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.

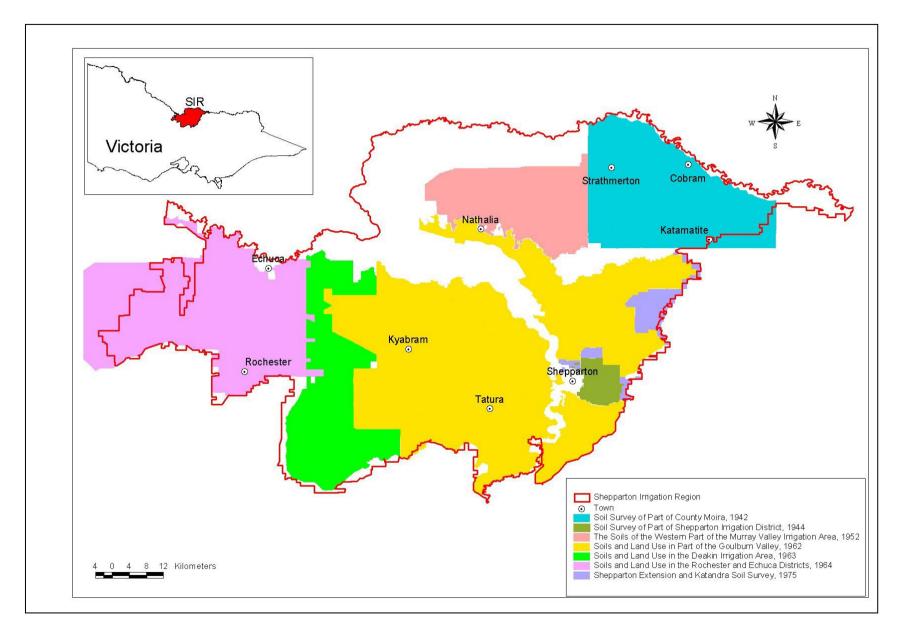


Figure 1 Soil Surveys in the Region

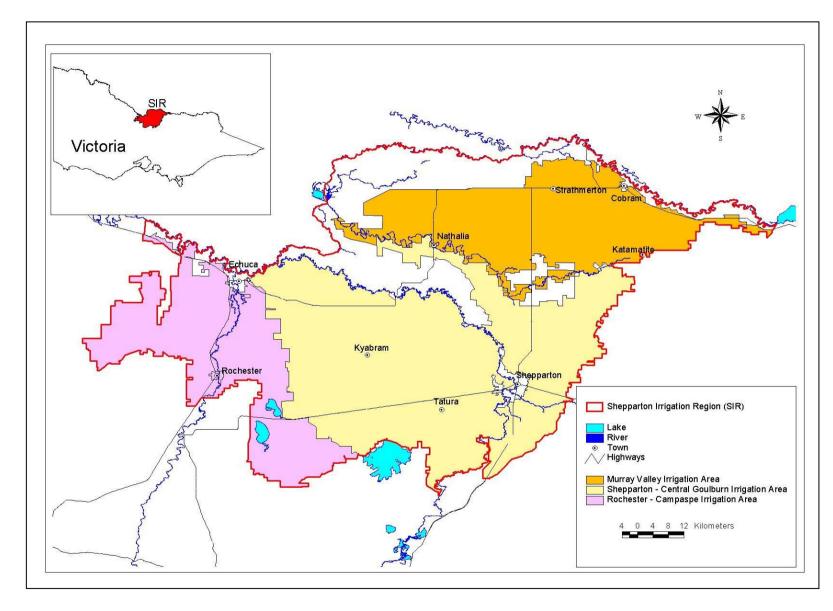


Figure 2 Irrigation Areas in the Region

Table 1.1 Soil types - MV irrigation area

0-4.5	0-11	0-11	A O	Manager
Soil Type	Soil	Soil	Area Covered	Measured
- · · ·	Symbol	Group	(ha)	Soil
Barwo silty loam	Basl	3	136	
Barwo silty loam phase	Baslp	3	497	
Boosey clay loam	Bcl	5	1,966	
Boosey loam	BI	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	18	283	
Grey/sandy loam over clay	E	2	487	
Kaarimba silty loam	Kbsl	2	124	
Kaarimba silty loam phase	Kbslp	2	108	
Katamatite loam*	KI	2	235	
Katunga gravelly loam	Kagl	4	1,488	
Katunga sandy loam	Kasl	4	395	
Lemnos loam*	LI	3	316	1
Moira loam	Mol	3	20,717	√
Moira loam friable phase	Mlfp	2	3,112	٧
Moira loam friable phase	Mlfp	2	231	
Moira loam heavy phase	Mlph	3	491	
Moira loam light phase	Mlpl	3	4,761	1
Muckatah clay loam	McI	6	6,727	V
Mywee clay	Myc NI	5	1,874	1
Naring loam		3	11,993	V
Naring loam friable phase	NIp	3	343	
Naring loam friable phase	NIfp	3	100	
Naring loam heavy phase	Nlph Nlpl	3	300 677	
Naring loam light phase 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	0	0	182	
Sandmount sand	Ss	1S	1,843	1
Sandmount sand phase	Ssp	1S	276	√
Sandmount sand shallow phas	Ssp	1S	677	٧
Shepparton fine sandy loam*	SfsI	2	471	
Similar range Ss to Csl	В	1D	1,050	√
Similar to CI no lime	A	1D	585	٧
Type 1	T1	5	553	
Type 2	T2	6	664	
Type 3	T3	3	54	
Type A	TA	1	684	
Туре В	TB	1	635	
Type C	TC	1	490	
Type D	TD	1	87	
Ulupna clay	Uc	5	4,412	V
Unclassified	U	0	1,481	٧
Waaia loam	WI	2	6,098	√
Waaia loam phase	Wlp	2	5,320	√
Waaia sandy loam	Wsl	2	408	,
Yarroweyah loam	YI	3	1,603	
Total			111,622	
	1	l .	,	

