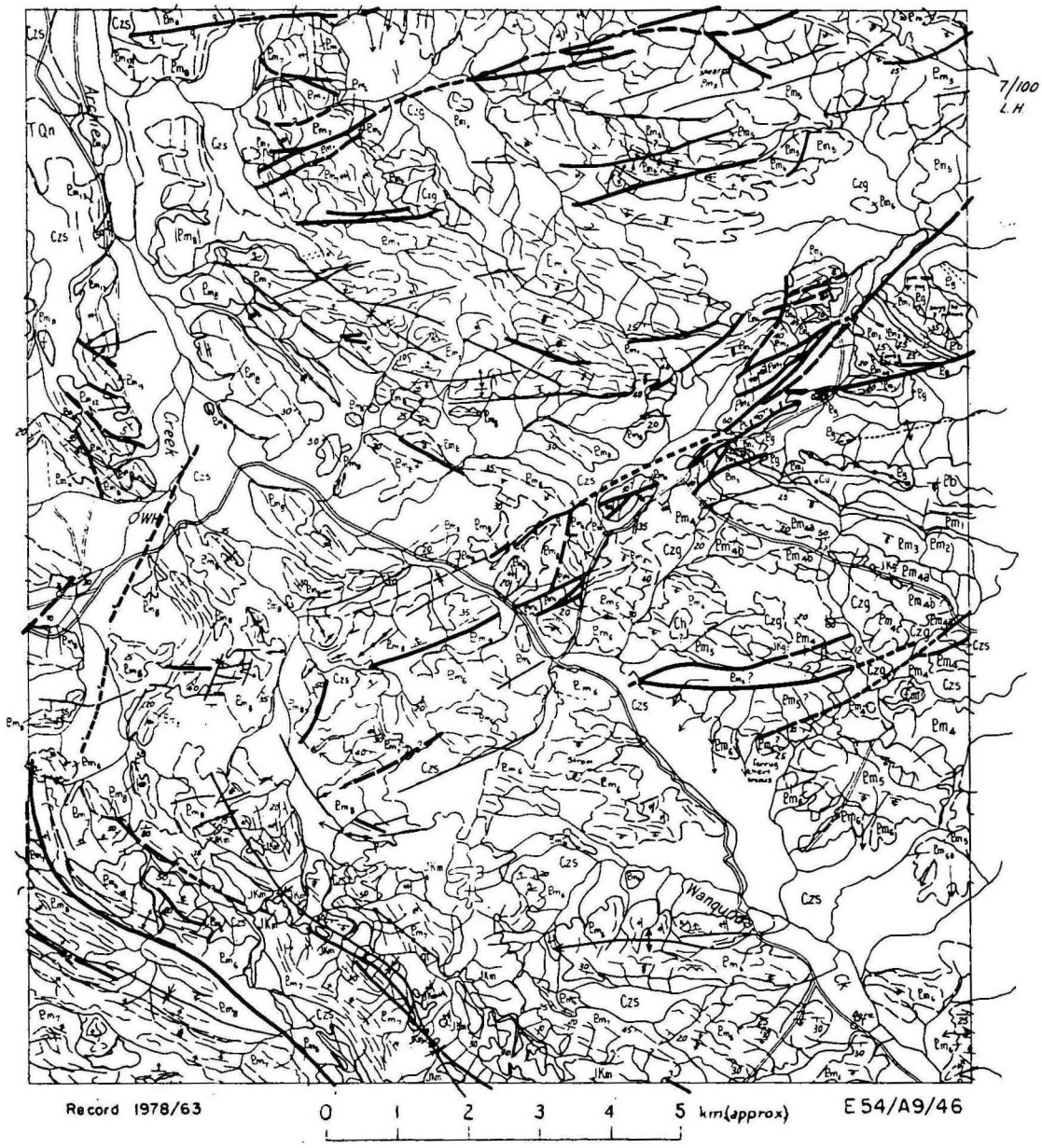


Fig. 12a



LAWN HILL

RUN 7 0094
L.H.



Geology 1976-77 by I.P. Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J. Mifsud (BMR)

