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# Irrigated land suitability assessment of Haughton Section - Stage I Nine Mile Lagoon to Oaky Creek

# Burdekin River irrigation area

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## SUMMARY

The Burdekin River Irrigation Area (BRIA) is being progressively developed, with new farms being released only after thorough land resource investigation has been completed and irrigation infrastructure is in place. The first section released (Mulgrave Section) adjoins this study area (Haughton - Stage 1).

Stage 1 of the Haughton Section comprises 4147 ha of very gently sloping alluvial terrain bounded by Barratta Creek in the East, Nine Mile Lagoon Creek in the south, Haughton Main Channel (HMC) in the west and Oaky Creek to the north. A detailed soil survey of the area was conducted during the dry seasons of 1987 and 1988. The results of the survey were then used to assess the irrigation potential of the area for crops such as sugar-cane, row crops, rice and horticultural crops.

While the topography of the area is simple, with only 2 landscape units present, the soils are not. Furthermore, previous studies indicated that some of the soils in this section were strongly sodic, raising problems for irrigated cropping. This study confirms that soils will be the primary constraint on irrigation options in this area.

### Landscape units and soils

There are two landscape units in Haughton Section 1; the Alluvial Plains of the Burdekin and Haughton Rivers; and the Miscellaneous Alluvial Landforms.

**The Alluvial Plains.** Approximately 80 per cent of the area (3280 ha) was mapped as part of the alluvial plains, landscape unit 2. Soils of this landscape unit comprise Barratta cracking clays and sodic duplex Oakey and Dowie soils. The Barratta clays occupy 1334 ha, often in the lowest positions in the landscape. Between Nine Mile Lagoon and Lagoon Creeks, areas of these clay soils act as pathways for contemporary drainage into Barratta creek.

The sodic duplex soils of the alluvial plains occupy 1946 ha and are located on either low rises or on the sloping margins of the area. Within the alluvial plains there is a much higher proportion of sodic duplex soils when compared to other areas of alluvial plains east of Barratta Creek. This is particularly obvious in the area north of Lagoon Creek. Many of the sodic duplex soils of landscape unit 2 are the shallow-surfaced soil types: 2Dda, 2Dya, 2Dba and 2Ddb. The very sodic Dowie soil types (2Dba, 2Ddb) are extensive (503 ha) and occur in such patterns as to represent a major constraint to the development of the area.

**Miscellaneous Alluvial Landforms.** The Miscellaneous Alluvial Landforms, landscape unit 6, consist of levees, flood-outs, fans, channel benches and prior streams. These landforms cover 867 ha and comprise a wide range of soils. Such soil complexity reflects the extremely varied composition of parent alluvium from more recent levee deposits along Lagoon and Oaky Creeks, siliceous prior stream deposits and earlier flood-outs of Oaky, Lagoon and Nine Mile Lagoon Creeks. In addition to the problem of soil complexity, most of the soils of this landscape unit are highly sodic duplex soils and are situated close to HMC.

In all, some 275 unique map areas (UMAs) were described in Haughton Stage 1, ranging in size from less than 1 ha to 228.3 ha. The modal UMA size of less than 10 ha reflects the complexity of this alluvial landscape; the soils of which show patterns of sequential deposition of alluvium and burial of prior stream systems.

Altogether, the sodic duplex soils occur over 2730 ha or 65 per cent of Haughton Stage 1, almost double the average incidence of these soils in the BRIA. At least 60% by area of the sodic duplex soils in Haughton Stage 1 are strongly sodic (ESP >15) by a depth of 0.3 m. This adverse chemical characteristic together with shallow surface horizons and significant soluble salt levels at depth, will severely limit soil water entry and extraction by plant roots.

**Areas of land suitable for irrigated cropping**

In terms of irrigation farm design, the southern part of the area will prove the most difficult, due to problems associated with soil complexity and the distribution of unsuitable soils. In particular, there are large areas of unsuitable soils located close to HMC.

**Sugar-cane.** A total of 2947 ha of Haughton Stage 1 has been assessed as suitable for the production of sugar-cane under furrow irrigation. While this represents a significant area, sodic duplex soils make up a considerable proportion of the suitable area, usually with a moderate sodicity limitation based on field pH as an indicator. The chemical analyses reported herein indicate that excessive sodicity may be a more severe limitation in Haughton Stage 1 than for other areas of the BRIA with similar sodic duplex soil types. As such, much of this area rated as suitable for sugar-cane may in fact be marginal i.e., class 4, if the sodic duplex soils of the area were more exhaustively analysed.

**Row crops.** Less land (2270 ha) is suitable for the furrow irrigation of maize and this area could be further reduced if a more severe sodicity limitation does exist. Irrigation farm design based on such a crop would be very difficult due to the limited amount of suitable land and its distribution some distance from HMC. The cropping potential of Haughton Stage 1, however, does improve considerably when a more salt and sodium tolerant row crop such as cotton is considered (2830 ha suitable).

**Rice.** As it is less costly to reduce the effect of excessive sodicity, rice production by flood irrigation offers perhaps the preferred land use for this area with 2106 ha assessed as suitable. Excessive deep drainage and slope in some areas are the main limitations which reduce the area suitable for rice production.

**Horticultural crops.** Haughton Stage I does not contain appreciable areas of land suitable for the furrow irrigation of small crops such as capsicums or production of mangoes by means of low volume irrigation. The areas assessed as suitable for the production of such crops are 110 ha and 140 ha respectively.

## 1. INTRODUCTION

In the Burdekin River Irrigation Area (BRIA), the Queensland Department of Primary Industries (QDPI) is undertaking a series of high intensity soil surveys at a scale of 1:25 000. These surveys are principally required to provide the Water Resources Commission (WRC) with detailed land resource information and an assessment of land suitability for irrigation farm design. This information is also provided to prospective purchasers prior to the release of farms by the WRC and subsequently to new landholders to assist with farm development planning and crop management.

Haughton Stage 1 covers 4147 ha and is located 9 km west of the town of Clare on the left bank of the Burdekin River ( shown in Figure 1). Early in 1987, it was thought that Haughton Stage 1 represented the next area after Mulgrave Section to be developed for irrigation with water from the newly constructed Haughton Main Channel even though an earlier broadscale soil survey by Reid and Baker (1984) indicated the existence of substantial areas of highly sodic duplex soils in this area.

Due to the perceived high priority for its development the detailed survey of Haughton Stage 1 commenced in the area between Nine Mile Lagoon Creek and Lagoon Creek (shown in Figure 2) during the dry season of 1987 and then extended to Oaky Creek in 1988 to complete Haughton Stage 1. Preliminary assessments of the irrigation potential of the area were provided to the WRC during the course of the work and these have tended to lower the development priority earlier afforded to Haughton Stage 1.

This report provides a summary of the results of the irrigated land suitability assessment and the detailed soil survey on which it was based. Constraints to irrigation farm design and potential land degradation hazards have been highlighted together with more detail on some of the highly sodic soils of the area.

The map contained in the rear of the report shows the soils of the area at a scale of 1:25 000 and land suitability for five commonly grown crops at a scale of 1:50 000. Working plans showing the same information and the land suitability assessment separately for each crop at a scale of 1:10 000 are available from QDPI.

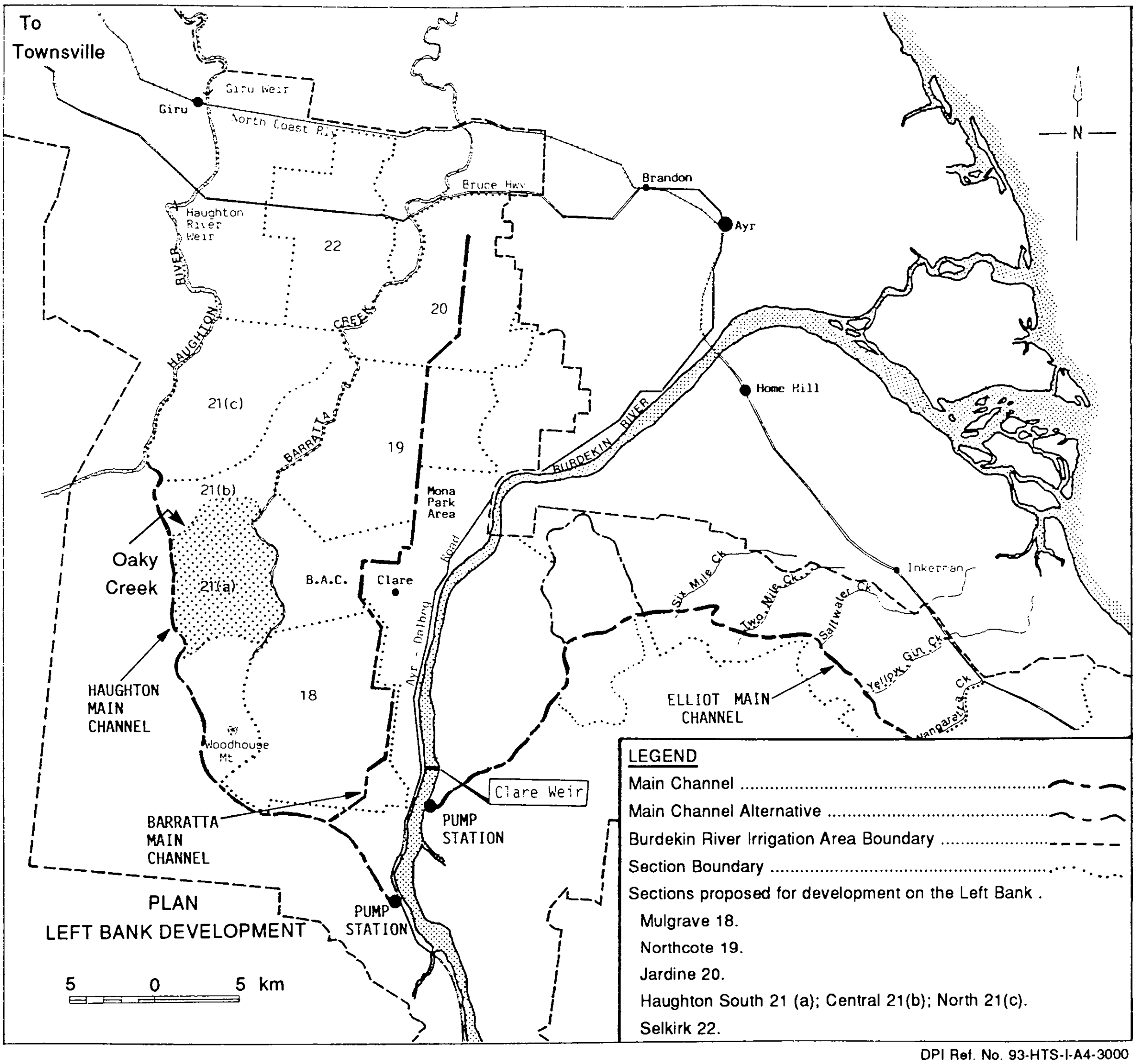


**Figure 1.** Location of Haughton Section - Stage 1 survey area (shown by shading).

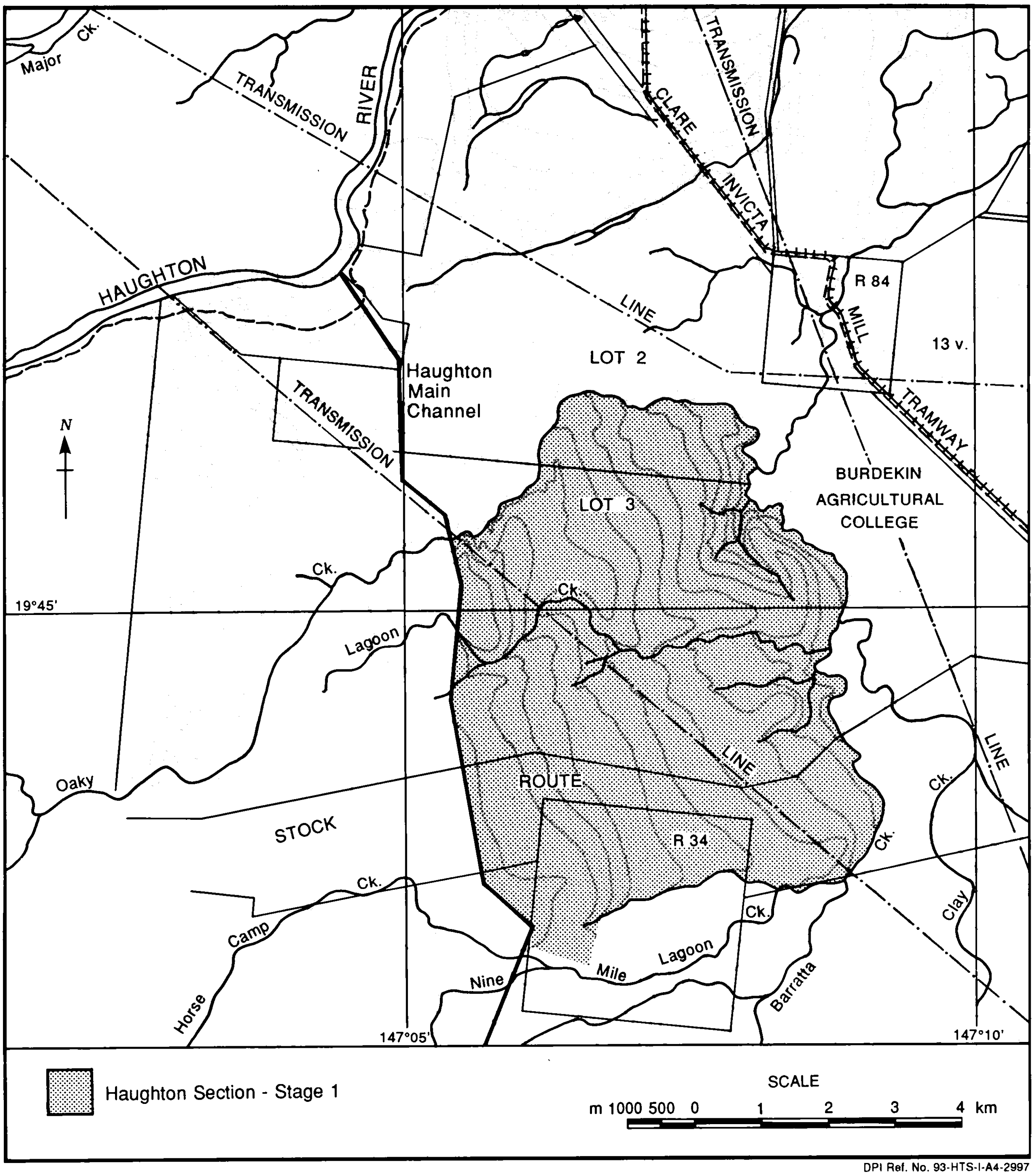


**Figure 2.** Physical features and surface contours of Haughton Section - Stage 1, bounded by Haughton Main Channel, Oaky and Barratta Creeks and part of Nine Mile Lagoon Creek.

# 2. PHYSIOGRAPHY

## 2.1 Climate

The climate of the area is characterised by well defined wet and dry seasons with the dry season extending over the cooler months from May to September. The nearest weather recording station to the survey area is situated at Clare, 9 km to the east.

Temperature and evaporation rates for the Haughton Stage 1 area are expected to be very similar to those recorded at Clare; average temperature range is about 20.5 to 32.3°C (October to April) and 13.0 to 27.3°C (May to September) and evaporation is at a maximum over the period October to January. Rainfall is likely to be slightly higher than at Clare due to the convectional influence of adjacent hills to the west of the Haughton River. The average annual rainfall for Clare is 893 mm. Seventy-five percent of the total rainfall falls between December and March and rainfall variability is high.

A more detailed analysis of the weather data recorded for Clare is provided in Donnollan *et al.* (1990).

## 2.2 Topography

The topography of the survey area is relatively uniform with little variation in elevation; slopes are commonly less than 1 in 200. Approximately 80 per cent of the area is alluvial plain (landscape unit 2) with the residue being miscellaneous alluvial landforms (landscape unit 6). The miscellaneous alluvial landforms consist of levees, flood-outs, fans, channel benches and prior streams located mainly adjacent to the Haughton Main Channel and Lagoon and Oaky Creeks (see accompanying map).

## 2.3 Surface drainage

Surface drainage of the area between Nine Mile Lagoon Creek and Oaky Creek has followed many different paths over time. This is reflected in surface features such as prior stream patterns, discrete flood-out deposits and fans which have been abandoned and previous drainage depressions which have been infilled by fine textured alluvium.

Some of these features have been highlighted in Figure 3. The main creeks that currently drain the area have been labelled on Figure 3. It should be noted that Lagoon Creek which flows through the centre of Haughton Stage 1 actually commences as an overflow distribution channel of Oaky Creek (shown by arrows).

Outbreaks of Oaky Creek and Nine Mile Lagoon Creek have been numerous and are clearly demonstrated by the prior stream and flood-out patterns such as those adjacent to HMC (Figure 3). The extent and location of some of these features is shown by discontinuous lines in Figure 3.

