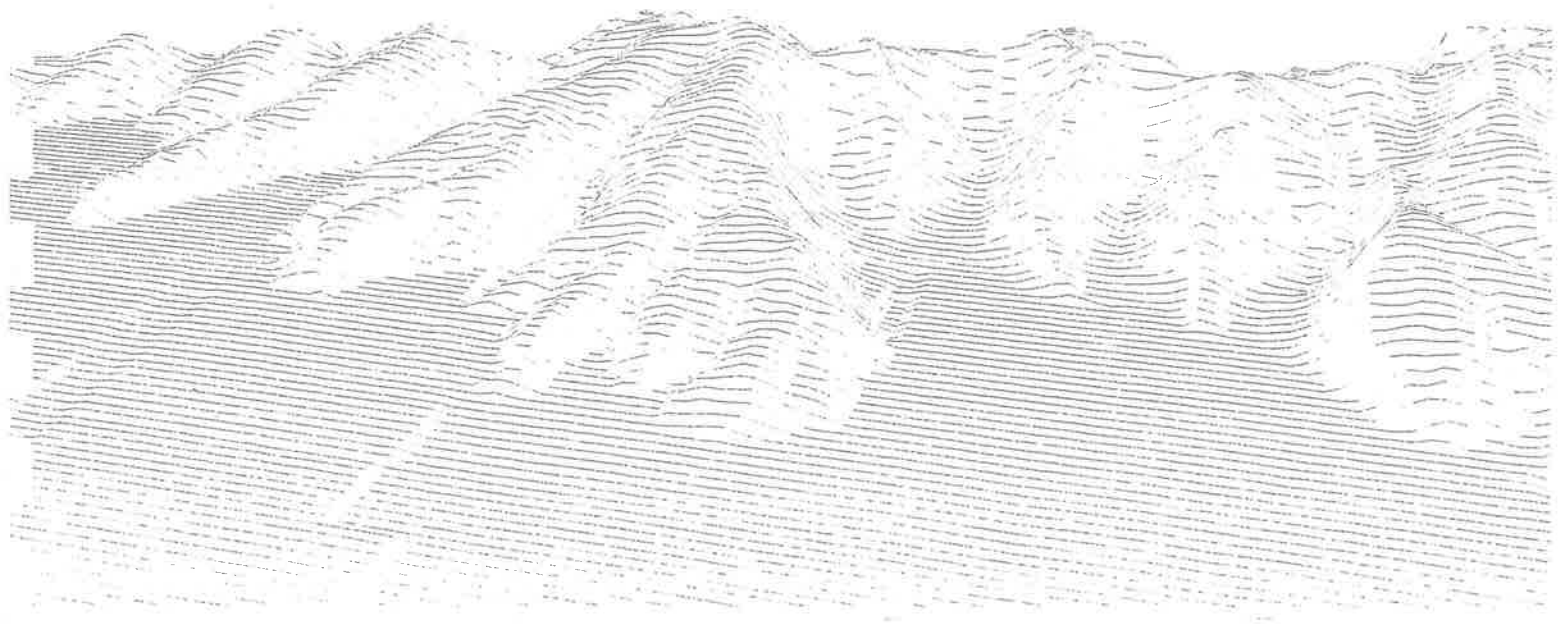




Manaaki Whenua
Landcare Research
NEW ZEALAND LTD

New Zealand Land Resource Inventory Arc/Info Data Manual Edition 1, May 1992

P.F.J. Newsome



NEW ZEALAND LAND RESOURCE INVENTORY
ARC/INFO DATA MANUAL
EDITION 1, MAY 1992

P.F.J. Newsome

DSIR Land Resources

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DSIR Land Resources

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Typed by Tessa Roach

CONTENTS

	Page
1. INTRODUCTION	6
2. THE NEW ZEALAND LAND RESOURCE INVENTORY (NZLRI)	7
2.1 ATTRIBUTES	7
2.1.1 Pre-declared Items	8
AREA	9
PERIMETER	10
COVER#	11
COVER-ID	12
LEGEND	13
LUC	15
ROCK	17
ROCK2	24
SOIL	25
SLOPE	28
EROSION	31
VEG	33
VEG2	37
TYPE	41
AREAH	42
LCORR	43
CCAV, CCTO, CCPO	45
PRSIC	46
PRSIR	48
PRSIIV	49
TOPROCK	50
BASEROCK	51
DOMSOI	53
GENSOI	54
NZGSOIGRP	55
PHAAV, PHATO, PHAPO	58
PSUAV, PSUTO, PSUPO	59
EDITION	60
POLYID	61
2.2 REFERENCE AND ACKNOWLEDGEMENT OF SOURCE	62
3. REFERENCES	63