Fig. 13

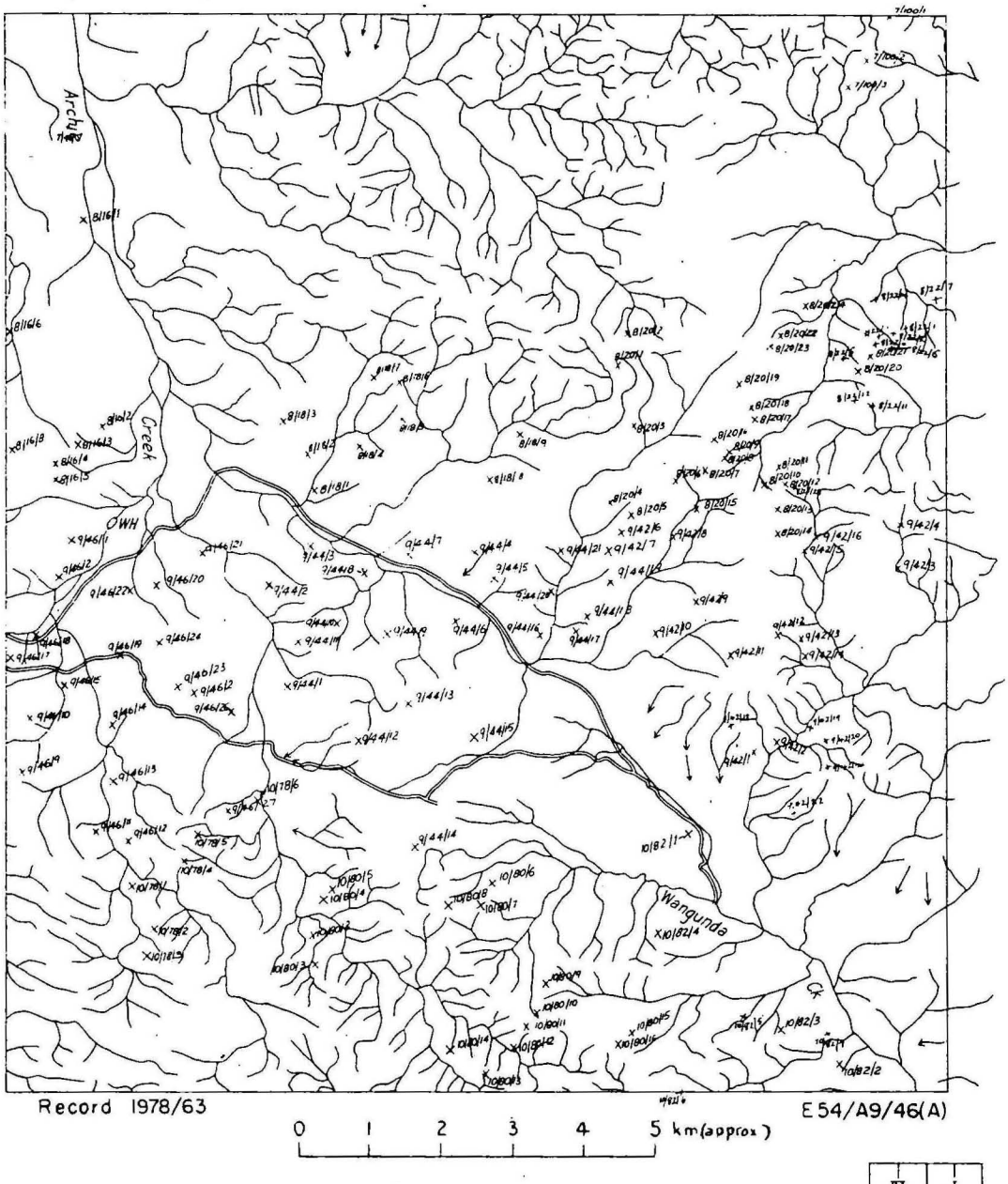

Archy
Creek
OWH
Wangunda
Record 1978/63
E54/A9/46(A)
0 1 2 3 4 5 km(approx)
LAWN HILL

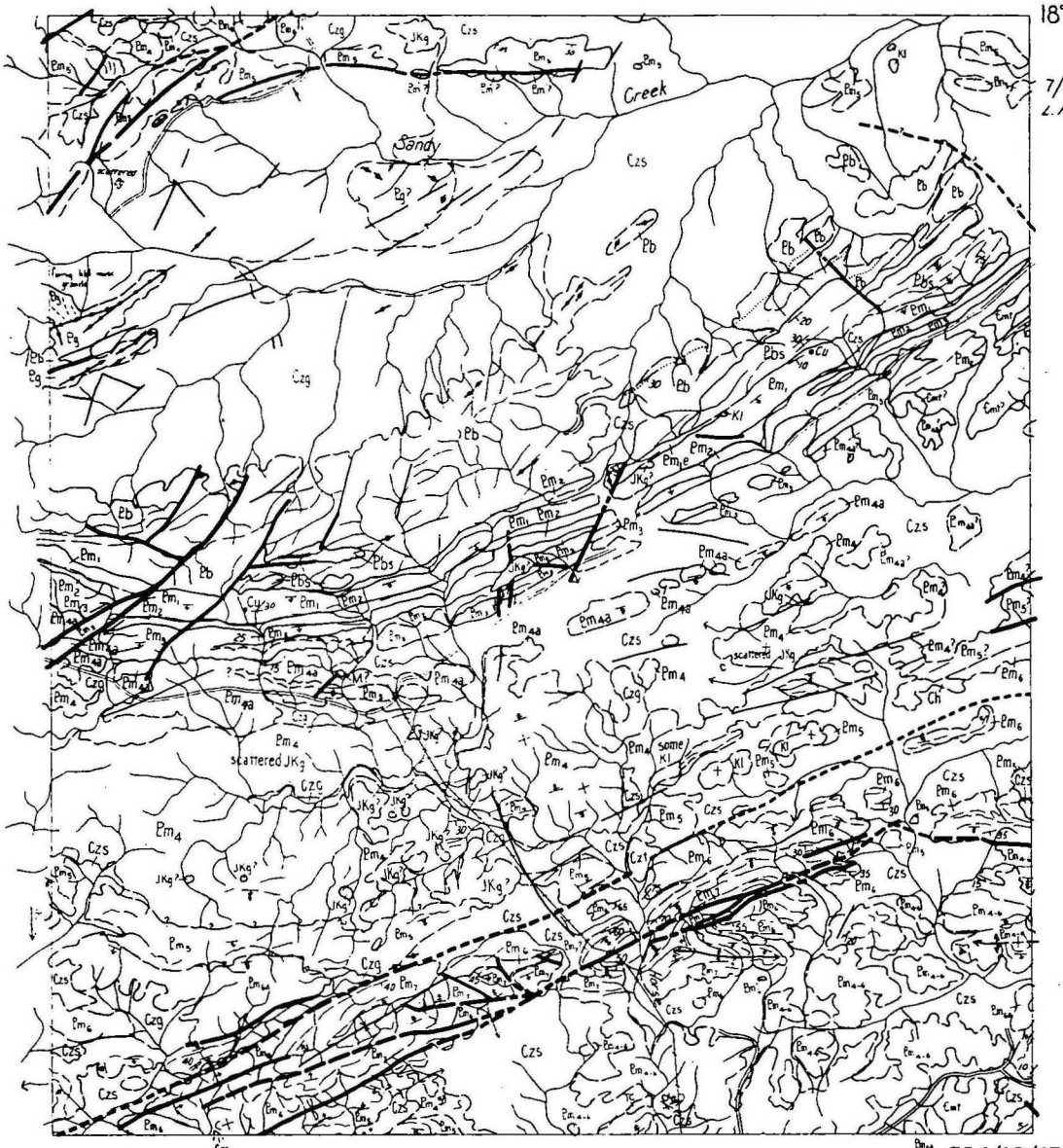
Fig. 13a

RUN 7 102
L H

RUN 8 0022
L. H.

18° 45'

7/06
L.H.

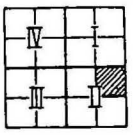


Record 1978/63

0 1 2 3 4 5 km.(approx.)