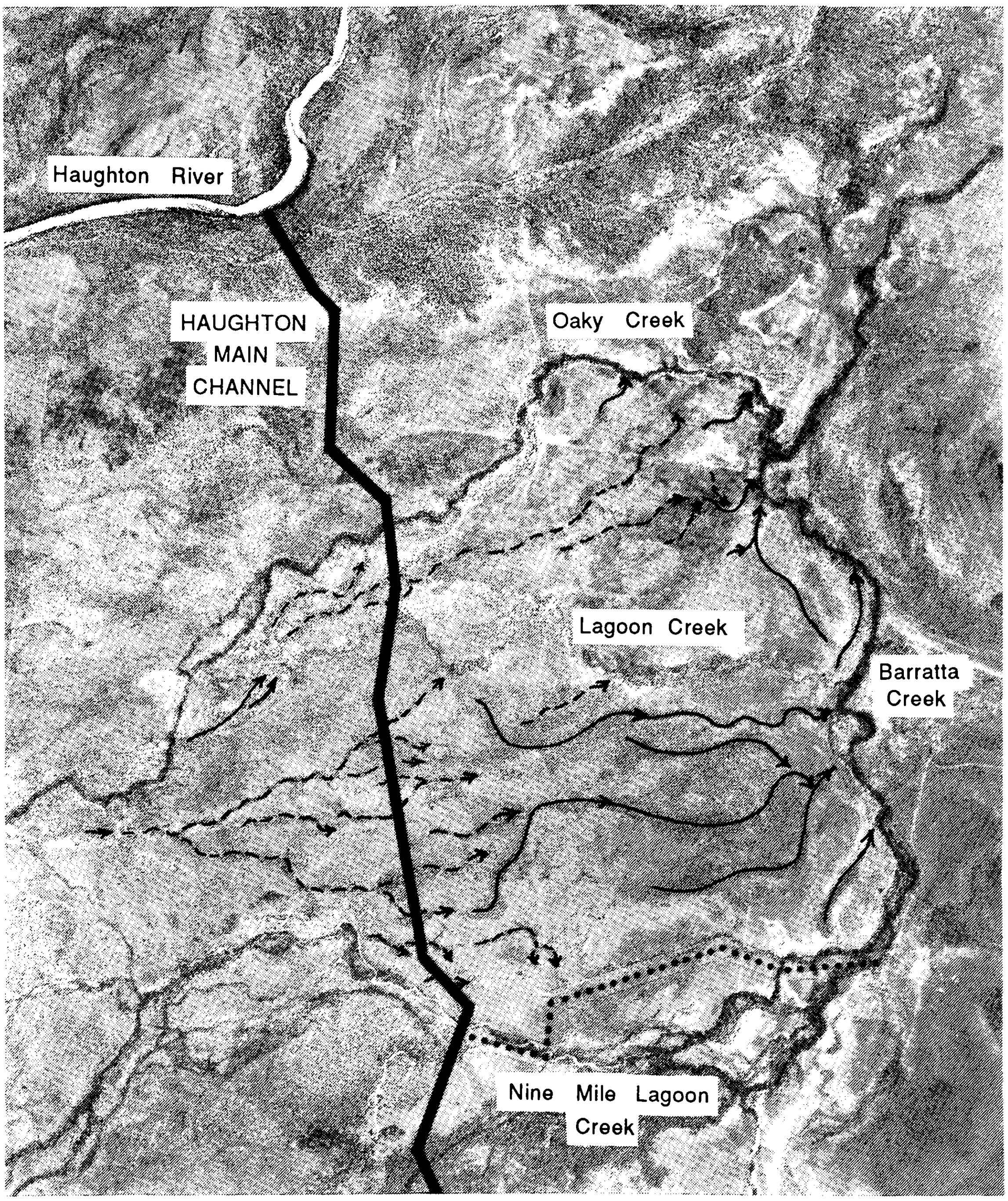


**Figure 3.** Surface drainage features of the Haughton Stage 1 area. Continuous lines indicate broad drainage floors infilled with clay alluvium. Discontinuous lines indicate prior stream and flood-out patterns. The southern boundary of the survey area is shown by ••••••••••••.

In some instances the prior streams are elevated above the surrounding terrain with very coarse textured soils along the centre of the prior stream (eg. UMA38). In other situations they are evidenced by sandy ridges (eg UMAs 62 and 64 in the south and 224 in the north), flanked by areas of sodic duplex soils which may have developed by prior microtopographic salinisation - solonisation.

Other areas are characterised by intense patterns of very narrow prior streams within large areas of highly sodic duplex soils (eg. UMA72). **All prior streams identified while in the field have been shown on the 1:25 000 scale soils map with discontinuous lines.**

Some of the most extensive relict flood-out deposits occur adjacent to Nine Mile Lagoon Creek in the south of the area. Much of this southern area overlies coarse textured material within 1.5 m of the surface. The associated discrete occurrences of raised gravelly deposits (6Dyg4, UMA 19 and 21) suggest a major prior drainage path through this part of the area.

Infilling of previous drainage depressions with finer textured alluvium has been extensive and these areas of cracking clay soils still carry a considerable amount of surface flow towards Barratta Creek where they become incised for short distances (shown by continuous lines on Figure 3).

## 2.4 Predevelopment flooding

Major floods such as those experienced in 1940, 1946 and 1958 have a probability of occurrence of once in 35 years. Resulting flooding would inundate most of Haughton Stage 1 to a depth of over 1 m (McIntyre and Associates, unpublished). Inundation would exceed 2 m over about half of Haughton Stage 1 adjacent to Barratta, Lagoon and Oaky Creeks. Such severe flooding of the area occurs due to the outbreak of floodwaters from the Burdekin River further upstream and meeting local runoff along the line of Barratta Creek. Flooding of Barratta Creek would then hold up runoff flowing down both Lagoon and Oaky Creeks. Flooding is particularly deep along Oaky Creek due to supplementation by smaller local creeks within its catchment and the outbreak of floodwaters from the Haughton River near Piccaninny Creek.

McIntyre and Associates concluded that inundation of much of Haughton Stage 1 may only be for a short duration once the major rivers are no longer breaking their banks. However, the area adjacent to Barratta and Oaky Creeks may remain inundated for a longer period due to the concentration of local runoff and floodwaters down Barratta Creek. These more deeply flooded areas (>2 m) are also likely to have the highest rates of flow which would be very damaging to crops. Considering the depth of inundation over existing cane growing areas in the lower Burdekin, McIntyre and Associates recommended that the 2 m flood depth contour associated with a 35 year flood be adopted as the limit for cane expansion.

## 2.5 Vegetation

Reid and Baker (1984) provide a description of the general relationships between vegetation and soils over the entire left bank of the BRIA which includes the Haughton Stage 1 area. The area retains most of its original vegetation with minimal clearing of the open woodlands. Appendix I provides a list of both common and scientific names of the species recorded during this soil survey. Table 1 lists the predominant structural form and species of vegetation recorded on each of the soil types mapped within Haughton Stage 1. Structural formation terminology follows that of Walker and Hopkins (1984).

In general terms, Haughton Stage 1 is lightly timbered, due mainly to the predominance of sodic duplex soils over much of the area (2730 ha or 65 per cent). Sodic duplex soils are also often present as secondary soils in complex soil units which results in reduced tree canopy cover and height. Low to mid-high isolated trees or open woodlands of cabbage gum and beefwood form the predominant vegetation on the sodic duplex soils. A tall shrubland of beefwood and false sandalwood can also occur on some of the most sodic soils of this group. Grasses vary from tussock grassland of blue grasses, black spear grass and kangaroo grass, to sparse tussock grassland of the same species; together with purple top Rhodes grass on the most sodic soils of this group.

Low to mid-high open woodlands of poplar gum with carbeen and cabbage gum associated with tussock grassland of blue grasses, black spear grass and kangaroo grass is the predominant vegetation on the Barratta clays (2Ug soils) of the alluvial plain. Tree canopy cover is greatest on the more low lying areas of 2Ugd soils and least on the slightly more elevated areas of 2Ugh soils which have heavier surface texture.

The tallest and most dense tree cover occurs on the minor areas of better drained soils of levees and prior streams throughout the area. The predominant vegetation on such soils (eg. 6Ucc, 6Dra, 6Dbe, 6Dya) is mid-high woodland to open woodland of grey bloodwood, poplar gum and carbeen, associated with tussock grassland of black spear grass, giant spear grass and golden beard grass.

**Table 1.** Major distinguishing attributes of the soil types, Haughton Section - Stage I, Nine Mile Lagoon to Oaky Creek, Burdekin River Irrigation Area

## Landscape Unit 2: Burdekin and Haughton River alluvial plains

### Low lying flats

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 2Uga | Barratta | 0.01-0.02 m weak to moderate self mulch over grey to dark medium to heavy clay to 0.05-0.10 m over alkaline grey to dark medium to heavy clay to 1.00-1.35 m over brown medium to heavy clay to 1.50+ m. Normal gilgai, less than 0.10 m vertical interval. | Grey clay - black earth | Ug5.29<br>Ug5.17 | Mid-high open woodland of poplar gum and carbeen associated with tussock grassland of blue grasses. |
| 2Ugc | Barratta | Weakly self mulching to hard setting surface over bleached, brown-mottled grey to dark light to light medium clay to 0.05-0.15 m over neutral to moderately alkaline grey medium to heavy clay to 1.20 m over moderately to strongly alkaline brown light to light medium clay to 1.5+ m. Normal gilgai, 0.05-0.20 m vertical interval. | (Bleached)++ grey clay - (bleached) black earth | Ug3.2<br>Ug3.1 | Low to mid-high open woodland of poplar gum and carbeen associated with tussock grassland of blue grasses. |
| 2Ugd | Barratta | Weakly self mulching to hard setting surface over bleached, brown-mottled grey to brown light to light medium clay to 0.10-0.25 m over brown-mottled grey to brown medium clay to 1.00-1.20 m over grey to brown light medium to medium heavy clay to 1.50+ m, strongly alkaline at and below 0.90-1.20 m. Normal gilgai, 0.10-0.30 m vertical interval. | (Bleached) grey and brown clay | Ug3.2<br>Ug3.3 | Low to mid-high open woodland of poplar gum and carbeen associated with tussock grassland of blue grasses, kangaroo grass and black spear grass. |

**Table 1.** (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 2Uge | Barratta | Weakly self mulching to hard setting surface over frequently bleached, brown-mottled grey to brown or dark light to light medium clay to 0.05-0.25 m over brown-mottled grey to brown medium to medium heavy clay to 0.80-1.30 m over brown light medium to medium clay to 1.50+ m, strongly alkaline above or at 0.60 m. Normal gilgai, 0.05-0.30 m vertical interval. | (Bleached) grey clay - grey and brown clay - black earth | Ug3.2<br>Ug5.25<br>Ug3.3<br>Ug5.17 | Low to mid-high open woodland of poplar gum with carbeen, cabbage gum and beefwood associated with tussock grassland of blue grasses, black spear grass and kangaroo grass. |
| 2Ugf | Barratta | 0.01-0.02 m moderate self mulch over brown-mottled grey medium clay to 0.05-0.20 m over brown-mottled grey medium heavy clay to 1.20-1.50+ m over grey to brown medium clay to 1.50+ m, strongly alkaline at 1.20-1.50 m. Normal gilgai, 0.10-0.50 m vertical interval. | Grey clay | Ug5.25<br>Ug5.28 | Low to mid-high open woodland of poplar gum and carbeen with broad leaf tea-tree associated with tussock grassland of blue grasses. |
| 2Ugg | Barratta | 0.01-0.02 m moderate self mulch over occasionally bleached, brown-mottled grey to dark medium clay to 0.10-0.20 m over grey medium to medium heavy clay to 0.80-1.20 m over brown to yellow-brown light to medium clay to 1.50+ m, strongly alkaline at and below 0.60-0.90 m. Normal gilgai, 0.10-0.30 m vertical interval. | Grey clay - (bleached) grey clay-black earth | Ug5.28<br>Ug3.2<br>Ug5.17 | Low to mid-high open woodland of poplar gum and carbeen with cabbage gum associated with tussock grassland of blue grasses and cane grass. |

Table 1. (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 2Ugh | Barratta, Yalinga | 0.01-0.02 m moderate to strong self mulch over brown-mottled grey medium to medium heavy clay to 0.10-0.15 m over grey medium to medium heavy clay to 1.00-1.50+ m over brown light medium to medium heavy clay to 1.50+ m, strongly alkaline at and below 0.30 m. Normal gilgai, 0.10-0.30 m vertical interval. | Grey clay | Ug5.29<br>Ug5.28<br>Ug5.25 | Mid-high isolated trees to open woodland of carbeen, poplar gum and cabbage gum with tussock grassland of blue grasses, cane grass and Flinders grass. |
| 2Ugk | Barratta | Normal gilgai 0.10-0.30 m vertical interval.<br><br>Mound: 0.01-0.02 m weak to strong self mulch over grey to dark medium to medium heavy clay to 1.00-1.50+ m over brown to yellow-brown light medium to medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.30-0.60 m. | Grey clay - black earth | Ug5.2<br>Ug5.29<br>Ug5.17 | Low to mid-high open woodland of poplar gum, carbeen and cabbage gum associated with tussock grassland of blue grasses and cane grass. |
| | | Depression: Weakly cracking, hard setting surface over bleached, brown-mottled grey to dark light to light medium clay to 0.05-0.10 m over brown-mottled grey light medium to medium clay to 0.30-0.60 m over grey to yellow-brown medium clay to 0.70-1.20 m over brown to yellow-brown light to light medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.60-0.90 m. | (Bleached) grey clay - (bleached) black earth | Ug3.2<br>Ug3.1 | |

**Table 1.** (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| | | **Slightly elevated flats** | | | |
| 2Dba | Dowie | 0.05-0.12 m brown loam - fine sandy to clay loam A horizon bleached throughout or near base over brown medium clay B horizon to 0.70-1.50+ m over brown to yellow-brown light to light medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.30 m. | Solodic-solodized solonetz | Db1.33<br>Db1.43 | Low to mid-high isolated trees of cabbage gum, beefwood and poplar gum or tall shrubland of beefwood and false sandalwood associated with open to sparse tussock grassland of blue grasses, black spear grass, purple top Rhodes grass and button grass. |
| 2Dbb | Oakey | 0.05-0.15 m dark to brown loam - fine sandy to clay loam A1 horizon over bleached A2 horizon to 0.12-0.20 m over brown medium clay B horizon to 0.70-1.50+ m over brown to yellow-brown fine sandy clay to light medium clay D horizon to 1.50+ m, strongly alkaline above or at 0.60 m. | Solodic-solodized solonetz | Db1.33<br>Db1.43 | Low to mid-high open woodland or isolated trees of cabbage gum and beefwood with carbeen and poplar gum associated with tussock grassland of purple top Rhodes grass, black spear grass and blue grasses. |
| 2Dbc | Oakey | 0.05-0.25 m dark to grey loam - fine sandy to clay loam A1 horizon over bleached A2 horizon to 0.20-0.35 m over brown-mottled grey to brown medium clay B horizon to 0.70-1.30 m over brown to yellow-brown fine sandy clay to light medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.90-1.20 m. | Solodic-solodized solonetz | Dy3.33<br>Db2.33 | Mid-high open woodland of poplar gum, cabbage gum and beefwood associated with tussock grassland of black spear grass, blue grasses and kangaroo grass. |

**Table 1.** (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 2Dbd | Oakey | 0.10-0.20 m brown-mottled dark to brown loam - fine sandy to clay loam A1 horizon over bleached A2 horizon to 0.20-0.35 m over dark to brown medium clay B horizon to 0.70-1.00 m over brown to yellow-brown fine sandy clay to medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.60 m. | Solodic-solodized solonetz | Dd1.33<br>Dd1.43<br>Db1.33 | Low to mid-high open woodland or isolated trees of cabbage gum, poplar gum and beefwood associated with tussock grassland of black spear grass, blue grasses and kangaroo grass. |
| 2Dya | Oakey | 0.05-0.12 m brown-mottled dark to brown loam - fine sandy to clay loam A horizon bleached throughout or near base over frequently brown-mottled grey to brown medium clay B horizon to 0.60-1.20 m over brown to yellow-brown light medium to medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.60 m. Frequently normal gilgai, less than 0.10 m vertical interval. | Solodic-solodized solonetz | Dy3.33<br>Dy2.33<br>Db2.33<br>Db1.33 | Mid-high open woodland or isolated trees of cabbage gum, poplar gum and beefwood associated with tussock grassland of blue grasses, black spear grass and kangaroo grass. |
| 2Dyb | Oakey | 0.05-0.10 m brown-mottled dark to brown loam - fine sandy to clay loam A1 horizon over bleached A2 horizon to 0.12-0.20 m over dark to grey medium to medium heavy clay B horizon to 0.60-1.20 m over brown to yellow-brown fine sandy clay to medium clay D horizon to 1.50+ m, strongly alkaline above or at 0.60 m. | Solodic-solodized solonetz | Dd1.33<br>Dd1.43<br>Dy2.33<br>Dy2.43 | Low to mid-high open woodland of cabbage gum, poplar gum, beefwood and carbeen associated with tussock grassland of black spear grass, blue grasses and purple top Rhodes grass. |

Table 1. (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 2Dda | Oakey | 0.05-0.12 m brown-mottled dark to brown sandy clay loam - fine sandy to clay loam A horizon bleached throughout or near base over dark to brown medium to medium heavy clay B horizon to 0.60-0.90 m over brown to yellow-brown light to medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.60-0.90 m. | Solodic-solodized solonetz | Dd1.33<br>Dd1.43<br>Db1.33 | Mid-high isolated trees or open woodland of cabbage gum and beefwood associated with tussock grassland of black spear grass and blue grasses. |
| 2Ddb | Dowie | 0.05-0.12 m brown-mottled dark to brown loam - fine sandy to clay loam A horizon bleached throughout or near base over dark to grey medium to medium heavy clay B horizon to 0.60-1.00 m over brown to yellow-brown light to medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.30 m. | Solodic-solodized solonetz | Dd1.33<br>Dy2.33 | Mid-high isolated trees or open woodland of cabbage gum, beefwood, carbeen and poplar gum associated with open tussock grassland of black spear grass, blue grasses, purple top Rhodes grass and kangaroo grass. |

Table 1. (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 2Ddc-2Ugi | | Linear gilgai complex. Vertical interval of gilgai less than 0.05 m, 60-70% depression. | | | Mid-high open woodland of cabbage gum, carbeen and beefwood associated with tussock grassland of black spear grass, blue grasses, kangaroo grass and Flinders grass. |
| | | Depression (2Ddc): 0.05-0.20 m brown-mottled dark clay loam A1 horizon over bleached A2 horizon to 0.20-0.35 m over strongly alkaline dark to grey medium to heavy clay B horizon to 0.80-1.20 m over grey to brown medium to heavy clay B horizon to 1.00-1.40 m over yellow-brown light medium to medium clay D horizon to 1.50+ m. | Solodic-solodized solonetz | Dd1.33<br>Dy2.33 | |
| | | Mound (2Ugi): 0.01-0.02 m moderate to strong self mulch over grey to brown medium to heavy clay to 0.10-0.20 m over strongly alkaline grey to brown medium to heavy clay to 1.00-1.30 m over yellow-brown medium clay D horizon to 1.50+ m. | Grey and brown clay | Ug5.2<br>Ug5.3 | |