1. INTRODUCTION

The New Zealand Land Resource Inventory (NZLRI), is the principal, but not the only, spatial database held on the DSIR, Land Resources, Geographic Information System. Other spatial databases include:

- The Vegetative Cover Map of New Zealand (1:000 000 scale)
- A digital topographic database (1:250 000 scale), held under licence from the Department of Survey and Land Information.
- Various administrative and natural boundary databases (various scales).
- Various soil survey's (various scales).

The NZLRI is however the database which nationally has the greatest coverage (all New Zealand except Stewart Island and outlying islands), at the largest scale (1:63 360-1:50 000), mapping the largest number of attributes (refer overleaf) to nationally consistent standards and classifications. It therefore forms a valuable resource management and planning tool in national to local applications and the spatial vehicle for expression of more detailed textural databases, such as, for example, the National Soils Database.

2. THE NEW ZEALAND LAND RESOURCE INVENTORY (NZLRI)

The NZLRI database was digitised, between 1977 and 1980, from the New Zealand Land Resource Inventory maps (NWASCO 1975-79). These maps are at a scale of 1:63,360 and are compiled on the NZMS 1 topographic map series. The database consists of a total of about 85,000 map units (with a median size over New Zealand of 153 ha) and their physical resource descriptions.

The data were collected between 1973 and 1979 from detailed aerial photo-interpretation, large scale resource maps and extensive field work.

Since the publication of the 1st edition NZLRI, a remapping programme has resulted in 2nd edition coverage for the South Auckland, Northland, Wairau/Awatere, and Wellington regions. The South Auckland region was remapped at 1:63,360 scale on NZMS 1 sheets, while the remainder were compiled on 1:50,000 scale NZMS 260 (metric) topographic sheets.

2.1 ATTRIBUTES

The core data description is made up of 6 items; Rock, Soil, Slope, Erosion, Vegetation, and land Use Capability. These items are called on the database; ROCK, SOIL, SLOPE, EROSION, VEG, LUC respectively. During the course of digitising three other items were recorded, namely; LEGEND, ISLAND, and TYPE.

Once the maps had been digitised other items were added. These include Stock Carrying Capacity (CCAV, CCTO, CCPO), *Pinus radiata* Site Index (PRSIC, PRSIR, PRSIAV), and Phosphate Requirements (PHAAV, PHATO, PHAPO, PSUAV, PSUTO, PSUPO). In addition further items were added to correlate between, or to generalise, existing items. These include LUC correlation units (LCORR), Basement rock (BASEROCK), Surface rock (TOPROCK), Dominant soil (DOMSOI), equivalent '4-mile' soil (GENSOI), and equivalent soil group (NZGSOIGRP).

