

2. Soils in the Shepparton Irrigation Region

2.1 Soil Maps of Irrigation Areas

The Shepparton Irrigation Region (SIR) has detailed published soil maps, produced from a series of soil surveys during the period from 1942 to 1975. The surveys were

- Soil Survey of Part of County Moira (Butler *et al*, 1942),
- Soil Survey of Part of Shepparton Irrigation District (Skene and Freedman, 1944),
- The Soils of the Western Part of the Murray Valley Irrigation Area and their Classification for Irrigation (Johnston, 1952),
- Soils and Land Use in Part of the Goulburn Valley (Skene and Poutsma, 1962),
- Soils and Land Use in the Deakin Irrigation Area (Skene, 1963),
- Soils and Land Use in the Rochester and Echuca Districts (Skene and Harford, 1964),
- A Re-Survey of Lemnos Loam and Goulburn Loam near Kyabram (Mikhail and Walbran, 1972), and
- Report of the Shepparton Extension and Katandra Soil Survey (Mikhail, 1975).

Figure 1 illustrates the areas of coverage of these soil surveys.

The agricultural industries in the region have used the published maps extensively, in particular for crop suitability guidance. The maps have also been used for irrigation and catchment management planning.

The SIR is serviced by Goulburn–Murray Water Authority, which has divided the SIR into the following five service areas:

- (i) Murray Valley Irrigation Area,
- (ii) Shepparton Irrigation Area,
- (iii) Central Goulburn Irrigation Area,
- (iv) Rochester Irrigation Area, and
- (v) Campaspe Irrigation Area.

These service areas have been adopted for use in presenting soil hydraulic property data in this document. However, Shepparton Irrigation Area and Central Goulburn Irrigation Area are combined as they were mostly covered by one of the original soil surveys – Soils and Land Use in Part of the Goulburn Valley (Skene and Poutsma, 1962). Rochester Irrigation Area and Campaspe Irrigation Area are also combined as they were mostly covered by another original soil survey – Soils and Land Use in the Rochester and Echuca Districts (Skene and Harford, 1964).

In summary, this document uses three irrigation areas to organise data:

- (i) Murray Valley (MV) – includes Murray Valley Irrigation Area.
- (ii) Shepparton – Central Goulburn (SCG) – includes Shepparton and Central Goulburn Irrigation Areas.
- (iii) Rochester – Campaspe (RC) – includes Rochester and Campaspe Irrigation Areas.

These three irrigation areas are shown in Figure 2. As the boundaries of the soil surveys and the three irrigation areas are not identical, some of the soil types appear in two adjacent irrigation areas. For each of these soil types, soil hydraulic properties were measured in the irrigation area with greater presence of the particular soil type. It also needs to be noted that some parts of the SIR were not covered by any of the original soil surveys.

2.2 Soil Types and Soil Groups

In the published soil maps, soils of the SIR have been categorised into about 150 types mainly based on soil profile features such as colour, texture, depth and topographical position in the landscape. Soils with similar land use capabilities are grouped in 6 soil groups. Soil groups were designed primarily for giving an indication of crop suitability of soils. For example, Group 1 was considered suitable for horticulture crops, and Groups 2 and 3 for pasture and shallow-rooting crops. Topographically, Group 1 soils are located at the highest parts of the landscape, and Group 6 soils at the lowest parts of the landscape. Prior to this study, it was recognized that soil permeability was expected to decrease from Group 1 to Group 6 (Skene and Poutsma, 1962). In the published soil maps of the MV region, soil types were not classified into soil group. Soil grouping for the MV area was done later and no soil type was defined under Group 4. The soil types, their associated areas and soil groups in each of the three irrigation areas are presented in Tables 1.1, 1.2 and 1.3.

Some part of the SCG irrigation area near Kyabram, which is covered mainly by Lemnos loam and Goulburn loam, was re-surveyed during the 1970s (Mikhail and Walbran, 1972). The soil types in the re-surveyed area were divided into Lemnos loam friable phase, Lemnos semi friable phase, Lemnos loam, Goulburn loam and Goulburn loam friable phase soil type. These soil types were not identified in other parts of the SCG irrigation area.

The published soil maps for SIR have extensive spatial coverage at high resolution. They have been, and will continue to be, used extensively by agricultural producers and agencies in the region. For these reasons, the soil groups and types in the published soil maps were used as a reference for the design of data collection and the analysis of results in this study.

