APPENDIX 3 - SPECIFIC METHODOLOGY

3.1 Map Unit Determination

Map units were delineated according to geology and slope category (McDonald et al 1984) using geological mapping, topographical mapping, aerial photography and field survey techniques.

3.2 Field Observations

Most field descriptions (refer table All) are based on definitions used in 'Australian soil and land survey' (McDonald et al 1984) or 'A factual key for the recognition of Australian soils' (Northcote 1979). The definition for soil horizon boundaries is listed below.

Check that all containers are full and will last overnight to allow soil to saturate and conductivity rate to equilibrate.

Next day, remove water container and fill each ring. Mark that point as zero for future measurements and record zero time. At appropriate time intervals, depending on rate of infiltration - 5 min, 15 min, 30 min, 60 min, record the drop in water level in mm on sheets provided. If water levels are getting low, fill rings to zero again straight after taking readings.

Boundaries

S	Sharp	< 5 mm
A	Abrupt	5-20 mm
C	Clear	20-50 mm
G	Gradual	50-100 mm
D	Diffuse	> 100 mm
+	Continuing	

Record measurements for 3 hours or until the rate of infiltration is constant.

Dig out each ring taking care not to disturb the soil contained within the ring. Up-end the ring and record the proportion of soil area that has been transmitting water for each ring and record if water movement has been evenly distributed or confined to root/worm holes or structural cracks. Note any other differences, i.e. rocks, sand, clay patches.

3.3 Field Tests

3.3.1 Saturated Hydraulic Conductivity

Site selection:

Because of the considerable time and effort that is required to obtain meaningful permeability (Ksat) values, it is imperative that sites are chosen carefully and chosen prior to the day of measurement. The sites should have nil, or at least, minimal disturbance.

Procedure:

Insert six infiltration rings so that each ring is approximately 100 mm into the main clay horizon - remove some topsoil if necessary. Use the mechanical vibrator and special plate to insert rings, otherwise use gentle tapping with a sledgehammer.

Rings need to be at least 2 metres apart and located at random. Relocate ring if obstacles such as stones or roots prevent an even downward movement of the ring into the soil.

Fill ring with water and set up reservoir tank so that water is added when the level drops below the outlet tube. Record the time and date on field sheets.

3.4 Laboratory Analysis

Samples collected for each soil horizon were air dried, ground using a mortar and pestle and sieved to 2 mm. Physical analyses and soil pH, Ec and C1% measurements were conducted at Keith Turnbull Research Institute and chemical analyses at the State Chemistry Laboratory. All results are expressed in terms of oven dry soil.

3.4.1 Physical Properties

i) Particle size analysis

Based on a method by Hutton (1956), silt and clay percentages are determined by plummet balance readings on a 2% suspension, and sand percentages are determined by hand decantation followed by sieving.

Coarse sand	2 - 0.2 mm
Fine sand	0.2 - 0.002 mm
Silt	0.02 - 0.002 mm
Clay	< 0.002 mm

Dispersion Based on the method by Emerson (1977) Modification:

E2.4 E3.4	Complete
E2.3 E3.3	Major dispersion
E2.2 E3.2	Some dispersion
E2.1 E3.1	Minor dispersion

Atterberg Limits

Methods based on the Australian Standard AS 1289 3.4.2 Chemical Properties

Soil pH

1:5 soil-water suspension shaken for 1 hour and allowed to reach room temperature. Measured with a glass electrode and digital pH meter.

Electrical conductivity

Measurements on the above suspension using a dip-cell and direct reading meter.

Chloride ion %

Measurements on the above suspension using a silver nitrate titration.

Exchangeable Ca, Mg, Na, K

Gillman and Sumpter's method of extraction for acidic soils method no. 024 (State Chemistry Laboratory 1991) and Tuckers method for alkaline soils method no. 006 (State Chemistry Laboratory 1991). The extracts were analysed using Inductively Coupled Plasma atomic emission spectroscopy.

Exchangeable Al and MI

Extracted with 0.1 m KCl and concentrations determined by calorimetry and atomic absorption spectrophotometry respectively method no. 001 (State Chemistry Laboratory 1991).

Oxidizable Organic Carbon

Walldey and Black method no. 014 (State Chemistry Laboratory 1991).

Phosphorus

Olsen method, method no. 010 (State Chemistry Laboratory 1991).

Potassium

Skene method no. 011 (State Chemistry Laboratory 1991).

Total Nitrogen %

Method no. 007 (State Chemistry Laboratory 1991).

Exchangeable H

Method no. 005 (State Chemistry Laboratory 1991)

LOCATION REFERENCE

101 Described by

102 Date

Map Sheet

103 Scale

104 Number

Map Reference

105 Type

106 Easting / Latitude

107 Northing / Longitude

108 Zone

Aerial Photographs

109 Film number

110 Run number

111 Frame number

112 Position east mm.

113 Position north mm

Site Photographs

114 Type

115 Roll number

116-7 Film number

From ...

To...

CLASSIFICATION

Map Classification

201 Pre-map unit

202 Final map unit

203 Site elevation m.

204 Geology

Land Use Within Unit

205 Land use

206 Land use type

Water

207 Annual rainfall mm.

208 Rainfall distribution

J	F	M
A	M	Jn
Jy	A	S
0	N	D

209 Frost incidence

210 Surface runoff

211 Site drainage

212 Standing water mm.

Land Degradation

213-24 Erosion

Type Degree State

225 Erosion gully depth

226 Aggradation

227 Flooding

228 Inundation

229 Salinity

Soil Classification

230 Type observation

231 Depth solum

232 Great Soil Group

233 Northcote s.r.t.

234 Northcote PPF key

LANDFORM & LAND SURFACE

Landform Pattern

301 Relief m.

302 Modal slope

303 Relief /Modal slope

304 Pattern type

Landform Element

305 Morphology type

306 Element type

307 Slope evaluation

308 Simple slope %

309 Upper slope %

310 Mid-slope %

311 Lower slope %

312 Slope category

313 Slope inclination

314 Slope length m.

315 Slope width m.

316 Aspect °

317-8 Geomorph. agent

Land Surface

319 Site disturbance

320 Microrelief

321-2 M'relief. interval vert. mm horiz. mm

323-4 Surface condition

325 Regolith depth m.

Coarse Fragments

326 Surface gravel

327 Lithology

328 Surface stone

329 Lithology

330 Surface boulder

331 Lithology

Substrate Material

332 Type observation

333 Depth observation m.

334 Confidence

335 Porosity

336 Strength

337 Lithology

NATIVE VEGETATION

401 Growth form

402 Tallest stratum

403 Crown cover

404 Structural form

405-7 Dominant species

408-10 Major u/storey species

411-3 Major herbs

503	504-5	506	507	508	509	510	511	512	513
Horizon	Horizon depths upper - lower	Boundaries	Colour	Moisture state	V/C rating	Motttle abundance	Mottle size	Mottle contrast	Mottle colour
503	514	515	516	517	518	519	520	521	522
Horizon	Texture group	Texture grade	Texture qualifier	Structure compound	Structure grade	Structure size	Structure type	Fabric	Soil water status
503	523	524	525	526	527	528-9	530	531	532
Horizon	Consistence	Pans cementation	Pans type	Pans continuity	Pans structure	Segregation abund. & depth	Segregation nature	$CaCO_3$ test	Dispersion [lab test]
503	533	534	535	536	537	538	539	502	501
Horizon	Slaking [lab test]	Coarse fragment abundance	Coarse fragment size	Coarse fragment shape	Coarse fragment Lithology	pH	Organic matter content	Sample [lab tests]	Laboratory number