Estimating Soil Properties for Soil Classes in the PIRSA Land Resource Data Base

PIRSA Land Information has produced soil landscape polygon coverage for SA's agricultural districts. A key element of the database is a look-up table of attributes for each polygon. These attributes are listed in the attachment. Attribute values are determined from site observations / measurements and represent the most common (or characteristic) condition for that attribute in the polygon. Where there is significant variability within polygons, proportional components are used, each with their own set of attributes.

However, where there is a requirement for attributes other than those in the look-up table, or where an interpretation or modelling task requires site data rather than polygon data, an alternative approach must be invoked. The ASRIS project involved both of these requirements.

The solution offered by PIRSA entailed making interpretations from soil class data. Sixty one soils were identified as a result of PIRSA's land resource assessment program. Whilst these classes obviously include a degree of variability, we believe about 95% of soils fit reasonably comfortably in one of the 61 classes, and each site record was classified accordingly. In addition, the proportions of up to five soil classes were specified for each polygon (or polygon component) in the look-up table linked to the mapping database.

Estimation of the values of attributes that were not included in PIRSA's data set was based on the 61 soil classes. Texture, clay content and thickness of horizons were based on modal profile descriptions.
Ksat estimates were based on the McKenzie tables relating physical properties to Atlas of Australian Soils classes. Bulk density, field capacity and wilting point estimates were made from published data on similar soils from across South Australia. The Handbook of Australian Soils was a key reference in this regard.

Once the 61 soil classes were linked to the above physical attributes, both the site data and polygon data could be used to generate attribute surfaces, or to model some additional feature.

The data in the table used to assign soil attributes to the each polygon is based on average values (real or estimated) for each soil group for each attribute, as set out in the table below.

Soil property	Level of certainty	Basis for estimate
A-horizon texture	H	Modal A & B textures for each soil group developed from soil descriptions associated with mapped land systems Expert knowledge.
B-horizon texture	M	
A-horizon clay %	M	Estimate from standard tables relating field texture to clay content. Verification from limited psa
B-horizon clay %	M	
A-horizon thickness	M	Modal A & B thicknesses for each soil group developed from soil descriptions associated with mapped land systems Expert knowledge.
B-horizon thickness	M	
A- and B-horizon bulk density	L	Estimates from published data on similar soils (PIRSA has no BD data) Interpolation of McKenzie et al (2000) PPF attribution.
A- and B-horizon saturated hydraulic conductivity	L	Interpolation of McKenzie et al (2000) PPF attribution.
A- and B-horizon AWC	M	Estimates from published data on similar soils (PIRSA has limited AWC data) Estimates using relationships developed between soil materials and AWC Interpolation of McKenzie et al (2000) PPF attribution.

where
H High certainty: Estimate based on good data and data likely to be in a narrow range; likely to be fairly accurate,
M Moderate certainty: Result based on data plus significant expert judgement,
L Low certainty: A best guess based on limited data and experience.