Soil hydraulic properties of Group 1 were found to be highly variable as this group comprises highly dissimilar soil types. For this reason, Group 1 is divided into two sub-groups: Group 1 Sandy soils (Group 1S) and Group 1 Duplex soils (Group 1D).

2.3 Soil Horizons

Most of the soil types of the region are layered and commonly known as duplex soils. They are characterised by a shallow Horizon A of 100–200 mm and presence of a restricting layer at or below the interface with Horizon B1. Soil hydraulic properties of both Horizons A and B1 were measured. For Horizon B2, only saturated hydraulic conductivity was measured.

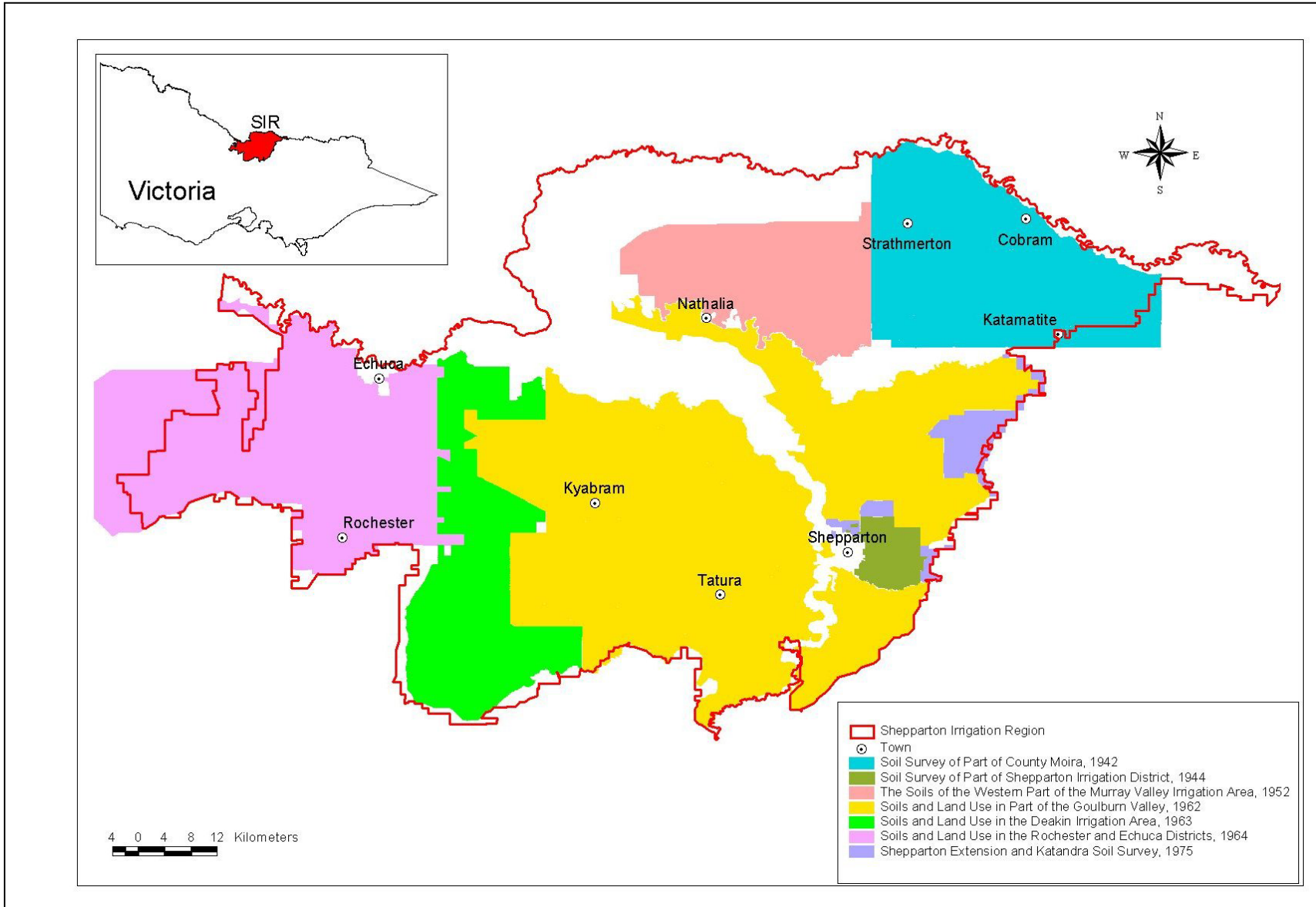


Figure 1 Soil Surveys in the Region

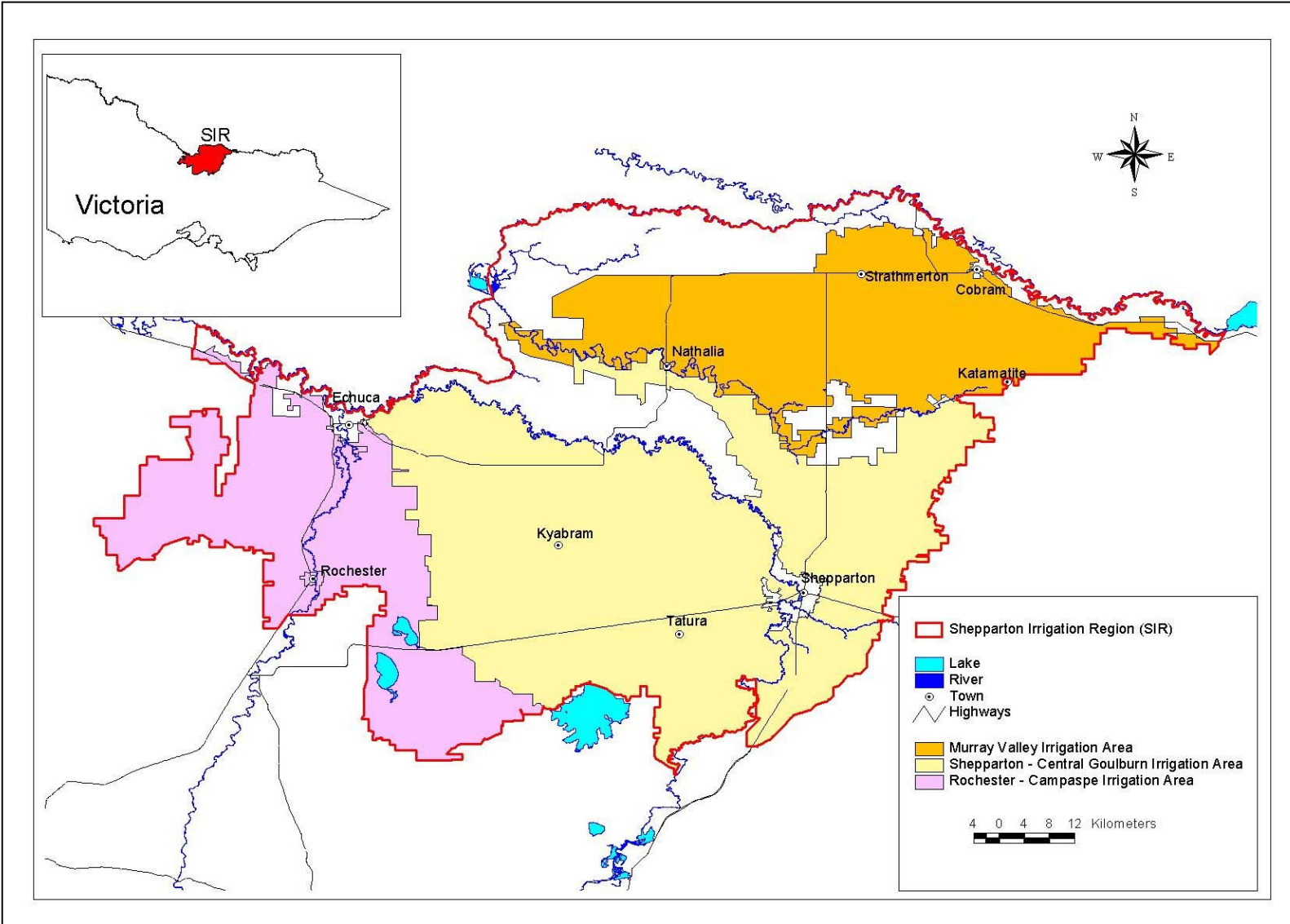


Figure 2 Irrigation Areas in the Region

Table 1.1 Soil types – MV irrigation area

Soil Type	Soil Symbol	Soil Group	Area Covered (ha)	Measured Soil
Barwo silty loam	Basl	3	136	