E54/A9/47

Geology 1976-77 by I.P. Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J. Mifsud (BMR)
Fig 14



LAWN HILL

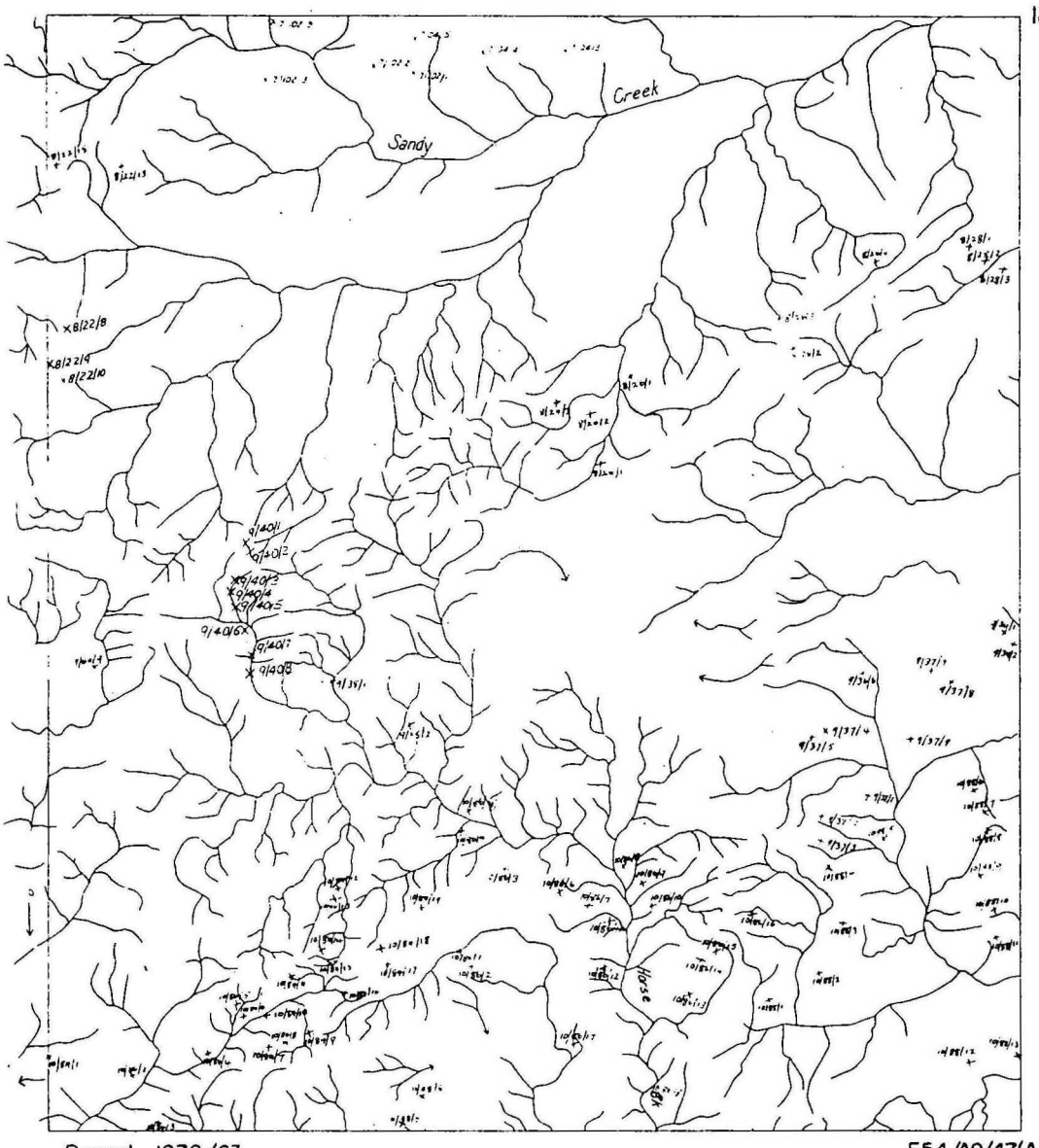
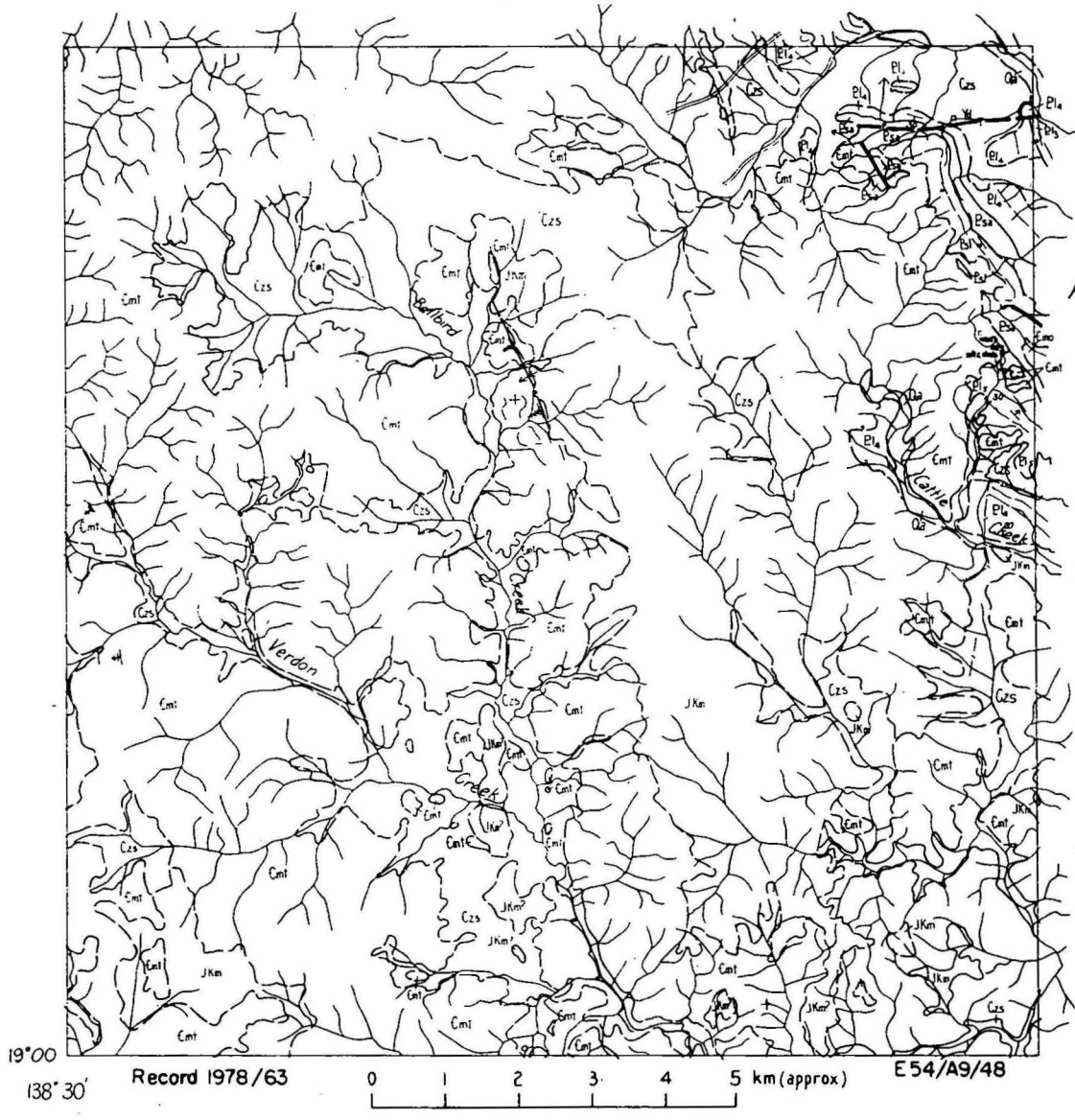
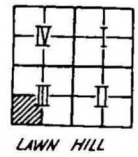