2.1.1 Pre-declared Items

NAME	DESCRIPTION	WIDTH ¹	OUTPUT ¹	TYPE	N.DEC ¹
area	area in map units	4 (8)	12 (18)	f	3 (5)
perimeter	perimeter in map units	4 (8)	12 (18)	f	3 (5)
cover#	coverage internal id	4	5	b	0
cover-id	coverage user id	4	5	b	0
legend	NZLRI region number	2	2	c	-
luc	land use capability	9	9	c	-
rock	rock type (ed 1)	16	16	c	-
rock2	rock type (ed 2)	16	16	c	-
soil	soil unit	23	23	c	-
slope	slope	11	11	c	-
erosion	erosion degree & type	12	12	c	-
veg	vegetation cover (ed 1)	20	20	c	-
veg2	vegetation cover (ed 2)	20	20	c	-
type	map unit type	1	1	c	-
areah	area in hectares	4	12	f	2
(indexed to LUC)					
lcorr	N I luc correlation unit	5	5	c	-
ccav	stock units/ha (av)	4	4	n	1
ccto	stock units/ha (top)	4	4	n	1
ccpo	stock units/ha (pot)	4	4	n	1
prsic	P. rad site index class	7	7	c	-
prsir	P. rad site index range	6	6	c	-
prsiav	P. rad site ind average	2	2	i	-
(indexed to rock)					
toprock	surface rock type	3	3	c	-
baserock	basement rock type	3	3	c	-
(indexed to soil)					
domsoi	dominant soil type	9	9	c	-
gensoi	equiv '4-mile' soil	5	5	c	-
nzgsoigrp	equiv soil group	10	10	c	-
(indexed to LUC, soil, slope)					
phaav	Phos req (av su) (kg/ha)	2	2	i	-
phato	Phos req (top su) (kg/ha)	2	2	i	-
phapo	Phos req (pot su) (kg/ha)	2	2	i	-
psuav	Phos req (av su) (kg.su)	4	4	n	1
psuto	Phos req (top su) (kg/su)	4	4	n	1
psupo	Phos req (pot su) (kg/su)	4	4	n	1
edition	NZLRI mapping edition	3	3	c	-
polyid	Unique polygon identifier	8	8	i	-

¹ Values in parentheses apply to double precision coverages (recommended for metric NZLRI)

AREA

AREA is a 12 character, floating point item giving the AREA OF THE POLYGON IN COVERAGE UNITS. Coverage units are meters (note American spelling) for metric versions of the NZLRI, or yards on the original (imperial) version of the NZLRI.

AREA is a system item which is automatically initialised by ARC/INFO and which is updated by ARC during processes which change topology.

The .PAT item definition for AREA is as follows:

Item name	Item width ¹	Output width ¹	Item type	No. of decimals ¹
AREA	4 (8)	12 (18)	f	3 (5)

¹ Values in parentheses apply to double precision coverages (recommended for metric NZLRI)

PERIMETER

PERIMETER is a 12 character, floating point item giving the PERIMETER OF THE POLYGON IN COVERAGE UNITS. Coverage units are meters (note American spelling) for metric versions of the NZLRI, or yards on the original (imperial) version of the NZLRI.

PERIMETER is a system item which is automatically initialised by ARC/INFO and which is updated by ARC during processes which change topology.

The .PAT item definition for PERIMETER is as follows:

Item name	Item width ¹	Output width ¹	Item type	No. of decimals ¹
PERIMETER	4 (8)	12 (18)	f	3 (5)

¹ Values in parentheses apply to double precision coverages (recommended for metric NZLRI)

COVER#

COVER# (where 'cover' is the coverage name) is a 5 character, binary integer item giving the POLYGON INTERNAL NUMBER. (This number is the reference for the LPOLY# and RPOLY# items in the .AAT)

COVER# is a system item which is automatically initialised by ARC/INFO when the coverage is 'built', and is updated by ARC during processes which change topology.

The .PAT item definition for COVER# is as follows:

Item name	Item width	Output width	Item type	No. of decimals
COVER	4	5	b	-

COVER-ID

COVER-ID (where 'cover' is the coverage name) is a 5 character, binary integer item giving the POLYGON USER NUMBER. This number can be altered by the user and will commonly have a value of 'COVER# - 1' (i.e. one less than the COVER#).

COVER-ID is a system item which is automatically initialised by ARC/INFO when the coverage is 'built'.

The .PAT item definition for COVER-ID is as follows:

Item name	Item width	Output width	Item type	No. of decimals
COVER-ID	4	5	b	-

LEGEND

LEGEND is a 2 character, right justified, item giving the number of the NZLRI Survey Region in which the map unit lies. Since each Survey Region has a unique Land Use Capability classification, LEGEND is essential if one is to correctly define LUC Units.