Barwo silty loam phase	Baslp	3	497	
Boosey clay loam	Bcl	5	1,966	
Boosey loam	Bl	6	9,680	√
Boosey loam friable phase	Blfp	6	414	√
Boosey loam light phase	Blpl	6	511	
Cobram loam	Cl	2	9,012	√
Cobram loam light phase	Clp	2	648	
Cobram sandy loam	Csl	2	2,958	
Congupna clay*	Cc	6	247	
Congupna clay loam*	Ccl	5	443	
East Shepparton fine sandy*	Efsl	1D	384	
Goulburn clay loam*	Gcl	4	261	
Goulburn loam*	Gl	4	815	
Grey sandy soil	C	1S	283	
Grey/sandy loam over clay	E	2	487	
Kaarimba silty loam	Kbsl	2	124	
Kaarimba silty loam phase	Kbslp	2	108	
Katamatite loam*	Kl	2	235	
Katunga gravelly loam	Kagl	4	1,488	
Katunga sandy loam	Kasl	4	395	
Lemnos loam*	Ll	3	316	
Moira loam	Mol	3	20,717	√
Moira loam friable phase	Mlfp	2	3,112	√
Moira loam friable phase	Mlfp	2	231	
Moira loam heavy phase	Mlph	3	491	
Moira loam light phase	Mlpl	3	4,761	
Muckatah clay loam	Mcl	6	6,727	√
Mywee clay	Myc	5	1,874	
Naring loam	Nl	3	11,993	√