18° 45'
Sandy
Creek
Horse
Record 1978/63
E54/A9/47(A)
0 1 2 3 4 5 km (approx.)
LAWN HILL

Fig. 14 a



Geology 1976-77 by I.P.Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J Mifsud (BMR)
Fig 15



LAWN HILL

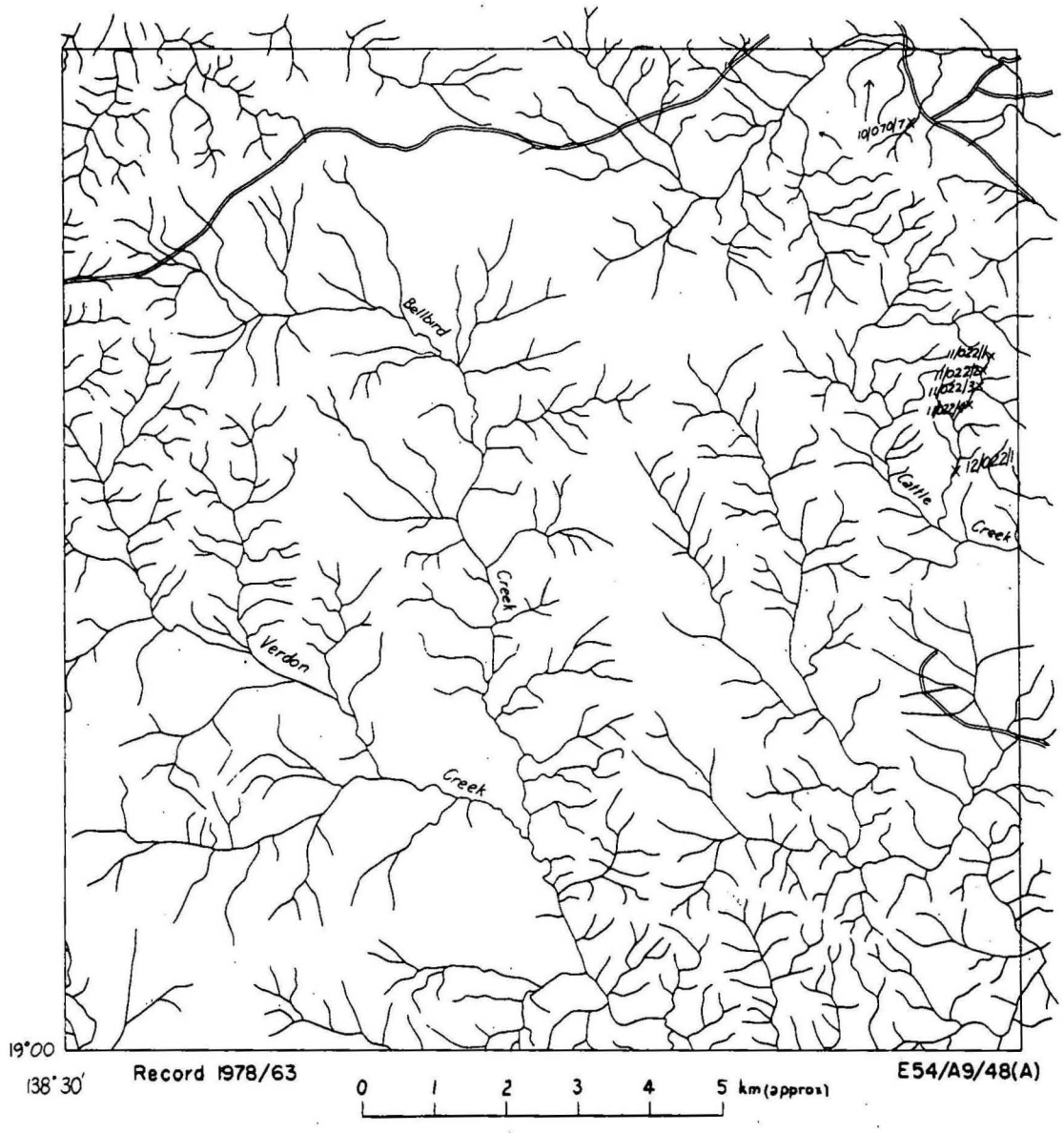
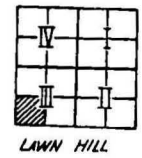
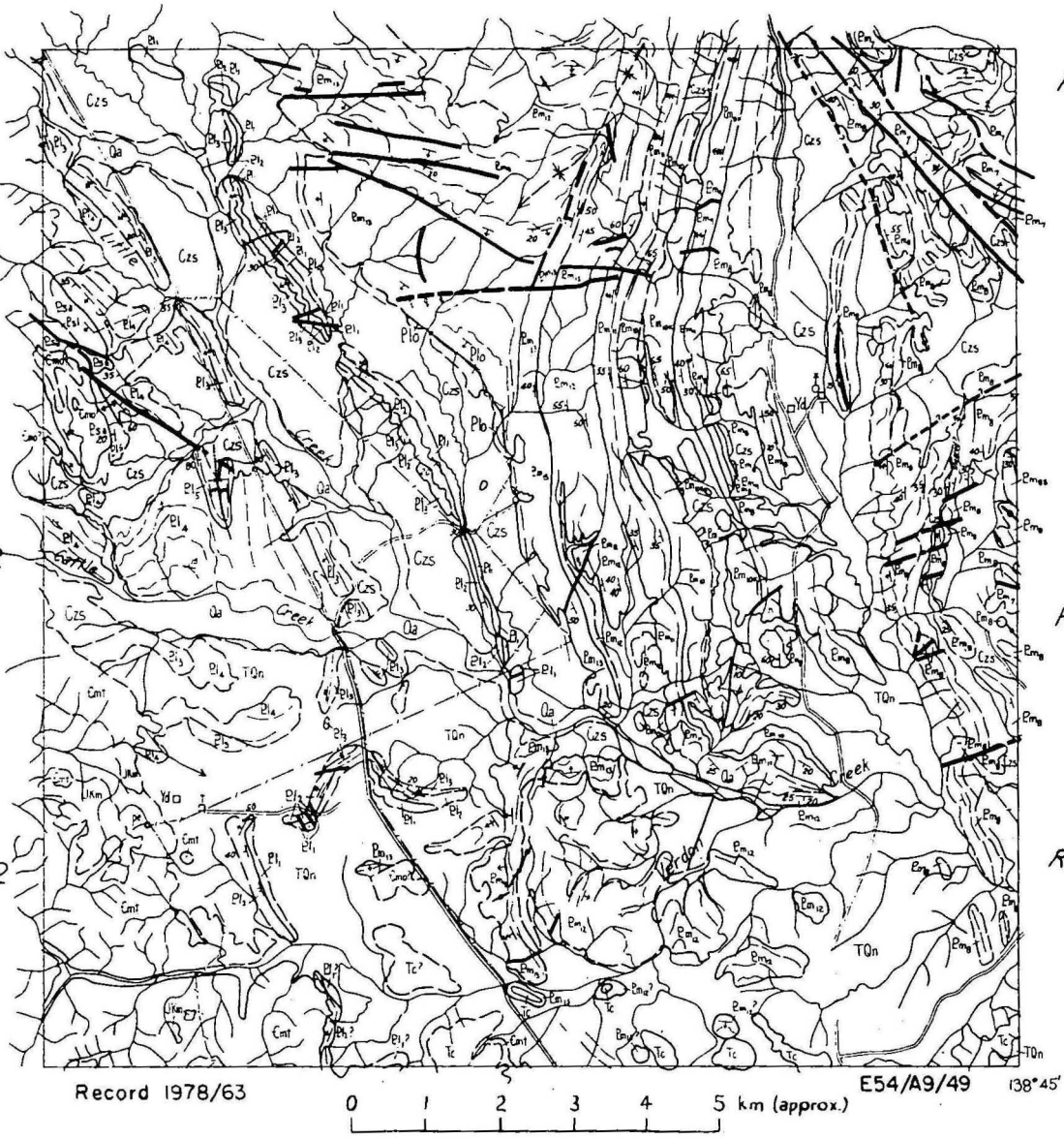
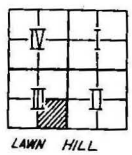

