

Chapter 3. Soils and Sites

3.1 Soils

The SIR has detailed published soil maps, which were prepared during the period from 1942 to 1964 (Butler, 1942; Johnston, 1952; Skene and Poutsma, 1962; Skene, 1963; Skene and Harford, 1964). These soil maps classify 148 soil types into 6 major soil groups. 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 10-20 cm and presence of a restricting layer at or below the interface with Horizon B.

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

3.2 Soil Classification

(1) Australia Soil Classification Schemes

Several general purpose soil classification schemes have been developed for Australian soils. Soils are classified and named using features such as depth, colour and texture of the various layers. Well known soil classification schemes used in Australia are the *Great Soil Groups* (Stace et al, 1968), a *Factual Key* developed by Northcote (Northcote, 1979) and the Australian Soil Classification (Isbell, 1996). In the *Great Soil Groups*, Australian soil has been classified into 43 great groups which have been arranged in seven categories. The *Great Soil Groups* have been popular in Australia for many years and many people are familiar with them. The *Factual Key* for the Recognition of Australian Soil (Northcote, 1979) is based on specified soil properties evaluated in terms of profile form and results in the definition of Principal Profile Forms. The *Australian Soil Classification* is more recent and incorporated a vast amount of soil data accumulated over the past three decades. The scheme is a general purpose, hierarchical one (order, suborder, great group, subgroup, family). A change from previous Australian classification schemes is the use of laboratory data (mainly chemical) at some levels in a number of the orders.

(2) SIR Soil Classification

Soils of the SIR have been categorised into 148 soil types mainly based on soil profile features such as colour, texture, depth and topographical position in the landscape (Skene and Poutsma, 1962; Skene, 1963; Skene and Harford, 1964; and Johnston, 1952). These soil types cover an area of 520,000 ha. Soils with similar land use capabilities are grouped together in 6 soil groups, based mainly on their position in geomorphological landscape units. 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 part of the landscape, and Group 6 soils at the lowest part of the landscape. Prior to this project, it was recognized that soil permeability was expected to decrease from Group 1 to Group 6 (Skene and Poutsma, 1962).

The well known Australian soil classification schemes are general purpose and are based on a great number of soil attributes. These classifications are for Australia wide use and

based on low-resolution maps. All soils in the SIR are classified into only one or two categories based on these soil classifications. By contrast, the existing 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 existing published soil maps are used as a reference for the design of data collection and the analysis of results in this study.

3.3 Selected Soil Types

A total of 34 soil types were selected for measurement, accounting for 75% of the total area of the SIR. Measurements and sampling were conducted on a total of 79 sites in the Murry Valley (MV), Goulburn Valley (GV), and Rochester (RO) Irrigation Districts. The selected soil types, their associated areas, and the number of sampling sites are listed in Table 3.1.

Table 3.1 Selected Soil Types for Measurements of Soil Hydraulic Properties

Soil Type	Soil Group	Irrigation District	Area Covered (ha)	No. of Sampling Sites
Alta clay loam (Acl)	5	RO	3,989	2
Boosey loam (Bl)	6	MV	11,081	1
Boosey loam friable phase (Blfp)	6	MV	459	1
Carag clay (Crc)	6	RO	8,056	1
Cobram loam (Cl)	2	MV	12,041	3
Cobram sandy loam & Ss (Csl)	1	MV	3,044	1
Congupna clay (Cc)	6	GV	4,257	1
Congupna clay loam (Ccl)	5	GV	13,663	2
East Shepparton fine sandy loam (ESfsl)	1	GV	4,998	4
Goulburn clay loam (Gcl)	4	GV	18,306	1
Goulburn loam (Gl)	4	GV	29,535	6
Goulburn loam friable phase (Glfp)	3	GV		1
Katamatite loam (Kl)	2	GV	243	1
Koga clay loam (Kocl)	4	RO	23,758	2
Koyuga clay loam (Kycl)	4	RO	15,740	2
Lemnos loam (Ll)	3	GV	67,243	10
Lemnos loam friable phase (Llfp)	3	GV		2
Lemnos loam semi friable phase (Llsfp)	3	GV		1
Moira loam (Ml)	3	MV	23,442	1
Moira loam friable phase (Mlfp)	2	MV	6,735	3
Muckatah clay loam (Mcl)	6	MV	9,469	3
Nanneella fine sandy loam (Nfsl)	1	RO	4,685	5
Naring loam (Nl)	3	MV	12,939	3
Rochester clay (Rc)	5	RO	8,992	1
Sandmount sand (Ss)	1	MV	3,193	1
Sandmount sand phase (Ssp)	1	MV	276	1
Shepparton fine sandy loam (Sfsl)	2	GV	38,213	6
Timmering loam (Tl)	2	RO	10,035	4
Ulupna clay (Uc)	5	MV	5,779	1
Waaia loam (Wal)	2	MV	6,101	3
Waaia loam phase (Walp)	2	MV	5,321	1
Wallenjoe clay (Wc)	6	RO	8,195	1
Wana loam (Wnl)	4	RO	7,629	1
Wanalta loam (Wl)	3	RO	21,198	6
Total			388,615	79

3.4 Sampling Sites

Sampling sites for measurement of hydraulic properties on selected soil types were determined using existing soil maps and aerial photos. The selection of sampling site was based on the following criteria :

(1) Geographic spread

There are three irrigation districts in the SIR: Murray Valley (MV), Goulburn Valley (GV) and Rochester Region (RO) (Figure 3.1). The sampling sites were selected in such a way that major or typical soil types of the three irrigation districts were included for measurement. At least one soil type from each soil group was included for the measurement of hydraulic properties at each irrigation district. Table 3.2 presents the number of sampling sites for each soil group and irrigation district.