Naring loam friable phase	Nlfp	3	343	
Naring loam friable phase	Nlfp	3	100	
Naring loam heavy phase	Nlph	3	300	
Naring loam light phase	Nlpl	3	677	
Narioka silty clay loam	Nkscl	6	387	
Nathalia fine sand	Ntfs	1S	63	
Picola loam	Pil	5	770	
Resembles Csl to Ss range	D	1D	95	
Other soils with small area	O	0	182	
Sandmount sand	Ss	1S	1,843	√
Sandmount sand phase	Ssp	1S	276	√
Sandmount sand shallow phas	Ssp	1S	677	
Shepparton fine sandy loam*	Sfsl	2	471	
Similar range Ss to Csl	B	1D	1,050	√
Similar to Cl no lime	A	1D	585	
Type 1	T1	5	553	
Type 2	T2	6	664	
Type 3	T3	3	54	
Type A	TA	1	684	
Type B	TB	1	635	
Type C	TC	1	490	
Type D	TD	1	87	
Ulupna clay	Uc	5	4,412	√
Unclassified	U	0	1,481	
Waaia loam	Wl	2	6,098	√
Waaia loam phase	Wlp	2	5,320	√
Waaia sandy loam	Wsl	2	408	
Yarroweyah loam	Yl	3	1,603	
Total			111,622	

Note: * these soils have greater presence in SCG irrigation area, and therefore these were measured in SCG irrigation area.