Bellbird
Creek
Verdon
Creek
Creek
Creek
19°00
138°30'
Record 1978/63
0 1 2 3 4 5 km (approx)
E54/A9/48(A)

Fig. 15a


IV
III
II
LAWN HILL



Geology 1976-77 by I.P. Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J. Mifsud (BMR)
Fig 16



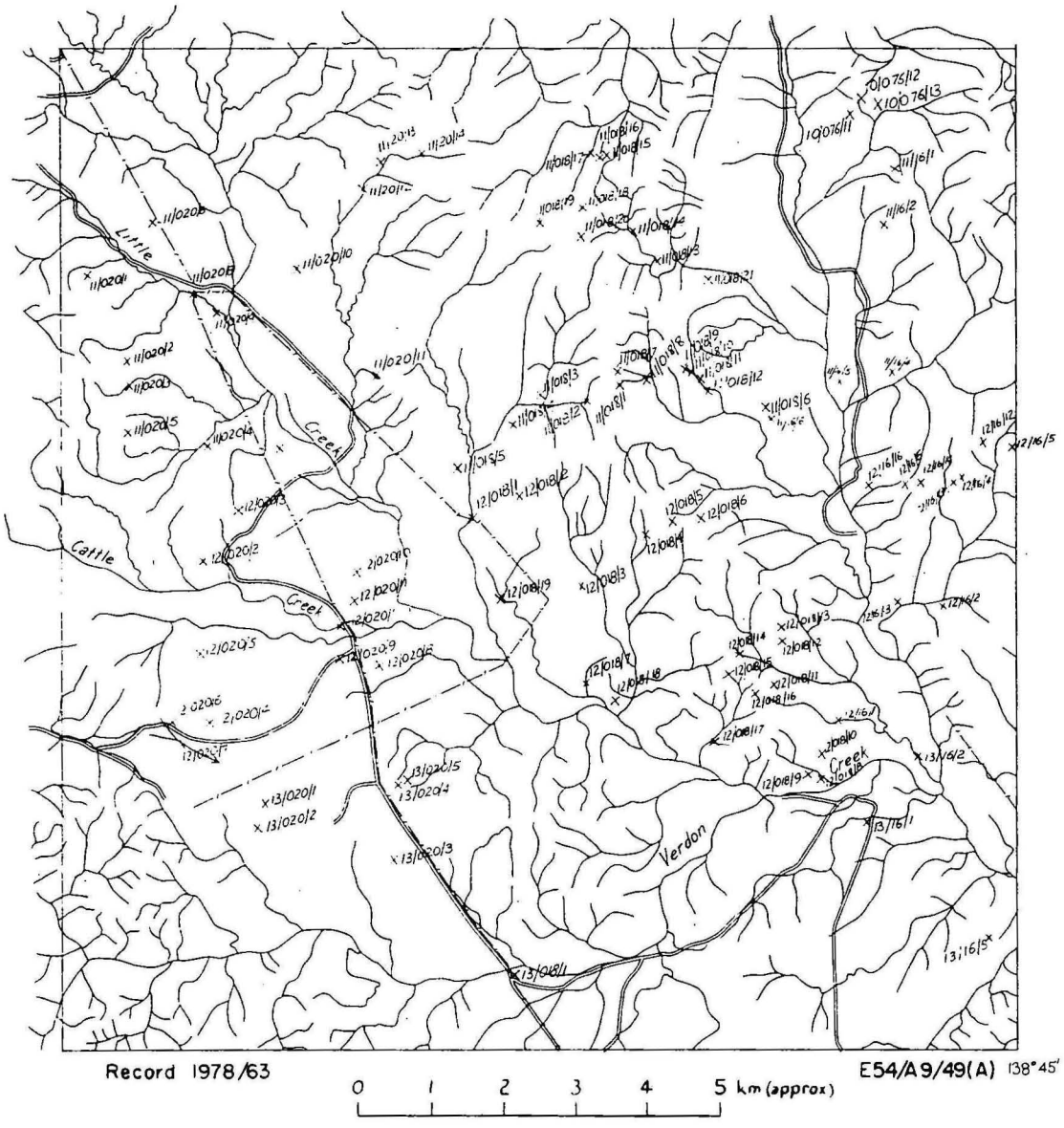
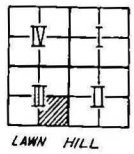
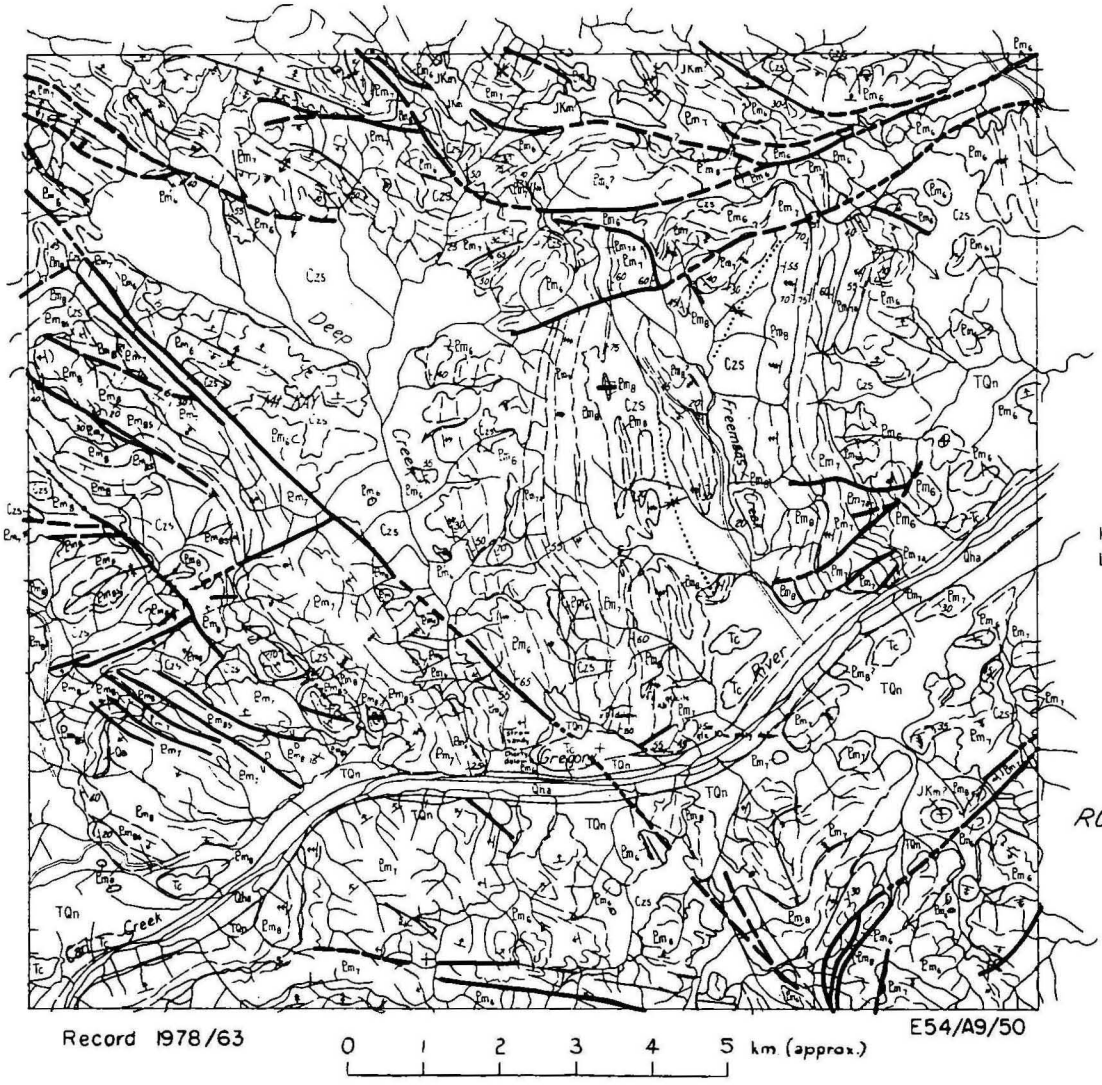

Little
Creek
Cattle
Creek
Creek
Verdon
Record 1978/63
E54/A9/49(A)
138°45'
0 1 2 3 4 5 km (approx)