Table 3.2 Distribution of Sampling Sites

Irrigation District	Number of Sampling Sites						Total Sampling Sites
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Murray Valley	2	8	4	-	1	5	20
Goulburn Valley	4	7	14	6	2	1	34
Rochester	5	4	6	5	3	2	25
Total	11	19	24	11	6	8	79

(2) Lighter soil groups

As the lighter soils have more potential for recharge and consequently the adoption of alternative irrigation methods, more sampling sites were selected from the lighter soil Groups 1 to 3.

(3) Local variability

To capture variability in the measurements, two to eight sample locations were selected for measurement at each sampling site.

Field measurements were carried out on a total of 79 sites in the SIR, and the sites are shown in Figure 3.1.

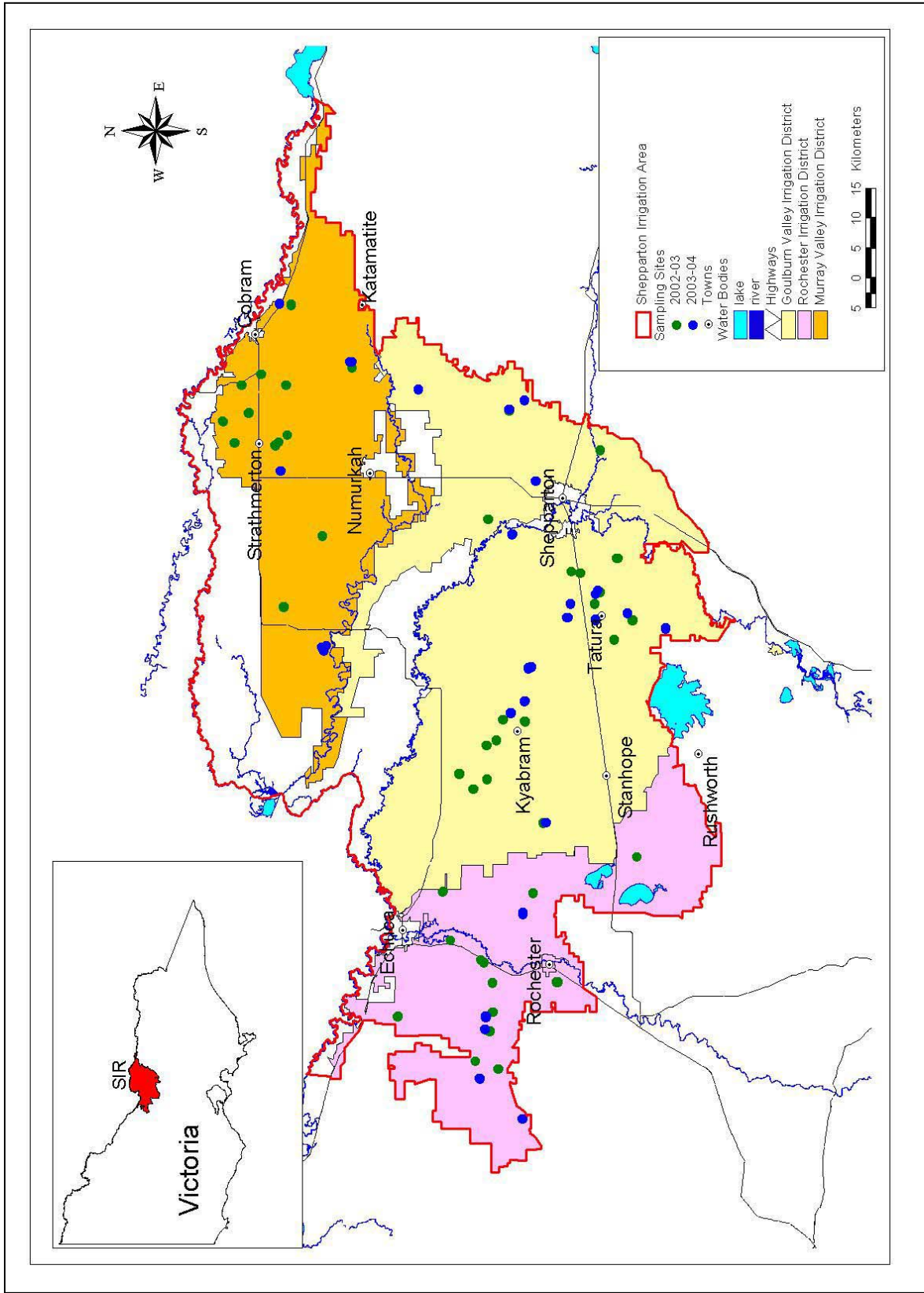


Figure 3.1 Sampling Sites