Table 1.2 Soil types – SCG irrigation area

Soil Type	Soil Symbol	Soil Group	Area Covered (ha)	Measured Soil
Alta clay loam*	Acl	5	2,312	
Arkoo loam	Akl	4	438	
Broken sand	Bs	1S	116	
Carag clay	Crc	6	1,993	
Complex I	I	6	176	
Complex II	II	5	584	
Complex III	III	6	1,826	
Complex IV	IV	6	376	
Congupna clay	Cc	6	4,644	√
Congupna clay loam	Ccl	5	12,234	√
Congupna clay loam light surface	Ccl l.s.	5	198	
Congupna loam	Cl	5	150	
Coomboona clay	Coc	5	164	
Coomboona loam	Col	4	886	
Dunbulb loam	DI	4	1,806	
Dunbulb loam light surface	DI l.s.	4	120	
East Shep sandy loam deep phase	Esip	1D	192	
East Shepparton fine sandy loam	Efsl	1D	4,589	√
East Shepparton sandy loam	Esl	1	156	
Erwen loam normal phase	Erl	3	1,820	
Goulburn clay loam	Gcl	4	18,029	√
Goulburn loam	Gl	4	29,873	√
Goulburn loam friable phase	Glfp	3		√
Grahamvale sandy loam	Grsl	1D	180	
Gupna fine sandy loam	Gufsl	5	2,047	
Gupna loam	Gul	5	1,700	
Kanyapella clay	Kpc	5	1,794	
Kanyapella clay loam	Kpcl	5	1,344	
Karook fine sandy loam	Kfsl	3	307	
Karook loam	Krl	3	257	
Katamatite loam	Kl	2	544	√
Katamatite loam - brown phase	Klb	2	3,010	
Katamatite loam - yellow phase	Kly	2	1,006	
Koga clay loam	Kgcl	4	2,824	
Koyuga clay loam	Kocl	4	1,433	
Lemnos loam	LI	3	68,250	√
Lemnos loam friable phase	Lifp	3		√
Lemnos sandy loam	Lsl	3	239	
Lemnos loam semi-friable phase	Lisfp	3		√
Lunette soils - unclassified	Lns	4	396	
Moora clay	Mc	5	136	
Moora clay loam	Mcl	5	454	
Orrvale sandy loam	Osl	4	188	
Orrvale sandy loam deep phase	Oslp	4	101	
Orvale loam	OI	4	740	
Other soils with small area	O		622	
Prior streams		6	694	
River frontage	R.F.	6	990	
Rooka loam	RI	5	605	
Sandmount sand	Ss	1S	947	
Shepparton fine sandy loam	Sfsl	2	36,315	√
Shepparton loam	SI	2	353	
Shepparton sandy loam	Ssl	2	888	
Shepparton sandy loam deep phase	Sslp	2	172	
Timmering fine sandy loam	Tifsl	2	1,217	
Type 1	1	4	505	
Type 1h	1h	4	198	
Type 2	2	6	6,909	
Type A	A	4	322	
Type B	B	4	77	
Type E	E	4	501	
Type H	H	5	97	
Type J	J	2	743	
Type M	M	0	102	
Type N	N	4	123	
Type S	S	4	265	
Unclassified	U	0	8,661	
Wallenjoe clay*	Wjc	6	3,532	
Wana loam*	Wnl	4	3,187	
Wanalta loam*	Wl	4	5,057	
Wenora loam	Wnl	4	178	
Yambuna clay	Ybc	5	2,038	
Youanmite loam	YI	2	406	
Youanmite loam	Yld	2	387	
Yuga clay*	Yc	5	2,270	
Zeerust fine sandy loam	Zfsl	4	2,355	
Total			250,348	

Note: * these soils have greater presence in RC irrigation area, and therefore these were measured in RC irrigation area

Table 1.3 Soil types – RC irrigation area

Soil Type	Soil Symbol	Soil Group	Area Covered (ha)	Measured Soil
Alta clay loam	Acl	5	1,670	√
Arkoo loam	Akl	4	499	
Binabbin clay	Bic	4	613	
Campaspe suite type 1	C1	5	803	
Campaspe suite type 2	C2	5	283	
Campaspe suite Type 3	C3	5	575	
Carag clay	Crc	6	4,805	√
Colbinabbin clay	Cc	4	320	
Colbinnabbin clay loam	Ccl	4	530	
Cornella clay	Cac	5	1,874	
Corop clay	Cpc	6	1,412	
Erwen loam	Erl	3	1,081	
Kanyapella clay	Kpc	5	61	
Kanyapella clay loam	Kpcl	5	39	
Karook loam	Kl	3	297	
Koga clay loam	Kocl	4	15,054	√
Koyuga clay loam	Kycl	4	7,574	√
Lockington sand	Ls	1S	43	
Lunette soils - Unclassified	Lns	4	1,475	
Moora clay	Mc	5	770	
Moora clay loam	Mcl	5	1,042	
Nanneela fine sandy loam	Nfsl	1	4,582	√
Nanneela loamy fine sand	Nlfs	1D	419	
Other soils with small area	O		32	
Prior stream bed	1	4	231	
Prior stream bed	1h	4	902	
Prior streams	2	6	1,428	
Restdown clay	Rdc	5	3,697	
Rochester clay	Rc	5	5,576	√
Rooka loam	Rl	5	448	
Timmering loam	Tl	2	9,960	√
Type A	A	4	95	
Type C	C	4	281	
Type D	D	5	255	
Type E	E	4	96	
Type F	F	4	79	
Type G	G	5	91	
Unclassified	U		5,658	
Variable soils in drainage	Dv	6	1,534	
Wallenjoie clay	Wjc	6	4,613	√
Wana clay loam	Wacl	4	1,616	
Wana loam	Wnl	4	4,375	√
Wanalta loam	Wl	3	15,041	√
Wanurp sandy loam	Wpsl	3	328	
Wenora loam	Wel	4	250	
Yuga clay	Yc	5	5,041	√
Total			107,448	