The meaning of the values are as follows:

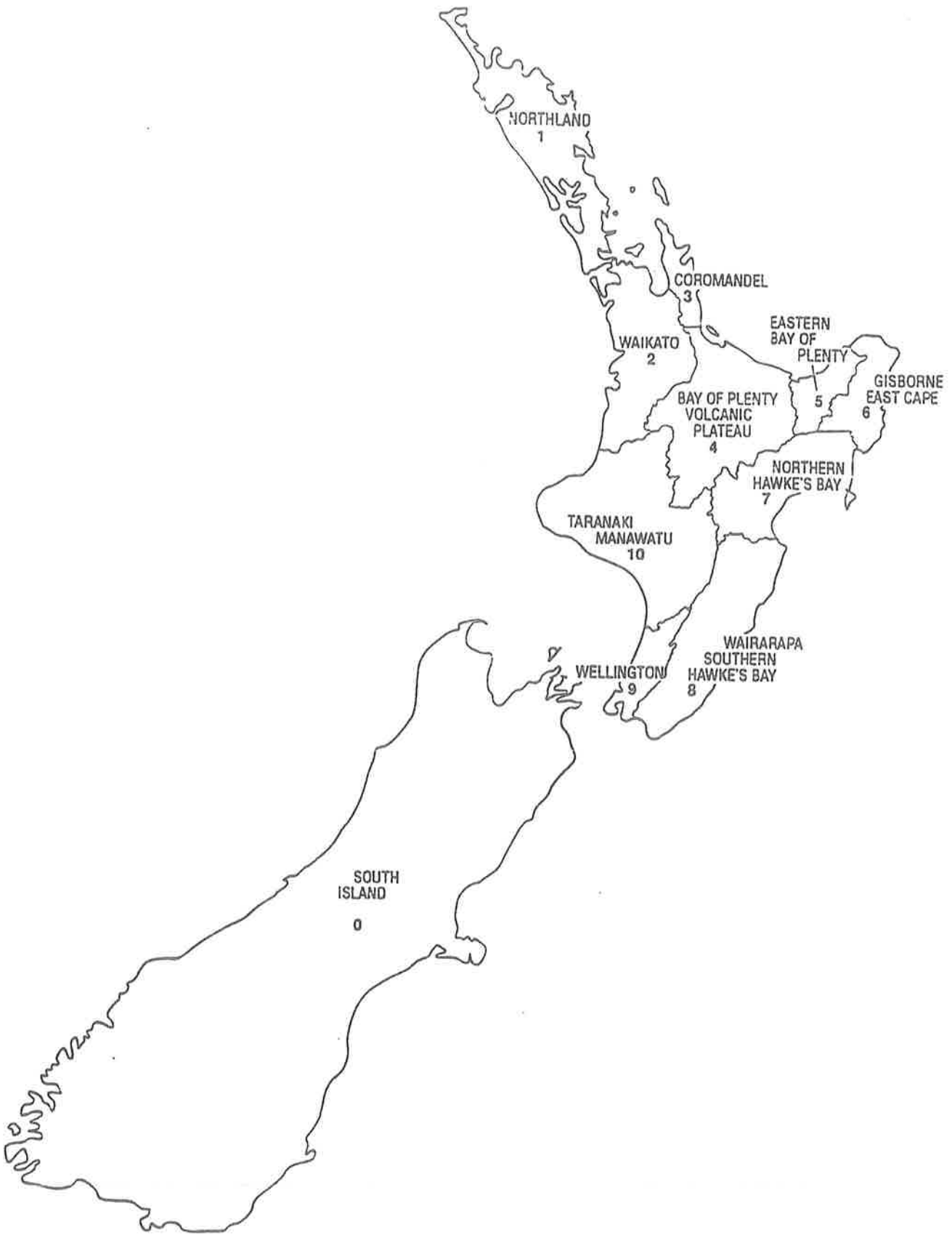
00	South Island
01	Northland
02	Waikato
03	Coromandel - Great Barrier
04	Bay of Plenty - Volcanic Plateau
05	Eastern Bay of Plenty
06	Gisborne - East Cape
07	Northern Hawkes Bay
08	Wairarapa - Southern Hawkes Bay
09	Wellington
10	Taranaki - Manawatu

NO RECORDS HAVE A VALUE OF ' ' EXCEPT THE WORLD POLY

The Geographic extent of these Regions is shown on the map overleaf

The .PAT item definition for LEGEND is as follows:

Item name	Item width	Output width	Item type	No. of decimals
LEGEND	2	2	c	-



New Zealand Land Resource Inventory survey regions and LEGEND numbers

LUC

LUC is a 9 character item made up of a dominant Land Use Capability assessment and (sometimes) a subdominant Land Use Capability. Its format is as follows:

where | csuu+csuu |
 c = LUC class (Roman Numerals on printed maps)
 s = LUC subclass modifier
 uu = LUC unit identifying number

eg. 4e15+3w 1 - the dominant LUC is 4e15 and the subdominant LUC is 3w1.
 - the LUC classes are 4 and 3
 - the LUC subclasses are 4e and 3w
 - the LUC units are 4e15 and 3w1

The values for class, subclass modifier, and unit identifier are explained as follows:

LUC Class Suitability	1 2 3 4 arable	5 6 7 non arable	8 protection	
LUC 'Subclass' Major Limitation	c climate	e erosion	s soil	w wetness
LUC 'Unit'	1 2 3 4 5 ... associates, ranks, and describes units with similar landform, potential, limitations, and behaviour			

The detailed meaning of a LUC unit is dependent on the NZLRI Survey Region in which it lies. New Zealand has been divided into 10 Survey Regions. The Region in which a map unit lies is specified in the item LEGEND. Each LUC Unit is described in detail in the Regional Extended Legend which accompanies the maps. These descriptions may be amplified in a Regional Bulletin. The Extended Legends briefly characterise each LUC unit in terms of its physiography, land use, potential erosion, and aspects of productivity and management. The Regional Bulletins compare the various LUC units and relate them to each other, as well as giving photographic descriptions of each.

Normal units (TYPE = n) have a LUC value

Non-normal units have the following values:

estu -for TYPE = e (estuaries)
 ice -for TYPE = i (ice)
 lake -for TYPE = l (lake)
 quar -for TYPE = q (quarry/mine)
 rive -for TYPE = r (river)
 town -for TYPE = t (town/urban)

NO RECORDS HAVE A VALUE OF ' ' EXCEPT THE WORLD POLY

The .PAT item definition for LUC is as follows:

Item name	Item width	Output width	Item type	No. of decimals
LUC	9	9	c	-

ROCK

ROCK is a 16 character, left justified, unformatted item. The Rock item is made up of the rock types as described in the tables overleaf and the following qualifying symbols:

() + / '

' indicates deep weathering (North Island only) eg. Vo'

+ indicates a combination of rock types eg. Lo+Al

() indicates significant in patches eg. (Al)

/ indicates stratigraphic succession, surface rock first.

eg. Lo/Gw

eg. (Lo)+Al/Gw

The values of the first edition rock type symbols appear on the following pages.

To maintain a level of national consistency all coverages in the NZLRI have both a ROCK item and a ROCK2 item. Areas covered by 2nd edition mapping have had their ROCK2 recording correlated back to ROCK notation so rock type information can be accessed in either format from the respective item. The ROCK notation, however, remains the only nationally consistent one and so must be used for analyses which include edition 1 areas. Areas covered only by edition 1 mapping have blank records in the ROCK2 item.

Normal units have a ROCK value

Non-normal units have the following values:

estu -for TYPE = e (estuaries)

ice -for TYPE = i (ice)

lake -for TYPE = l (lake)

quar -for TYPE = q (quarry/mine)

rive -for TYPE = r (river)

town -for TYPE = t (town/urban)

NO RECORDS HAVE A VALUE OF ' ' EXCEPT THE WORLD POLY

The .PAT item definition for ROCK is as follows

Item name	Item width	Output width	Item type	No. of decimals
ROCK	16	16	c	-

THE NORTH ISLAND ROCK TYPE CLASSIFICATION (Edition 1)

I IGNEOUS ROCK TYPES

- / Ng Ngauruhoe ash
- / Ta Tarawera Ash and Lapilli
- / Rm Rotomahana Mud
- / Kt Kaharoa and Taupo ashes
- / Mo Ashes older than Taupo Pumice
- / Lp Lapilli
- / Tp Taupo and Kaharoa breccia and volcanic alluvium
- / Ft Breccias older than Taupo breccia
- / La Lahar deposits
- * / Sc Scoria
- / Vo Lavas, ignimbrite and other 'hard' volcanic rocks
- * / Vu 'Soft' volcanic rocks
- / Gn Crystalline intrusive rocks
- * / Um Ultramafic rocks