## Landscape Unit 6: Miscellaneous alluvial landforms

### Levees, flood-outs, fans and prior streams

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 6Uca | Yellabin | 0.10-0.30 m dark coarse sand to sandy loam A horizon over acid to neutral brown to yellow-brown coarse sand to sandy loam B horizon to 0.80-1.00 m over brown-mottled coarse sand D horizon to 1.50+ m. | No suitable group, affinities with earthy sand | Uc5.11<br>Uc5.21<br>Uc5.23 | Low to mid-high woodland of pandanus, broad leaf tea-tree and grey bloodwood with cocky apple and poplar gum associated with tussock grassland of giant and black spear grass. |

**Table 1.** (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 6Ucb | Hylo | 0.20-0.30 m dark to grey or brown coarse sand to sandy loam A1 horizon over bleached A2 horizon to 0.50-0.60 m over acid to neutral frequently yellow or brown-mottled yellow-brown to brown coarse sand to sandy loam B horizon to 1.50+ m. | No suitable group, affinities with siliceous sand or earthy sand | Uc2.21<br>Uc2.22<br>Uc3.21 | Mid-high woodland of poplar gum, carbeen, grey bloodwood and broad leaf tea-tree associated with tussock grassland of giant and black spear grass. |
| 6Ucc | Burdekin | 0.05-0.50 m dark to brown sand to fine sandy loam A1 horizon over grey, brown or yellow A12 or A2 horizon to 0.50-1.10 m over acid to neutral brown to yellow sand to light sandy clay loam A3 or B horizon to 1.50+ m. | No suitable group, affinities with siliceous sand or earthy sand | Uc5.21<br>Uc5.11<br>Uc5.23<br>Uc4.21 | Mid-high woodland to open woodland of poplar gum, grey bloodwood, broad leaf tea-tree and pandanus associated with tussock grassland of giant and black spear grass and golden beard grass. |
| 6Dra | Lancer | 0.15-0.30 m dark to grey sandy loam to light sandy clay loam A1 horizon over occasionally bleached, brown to red-brown sandy loam to light sandy clay loam A2 horizon to 0.20-0.50 m over acid to neutral yellow-mottled red to red-brown medium clay B horizon to 0.85-1.50+ m over yellow-brown to brown sandy clay loam to sandy clay D horizon to 1.50+ m. | Red podzolic soil | Dr3.32<br>Dr3.22<br>Dr3.31 | Mid-high woodland of grey bloodwood, poplar gum and carbeen with cocky apple associated with tussock grassland of black spear grass, giant spear grass and brown sorghum. |

**Table 1.** (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 6Dba | | 0.10-0.20 m dark to brown sandy loam to sandy clay loam A1 horizon over bleached A2 horizon to 0.15-0.30 m over occasionally yellow-mottled brown light medium to medium clay B horizon to 0.50-1.30 m over yellow-brown to brown sandy clay to medium clay D horizon to 1.50+ m, alkaline at and below 0.60 m. | Solodic-solodized solonetz | Db1.33<br>Db1.43<br>Db2.33<br>Db2.43 | Low to mid-high open woodland or isolated trees of poplar gum, carbeen, grey bloodwood, cabbage gum and beefwood associated with tussock grassland of black spear grass, blue grasses and Rhodes grass. |
| 6Dbe | Glenalder | 0.05-0.15 m brown-mottled dark to brown loam to clay loam A1 horizon over bleached A2 horizon to 0.10-0.20 m over alkaline red-mottled brown medium clay B horizon to 0.55-0.70 m over brown to grey loamy sand to light medium clay D horizons to 1.50+ m. | Red-brown earth | Db2.33<br>Db2.43 | Mid-high woodland to open woodland of poplar gum, grey bloodwood and carbeen associated with tussock grassland of blue grasses, black spear grass and golden beard grass. |
| 6Dbh | | 0.05-0.15 m dark to brown sandy clay loam - fine sandy to clay loam A1 horizon over bleached A2 horizon to 0.10-0.25 m over strongly alkaline brown medium clay B horizon to 0.60-1.00 m over brown clay loam to light medium clay D horizon to 1.50+ m. | Solodic-solodized solonetz | Db1.33<br>Db1.43 | Low to mid-high isolated trees of beefwood and cabbage gum or tall shrubland of false sandalwood associated with open tussock grassland of purple top Rhodes grass and blue grasses. |
| 6Dya | | 0.10-0.40 m dark to brown or grey loamy sand to sandy loam A1 horizon over bleached, yellow-mottled grey to yellow-brown loamy sand to sandy loam A2 horizon to 0.60-1.20 m over acid to neutral red or grey-mottled yellow to yellow-brown or yellow-grey sandy clay to medium clay B horizon to 1.50+ m. | Yellow podzolic soil | Dy3.32<br>Dy3.31<br>Dy3.42 | Mid-high woodland of poplar gum and grey bloodwood with broad leaf tea-tree associated with tussock grassland of black and giant spear grass. |

Table 1. (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 6Dyb | | 0.15-0.30 m dark to brown loamy sand to sandy loam A1 horizon over bleached, grey to yellow-brown loamy sand to sandy loam A2 horizon to 0.30-0.60 m over acid to neutral red or grey-mottled yellow-brown to yellow-grey sandy clay to medium clay B horizon to 1.50+ m. | Soloth-solodic soil | Dy3.32<br>Dy3.42<br>Dy3.31 | Mid-high open woodland to woodland of poplar gum and grey bloodwood with carbeen and broad leaf tea-tree associated with tussock grassland of black spear grass, giant spear grass and blue grasses. |
| 6Dye | Kelona | 0.20-0.40 m brown-mottled grey to brown or dark loamy sand to sandy loam A1 horizon over bleached A2 horizon to 0.30-0.60 m over alkaline red-mottled grey to yellow-brown or yellow medium clay B horizon to 1.00 -1.50+ m over yellow-grey to yellow sandy clay D horizon to 1.50+ m. | Solodic-solodized solonetz | Dy3.43<br>Dy3.33 | Mid-high open woodland of grey bloodwood and poplar gum with carbeen, broad leaf tea-tree and beefwood associated with tussock grassland of black spear grass and giant spear grass. |
| 6Dyf | | 0.10-0.25 m dark to brown or grey loam - fine sandy to clay loam A1 horizon over bleached A2 horizon to 0.25-0.50 m over alkaline red-mottled brown to yellow-brown or yellow medium clay B horizon to 1.00 m over brown sandy clay to light medium clay D horizon to 1.50+ m. | Solodic-solodized solonetz | Dy3.33<br>Dy3.43<br>Db2.33 | Mid-high open woodland of poplar gum, carbeen and cabbage gum with grey bloodwood and beefwood associated with tussock grassland of black and giant spear grass and kangaroo grass. |
| 6Dyg | Kelona | 0.05-0.10 m grey to dark or brown sandy clay loam to loam A1 horizon over bleached A2 horizon to 0.10-0.30 m over strongly alkaline frequently brown-mottled grey to yellow-brown or yellow light medium to medium clay B horizon to 0.70-1.20 m over brown-mottled yellow-brown to grey clay loam to light medium clay D horizon to 1.50+ m. | Solodic-solodized solonetz | Dy3.33<br>Dy3.43<br>Dy2.33<br>Dy2.43 | Mid-high open woodland or isolated trees of cabbage gum, carbeen, poplar gum, grey bloodwood and beefwood associated with tussock grassland of black spear grass and purple top Rhodes grass. |

Table 1. (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 6Dyj | | 0.02-0.10 m brown to grey sandy clay loam to clay loam A1 horizon over bleached A2 horizon to 0.05-0.15 m over occasionally brown or yellow-mottled yellow-brown to brown light medium to medium clay B horizon to 0.60-1.00 m over brown to yellow-brown or yellow-grey clay loam to medium clay D horizon to 1.50+ m, strongly alkaline at and below 0.30 m. | Solodic-solodized solonetz | Db1.33<br>Db2.33<br>Dy2.33 | Mid-high open woodland or isolated trees of cabbage gum and beefwood, or tall shrubland of false sandalwood associated with open tussock grassland of blue grasses, giant and black spear grass and purple top Rhodes grass. |
| 6Ddb | | 0.15-0.30 m dark to grey or brown coarse sand to sandy clay loam A1 horizon over bleached A2 horizon to 0.25-0.50 m over occasionally brown-mottled alkaline dark medium clay B horizon to 0.60-0.70 m over yellow-brown to yellow clay loam to light medium clay D horizon to 1.50+ m. | Solodic soil | Dd1.43<br>Dd1.33<br>Dd2.43 | Mid-high open woodland of cabbage gum, poplar gum, carbeen and beefwood associated with tussock grassland of blue grasses and black spear grass. |
| | | **Channel benches** | | | |
| 6Ugc | | Hard setting surface over brown-mottled, dark to grey light clay to 0.10-0.20 m over bleached brown-mottled dark to grey light clay to 0.15-0.30 m over alkaline grey medium clay to 0.75-1.50+ m over grey to brown light clay to 1.50+ m. | (Bleached) grey clay | Ug3.2 | Tall woodland of carbeen and tea-tree associated with tussock grassland of blue grasses, kangaroo grass and black spear grass. |

Table 1. (Cont.)

| Soil type | Series affiliation | Major distinguishing attributes | Great Soil Group | Main Principal Profile Forms | Predominant natural vegetation |
|---|---|---|---|---|---|
| 6Gna | Farencer | 0.20-0.40 m dark clay loam A horizon over neutral to alkaline brown to dark light to medium clay B horizon to 0.90-1.20 m over brown sandy clay loam to sandy clay D horizon to 1.50+ m. | No suitable group, affinities with alluvial soil | Db1.12<br>Db1.13<br>Gn3.42<br>Dd1.12 | Mid-high open woodland to woodland of carbeen, poplar gum and beefwood associated with tussock grassland of giant spear grass, black spear grass and brown sorghum. |
| 6Dbb | Kelona | 0.10-0.25 m dark to grey loam, fine sandy to clay loam A1 horizon over bleached A2 horizon to 0.30-0.40 m over alkaline brown to dark medium clay B horizon to 1.00-1.20 m over brown to dark light medium to medium clay D horizon to 1.50+ m. | Solodic soil | Db1.33<br>Db1.43<br>Dd1.43<br>Dd1.33 | Mid-high open woodland to isolated trees of poplar gum, carbeen, cabbage gum and grey bloodwood associated with tussock grassland of black spear grass, giant spear grass and brown sorghum. |
| 6Dyd | Tootra | 0.10-0.20 m brown-mottled grey to dark or brown loam to clay loam A1 horizon over bleached A2 horizon to 0.20-0.40 m over acid to neutral red-mottled yellow-brown to brown medium to medium heavy clay B horizon to 0.50-0.80 m over yellow-brown to brown or red sandy clay to medium clay D horizon to 1.50+ m. | Brown podzolic soil | Db2.32<br>Dy3.42<br>Dy3.32 | Mid-high open woodland of poplar gum, carbeen and grey bloodwood associated with tussock grassland of black and giant spear grass. |
| | | **Backplains and depressions** | | | |
| 6Dda | | 0.10-0.15 m dark to brown clay loam A1 horizon over bleached A2 horizon to 0.15-0.25 m over alkaline dark medium clay B horizon to 0.50-0.90 m over brown to yellow-brown clay loam to light medium clay D horizon to 1.50+ m. | Solodic-solodized solonetz | Dd1.33<br>Dd1.43 | Mid-high open woodland to isolated trees of poplar gum, carbeen, beefwood and grey bloodwood associated with tussock grassland of black spear grass, blue grasses and Rhodes grass. |

# 3. SOILS

## 3.1 Soil survey methodology

A free survey technique was used which utilised aerial photo interpretation to assist in the location of soil boundaries. Fully rectified colour aerial photographs at a scale of 1:10 000 were used in the field to mark up soil boundaries and mapping sites. Prior to the commencement of field work, WRC surveyors established a 250 x 100 m grid as part of a level survey and this grid permitted the precise location of field mapping sites.

The mapping site intensity was varied depending on soil landscape complexity. The intensity was lowest in areas of cracking clay soils and greatest in the miscellaneous alluvial landforms (landscape unit 6). All field work was conducted by vehicle traverse. A total of 794 mapping sites were described and stored on computer in a site description file. This site intensity is approximately one per 6 hectares which is the maximum recommended for 1:25 000 scale mapping but the minimum for 1:10 000 scale mapping (Reid 1988). The latter scale is currently being used by WRC in the design of 40 to 100 ha sized irrigation farms in the BRIA.

All map unit boundaries and the location of prior streams and gully erosion (where observed) have been entered onto a GIS using the software ARC/INFO.

A description of the soil profile and information on vegetation, soil surface characteristics, microrelief (gilgai) and slope where necessary were recorded at each mapping site using the terminology and codes of McDonald *et al.* (1984). AMG coordinates were determined for each mapping site and added to the site description file.

## 3.2 Soil taxonomic and mapping units

To distinguish broad land types, Thompson (1977), Reid and Baker (1984) and Thompson *et al.* 1990 identified seven topographic forms within the lower Burdekin Valley. The term "topographic form" has since been replaced by the term "landscape unit" which can be defined as a natural unit of land in which a particular soil or association of soils is developed from a single rock type or complex of rock types. The soils bear a constant relationship to a limited range of landform elements or native vegetation communities and there is a similar drainage net throughout the landscape unit. As such the landscape unit is identical to the broadscale mapping unit known as the land system which many readers may be more familiar with.

In the survey area, only two landscape units were identified. There were: landscape unit 2 - Alluvial plains of the Burdekin and Haughton Rivers and, landscape unit 6 - Miscellaneous alluvial landforms. In Haughton Stage 1, landscape unit 6 comprised alluvial landforms associated with current and relict streams.

The soil taxonomic system developed for the lower Burdekin Valley (Thompson and Reid 1982) identifies each soil type (previously termed a soil profile class) via a four digit alphanumeric code: a number for the landscape unit; two letters for the appropriate subdivision of the Primary Profile Form (Northcote 1979) and one letter to separate each soil type. This final letter denotes either morphological differences or soil characteristics that may significantly influence the performance of that soil type under irrigated crop production. For example, the code 2Ugd denotes a soil type of landscape unit 2 (Burdekin and Haughton River alluvial plains); the "Ug" indicates that the soil type is a uniform textured cracking clay within the Factual Key of Northcote (1979) and the final letter "d" separates this soil type from other soil types of the same landscape unit due to different morphological and chemical characteristics.

During mapping, each soil profile described was assigned to a soil type within the soil taxonomic system outlined above. In some instances soil profiles were classified as a variant of a particular soil type where a morphological difference was observed from that of the modal soil type. A number after the soil type code eg. 2Ugd2 distinguishes the variants and these are listed in Table 2.

In some areas where a land attribute not normally associated with the soil type was identified and was thought to have a significant influence on land use, then the particular mapping unit was identified as a phase of the soil type. A capital letter after the soil type code distinguishes the phase, for example, 2DbbE for an eroded 2Dbb mapping unit.

Each of the soil types mapped within Haughton Stage 1 are listed in Table 1 together with the older soil series nomenclature of Hubble and Thompson (1953). Also listed in Table 1 are the appropriate Great Soil Group terms (where applicable) from Stace *et al.* (1968) and the main Principal Profile Forms (Northcote 1979) for each soil type. As the new Australian soil classification (Isbell 1992) was not available at the time of this survey, equivalent classes according to the new system have not been provided. However, a correlation between Burdekin soil types and the new classification can be found in Loi and Day (in prep.).

In terms of naming the soil mapping units, two types of mapping units were used. A simple mapping unit was used where one particular soil type occupied 70% or more of the mapping unit, and the unit was named after that soil type, eg. 2Ugd. The second unit used was the compound or complex mapping unit in which the dominant soil type occupied less than 70% of the mapping unit. In this case, the compound mapping unit was named after the two most commonly occurring soil types, the one occupying the greatest area being named first, eg. 2Ugd-2Uge.

Each single delineation of a mapping unit has been termed a unique map area or UMA (after Basinski 1978) and given a number. This UMA number and the UMA name (ie. the soil mapping unit name) were added to the site description file. This allows the necessary linkage between the site description file and the UMA file which contains land suitability data for each UMA (see also Section 4 of this report).

**Table 2.** The area and numbers of each mapping unit within Haughton Section - Stage 1, Burdekin River Irrigation Area

| Mapping unit | Area (ha) | Number of UMAs |
|---|---|---|
| 2Dba | 317.4 | 22 |
| 2Dba2 | 1.5 | 1 |
| 2DbaE | 3.4 | 2 |
| 2Dbb | 146.3 | 13 |
| 2Dbb2 | 21.4 | 1 |
| 2DbbE | 10.6 | 2 |
| 2Dbc | 2.4 | 1 |
| 2Dbc2 | 17.1 | 1 |
| 2Dbd | 51.9 | 2 |
| 2DbdE | 4.8 | 1 |
| 2Dda | 248.1 | 13 |
| 2Dda2 | 148.0 | 5 |
| 2Ddb | 180.4 | 6 |
| 2Ddc | 10.8 | 1 |
| 2Dya | 398.6 | 9 |
| 2Dya2 | 16.0 | 2 |
| 2DyaE | 11.1 | 1 |
| 2Dyb | 283.2 | 20 |
| 2Dyb2 | 72.0 | 4 |
| 2SP* | 1.3 | 1 |
| **Sub-total** | **1946.3** | **108** |
| 2Ugc | 6.7 | 1 |
| 2Ugd | 317.9 | 12 |
| 2Ugd2 | 36.6 | 2 |
| 2UgdE | 4.4 | 2 |
| 2Uge | 341.8 | 16 |
| 2Uge2 | 16.5 | 2 |
| 2UgeE | 1.6 | 1 |
| 2Ugf | 8.1 | 1 |
| 2Ugg | 46.5 | 4 |
| 2Ugh | 198.7 | 13 |
| 2Ugk | 321.9 | 14 |
| 2Ugk2 | 32.8 | 1 |
| **Sub-total** | **1333.5** | **69** |
| **Total Landscape Unit 2** | **3279.8** | **177** |

| Mapping unit | Area (ha) | Number of UMAs |
|---|---|---|
| 6Dba | 141.7 | 14 |
| 6Dba2 | 8.5 | 3 |
| 6Dba3 | 42.9 | 2 |
| 6DbbE | 29.1 | 1 |
| 6Dbe2 | 23.7 | 1 |
| 6Dbh | 11.4 | 2 |
| 6Dda | 64.3 | 6 |
| 6Dda2 | 30.7 | 3 |
| 6Ddb2 | 5.2 | 1 |
| 6Dra2 | 9.0 | 3 |
| 6Dya | 37.9 | 2 |
| 6Dyb | 41.4 | 9 |
| 6Dyb2 | 21.2 | 2 |
| 6Dyb3 | 3.1 | 2 |
| 6Dyd | 2.3 | 1 |
| 6Dye | 31.1 | 4 |
| 6Dyf | 19.1 | 4 |
| 6Dyf2 | 8.9 | 1 |
| 6Dyf3 | 35.1 | 1 |
| 6Dyg | 17.3 | 4 |
| 6Dyg2 | 44.3 | 6 |
| 6Dyg3 | 21.6 | 2 |
| 6Dyg4 | 18.7 | 2 |
| 6DygE | 8.6 | 1 |
| 6Dyj | 137.2 | 12 |
| 6Dyj2 | 15.8 | 1 |
| 6Dyj3 | 1.9 | 1 |
| 6Gna2 | 5.1 | 1 |
| 6Uca | 6.7 | 1 |
| 6Ucb | 8.5 | 2 |
| 6Ucb3 | 2.2 | 1 |
| 6Ucc | 4.9 | 1 |
| 6UgcE | 7.9 | 1 |
| **Total Landscape Unit 6** | **867.3** | **98** |

**Total Area Mapped 4147.1**

2SP* Seasonal or permanent swamps

**Variants and Phases**

**Suffixes**

2 Buried soils or D horizons of contrasting or coarser textures underlie the modal soil type at depths less than 1.50 m.

3 Significant variation in depth or field texture of the A horizon to that of the modal soil type.

4 Significant amounts of coarse gravel or cobble within the soil. These coarse fragments are absent from the modal soil type.