Fig. 16a


IV
I
III
II
LAWN HILL

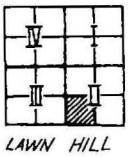
RUN 11 0010



RUN13 0016
L H

RUN 13 0010
L H

Geology 1976-77 by I.P. Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J. Mifsud (BMR)
Fig 17



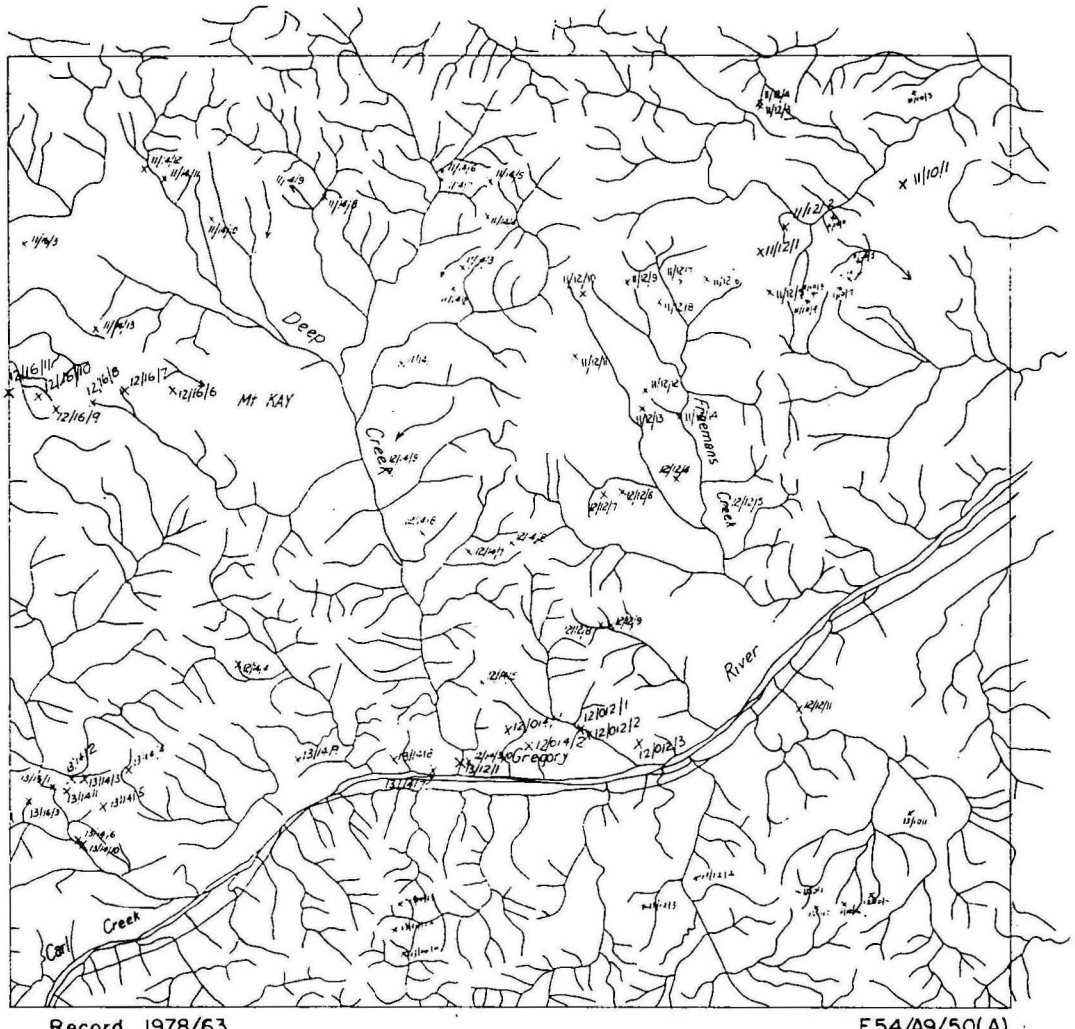
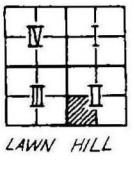
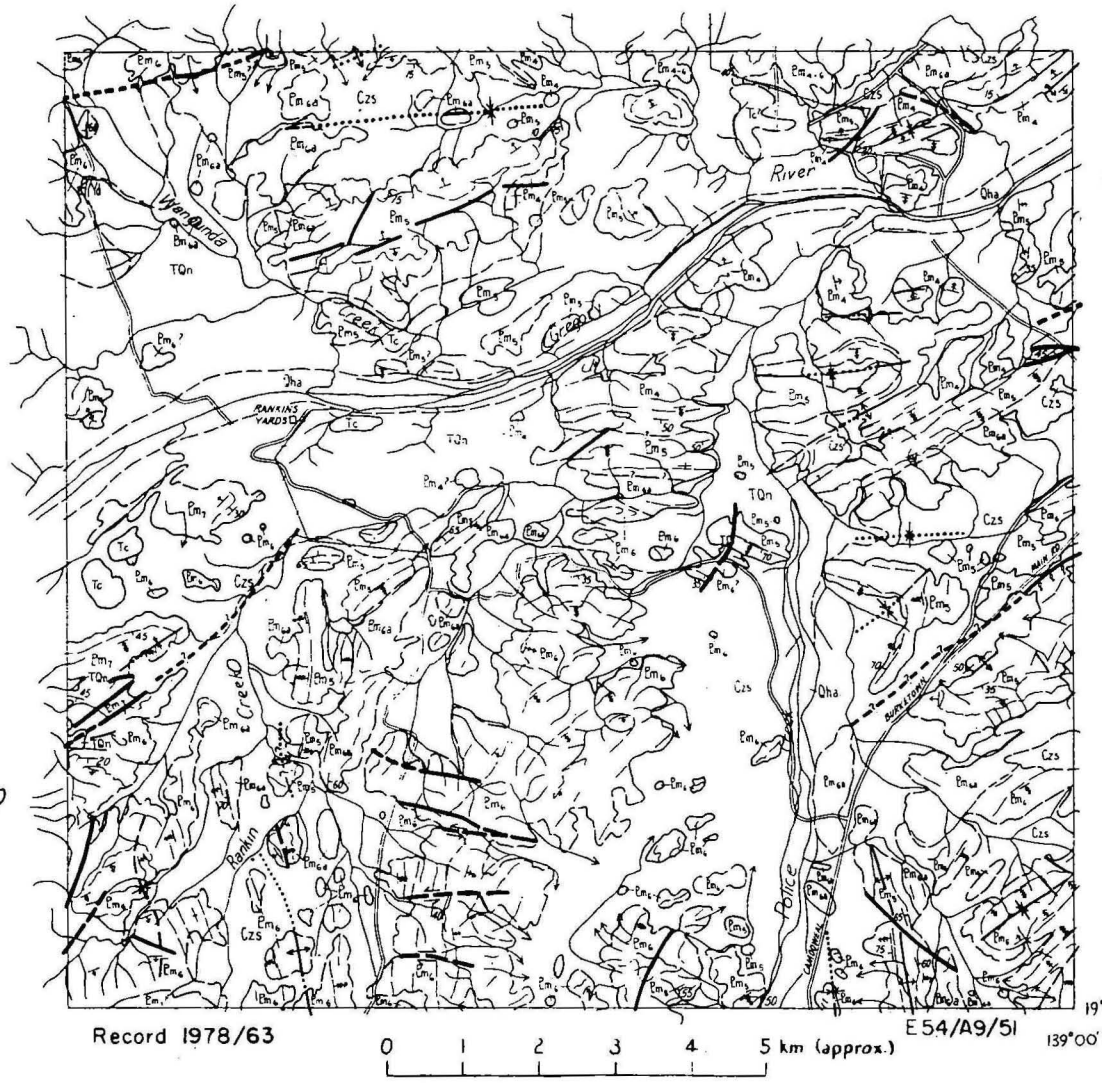
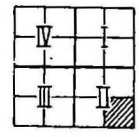