II SEDIMENTARY ROCK TYPES

- / Pt Peat
- / Lo Loess
- / Wb Sands — windblown
- / Gr Gravels
- / Al Undifferentiated floodplain alluvium
- / Us Unconsolidated to moderately consolidated clays, silts, sands, tephra and breccias
- / Mm Mudstone or fine siltstone — massive
- / Mb Mudstone or fine siltstone — banded
- / Mj Mudstone or fine siltstone — jointed
- / Me Mudstone — bentonitic
- / Sm Sandstone or coarse siltstone — massive
- / Sb Sandstone or fine siltstone — jointed
- / Me Mudstone — bentonitic
- / Sm Sandstone or coarse siltstone — massive
- / Sb Sandstone or coarse siltstone — banded
- * / Cg Conglomerate and breccia
- / Ar Argillite
- / Ac Argillite — crushed
- / Gw Greywacke
- / Li Limestone

Notes:

- * These rock types do not appear on the worksheets but are recorded in the computer data base.

Ac
Lst
Lst

2. Worksheets printed prior to 1977 contain time-stratigraphic and other symbols from published geological maps instead of the above symbols (see Crippen and Eyles 1985). The computer database, however, records only the rock type symbols above.
3. Changes to the classification have occurred during the survey (see Crippen and Eyles 1985).
4. For a more detailed description of the classification refer to Crippen and Eyles 1985.

THE SOUTH ISLAND NZLRI ROCK TYPE CLASSIFICATION (Edition 1)

- I SURFICIAL ROCK TYPES
- Al Alluvium, colluvium, glacial drift
 - Wb Windblown sand
 - Lo Loess
 - Pt Peat
- II SEDIMENTARY ROCK TYPES
- WEAKLY INDURATED SEDIMENTARY ROCKS
- Ms Mudstone
 - Ss Sandstone
 - Fy Interbedded sandstone and mudstone
 - Cw Conglomerate
- STRONGLY INDURATED SEDIMENTARY ROCKS
- Ar Argillite
 - Hs Sandstone
 - Gw Greywacke
 - Cg Conglomerate
 - Ls Limestone
- III IGNEOUS ROCK TYPES
- Tb Pyroclastics (ash and lapilli)
 - Vo Lavas
 - In Ancient volcanoes, minor intrusives (dikes and sills)
 - Gn Plutonics
 - Um Ultramafics
- IV METAMORPHIC ROCK TYPES
- St1 Semi-schist
 - St2 Schist
 - Gs Gneiss
 - Ma Marble

Notes:

For a more detailed description of this classification refer to Lynn 1985.

ROCK2

ROCK2 is a 16 character left justified unformatted item.

In second edition NZLRI sheets the rock classification and notation was modified. The ROCK2 item is made up of the rock types as described in the table overleaf and the following qualifying symbols:

- w indicates deep weathering eq. wVo
- p indicates significant in patches eg. pAl
- * used in conjunction with /, indicated that the rock types linked by the * are both overlain by the preceding rock type. eg Lo/Sm*Li, Loess overlying both Massive sandstone AND Limestone. (This contrasts with Lo/Sm+Li where the Loess overlies Sm only)
- + indicates a combination of rock types
- / indicates stratigraphic succession, surface rock first.

eg. pLo+Al/Gw

The values of the second edition rock type symbols together with their correlations back to the first edition classifications appear overleaf.

To maintain a level of national consistency all coverages in the NZLRI have both a ROC item and a ROCK2 item. Areas covered by 2nd edition mapping have had their ROCK2 recording correlated back to ROCK notation so that rock type information can be accessed in either format from the respective item. The ROCK notation, however, remains the only nationally consistent one and so must be used for analyses which include edition 1 areas. Areas covered only by edition 1 mapping have blank records in the ROCK2 item.

Normal units have a ROCK2 value

Non-normal units have the following values:

- estu -for TYPE = e (estuaries)
- ice -for TYPE = i (ice)
- lake -for TYPE = l (lake)
- quar -for TYPE = q (quarry/mine)
- rive -for TYPE = r (river)
- town -for TYPE = t (town/urban)

NO RECORDS HAVE A VALUE OF ' ' EXCEPT THE WORLD POLY AND THOSE AREAS COVERED ONLY BY EDITION 1 MAPPING.