E Areas affected by severe erosion.

The area of each mapping unit within Haughton Stage 1 is shown in Table 2. Also shown in this table is the number of UMAs of each soil type whether it occurs as a simple mapping unit or as the dominant soil type within a compound or complex mapping unit.

## 3.3 Soil morphology and distribution

### 3.3.1 Introduction

The soil types mapped within each of the landscape units are listed in Table 1, together with a brief description of the major distinguishing attributes of each soil type. A more comprehensive description of each of the soil types can be found in Thompson and Reid (1982) and in McClurg *et al.* (1993). It should be noted that the full range of morphological attributes as listed for each soil type in the two publications above may not necessarily occur within the Haughton Stage 1 area.

### 3.3.2 Soils of The Alluvial Plains (landscape unit 2)

The Burdekin and Haughton River alluvial plains consist of fine textured sediments deposited during overbank flooding. The sediments have formed a level plain (slopes often less than 0.5 per cent) with very poor surface drainage. This landscape unit occupies some 3280 ha or almost 80 per cent of Haughton Stage 1 (Table 2).

Grey cracking clays (2Ug soils), also known as Barratta clays, occupy 1334 ha of Haughton Stage 1, mainly between Lagoon Creek and Nine Mile Lagoon Creek (see accompanying map). The soil types 2Ugd and 2Uge with lower surface clay content are found in low lying flats and drainage depressions with slopes often less than 0.2 per cent. These two soil types have light to light-medium clay surfaces that either set hard or have weak self mulching characteristics. In contrast, soil types 2Ugg, 2Ugh and 2Ugk usually occur on slightly more elevated flats and have medium to heavy clay surfaces with moderate to strong self mulching characteristics.

Sodic duplex soils (2D soils), also known as Oakey and Dowie soils, comprise the remaining 1946 ha of landscape unit 2 and are particularly widespread between Lagoon and Oaky Creeks. These soils occur at a slightly higher elevation in the landscape than the Barratta clays, and on slopes usually between 0.2 and 0.5 per cent. Oakey and Dowie soils were also found on steeper sloping areas adjacent to creeks, particularly around the margins of the survey area.

The colour of the clayey upper B horizon of the sodic duplex soils varies greatly from grey to brown or dark. All have B horizons of strong consistency and coarse macro-structure. The depth of the A horizon and the depth at which the field pH becomes strongly alkaline (pH $>8.5$) are attributes used to separate these soils.

Sodic duplex soil types 2Dba, 2Dya, 2Dda and 2Ddb have the shallowest surfaces being less than 0.12 m in depth and are the predominant soil types within landscape unit 2 (1325 ha). The Oakey soil types 2Dya and 2Dda are strongly alkaline below 0.3 m in depth and particularly widespread in the area between Lagoon and Oaky Creeks. In comparison, the field pH at 0.3 m in both of the Dowie soil types 2Dba and 2Ddb is always in excess of 8.5 which corresponds with strongly sodic characteristics (Donnollan, 1991). Dowie soils occur widely throughout Haughton Stage 1 (503 ha) with the most extensive occurrences adjacent to Haughton Main Channel between Lagoon and Nine Mile Lagoon Creeks. In one unusual occurrence (UMA 72) near the Channel, Dowie soils (2Ddb) were found to be closely associated with linearly distributed uniform sands (soil type 6Ucb) representing buried stream deposits. These relict buried stream deposits were observed to transgress a number of adjacent mapping units throughout Haughton Stage 1, reflecting prior stream paths during periods of higher sea level or more humid climatic regimes.

The Oakey soil types 2Dbb and 2Dyb with deeper surfaces (0.12 - 0.2 m) are also widespread in Haughton Stage 1 (534 ha). These soils occur mainly around the margin of the area along Nine Mile Lagoon and Barratta Creeks. The soil reaction trend for 2Dbb and 2Dyb soil types is similar to the other Oakey soils, 2Dya and 2Dda, described above, in that the pH does not usually reach 8.5 by 0.3 m in depth but will by 0.6 m. Other Oakey soil types, 2Dbc, 2Dbd and 2Ddc, with deeper surfaces (>0.2 m) and less alkaline soil reaction trends occur as only minor soils (87 ha) within the area.

### 3.3.3 Soils of landscape unit 6

A very wide range of soil types occurs on the levees, flood-outs and fans of the various creeks and prior streams. The greatest occurrence of these alluvial landforms occurs adjacent to HMC due to overbank flooding of Oaky and Nine Mile Lagoon Creeks.

The uniform sands (soil types 6Uca, 6Ucb, 6Ucc), as mapping units, occupy only 22 ha of the survey area (Table 2). However, they also occur as secondary soils within complex mapping units and extensively in thin linear patterns within many units, reflecting prior stream deposits. Such linear patterns are too thin to be mapped at this scale but the most obvious occurrences have been delineated with a broken line on the soils map. Such sandy soils will have an influence on the design and construction of area works and new irrigation farms particularly where they are elevated in the landscape, for example UMA 38 (6Dye-6Ucb).

All of the 6Uc soil types have yellow-brown to brown B horizons, with textures not exceeding sandy loam to light sandy clay loam. The one occurrence of 6Uca (UMA 189) is located adjacent to Oaky Creek and is transgressed by a prior stream leading to a small lagoon to the north. The soil type 6Ucb is distinguished by the presence of a bleached A2 horizon to a depth of 0.6 m and was found to occur on the major prior stream deposits adjacent to HMC.

Another soil type with a very deep sandy A horizon, 6Dya, has been developed on raised flood-out deposits adjacent to HMC as a result of previous overbank flooding of Oaky Creek. This soil type with A horizons extending to 1.2 m over a yellow-brown or yellow-grey clay B horizon, occurred over almost 40 ha.

By far the most extensive soils within landscape unit 6 are sodic duplex soils, extending over 783 ha. Approximately 73 per cent of the soils within this group have A horizon depths less than 0.3 m. These soils with shallow surfaces have brown, yellow-brown, grey or dark clay B horizons to a depth of about 1 m, overlying buried subsoil horizons, often of lighter texture than the B horizon above. Two of the sodic duplex soil types 6Dbh and 6Dyj within this broad group occupy 166 ha and are distinguished by thin surfaces, less than 0.15 m in depth and are very strongly sodic by 0.3 m. This sodicity level is associated with high pH values ($\geq$ 8.5) at 0.3 m.

Other sodic duplex soils with A horizon depths between 0.15 and 0.3 m have more variable pH and sodicity levels at 0.3 m. Soil types with these characteristics are 6Dba, 6Dyg, 6Dda and 6Ddb and were found mainly on flood-out deposits adjacent to HMC, mainly in the south of the area. Collectively, these four soil types total some 404 ha.

The remaining sodic duplex soils of this landscape unit cover 213 ha; they have deeper surfaces (to 0.6 m in depth) and are not strongly alkaline or sodic (ESP $>$ 6) in the upper 0.9 m of the profile. These soils (6Dbb, 6Dbe, 6Dyb, 6Dye and 6Dyf) have brown, yellow-brown to grey B horizons to about 1.2 m over buried subsoil horizons, often of lighter texture than the B horizon above.

Limited occurrences of the non-sodic duplex soil types 6Dra, 6Dyd and 6Gna make up the remaining 24 ha of landscape unit 6.

### 3.4 Chemical and physical characteristics

Following the field survey, representative soil profiles from 11 soil types were sampled for laboratory analysis. These sampled soils represent the most extensive soils, in particular, the sodic duplex soils which occupy 66 per cent or 2730 ha of Haughton Stage 1. The morphological and analytical data for the representative soil profiles are listed in Appendix II.

Profiles were sampled at 0 to 0.1 m, 0.1 to 0.2 m, 0.2 to 0.3 m, 0.5 to 0.6 m, 0.8 to 0.9 m, 1.1 to 1.2 m and 1.4 to 1.5 m unless a soil horizon boundary occurred within any particular sampling interval. Eight to ten surface samples (0 to 0.1 m) were also taken from each site and bulked for particular plant nutrient analyses. Analytical methods used and the principles followed in the interpretation of the results are outlined in Bruce and Rayment (1982) and Baker (1991).

In addition to the representative soil profiles, a further 23 sites were sampled mainly to further investigate soil salinity and sodicity levels in the sodic duplex soils. As these additional soil profiles were fully analysed, the results have been incorporated in the discussion of soil chemical and physical characteristics which follows. A list of the soil types and UMA's sampled is given in Table 3 and their location is shown in Figure 4.

**Table 3.** Soil types sampled within Haughton Section - Stage 1, Burdekin River Irrigation Area

| Soil type | Representative sample site number | Survey mapping site number | UMA number |
|---|---|---|---|
| **Sodic duplex soils of landscape unit 2** | | | |
| 2Dda | | HTS 195 | 30 |
| 2Dda | | HTS 204 | 40 |
| 2Dda | | HTS 209 | 30 |
| 2Dda | | HTS 402 | 30 |
| 2Dda | S4 | | 185 |
| 2Dda | | HTS 608 | 225 |
| 2Dya | S5 | | 134 |
| 2Dya | | HTS 596 | 222 |
| 2Dya | | HTS 660 | 225 |
| 2Dyb | | HTS 98 | 1 |
| **Cracking clays of landscape unit 2** | | | |
| 2Ugd (m) | S1A | | 11 |
| 2Ugd (d) | S1B | | |
| 2Uge (m) | S2A | | 122 |
| 2Uge (d) | S2B | | |
| 2Ugk (m) | S3A | | 13 |
| 2Ugk (d) | S3B | | |

| Soil type | Representative sample site number | Survey mapping site number | UMA number |
|---|---|---|---|
| **Sodic duplex soils of landscape unit 6** | | | |
| 6Dba | S6 | | 29 |
| 6Dba | | HTS 190 | 39 |
| 6Dba | | HTS 327 | 63 |
| 6Dba | | HTS 352 | 63 |
| 6Dda | S7 | | 69 |
| 6Dda | | HTS 328 | 69 |
| 6Dda | | HTS 371 | 60 |
| 6Dyb | | HTS 571 | 234 |
| 6Dye | S8 | | 38 |
| 6Dyg2 | S9 | | 39 |
| 6Dyg | | HTS 153 | 29 |
| 6Dyg | | HTS 397 | 33 |
| 6Dyg | | HTS 399 | 32 |
| 6Dyg | | HTS 460 | 173 |
| 6Dyj2 | S10 | | 33 |
| 6Dyj | | HTS 372 | 59 |
| 6Dyj | S11 | | 33 |
| 6Dyj | | HTS 389 | 33 |
| 6Dyj | | HTS 392 | 33 |
| 6Dyj | | HTS 393 | 33 |
| 6Dyj | | HTS 470 | 163 |

(m) mound profile, (d) depression profile

It can be seen from Table 3 and Figure 4 that emphasis was placed on sampling of the sodic duplex soils in the south west of the area, particularly in the vicinity of HMC. Some of the larger UMA's in this area have been multiple sampled to provide an understanding of the spatial variation in sodicity and salinity characteristics.

### 3.4.1 Fertility of surface soils

Very low to low levels of extractable phosphorus and low levels of organic carbon and total nitrogen were found in all three Barratta clay sites sampled (Table 4, Appendix 2). For the same soils, extractable potassium levels were medium to high, extractable copper

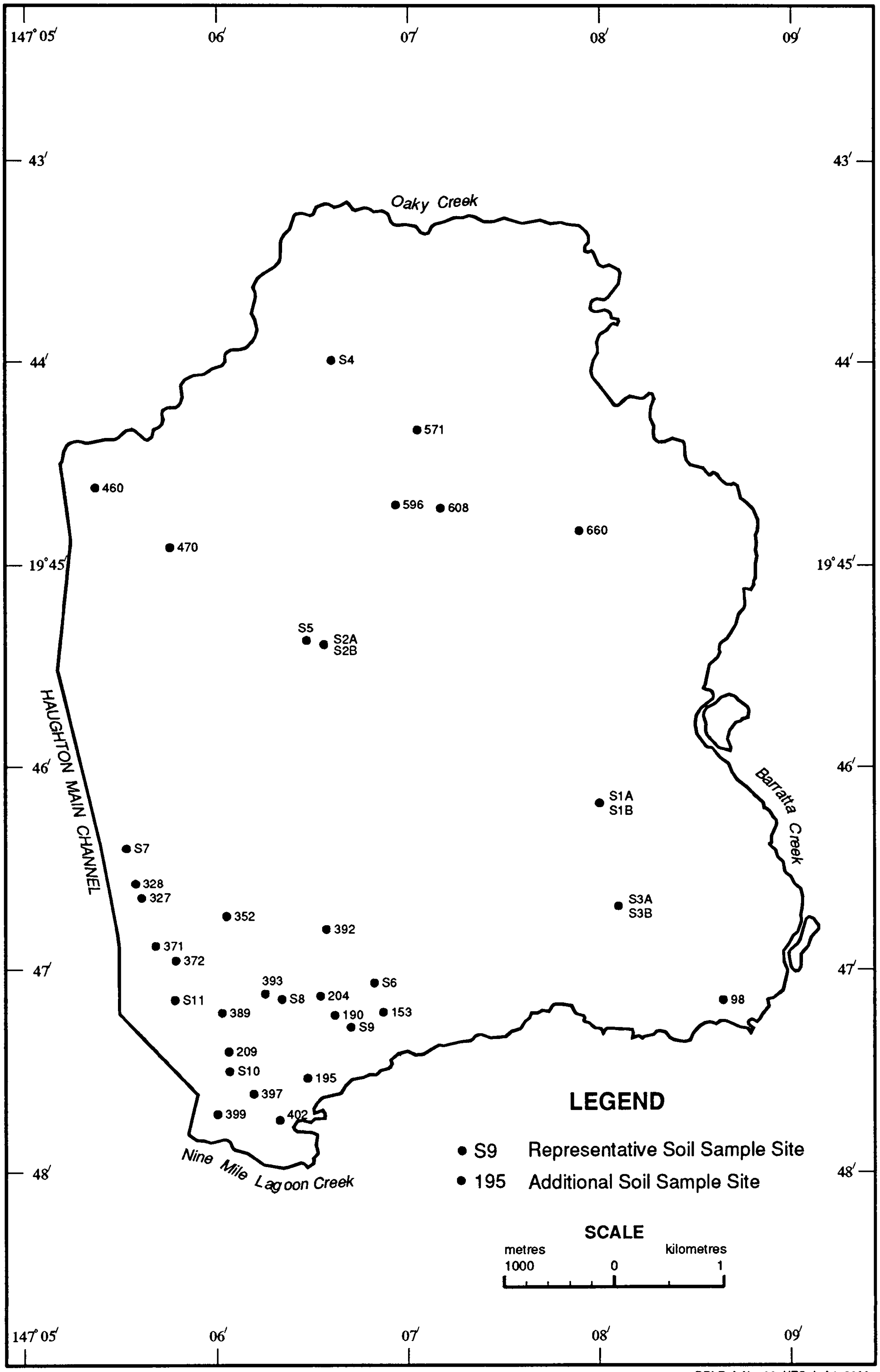


**Figure 4.** Location of representative and additional soil sampling sites, Haughton Section – Stage 1, Nine Mile Lagoon to Oaky Creek, Burdekin River Irrigation Area.

levels medium and extractable zinc levels very low to low on mounds and medium in the surface of depressions. The above data agree with the range of values for representative profiles of the same soil types elsewhere in the BRIA (Donnollan 1991).