Deep
Creek
Mt KAY
Freemans
Creek
River
Gregory
Creek
Record 1978/63
E54/A9/50(A)
0 1 2 3 4 5 km (approx)

Fig 17a


IV
I
III
II
LAWN HILL



Geology 1976-77 by I.P Sweet (BMR), L.J. Hutton (GSQ)
Drawn 1976-77 by J. Mifsud (BMR)
Fig 18



LAWN HILL

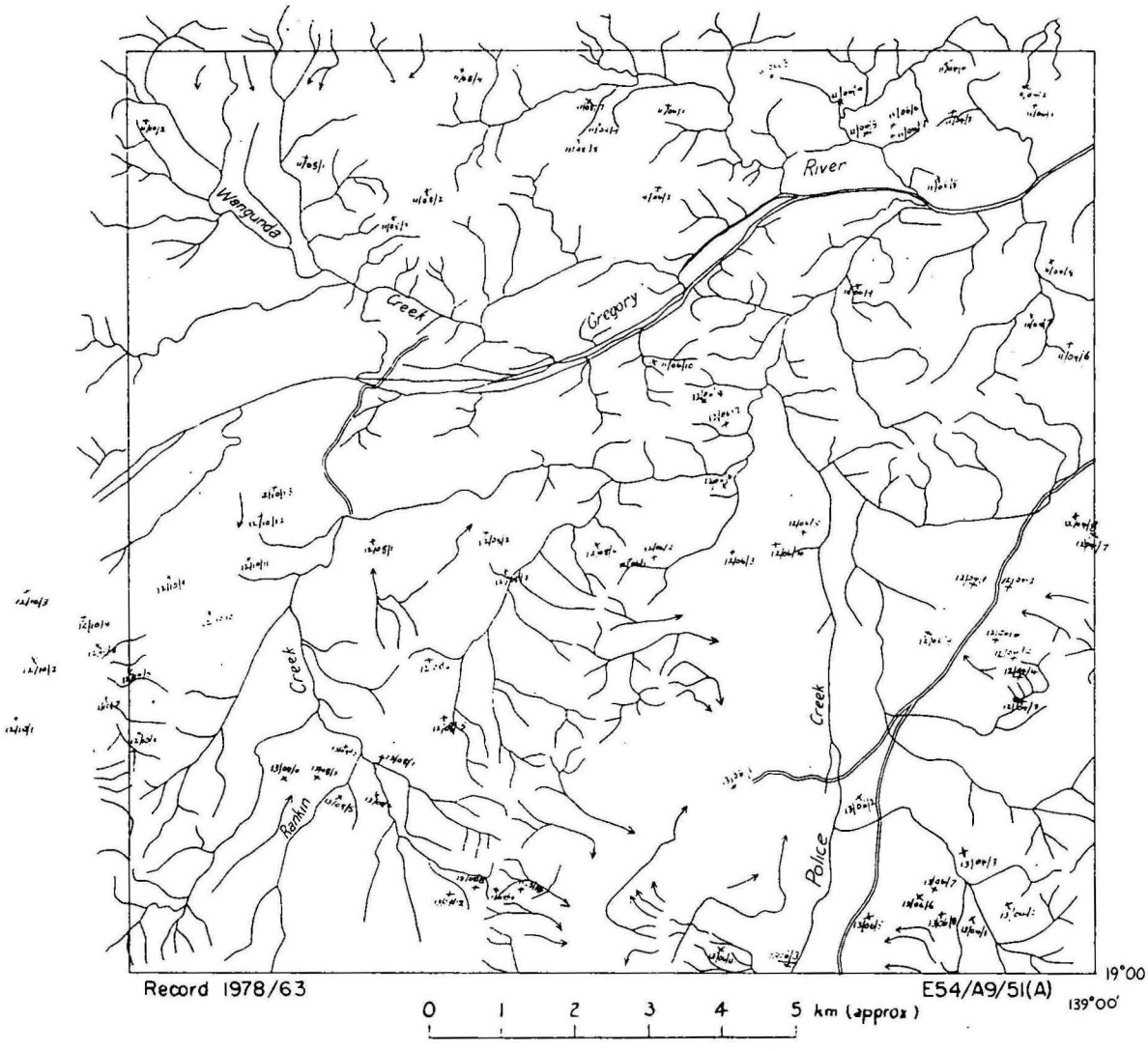
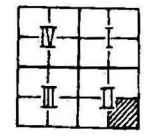


Fig 18a



LAWN HILL