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

Symbol Group (ha) Soil	Soil Type	Soil	Soil	Area Covered	Measured
Vital clay bram* Act 5 2,312 Vinco loam AkI 4 438 Invitor olam AkI 4 438 Invitation BS 1S 118 Jamps of Invitation Cro 6 1,793 Complex II II 6 1,752 Complex III III 1 6 1,752 Complex IV IV 6 3,758 Conguna clay loam Ccl 5 1,2234 V Conguna clay loam Ccl 5 1,932 Compute clay load load Ccl 1 1,2234 V Conguna clay loam Ccl 5 1,508 Compute clay load load 1 1,608 1 Compute clay load 1 1,809 1 Compute clay load <td>Son Type</td> <td></td> <td></td> <td></td> <td></td>	Son Type				
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James Jame					
6 176					
Semplex II					
Somplex II					
Demplex V					
Cc 6					
Conguna clay loam Col 5 12,234 v v v v v v v v v					V
Conguna clay Cost 198 Conguna clay Cost 198 Composition Ci 5 150 Composition Ci 5 150 Composition Cost 164 Cost					•
Ci					•
Coomboona clay					
Combone loam					
Disputable loam Disputable					
Dilikar 120					
cast Sheps sandy loam deep phase Eslp 1D 192 cast Shepparton in resandy loam Esl 1D 4,588 √ cast Shepparton sandy loam Esl 1 156 √ cast Shepparton sandy loam Esl 1 156 √ coulburn loam Gl 4 18,029 √ Soulburn loam Gl 4 29,873 √ Soulburn loam Gl 5 2,947 June fine Supna fine sandy loam Gl 5 1,744 June fine Supna fine sandy loam Kpc 5 1,734 June fine J					
Seal Shepparton fine sandy loam			1D		
Lest Shepparton Sandy loam			1D		√
Invention Inventor I		Esl	1		'
Soulburn clay loam	Erwen loam normal phase				
Soulburn loam	Goulburn clay loam				√
Soulburn loam friable phase Glfp 3	Goulburn loam				
Strahamvale sandy loam	Goulburn loam friable phase			-,	· ·
Suprish Sup	Grahamvale sandy loam			180	,
Supra Joan Sup	Gupna fine sandy loam				
Agricant	Gupna loam				
Agrication	Kanyapella clay				
Agrock Ine sandy loam	Kanyapella clay loam				
Agrook loam	Karook fine sandy loam				
Adamatite loam	Karook loam				
Catamatite loam - brown phase Kib 2 3,010 Catamatite loam - yellow phase Kiy 2 1,006 Coga clay loam Kgcl 4 2,824 Coyuga clay loam Kocl 4 1,433 Coyuga clay loam Li 3 68,250 Vermos loam firable phase Lifp 3 Vermos loam firable phase Lifp 3 Vermos loam semi-frable phase Listp 3 Vermos loam Vermos loam Vermos loam semi-frable phase Listp 3 Vermos loam Ve	Katamatite loam				V
Catamatite loam - yellow phase Kly 2 1,006	Katamatite loam - brown phase	Klb	2	3.010	
Kgc 4			2		
Coyuga day loam					
Lemnos loam					
Lift					√
Lisl 3 239		Llfp		,	
Listp 3				239	•
Line					√
Moora clay Mc 5 136 Mora clay loam McI 5 454 Drivale sandy loam Osl 4 188 Drivale sandy loam deep phase Oslp 4 101 Drivale sandy loam deep phase Ol 4 740 Other soils with small area O 622 Prior streams 2 6 694 River frontage R.F. 6 990 Rocka loam RI 5 605 Sandmount sand Ss 1S 947 Shepparton fine sandy loam Sfsl 2 36,315 √ Shepparton sandy loam Sl 2 353 Shepparton sandy loam Sl 2 388 Shepparton sandy loam deep phase Sslp 2 172 172 172 172 172 174 174 174 174 174 174 174 174 174 174 174 174 174 174 174 174				396	· · · · · · · · · · · · · · · · · · ·
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Rooka loam	River frontage	R.F.	6	990	
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Shepparton loam Sfsl 2 36,315 √ Shepparton loam SI 2 353 Shepparton sandy loam SI 2 388 Shepparton sandy loam deep phase SsIp 2 172 172 172 173 174	Sandmount sand				
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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 1 5 5 Type 2 5 5 5 Type 3 5 5 Type 4 5 5 Type 4 5 5 Type 5 5 5 Type 6 5 5 Type 7 5 5 Type 8 5 5 5 Type 8 5 5 5 Type 9 Type 9	Shepparton loam				*
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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	Soil	Area Covered	Measured
, , , , , , , , , , , , , , , , , , ,	Symbol	Group	(ha)	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	Срс	6	1,412	
Erwen loam	Erl	3	1,081	
Kanyapella clay	Крс	5	61	
Kanyapella clay loam	Kpcl	5	39	
Karook loam	KI	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	McI	5	1,042	
Nanneela fine sandy loam	Nfsl	1	4,582	√
Nanneela loamy fine sand	NIfs	1D	419	V
Other soils with small area	0	10	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	RI	5	448	Y
Timmering loam	TI	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	
Wallenjoe clay	Wjc	6	4,613	√
Wana clay loam	Wacl	4	1,616	٧
Wana loam	Wnl	4	4,375	√
Wanalta loam	WI	3	15,041	√
Wanurp sandy loam	Wpsl	3	328	V
Wenora loam	Wel	4	250	
Yuga clay	Yc	5	5,041	√
·		. ~	J,U4 I	V