**Table 4.** Fertility characteristics for surface soils (0-0.1 m) sampled within Haughton Section - Stage 1, Burdekin River Irrigation Area

| Soil type | Acid P (ppm) | Bicarb. P (ppm) | Extr. K (meq/100g) | Extr. Cu (ppm) | Extr. Zn (ppm) | Org. C (%) | Tot. N (%) |
|---|---|---|---|---|---|---|---|
| **Sodic duplex soils of landscape unit 2** | | | | | | | |
| 2Dda(6)* | | | | | | | |
| Mean | 6 | 4 | 0.38 | 0.8 | 0.5 | 1.1 | 0.06 |
| Minimum | 4 | 2 | 0.22 | 0.4 | 0.3 | 0.7 | 0.04 |
| Maximum | 7 | 5 | 0.64 | 1.1 | 0.8 | 1.6 | 0.09 |
| 2Dya(3), 2Dyb(1) | | | | | | | |
| Mean | 4 | 3 | 0.22 | 1.2 | 0.3 | 0.8 | 0.06 |
| Minimum | 2 | 1 | 0.13 | 0.8 | 0.2 | 0.4 | 0.03 |
| Maximum | 5 | 5 | 0.34 | 1.6 | 0.4 | 1.1 | 0.08 |
| **Overall mean** | **5** | **4** | **0.31** | **0.9** | **0.4** | **1.0** | **0.06** |
| **Cracking clay soils of landscape unit 2** | | | | | | | |
| 2Ugd(1), 2Uge(1), 2Ugk(1) | | | | | | | |
| Mean | 9 | 9 | 0.47 | 1.6 | 0.8 | 1.2 | 0.09 |
| Minimum | 5 | 4 | 0.36 | 1.1 | 0.3 | 0.8 | 0.06 |
| Maximum | 23 | 18 | 0.65 | 2.3 | 1.8 | 1.6 | 0.12 |
| **Sodic duplex soils of landscape unit 6** | | | | | | | |
| 6Dba(4) | | | | | | | |
| Mean | 6 | 5 | 0.27 | 0.3 | 0.2 | 0.6 | 0.03 |
| Minimum | 4 | 3 | 0.12 | 0.2 | 0.1 | 0.3 | 0.02 |
| Maximum | 7 | 7 | 0.45 | 0.5 | 0.3 | 0.9 | 0.05 |
| 6Dda(3) | | | | | | | |
| Mean | 7 | 4 | 0.30 | 0.7 | 0.3 | 1.0 | 0.06 |
| Minimum | 4 | 3 | 0.21 | 0.6 | 0.3 | 0.8 | 0.05 |
| Maximum | 11 | 7 | 0.38 | 0.8 | 0.4 | 1.1 | 0.06 |
| 6Dyg(5) | | | | | | | |
| Mean | 8 | 6 | 0.23 | 0.5 | 0.3 | 0.6 | 0.04 |
| Minimum | 5 | 2 | 0.14 | 0.2 | 0.2 | 0.4 | 0.02 |
| Maximum | 17 | 13 | 0.37 | 0.7 | 0.5 | 0.9 | 0.06 |
| 6Dyj(7) | | | | | | | |
| Mean | 13 | 11 | 0.35 | 0.5 | 0.4 | 0.8 | 0.05 |
| Minimum | 5 | 3 | 0.17 | 0.3 | 0.2 | 0.5 | 0.03 |
| Maximum | 29 | 25 | 0.60 | 0.7 | 0.7 | 1.3 | 0.07 |
| **Overall Mean** | **9** | **7** | **0.29** | **0.5** | **0.3** | **0.7** | **0.05** |
| **Weakly sodic duplex soils of landscape unit 6** | | | | | | | |
| 6Dyb(1) | 3 | 5 | 0.16 | 0.3 | 0.2 | 0.4 | 0.02 |
| 6Dye(1) | 5 | 3 | 0.22 | 0.2 | 0.4 | 0.5 | 0.03 |

(6)* refers to the number of analytical values available for each soil type or group of soil types.

The surface fertility status of all sodic duplex soils analysed is low and below that found for the three Barratta clay soils (Table 4, Appendix 2). In general, the origin of the sodic duplex soils ie. whether the soil occurred in landscape unit 2 or 6 made little difference to surface fertility characteristics with the exception that some soils of landscape unit 6 had slightly lower levels of extractable potassium, organic carbon and total nitrogen when compared to those of landscape unit 2. This is mainly a result of coarser surface textures in some of the landscape unit 6 soils, particularly in the case of 6Dyb and 6Dye and to some extent 6Dba.

When considering all sodic duplex soils together, extractable phosphorus levels were very low to low, as were organic carbon and total nitrogen levels. For the same soils, extractable potassium, copper and zinc were low to medium. Surface fertility data for this group of soils agrees with the range of values for representative profiles of the same soil types elsewhere in the BRIA (Donnollan 1991).

### 3.4.2 Total phosphorus, potassium and sulphur

All soils sampled from within landscape unit 2 mapping units had similar low levels of total sulphur, values decreasing from a mean of 0.016 per cent in the surface 0.1 m to 0.011 per cent by 1.2 m.

The Barratta clay (2Ug) soils, however, were a little better supplied with total phosphorus and potassium than the sodic duplex Oakey (2D) soils. The mean total phosphorus level for the 0.1 m depth of the Barratta clays was 0.022 per cent compared to the mean of 0.017 per cent in the same depth of the Oakey soils. Total phosphorus in the Oakey soils remained fairly constant with depth while levels decreased in the Barratta clays to 0.015 per cent by 1.2 m. All of the above values are nevertheless regarded as low, with the exception of some slightly higher total phosphorus levels in samples taken from depressions of the Barratta clay soils (mean value of 0.024 per cent at 0.1 m).

Total potassium values in the landscape unit 2 soils increased with depth. Mean values for the sodic duplex (2D) soils ranged from 0.84 per cent at 0.1 m to 1.17 per cent at 1.2 m and 1.1 to 1.44 per cent respectively for the same depths of the Barratta clay soils. These values represent medium to high levels of total potassium.

The sodic duplex soils of landscape unit 6 have even higher total potassium levels, increasing from 1.25 per cent at 0.1 m to 1.55 per cent at 1.2 m. However, total phosphorus and sulphur levels for these soils are the lowest of all soils sampled, averaging 0.015 per cent total phosphorus and 0.01 per cent total sulphur at 0.1 m. These values differ little with depth.

### 3.4.3 Cation exchange capacity and exchangeable cations

Cation exchange capacity (CEC) and exchangeable cation status are important characteristics of soils as these attributes have a major influence on plant nutrient status and uptake and can influence soil physical properties such as plant available water capacity, uptake of soil water and dispersion.

Mean clay content and cation exchange data for selected depths of the soils of both landscape unit 2 and 6 are given in Tables 5 and 6 respectively. It should be noted that the clay contents at 1.1 to 1.2 m of several profiles within soil types 2Dda and 6Dda are lower than in the main B horizon above at 0.5 to 0.6 m. This has resulted in lower mean clay contents, cation exchange capacity and exchangeable cations at 1.1 to 1.2 m than at 0.5 to 0.6 m.

**Table 5.** Mean clay content and cation exchange data for soils of landscape unit 2 sampled within Haughton Section - Stage 1, Burdekin River Irrigation Area

| Soil type and depth (m) | Clay (%) | CEC** (meq/100g) | Exchangeable cations** | | | | Exch Ca:Mg | CEC:Clay |
|---|---|---|---|---|---|---|---|---|
| | | | Ca | Mg | Na | K | | |
| | | | (meq/100g) | | | | | |
| **Sodic duplex soils of landscape unit 2** | | | | | | | | |
| 2Dda(6)* | | | | | | | | |
| 0.0-0.1 | 22 | 12.5 | 3.3 | 3.8 | 0.9 | 0.33 | 0.91 | 0.56 |
| 0.5-0.6 | 42 | 24.0 | 9.1 | 9.3 | 7.8 | 0.14 | 0.98 | 0.56 |
| 1.1-1.2 | 32 | 18.1 | 6.4 | 7.0 | 5.9 | 0.19 | 0.94 | 0.57 |
| 2Dya(3), 2Dyb(1) | | | | | | | | |
| 0.0-0.1 | 32 | 19.9 | 3.8 | 7.3 | 1.4 | 0.27 | 0.52 | 0.52 |
| 0.5-0.6 | 51 | 28.1 | 8.9 | 12.0 | 9.1 | 0.19 | 0.75 | 0.56 |
| 1.1-1.2 | 51 | 28.2 | 8.0 | 11.8 | 9.8 | 0.28 | 0.69 | 0.56 |
| **Cracking clay soils of landscape unit 2** | | | | | | | | |
| 2Ug soils (3) | | | | | | | | |
| Mound | | | | | | | | |
| 0.0-0.1 | 48 | 25.1 | 9.8 | 8.2 | 0.8 | 0.53 | 1.15 | 0.51 |
| 0.5-0.6 | 62 | 34.3 | 13.8 | 14.5 | 3.8 | 0.36 | 0.97 | 0.56 |
| 1.1-1.2 | 57 | 31.8 | 12.6 | 14.5 | 6.0 | 0.29 | 0.88 | 0.56 |
| Depression | | | | | | | | |
| 0.0-0.1 | 40 | 22.7 | 6.6 | 4.8 | 0.5 | 0.52 | 1.44 | 0.56 |
| 0.5-0.6 | 48 | 25.0 | 9.2 | 8.0 | 3.2 | 0.18 | 1.20 | 0.52 |
| 1.1-1.2 | 53 | 29.6 | 12.5 | 12.1 | 5.5 | 0.23 | 1.04 | 0.56 |

(6)* refers to the number of analytical values available for each soil type or group of soil types.
** CEC and exchangeable cations determined at pH 8.5 after ethanol leaching.

**Table 6.** Mean clay content and cation exchange data for sodic duplex soils of landscape unit 6 sampled within Haughton Section - Stage 1, Burdekin River Irrigation Area

| Soil type and depth (m) | Clay (%) | CEC** (meq/100g) | Exchangeable cations** | | | | Exch Ca:Mg | CEC:Clay |
|---|---|---|---|---|---|---|---|---|
| | | | Ca | Mg | Na | K | | |
| | | | (meq/100g) | | | | | |
| 6Dba(4)* | | | | | | | | |
| 0.0-0.1 | 15 | 6.1 | 1.3 | 1.4 | 0.2 | 0.3 | 0.98 | 0.41 |
| 0.5-0.6 | 37 | 14.9 | 3.2 | 5.4 | 7.4 | 0.1 | 0.72 | 0.41 |
| 1.1-1.2 | 34 | 15.8 | 3.9 | 5.7 | 8.9 | 0.2 | 0.69 | 0.48 |
| 6Dda(3) | | | | | | | | |
| 0.0-0.1 | 24 | 11.2 | 2.5 | 2.7 | 0.3 | 0.3 | 0.95 | 0.47 |
| 0.5-0.6 | 38 | 19.9 | 8.1 | 7.4 | 6.5 | 0.1 | 1.08 | 0.54 |
| 1.1-1.2 | 28 | 16.3 | 5.9 | 5.6 | 6.2 | 0.1 | 1.02 | 0.59 |
| 6Dyg(5) | | | | | | | | |
| 0.0-0.1 | 13 | 6.2 | 1.2 | 1.5 | 0.3 | 0.3 | 0.87 | 0.47 |
| 0.5-0.6 | 32 | 15.2 | 3.4 | 5.3 | 7.8 | 0.1 | 0.65 | 0.48 |
| 1.1-1.2 | 39 | 21.2 | 4.6 | 7.5 | 12.1 | 0.2 | 0.46 | 0.56 |
| 6Dyj(7) | | | | | | | | |
| 0.0-0.1 | 19 | 8.8 | 2.2 | 2.2 | 0.4 | 0.4 | 0.98 | 0.47 |
| 0.5-0.6 | 32 | 16.6 | 4.5 | 5.0 | 8.8 | 0.1 | 0.88 | 0.51 |
| 1.1-1.2 | 34 | 18.2 | 4.1 | 5.5 | 11.6 | 0.2 | 0.77 | 0.54 |
| 6Dyb(1) | | | | | | | | |
| 0.0-0.1 | 7 | 4.0 | 1.4 | 0.9 | 0.1 | 0.2 | 1.55 | 0.57 |
| 0.5-0.6 | 45 | 12.3 | 3.8 | 3.8 | 1.0 | 0.1 | 1.00 | 0.27 |
| 1.1-1.2 | 29 | 11.2 | 4.3 | 4.5 | 1.6 | 0.1 | 0.96 | 0.38 |
| 6Dye(1) | | | | | | | | |
| 0.0-0.1 | 5 | 4.1 | 1.2 | 0.6 | 0.02 | 0.3 | 2.00 | 0.81 |
| 0.5-0.6 | 50 | 17.5 | 6.2 | 4.5 | 1.00 | 0.3 | 1.36 | 0.35 |
| 1.1-1.2 | 36 | 16.4 | 8.4 | 5.7 | 2.00 | 0.3 | 1.46 | 0.45 |

(4)* refers to the number of analytical values available for each soil type or group of soil types.
** CEC and exchangeable cations determined at pH 8.5 after ethanol leaching.

When comparing all soils analysed, mounds of the Barratta clay (2Ug) soils have the highest cation exchange and exchangeable cation status, reflecting higher clay contents at all three selected depths. Soils analysed from the 2Ug cracking clay depressions have lower clay contents and cation exchange capacity status compared to the mound profiles but similar to subsoils of the sodic duplex Oakey soil types (2Dya and 2Dyb). However, the proportion of exchangeable cations varies considerably between the Barratta and Oakey soil types, with much higher exchangeable sodium in the 0.5 to 0.6 and 1.1 to 1.2 m depths in the latter soils.

Exchangeable calcium is highest in the 2Ug mound profiles with exchangeable magnesium and calcium present in approximately equal amounts, as they are also for the 2Ug depression profiles, 2Dda and 6Dda soil types. In the case of the soil types 2Dya, 2Dyb, 6Dba, 6Dyg and 6Dyj, exchangeable magnesium exceeds exchangeable calcium levels, particularly in the subsoil depths. Such high exchangeable magnesium levels may contribute together with the high exchangeable sodium status to cause the subsoil of many of these soil types to disperse readily when wet.

The soil types 6Dyb and 6Dye are quite different to the other sodic duplex soils of landscape unit 6 in that they both have deep sandy A horizons, hence the very low surface clay contents and low exchangeable cation status. The Ca:Mg ratio for these two soil types (6Dyb and 6Dye) is greater than 1.0 for all selected depths. These soils are typical of the raised prior streams of the area and have formed on older alluvial deposits when compared to adjacent flood-outs and fans predominated by the soil types 6Dba, 6Dyg and 6Dyj.

Clay content, cation exchange capacity and exchangeable calcium and magnesium levels throughout all selected depths of the sodic duplex soils 6Dba, 6Dda, 6Dyg and 6Dyj are considerably lower than levels found in the sodic duplex soils of landscape unit 2 (2Dda, 2Dya, 2Dyb). In fact exchangeable calcium and magnesium levels in the surface of all sodic duplex soils of landscape unit 6 are below those recommended as sufficient for plant uptake (Baker 1991).

Exchangeable potassium levels are highest in all three selected depths of the Barratta (2Ug) cracking clays. Surface exchangeable potassium levels in all other soils analysed are also sufficient ie. having over 0.2 meq per 100 g (Baker 1991) although levels often decrease below 0.2 meq per 100g at depth.

The exchangeable sodium status of these soils will be discussed in detail in the next section. One important difference between the soils of the two landscape units is the proportion of exchangeable sodium in the subsoils of the strongly sodic duplex soils. In the Oakey (2D) soils, exchangeable sodium levels increase markedly with depth, however magnesium remains the predominant cation. In contrast, the sodic duplex soils of landscape unit 6 (6Dba, 6Dda, 6Dyg and 6Dyj) have a higher proportion of exchangeable sodium, with sodium dominating the clay exchange in the subsoil in most instances.

The ratio of cation exchange capacity to clay content, also known as the clay activity ratio can be used to indicate the predominant clay mineral present. For the landscape unit 2 soils, the clay activity ratio is quite constant at around 0.55, irrespective of profile morphology. This value indicates the soils have a mixture of non-expanding and expanding clay minerals ie. a mixture of kaolinite, illite and montmorillonite. This agrees with Coughlan (1979) who found by X-ray diffraction that the $<2\ \mu m$ fraction of a Barratta (2Ug) clay soil, which had a clay activity ratio of 0.62, contained a mixture of poorly crystalline montmorillonite, kaolinite, quartz, illite and interstratified kaolin-montmorillonite.

Most selected depths for the sodic duplex soils of landscape unit 6 had clay activity ratios of between 0.4 and 0.5 which indicates a higher proportion of non-expanding clay minerals when compared to the landscape unit 2 soils.

The predominance of non-expanding clay minerals in many of the soils analysed from Haughton Stage 1 will result in a reduced plant available water capacity (PAWC) and a need to irrigate more frequently. Estimates of effective rooting depth and PAWC for the soil types sampled within Haughton Stage I are summarised in Donnollan (1991). Rooting depth is estimated to be between 0.4 and 0.6 m for the strongly sodic duplex soils (2Dda, 2Dya, 2Dyb, 6Dba, 6Dda, 6Dyg and 6Dyj) and 0.9 m for the weakly sodic duplex soils (6Dyb and 6Dye) and the Barratta clay (2Ug) soils. PAWC was estimated as 69 to 95 mm for the strongly sodic duplex soils, 114 mm for the weakly sodic duplex soils and 130 mm for the cracking clays.

### 3.4.4 Soil pH, sodicity and salinity

Soil pH provides a measure of the degree of acidity or alkalinity of the soil solution which has a major influence on plant nutrient availability. High soil pH may also indicate high levels of exchangeable sodium in the soils of this area (Baker *et al.*).

Soil pH profiles for all analysed soils are shown in Figures 5 and 6. With the exception of the mound profile of the Barratta clay 2Uge (Figure 5d), all soils had surface pH values between 5.5 and 6.7. The soloth soil type 6Dyb remained non-alkaline throughout the profile (Figure 5a), whereas the weakly sodic soil type 6Dye became moderately alkaline by a depth of 1.2 m.

Soil reaction trend within the Barratta (2Ug) clay soils was extremely variable, depending on the soil type and whether the site was sampled from the mound or depression position (Figure 5d). Subsoil pH values by a depth of 1.5 m varied from 7.7 for the 2Ugd depression profile to 8.8 for the 2Ugk mound.

Soil pH increased with depth most markedly in the strongly sodic duplex soil type 6Dyj (Figure 6a) where pH exceeded 8.5 by a depth of 0.3 m in all but one of the sampled profiles. Soil pH at 0.3 m in all other sodic duplex soils was quite variable (Figures 5b, c; 6b, c, d) with many values exceeding pH 8.0. Some sampled soil profiles classified in the field as soil types 2Dda, 2Dyb, 6Dyg, 6Dba and 6Dda had laboratory pH values in excess of 8.5 at 0.3 m in depth and as such have atypical soil reaction trends (Donnollan, 1991).

By a depth of 1.5 m, all sodic duplex soils with the exception of 6Dyb (Figure 5a) have pH values in excess of 8.0 which agrees with general soil reaction trends for the same soil types throughout the BRIA (Donnollan 1991).