The .PAT item definition for ROCK2 is as follows

Item name	Item width	Output width	Item type	No. of decimals
ROCK2	16	16	c	-

NZLRI ROCK TYPE CLASSIFICATION (Edition 2)

2nd Edition		1st Edition	
		North Island	South Island
A. IGNEOUS ROCKS			
(i) extremely weak to very weak igneous rocks			
Ng	Ngauruhoe tephra	Ng	-
Rm	Rotomahana mud	Rm	-
Ta	Tarawera tephra	Ta	-
Sc	Scoria	Sc	-
Lp	Pumiceous lapilli	Lp	-
Kt	Kaharoa & Kaharoa breccia & pumiceous alluvium	Tp	-
Mo	Ashes older than Taupo ash	Mo	-
Ft	Quaternary breccias older than Taupo breccia	Ft	-
La	Lahar deposits	La	-
Vu	Extremely weak altered volcanics	Vu	-
(ii) weak to extremely strong igneous rocks			
Vo	Lavas & welded ignimbrites	Vo	Vo
Tb	Indurated fine-grained pyroclastics	Vo	Tb
Vb	Indurated volcanic breccias	Vo	Tb
In	Ancient volcanics	Vo	In
Gn	Plutonics	Gn	Gn
Um	Ultramafics	Um	Um

2nd Edition		1st Edition	
		North Island	South Island
B. SEDIMENTARY ROCKS			
(i) very loose to compact (very soft to stiff) ^ sedimentary rocks			
Pt	Peat	Pt	Pt
Lo	Loess	Lo	Lo
Wb	Windblown sand	Wb	Wb
Al	Fine alluvium	Al	Al
Gr	Alluvium gravels	Gr	Al
Cl	Coarse slope deposits	Gr	Al
Gl	Glacial till	-	Al
Uf	Unconsolidated clays & silts	Us	-
Us	Unconsolidated sands & gravels	Us	-
(ii) very compact (very stiff) to weak sedimentary rocks			
Mm	Massive mudstone	Mm	Ms
Mb	Bedded mudstone	Mb	Fy
Mf	Frittered mudstone or Mj Jointed mudstone	Mj	Ms
Me	Bentonitic mudstone	Mj	Ms
Sm	Massive sandstone	Sm	Ss
Sb	Bedded sandstone	Sb	Fy
Cw	Weakly consolidated conglomerate	Cg	Cw
Mx	Sheared mixed lithologies	Mj Sb SM Ac	Ms?
Ac	Crushed argillite association of rocks	Ac	Ar

2nd Edition		1st Edition	
		North Island	South Island
(iii)	moderately strong to extremely strong sedimentary rocks		
Ar	Argillite	Ar	Ar
Si	Induated sandstone	Sm	Hs
Cg	Conglomerate and breccia	Cg	Cg
Gw	Greywacke association of rocks	Gw	Gw
Li	Limestone	Li	Ls
C	METAMORPHIC ROCKS		
Sx	Semi-schist	-	St1
Sy	Schist	-	St2
Gs	Gneiss	-	Gs
Ma	Marble	-	Ma
D	PERENNIAL ICE AND SNOW		
I		I	I

SOIL

SOIL is a 23 character item giving the soil unit. It's format is:

	s	=	the soil survey character
where	aa...	=	the soil unit
e.g.	BOA'	+	WT'
	*114a	+	25bH
	qToiH	+	NrH + BRock

There is no distinct NZLRI soil classification. The notation and classification used were those defined by the soil survey bulletin and maps referenced by the NZLRI mappers. These soil surveys were the most detailed soil survey available for the area at the time of mapping. The interpretation of the soil unit then, depends upon which soil survey the unit comes from. The soil survey is determined from the first character of SOIL and thence from reference to the index overleaf.