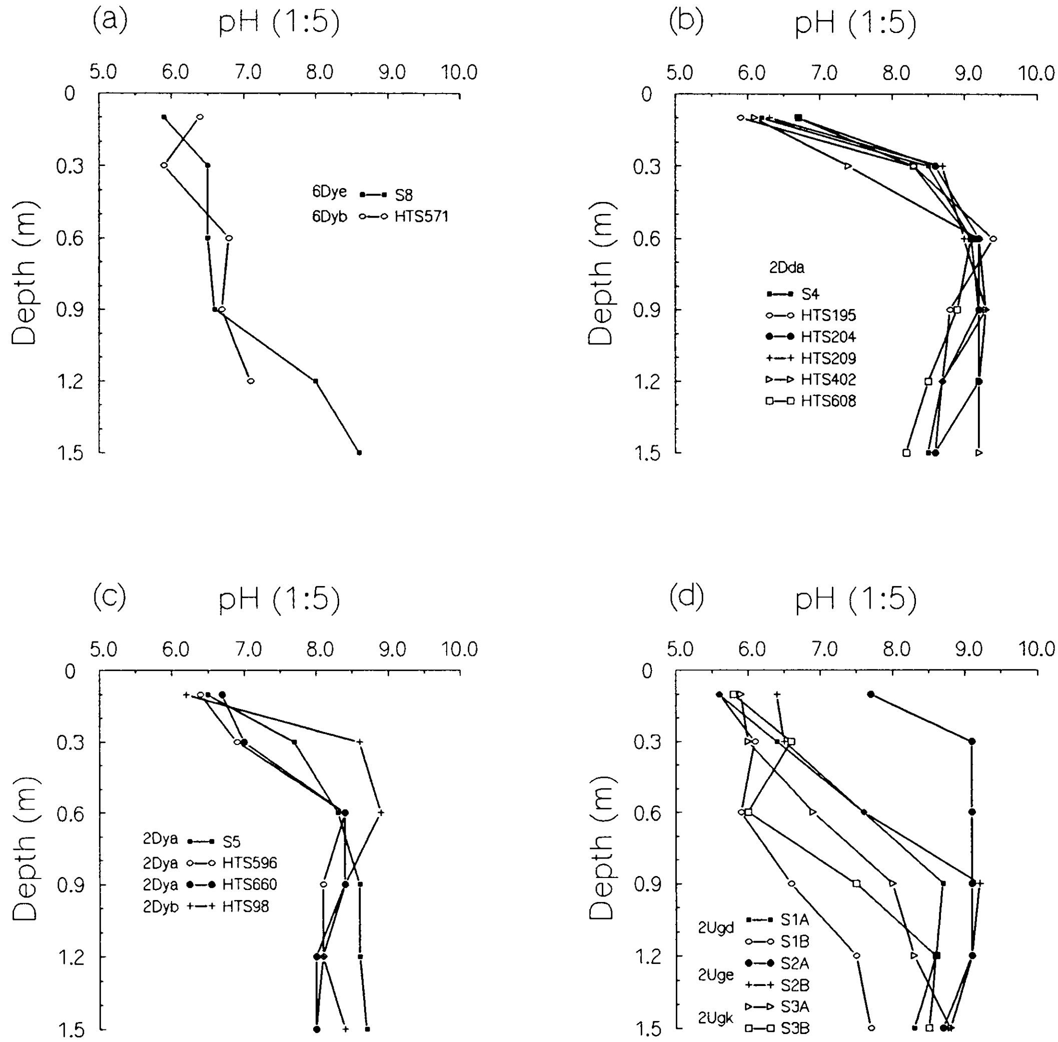


Figure 5. Soil pH profiles for (a) weakly sodic duplex soils of landscape unit 6 and (b,c,d) all soils of landscape unit 2, Haughton Section - Stage 1, Burdekin River Irrigation Area. A and B profiles for the Barratta (2Ug) clay soils indicate mound and depression sites respectively.

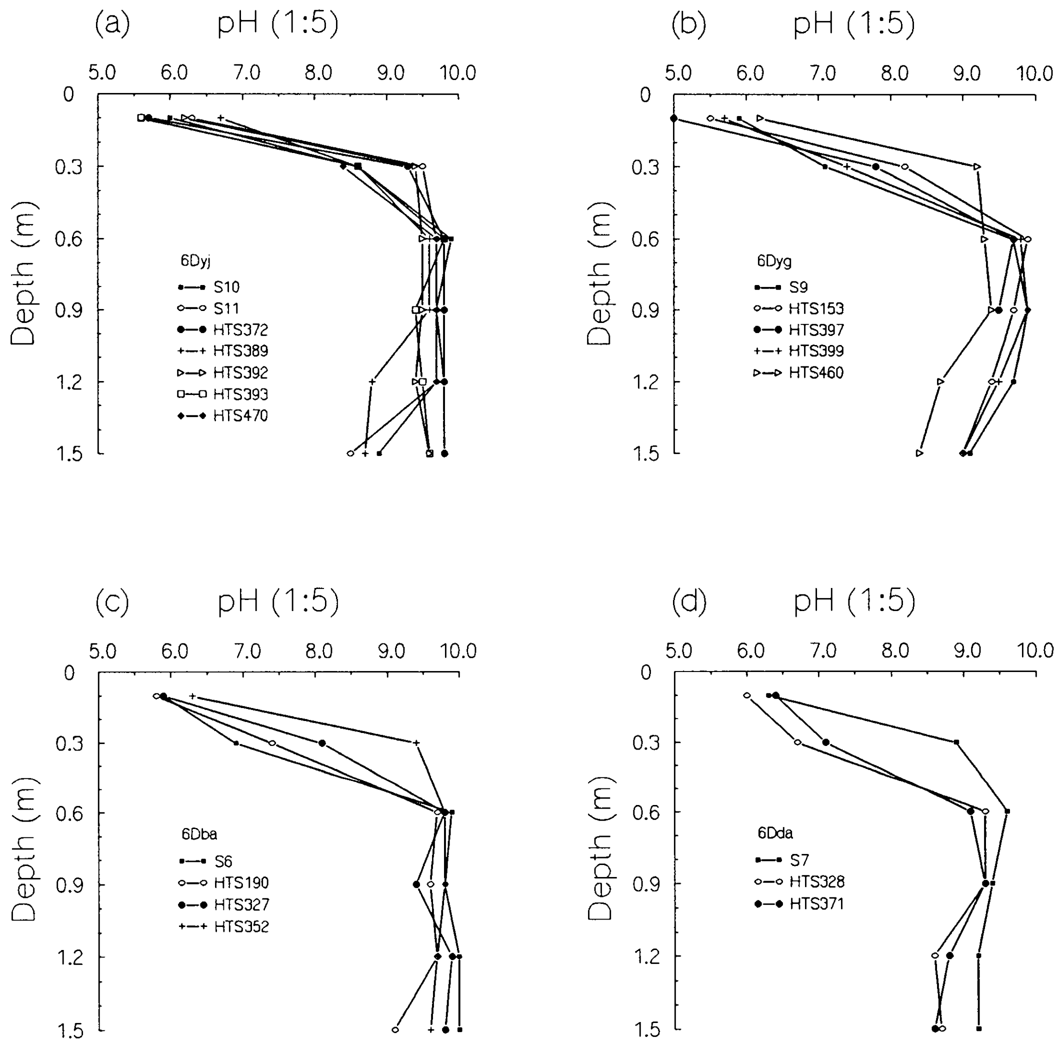


Figure 6. Soil pH profiles for strongly sodic duplex soils of landscape unit 6, Haughton Section - Stage 1, Burdekin River Irrigation Area.

There is a close relationship between soil pH and exchangeable sodium percentage (ESP)*, particularly for the sodic duplex soils of the BRIA (Baker et al. 1983), and this relationship is heavily relied upon in the assessment of land suitability. ESP profiles for all analysed soils are shown in Figures 7 and 8.

Extremely high ESP values (mean of 41.6 per cent) were found by a depth of 0.3 m in the strongly sodic duplex soil type 6Dyj (Figure 8a). ESP values for this soil type sampled from within Haughton Stage 1 are much higher than expected from the mean ESP profile for similar strongly sodic duplex soils throughout the BRIA (Donnollan 1991). At a depth of 1.5 m, mean ESP for the sampled 6Dyj profiles reached 65 per cent.

Many of the other sodic duplex soil types (2Dda, 2Dya, 2Dyb, 6Dyg and 6Dba) have ESP values at a depth of 0.3 m and below (Figure 7 and 8), considerably higher than expected from the mean ESP profile for similar sodic duplex soils throughout the BRIA (Donnollan 1991). This is particularly the case for most of the 6Dyg and 6Dba profiles analysed (Figure 8 b, c) and such high ESP values are not always indicated by field or laboratory determined pH. This causes some concern in the assessment of land suitability as ESP cannot be determined in the laboratory for all sodic duplex soil mapping units. Given the number of sodic duplex soils sampled from Haughton Stage 1 with an ESP greater than 25 at 0.3 m depth, the potential of this area for irrigated sugar cane and field crops with the exception of rice must be questioned even though substantial areas have been rated as suitable (usually class 3).

This phenomenon of higher than expected exchangeable sodium within the soils of Haughton Stage 1 may be associated with its close proximity to areas of weathering granite rich in sodium felspars in the catchment of Oaky Creek and its tributaries. All of the strongly sodic duplex soils of this area will have a tendency to disperse strongly when wet, as indicated by dispersion ratio (R1) values of 0.89 to 1.0 by a depth of 0.5 to 0.6 m and high ESP. These soils will become even more dispersive if soluble salts are leached from the soil profile.

ESP profiles for the weakly sodic duplex soil types 6Dye and 6Dyb (Figure 7a) are similar to that reported in Donnollan (1991) where subsoils do not become sodic (ESP 6 to 15) until a depth of 0.9 m.

For the three Barratta (2Ug) cracking clay soils analysed, 2Ugd and 2Ugk profiles were sodic (ESP 6 to 15) by 0.6 m and strongly sodic (ESP $\geq 15$) by 0.9 m (Figure 7d); as expected from similar soils elsewhere in the BRIA (Donnollan 1991). However, both mound and depression 2Uge profiles had atypically much higher ESP values at 0.3 m and below, with this soil becoming strongly sodic by a depth of 0.6 m. All of the clay soils analysed from this area will have a tendency to disperse strongly when wet, as indicated by dispersion ratio (R1) values of 0.89 to 0.99 by a depth of 0.5 to 0.6 m and significant exchangeable sodium present at that depth. If soluble salts are leached from these soils, they will tend to become even more dispersive.

* ESP = Exchangeable Na/CEC x 100   where CEC = cation exchange capacity.

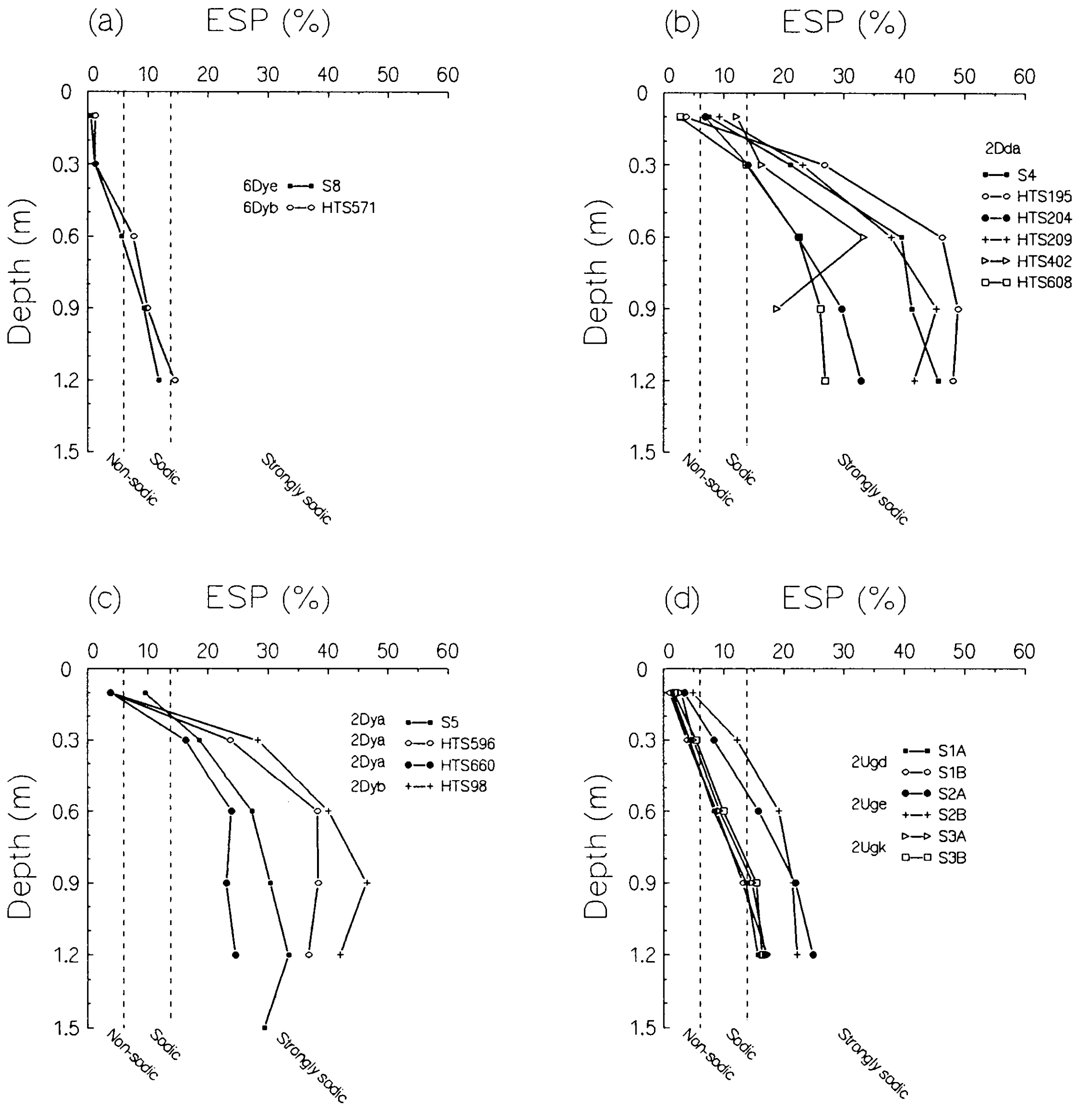


Figure 7. ESP profiles for (a) weakly sodic duplex soils of landscape unit 6 and (b,c,d) all soils of landscape unit 2, Haughton Section - Stage 1, Burdekin River Irrigation Area. A and B profiles for the Barratta (2Ug) clay soils indicate mound and depression sites respectively.

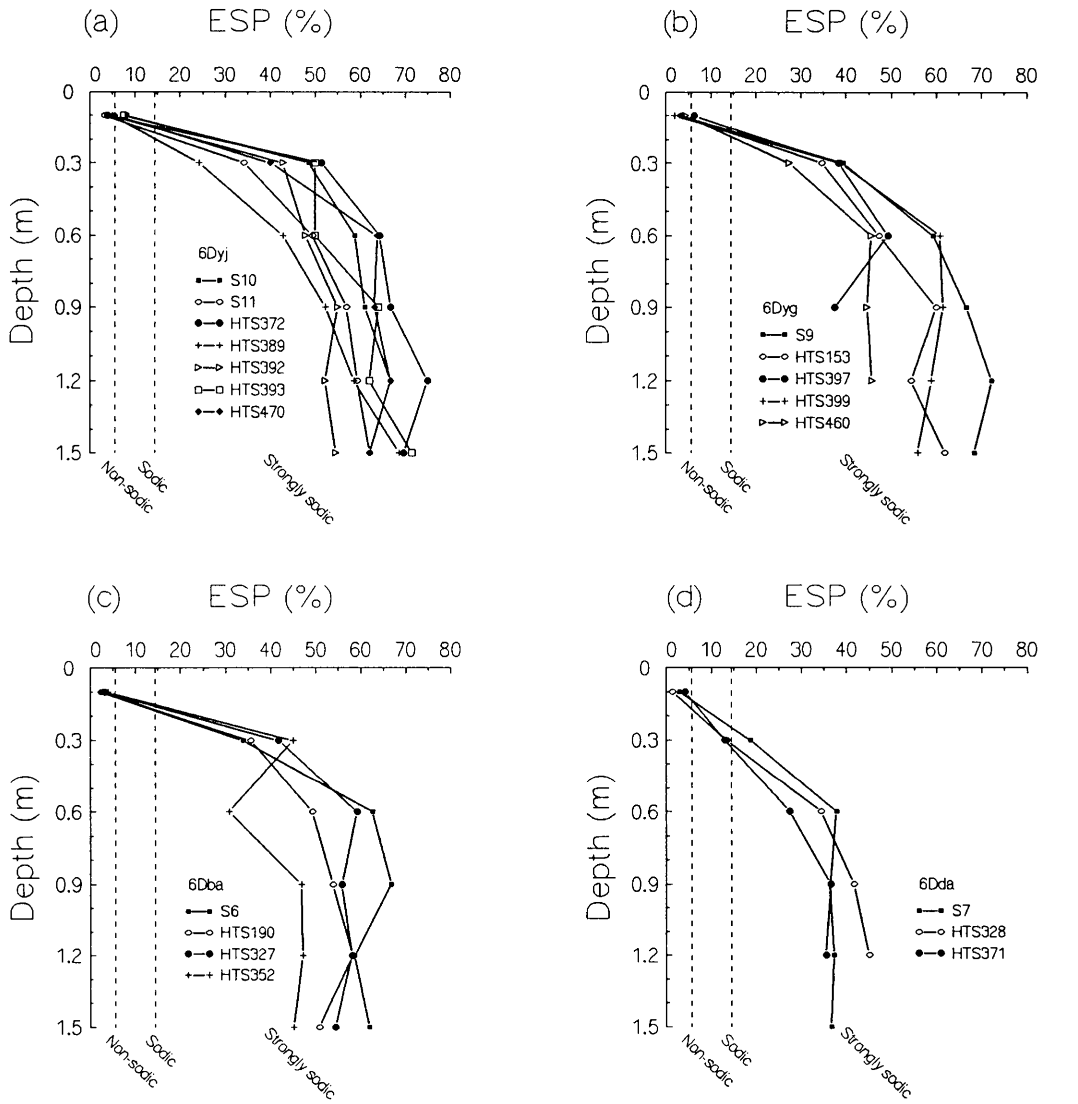


Figure 8. ESP profiles for strongly sodic duplex soils of landscape unit 6, Haughton Section - Stage 1, Burdekin River Irrigation Area.

Electrical conductivity (EC) profiles for all sampled soils are shown in Figures 9 and 10. Profiles of the strongly sodic duplex soil type 6Dyj (Figure 10a) had the highest soluble salt levels of all soils analysed. Most 6Dyj soil profiles had medium to high EC by a depth of 0.6 m, with two profiles having high EC at 0.3 m. The maximum salt bulge at 0.6 to 0.9 m for these soils confirms an effective rooting depth of less than 0.6 m.

Maximum soluble salt levels in other sodic duplex soil types, 2Dda, 2Dya, 6Dyg, 6Dba and 6Dda (Figures 9b, c and 10 b, c, and d respectively) reached medium by 0.6 m, confirming an effective rooting depth of less than 0.6 m. EC values in most profiles of these soil types decreased below a depth of 0.9 m.

Soluble salt levels in the weakly sodic duplex soil types 6Dye and 6Dyb (Figure 9a) are very low to low in the upper 1.2 m of the profile. This result conforms with the mean EC (1:5) profile reported for similar soils elsewhere in the BRIA (Donnollan 1991). From the EC profiles for the 6Dye and 6Dyb soils analysed, there should be no restriction to plant roots within the upper 1.2 m.

EC values for the Barratta clay (2Ug) soils from Haughton Stage 1 (Figure 9d) were all medium below a depth of 0.9 m which confirms this as the effective rooting depth. Soluble salt levels decreased little between 0.9 and 1.5 m.

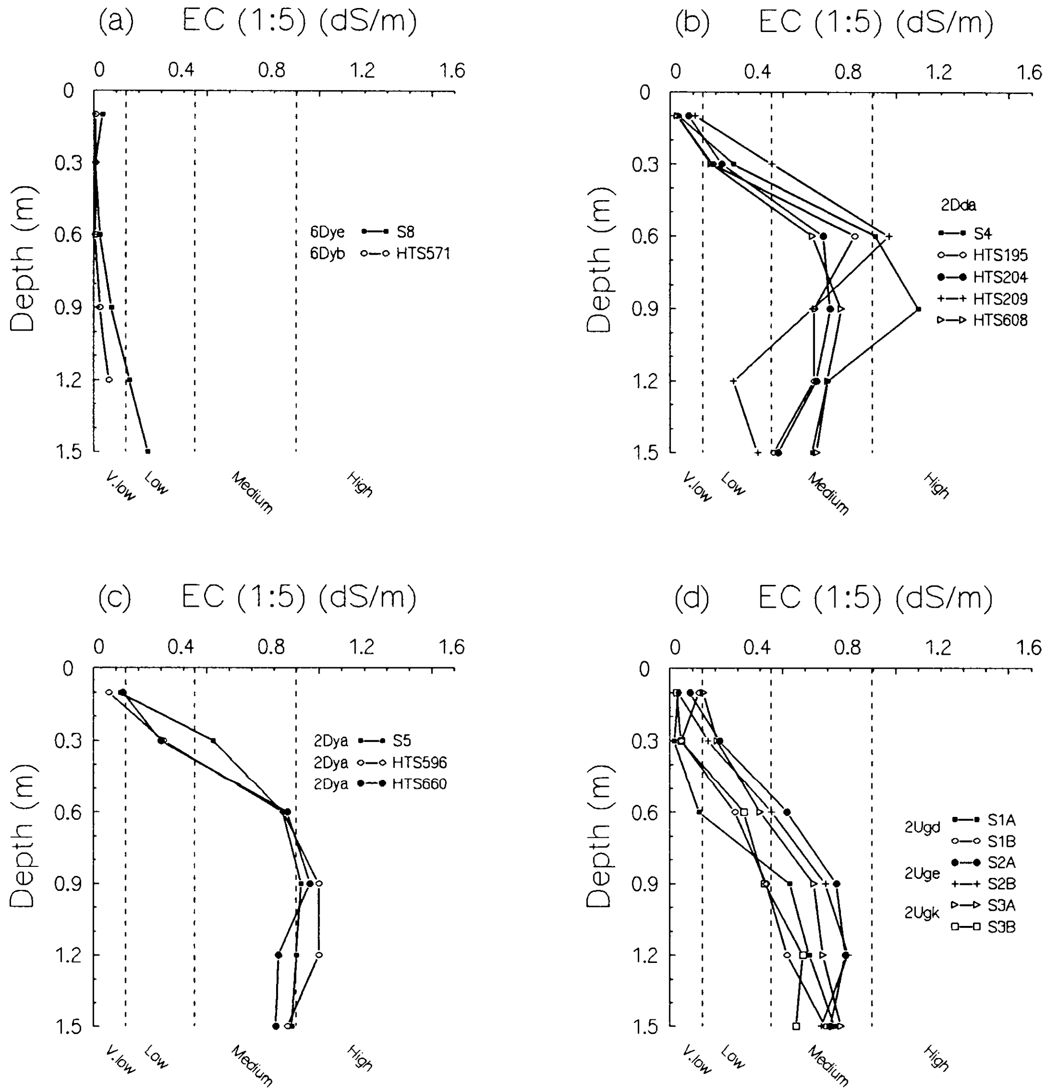


Figure 9. Electrical conductivity profiles for (a) weakly sodic duplex soils of landscape unit 6 and (b,c,d) all soils of landscape unit 2, Haughton Section - Stage 1, Burdekin River Irrigation Area. A and B profiles for the Barratta (2Ug) clay soils indicate mound and depression sites respectively.

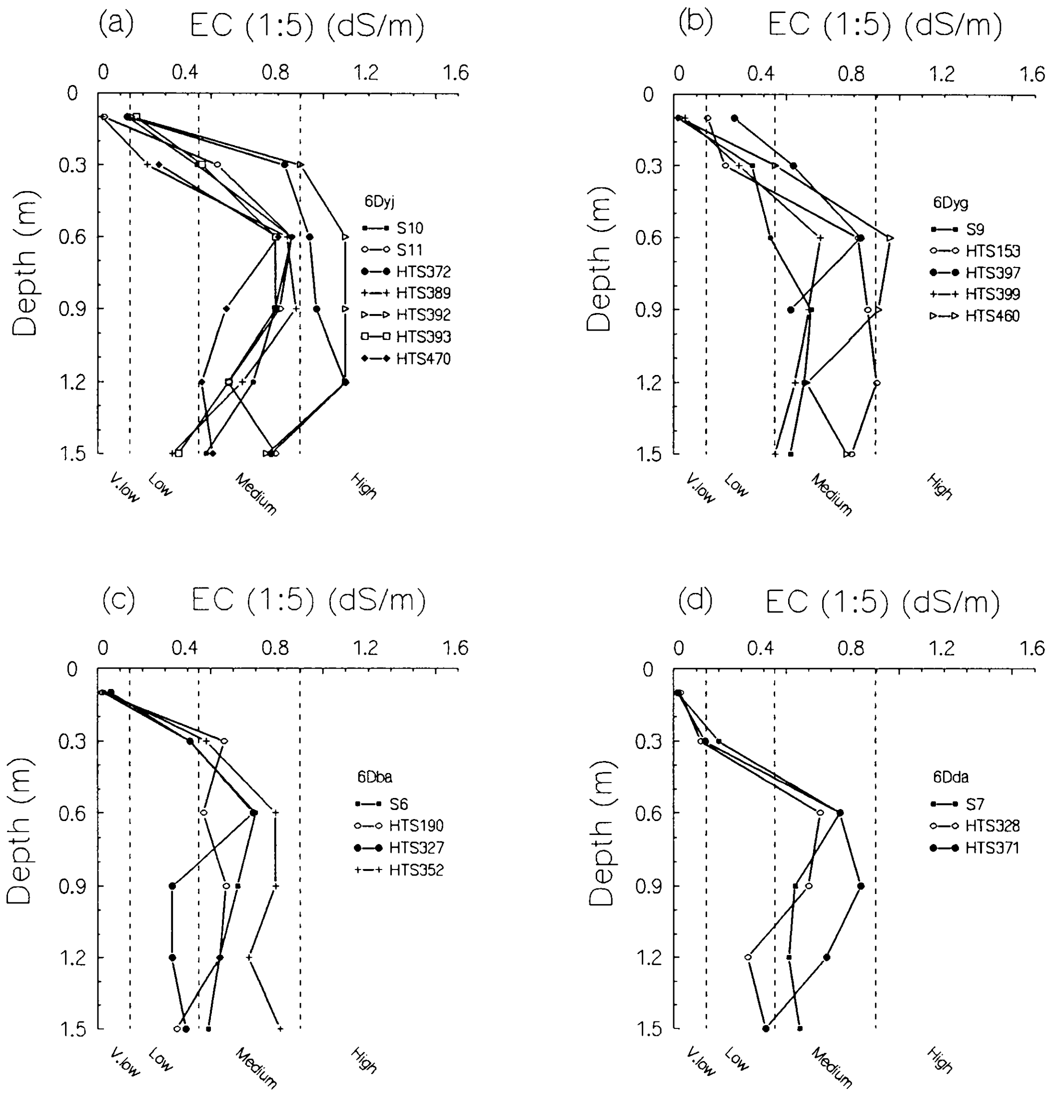


Figure 10. Electrical conductivity profiles for strongly sodic duplex soils of landscape unit 6, Haughton Section - Stage 1, Burdekin River Irrigation Area.

# 4. LAND EVALUATION

## 4.1 Current land use

At the time of the survey (1987-88), the area comprising Haughton Section - Stage 1 was being used for beef cattle grazing on native pastures. No tree clearing or poisoning had taken place. The area was made up of "Camerons" (Lot 2, Barratta) south of Oaky Creek, now resumed by the Water Resources Commission, part of "Barratta Gully" (Lot 3, Barratta) and part of the stock route and adjacent Camping Reserve No. 34. The location of these holdings can be seen in Figure 2.

## 4.2 Method of assessing land suitability

Land suitability assessment provides an estimate of the potential of land for a particular form of land use. In Queensland, land is assessed on the basis of five land suitability classes with suitability decreasing from class 1 to 5 (Land Resources Branch staff, 1990). A short definition of the classes is as follows:

**Class 1** Suitable land with negligible limitations;
**Class 2** Suitable land with minor limitations;
**Class 3** Suitable land with moderate limitations;
**Class 4** Marginal land - presently unsuitable; and
**Class 5** Unsuitable land.

More detailed definitions of each of the suitability classes is given in Appendix III.

Land resource information gathered during soil surveys, as well as the results of laboratory analyses on selected soil profiles, are used in assessing land suitability. In Haughton Section - Stage 1, as in other areas in the BRIA, the suitability of each individual mapping unit or unique map area (UMA) was assessed as to its suitability for a range of furrow-irrigated crops, including sugar-cane; flood irrigation of rice, and low volume irrigation of two selected tree crops.

Each of the three irrigation methods considered requires a different land suitability classification system (Donnollan and Day 1986). These classification systems were developed by first determining the land use requirements for each particular crop - irrigation method being assessed. Soil and land characteristics which cause land to have less than optimum conditions for a particular crop - irrigation method were recognised as limitations. Local soil and land attributes that will provide a measure or an estimate of the effects of each limitation were then selected and ranked as subclasses in terms of the increasing degree of severity imposed by each limitation on that irrigated land use.

The limitations were grouped into four categories depending on their effects as follows:

- **Crop productivity limitations** - nutrients, salinity, sodicity; and for tree crops, soil depth;
- **Water management limitations** - water availability, excessive permeability, soil complexity, internal drainage; and for rice, deep drainage;
- **Land surface management limitations** - rockiness, slope, microrelief, surface condition and wetness; and
- **Degradation limitations** - erosion and salinity outflow potential.

Details of limitation subclasses and the framework of each of the land suitability classification systems are given in Appendices IV, V and VI and are discussed more fully by McClurg (in press). When assessing the suitability of each UMA, the highest limitation subclass assigned usually determined the overall land suitability class. However, for UMA's which had two or more limitation subclasses with the same ranking, consideration was given to downgrading the overall land suitability class further, particularly if there were any interactions between these limitations.

Land was assessed for the following crop-irrigation methods:

| | |
|---|---|
| using **furrow irrigation** | - sugar-cane, soybeans, sorghum, maize, kenaf, sunflowers, cotton, legume seed crops (such as mungbean, chickpeas, pidgeon peas and dolichos), beans, capsicums, eggfruit, tomatoes, cucumbers, rockmelons, squash and zucchini; |
| using **flood irrigation (paddy)** | - rice; and |
| using **low volume irrigation** | - mangoes and avocadoes. |

### 4.3 Results of the land suitability assessment

Access to the land suitability data base for all 19 crops is available through the Ayr office of the Department; but for immediate planning purposes the assessment for five of the most commonly grown crops are discussed here. These crops are sugar-cane, maize, rice, capsicums and mangoes. A summary of the suitability of the land for these five crops is given in Table 7 and is illustrated on the accompanying map.

**Table 7.** The suitability of Haughton Section - Stage 1, Burdekin River Irrigation Area, for five crops produced under furrow irrigation (sugar-cane, maize and capsicums), flood irrigation of rice and low volume irrigation of mangoes

| Land Suitability Class | Area of land (ha) assessed within each land suitability class | | | | |
|---|---|---|---|---|---|
| | Sugar-cane | Maize | Rice | Capsicums | Mangoes |
| 1 | - | - | - | - | - |
| 2 | 533 | 16 | 416 | 16 | 17 |
| 3 | 2414 | 2254 | 1690 | 94 | 123 |
| Total Suitable | 2947 | 2270 | 2106 | 110 | 140 |
| 4 | 1069 | 1746 | 1392 | 3906 | 3895 |
| 5 | 131 | 131 | 649 | 131 | 112 |

For each UMA, the complete land suitability assessment for the five main crops, including individual limitation subclasses, is given in Appendix VII (sugar-cane, maize and rice) and VIII (capsicums and mangoes).

**Sugar-cane.** Based on the summary in Table 7, it would appear that sugar-cane is the most appropriate crop for Haughton Stage 1, with 2947 ha or 71 per cent of the area assessed as suitable. Sodicity, soil distribution complexity and occasionally plant water availability are the most restrictive of all limitations, causing land to be rated as marginal (class 4) for sugar-cane. However, based on the chemical analysis of the sodic duplex soils of the area, sodicity may in fact be a more severe limitation than indicated by the current method of assessment. This conclusion has been discussed fully in Section 3.4.4. Given that 2780 ha or 66 per cent of Haughton Stage 1 is comprised of sodic duplex soils, the potential of this area for irrigated sugar-cane must be questioned as higher inputs such as gypsum application will always be required to achieve acceptable yields. The area is also remote from existing tramlines and the provision of such infrastructure will be very expensive.

**Maize.** The area assessed as suitable for maize production (2270 ha or 55 per cent) is considerably less than for sugar-cane due in part to the greater sensitivity of maize to excessive sodicity and adverse soil surface conditions. This estimate of the area suitable for maize will be further reduced if the sodicity limitation is as severe as soil analyses indicate. However, the potential of Haughton Stage 1 for the irrigated production of a more sodium tolerant row crop such as cotton is considerably higher (2830 ha or 68 per cent suitable), at least on the current system of assessment.

**Rice.** Soil distribution complexity, excessive deep drainage, sodicity and occasionally slope or gradient are the main limitations which reduce the area of Haughton Stage 1 suitable for rice to 2106 ha or 51 per cent. This result does indicate the somewhat restricted potential of the area for rice production. However, if the sodicity limitation is actually more severe than the assessment indicates, the additional inputs such as higher fertiliser rates to achieve an acceptable yield will not be as expensive as the inputs required to grow crops such as sugar-cane and maize in this area.

**Capsicums and Mangoes**. Very little area of Haughton Stage 1 has been rated as suitable for the furrow irrigation of capsicums or low volume irrigation of mangoes. The most restrictive limitations for capsicums are soil permeability, adverse soil surface conditions and excessive sodicity. The effect of these limitations can be reduced to some extent by growing such horticultural crops on beds under plastic mulch and using trickle irrigation. However, the strongly sodic and very shallow surfaced sodic duplex soil types 2Dba, 2Dda, 2Ddb and 2Dya should still be regarded as unsuitable irrespective of the irrigation technique employed.

Surface wetness, excessive sodicity and salinity and restricted internal drainage are the main limitations which result in most of Haughton Stage 1 being rated as unsuitable for the low volume irrigation of mangoes.

## 4.4 Management considerations

Most of the soils of Haughton Stage 1 fall within two of the broad soil groups defined by Donnollan (1991). These are the cracking clays and the sodic duplex soils. Donnollan further subdivided each of these broad soil groups into a number of subgroups, as their characteristics and associated landform features require the adoption of specific management strategies for successful irrigated crop production.

A more comprehensive discussion of limitations to irrigated land use and management options appropriate to each of the soil subgroups is provided in Donnollan (1991). A summary of this information as it relates to the soils of Haughton Stage 1 is provided below.

### 4.4.1 Group 1. Cracking clays

These soils comprise the Barratta clays of **subgroup 1A** (2Ugc, d and e) and **subgroup 1B** (2Ugf, g, h and k). Collectively the Barratta clays occupy 1334 ha of Haughton Stage 1.

The most commonly assigned land suitability classes for the Barratta clays are class 2 or 3 for sugar-cane; class 3 for maize; class 2 or 3 for rice and class 4 for capsicums and for mangoes. Appendices VII and VIII provide the land suitability classes assigned to each particular area or UMA.

Barratta clays are generally suitable for furrow irrigation of sugar-cane and a range of row crops due mainly to high plant available water capacity, gentle slopes and low soluble salt levels to at least 0.6 m. Generally they are suitable for rice due to restricted internal drainage and gentle slopes. However, they are unsuitable for furrow irrigation of horticultural crops due to slow permeability within the root zone and are unsuitable for low volume irrigation of mangoes due to restricted internal drainage and excessive wetness.

As these soils occur on slopes less than 0.2 percent and have gilgai up to 0.3 m vertical interval in their natural state, precision levelling will be required to provide adequate surface drainage. After the first crop, a light brushing may be required to compensate for differential settling of fill in the gilgai depressions. It is also important that low spots, sufficiently deep to hold water after flushing, are not present in rice bays to attract geese with subsequent puddling and loss of production.

Shorter furrow lengths (less than 600 m) are suggested for sugar-cane and row crops where the land slope is 0.1 per cent or less to improve irrigation efficiency and avoid waterlogging. More frequent, high volume irrigation over a short duration will also improve irrigation efficiency as water entry becomes very slow after surface cracks close.