If the soil survey is not one of the general soil surveys for the South or North Island, then the soil unit is left-justified. Where the soil unit is from one of the general soil surveys then it is recorded within the first five character spaces following the survey or '+' notation but is formatted within this space as follows:

	nnngh		
where	nnn	=	right justified soil set number
	g	=	soil subgroup (a - j, or blank)
	h	=	phase character (H or S or blank)
e.g.	20		H

Normal units have SOIL values derived from their parent surveys', but, may also, or instead, have one or more of the following special values:

BRock	-	Bare Rock
DTail	-	Dredge Tailings
MSoil	-	Mountain Soils (North Island only)
OWork	-	Old Workings (old mining operations)
SKele	-	Skeletal Soils

Non-normal units have the following values:

!estu	-for TYPE = e (estuaries)
!ice	-for TYPE = i (ice)
!lake	-for TYPE = l (lake)
!quar	-for TYPE = q (quarry/mine)
!rive	-for TYPE = r (river)
!town	-for TYPE = t (town/urban)

NO RECORDS HAVE A VALUE OF ' ' EXCEPT THE WORLD POLY

The .PAT item definition for SOIL is as follows:

Item name	Item width	Output width	Item type	No. of decimals
SOIL	23	23	c	-

Refer to the DOMSOI item for an expression of the Dominant Soil recorded in the SOIL item. Refer also to the items GENSOI and NZGSOIGRP for two levels of generalisation of the DOMSOI item.

The soil survey characters for the North & South Island soil surveys are referenced below.

North Island Soil Surveys

- * General Survey of the Soils of North island, 1954.
- a Soil survey of Heretaunga Plains, 1939. scale 1:23760
- b Soils of Mid hawkes Bay, 1947. scale 1:95040
- c Provisional soil map of Great Barrier Island, 1952.
- d Soils of Matakaoa County, 1954. scale 1:126720
- e Soils of Gisborne Plains, 1962. scale 1:15840
- f Soil map of Whareama catchment, Wairarapa, 1965. scale 1:126720
- g Soils of the Manawatu-Rangitikei Sand Country, 1967. scale 1:63360
- h Land Inventory Survey — County Series: Ohinemuri Soils, 1968.
scale 1:6336D
- i Land Inventory Survey — County Series: Waimate West Soils, 1970.
scale 1:63360
- j Land Inventory Survey — County Series: Coromandel Thames Soils, 1968. scale
1:126720
- k Soils of Kairanga County, 1972. scale 1:63360
- l Soils of part Wanganui County, 1976. scale 1:31680
- m Soils of part Waitotara County, 1976. scale 1:31680
- n Interim Report on soils of Wellington Region, 1975. scale 1:63360.
- o Interim Report on soils of Wairarapa Valley, 1975. scale 1:126720
- p Soils of Manawatu County, 1977. scale 1:63360
- q Provisional soil map of King Country, 1977. scale 1:63360
- r Soils of Pohangina County, 1977. scale 1:63360
- s Land Inventory Survey — County Series: Wairoa (unpublished).
- t Land Inventory Survey — County Series: Taupo (unpublished).
- u Provisional soil map of Horowhenua County, 1957.
- v Soils of Stratford County, 1978. scale 1:63360
- w Soils of Egmont and part Taranaki Counties, 1981. scale 1:50000
- x Unused.
- y Soils of part Raglan County, 1976. scale 1:63360
- z Soils of Piako County, 1980. scale 1:63360
- A Personal Communication with D.J. Cowie, Southern Hawkes Bay — Wairarapa.
Listing of soils in Soil Conservation Centre Internal Report 64.
- B Provisional soil map of North Auckland, 1947. scale 1 inch : 1 mile
- C Soil map of Whangarei County, 1948.
- D Hauraki Plains, McLeod.
- E Part Franklin County, Orbell.
- F Provisional soil map Awhea and Opouawe Catchments, Gibbs.
- G Soils of Whakatane County (in prep. 1981). scale 1:63360
- H Soils of the Northern part, Kaingaroa State Forest and the Galatea Basin. scale
1:31680
- I Soils of Rerewhakaaitu District, 1978. scale 1:31680
- J Soils of Rotorua lakes District, 1979. scale 1:50000
- K Soils of Northland Region.
- L Special 4-mile soil, pt48b.
- M Soils of Waiotapu Region, 1978. scale 1:31680
- N Soils of Rangitikei County, 1979. scale 1:63360
- O Unnamed soil from 4-mile soil survey.
- P Otaki District Soil Resource Study, Palmer, Wilde.
- Q Manukau City, Pudie et al.
- ! A synthetic value inserted to distinguish non-normal units