Wet season trafficability is a major problem on the Barratta clays. Implementation of a controlled traffic - permanent bed system will increase the period when cultural operations can be undertaken successfully. Such operations should not be undertaken until the soil moisture content is nearing the lower plastic limit to avoid excessively cloddy seed beds.

Satisfactory germination and establishment of crops including sugar-cane can be achieved on Barratta clays by planting dry on furrow crests at a shallow depth and then wetting them slowly.

### 4.4.2 Group 2. Sodic duplex soils

These soils exhibit a very distinct change in texture from either a sandy or loamy surface (A) horizon to a dense sodic clay subsoil (B horizon). All of the soils of this group are sodic (ESP>6) in some part of the subsoil and have been divided into three very distinctive subgroups depending on the depth of the surface (A) horizon, the level of sodicity and at what depth subsoils become sodic (Donnollan, 1991). These soil characteristics will require the use of specific management techniques for successful irrigated crop production.

The strongly sodic duplex soils 2Dba, 2Ddb, 6Dbh and 6Dyj make up **subgroup 2A**. These soils occupy 670 ha of Haughton Stage 1. Characteristics of these soils include thin surface (A) horizons (less than 0.15 m), and subsoils that become strongly alkaline (pH 7.9 to 9.0) and strongly sodic (ESP>15) by 0.3 m. In this area, analysed soil profiles demonstrate extremely high ESP levels in excess of 25 at 0.3 m (see Section 3.4.4). Because of the influence of these characteristics on plant available water capacity, plant nutrition and general soil physical conditions, sodic duplex soils of subgroup 2A have been assessed as class 4 for all crops, i.e. as marginal land, currently unsuitable. Research is currently being undertaken by the Bureau of Sugar Experiment Stations on the amelioration of such sodic duplex soils. Management practices being investigated include the application of gypsum in solid form and via irrigation water, deep ripping, improved subsoil drainage and more appropriate irrigation methods.

Sodic duplex soils with a slightly deeper surface (A) horizon and subsoils that become strongly alkaline (pH>7.9) and strongly sodic (ESP>15) by 0.6 m make up **subgroup 2B**. Soil types that comprise this subgroup are 2Dbb, 2Dbd, 2Dya, 2Dyb, 2Dda and 2Ddc, totalling 1423 ha of the Burdekin and Haughton River alluvial plain; and 6Dba, 6Dda, 6Ddb and 6Dyg, totalling 404 ha of relict alluvial landforms such as flood-outs and fans.

The sodicity levels in most of these soil types are higher than expected when compared with soil profiles analysed from other areas of the BRIA and this has had a major influence on the assessment of land suitability. The most commonly assigned land suitability classes for sodic duplex soils of subgroup 2B in this area are class 3 or 4 for sugar-cane and maize, and class 4 for furrow irrigation of capsicums and low volume irrigation of mangoes. In most instances, sodic duplex soils of landscape unit 2 are class 3 for rice due to restricted internal drainage and low slopes. In contrast, those of landscape unit 6 are usually class 4 for rice due mainly to the presence of coarser textured material within 1.5 m of the surface. Appendices VII and VIII provide the land suitability classes assigned to each particular mapping unit or UMA. While not specifically assessed, horticulture crops are best grown under trickle irrigation and plastic mulch on these soils.

The sodic duplex soils of subgroup 2B have a restricted plant available water capacity of 50 to 80 mm (Gardner and Coughlan 1982) due to high levels of exchangeable sodium. This feature also restricts root proliferation and water entry into the soil, necessitating high irrigation frequency. Deep ripping to 0.6 m, taking care not to overturn the subsoil, can improve infiltration and thus the recharge of the soil water deficit of these soils (Smith and McShane 1981, Gardner and Coughlan 1982). Combining deep ripping with gypsum application in either the solid form or via irrigation water will further improve infiltration and soil water recharge (Smith and McShane 1981) and improve crop establishment. More frequent, high volume irrigation over a short duration may also improve irrigation efficiency.

Sodic duplex soils of this subgroup have medium soluble salt levels below a depth of 0.6 m. Leaching of this salt down the profile away from the root zone can be achieved by the growing of a number of rice crops (Smith and McShane 1981, Gardner and Coughlan 1982).

Due to their impermeable subsoils, sodic duplex soils of subgroup 2B require precision levelling to avoid problems with surface wetness. Furrow slopes of about 0.2 per cent on runs of less than 600 m are suggested to avoid excessive slumping of ridges and to maximise the opportunity for infiltration. **Extreme care should be taken when levelling soils of this subgroup to minimise removal of topsoil.** The topsoil or A horizon depth for most of the soils of this subgroup is less than 0.2 m.

Other sodic duplex soils with thick surfaces (A horizons >0.3 m) and subsoils that do not become strongly alkaline (pH>7.9) and sodic (ESP>6) until a depth of 0.9 m make up **subgroup 2C**. Soil types 2Dbc, 6Dbe, 6Dyb, 6Dye and 6Dyf comprise this subgroup and total some 203 ha of Haughton Stage 1.

Soils of this subgroup are generally suitable for the furrow irrigation of sugar-cane, maize and capsicums, but not suitable for rice due to their freely draining characteristics. Some of these soils are suitable for trickle irrigation of mangoes, depending on subsoil sodicity. In this area, occurrences of these soil types are not large and the narrow shape of some mapping units causes them to be assessed as class 4, particularly when associated with very dissimilar soils.

## 4.5 Constraints to irrigation farm design

Haughton Stage 1 presents a number of difficulties for subdivision and design of irrigation farms. The main difficulties are (i) the extent and distribution of land assessed as unsuitable for irrigation, (ii) the incidence of relict alluvial landforms and (iii) existing erosion and erosion hazard areas.

Flooding, particularly in areas adjacent to Barratta and Oaky Creeks may also prove to be a major constraint to development. It is recommended that flood modelling be a part of detailed investigations of the area prior to its development. Groundwater investigations and modelling of groundwater responses under various crop-irrigation scenarios should also be carried out. This is particularly important if the area is developed for rice production and if there are barriers to groundwater flow away from the area.

### 4.5.1 Extent and distribution of land unsuitable for irrigation

Approximately 1100 ha or 26 per cent of Haughton Stage 1 has been assessed as unsuitable for the irrigation of all five main crops, sugar-cane, maize, rice, capsicums and mangoes. This proportion of unsuitable land is the highest yet encountered on the Left Bank of the BRIA. Areas assessed as unsuitable for all five crops for Mulgrave, Northcote, Jardine and Haughton Stage 3 Sections represent 22, 7, 9 and 13 percent of total areas surveyed respectively. The high proportion of unsuitable land in Mulgrave Section is a result of the inclusion of extensive upland areas in the south of the survey area.

A listing of the unsuitable UMAs for Haughton Stage 1 and the limitation subclasses that are responsible for this outcome are shown in Table 8. Soil distribution complexity, erosion hazard, sodicity, soil surface conditions (for maize and capsicums), gradient, deep drainage (for rice) and salinity for mangoes are the main limitations which have been assessed as severe and resulted in these UMAs being class 4 or 5.

Much of this unsuitable land is located adjacent to Haughton Main Channel (see map in rear pocket). This will necessitate the construction of lateral channels to serve the more suitable land some distance from HMC. Very little suitable land will be able to be commanded direct from HMC and this will add to the cost of development of the area.

**Table 8.** Selected limitation subclasses for any UMA unsuitable for sugar-cane,maize,rice,capsicums and mangoes, Haughton Section - Stage 1, Burdekin River Irrigation Area.

| | | | | | | | | | Sugar-Cane (S) | | | | | Maize (Mz) | | | | | | | | Rice (R) | | | | Capsicums (Cap) | | | | | Mango (Mg) | | | | | | AREA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ST1 | ST2 | C | UMA | m | pd | id | w | e | p | t | so | sa | S | ps | t | p | so | sa | Mz | sa | so | t | dd | pd | R | pd | p | so | sa | Cap | so | sa | d | id | w | Mg | ha |
| 2Dba | | N | 8 | 3 | 2 | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | | 4 | 4 | | 4 | 4 | 2 | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 1.1 |
| 2Dba | | N | 77 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 11.6 |
| 2Dba | | N | 86 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 2 | | 4 | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 2.1 |
| 2Dba | 2DbaV | N | 90 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 37.5 |
| 2Dba | 2Dba2 | N | 107 | 3 | 4 | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | | 4 | 4 | | 4 | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 11.3 |
| 2Dba | 2Dba2 | N | 121 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 4 | | 3 | 4 | 3 | 4 | | 4 | | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 16.5 |
| 2Dba | | N | 129 | 3 | 2 | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 6.2 |
| 2Dba | 2Ddb | N | 164 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 4 | | 3 | 4 | 3 | 4 | | 4 | | | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | | 4 | 3 | 4 | 24.8 |
| 2Dba | 2Ddb | N | 201 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 21.4 |
| 2Dba | 2Dbb2 | N | 205 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 25.8 |
| 2Dba | 2Ddb | N | 218 | 3 | 2 | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 4.9 |
| 2Dba | | N | 226 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 7.8 |
| 2Dba | | N | 229 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 4.9 |
| 2Dba | 2Ugk | Y | 236 | 3 | 2 | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | | 4 | 2 | | | 4 | 2 | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 4 | 4 | 6.8 |
| 2Dba | 2Ddb | N | 243 | 3 | | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | | 4 | 4 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 2 | 4 | 29.9 |
| 2Dba | 2Ddb | Y | 251 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 42.3 |
| 2Dba | | N | 270 | 3 | | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 1.7 |
| 2Dba | | N | 105 | 3 | 4 | 3 | | 3 | 3 | 3 | 4 | 2 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | | 4 | 5 | | | 5 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 2.4 |
| 2Dba | | N | 204 | 3 | | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | | 4 | 5 | | | 5 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 2 | 4 | 7.5 |
| 2Dba | 6Dyb2 | Y | 240 | 3 | 4 | 3 | | | 3 | 4 | 4 | 2 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | | 4 | 5 | 4 | | 5 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 2 | 4 | 12.9 |
| 2Dba | 2Ddb | N | 260 | 3 | | 3 | | 3 | 3 | 3 | 4 | 2 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | | 4 | 5 | | | 5 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 2 | 4 | 13.1 |
| 2Dba | 2Dba2 | N | 266 | 3 | | 3 | | 3 | 3 | 3 | 4 | 2 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | | 4 | 5 | | | 5 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 2 | 4 | 24.9 |
| 2Dba2 | 2Dyb | N | 97 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | 4 | 4 | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 1.5 |
| 2DbaE | | N | 128 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 1.4 |
| 2DbaE | | N | 203 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 2.0 |
| 2Dbb | 2Ddb | N | 172 | 3 | | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | | 4 | 4 | | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 11.2 |
| 2Dbb | 2Dba | N | 264 | 3 | | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | | 4 | 3 | 4 | 10.3 |
| 2Dbb | 2Ddb | Y | 272 | 3 | | 3 | | 3 | 3 | 3 | 4 | 2 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | | 4 | 5 | | | 5 | | 3 | 4 | 2 | 4 | 4 | 4 | | 4 | 2 | 4 | 11.8 |
| 2DbbE | | N | 96 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 3.3 |
| 2DbbE | | N | 103 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 7.3 |
| 2Dbc2 | 2Dbc3 | N | 20 | 3 | 4 | 3 | | | 2 | 2 | | | 4 | 3 | 2 | 2 | 2 | | 4 | | | 3 | 4 | 4 | 4 | 4 | 2 | 3 | | 4 | 4 | 3 | 2 | 4 | 3 | 4 | 17.1 |
| 2DbdE | | N | 249 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 4.8 |
| 2Ddb | 2Dyb | N | 10 | 3 | | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | | 4 | 4 | | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 17.0 |
| 2Ddb | 2Dda2 | Y | 81 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | 4 | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 35.2 |
| 2Ddb | 2Dda | Y | 85 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 55.7 |
| 2Ddb | 2Dyb | N | 113 | 3 | 2 | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 8.1 |
| 2Ddb | 2Dba | N | 4 | 3 | 2 | 3 | | 3 | 3 | 3 | 4 | 2 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | | 4 | 5 | | | 5 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 16.2 |
| 2Ddb | 6Ucb | Y | 72 | 3 | 4 | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | 5 | 4 | 5 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 48.2 |
| 2DyaE | | N | 256 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 11.1 |
| 2Sp | | N | 193 | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 1.3 |
| 2Ugd | | N | 245 | | | 2 | | 5 | 2 | 3 | | | 5 | 3 | 3 | 3 | 2 | | 5 | | | 5 | 2 | | 5 | | 4 | 3 | | 5 | 3 | | | 4 | 2 | 5 | 6.0 |

Table 8 (Cont.)

| ST1 | ST2 | C | UMA | m | pd | id | w | e | p | t | so | sa | Sugar-Cane (S) S | ps | t | p | so | sa | Maize (Mz) Mz | sa | so | t | dd | pd | Rice (R) R | pd | p | so | sa | Capsicums (Cap) Cap | so | sa | d | id | w | Mango (Mg) Mg | AREA ha |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2UgdE | | N | 95 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 1.6 |
| 2UgdE | | N | 250 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 2.8 |
| 2UgeE | | N | 127 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 1.6 |
| 2Ugk | 2Dba | Y | 92 | 3 | | 3 | | | 2 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | | 4 | 2 | 2 | 3 | 4 | | 4 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 4 | 4 | 5.4 |
| 6Dba | 6Dba3 | N | 29 | 3 | | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 3 | 3 | 3 | 4 | 3 | 4 | | 4 | 4 | | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 35.3 |
| 6Dba | | N | 35 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | | 4 | 2 | | 4 | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 7.8 |
| 6Dba | 6Dyj | Y | 50 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | | 4 | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 30.8 |
| 6Dba | | N | 56 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | | 4 | 2 | | 4 | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 3.7 |
| 6Dba | | N | 26 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | | 4 | 2 | 5 | | 5 | | 3 | 4 | 2 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 12.7 |
| 6Dba | 6Dra2 | Y | 130 | 3 | 4 | 3 | | 2 | 3 | 3 | 2 | | 4 | 3 | 3 | 3 | 3 | | 4 | | 2 | 5 | | 4 | 5 | | 3 | 4 | | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 11.2 |
| 6Dba | 6Dbd | N | 247 | 3 | 3 | 3 | | 4 | 2 | 5 | 2 | | 5 | 2 | 5 | 2 | 3 | | 5 | | 2 | 5 | 3 | | 5 | 3 | 2 | 4 | | 5 | 4 | 4 | | 4 | | 4 | 1.1 |
| 6Dba2 | | N | 136 | 3 | 4 | 3 | | | 2 | 2 | 2 | | 4 | 2 | 2 | 2 | 3 | | 4 | | 2 | 3 | 4 | | 4 | 4 | 2 | 4 | | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 1.1 |
| 6Dba2 | | N | 155 | 3 | 4 | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | | 4 | 5 | 4 | | 5 | 4 | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 2.3 |
| 6Dba3 | 6Dba2 | N | 63 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | | 4 | 3 | 4 | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 42.1 |
| 6DbbE | 6Dbb2 | N | 198 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 29.1 |
| 6Dbh | | N | 41 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | | 4 | 2 | | | 4 | | 3 | 4 | | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 5.3 |
| 6Dbh | | N | 252 | 3 | | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | | 4 | 4 | | | 4 | | 3 | 4 | | 4 | 4 | 4 | | 4 | 2 | 4 | 6.1 |
| 6Dya | 6Dyg | Y | 170 | 3 | 4 | 3 | | | 3 | 2 | 3 | | 4 | 3 | 2 | 3 | 4 | 2 | 4 | | 3 | 3 | 5 | | 5 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 29.5 |
| 6Dye | 6Ucb | Y | 38 | 3 | 4 | 4 | | | 2 | | 2 | | 4 | 2 | | 2 | 3 | | 4 | | 2 | 2 | 5 | | 5 | 4 | 2 | 4 | | 4 | 4 | | 2 | 4 | 3 | 4 | 18.1 |
| 6Dye | 6Ucc | N | 62 | 3 | 4 | 4 | | | 4 | 2 | 2 | | 4 | | 2 | 4 | 3 | | 4 | | 2 | 2 | 5 | 4 | 5 | 4 | 4 | 4 | | 4 | 4 | | | 4 | 3 | 4 | 6.7 |
| 6Dye | | N | 162 | 3 | 4 | 3 | | | 2 | | 2 | | 4 | | | 2 | 3 | | 4 | | 2 | | 5 | 5 | 5 | 4 | 2 | 4 | | 4 | 4 | | | 4 | 3 | 4 | 1.4 |
| 6Dye | | N | 244 | 3 | 4 | 3 | | 2 | 3 | 3 | | | 4 | | 3 | 3 | 2 | | 4 | | | 5 | 5 | | 5 | 4 | 3 | 3 | | 4 | 4 | | | 4 | 2 | 4 | 4.9 |
| 6Dyg | | N | 36 | 3 | | 3 | | | 3 | | 4 | | 4 | 3 | | 3 | 4 | 2 | 4 | | 4 | 2 | | 4 | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 1.1 |
| 6Dyg | | N | 166 | 3 | | 3 | | | 3 | | 4 | | 4 | 3 | | 3 | 4 | 2 | 4 | | 4 | 2 | | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 5.3 |
| 6Dyg2 | 6Dba2 | N | 39 | 3 | | 3 | | | 2 | 2 | 4 | | 4 | 2 | 2 | 2 | 4 | 2 | 4 | | 4 | 3 | 4 | 4 | 4 | | 2 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 10.7 |
| 6Dyg2 | 6Dba | N | 61 | 3 | | 3 | | | 3 | 2 | 4 | | 4 | 3 | 2 | 3 | 4 | 2 | 4 | | 4 | 3 | 4 | 4 | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 15.6 |
| 6Dyg2 | | N | 67 | 3 | 4 | 3 | | | 2 | 2 | 4 | | 4 | 2 | 2 | 2 | 4 | 2 | 4 | | 4 | 3 | 4 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 0.8 |
| 6Dyg2 | 6Dyj2 | N | 126 | 3 | 2 | 3 | | | 3 | | 4 | | 4 | 3 | | 3 | 4 | 2 | 4 | | 4 | | 4 | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 3.2 |
| 6Dyg2 | | N | 173 | 3 | | 3 | | 2 | 3 | 3 | 4 | | 4 | 3 | 3 | 3 | 4 | 2 | 4 | | 4 | 4 | 4 | | 4 | | 3 | 4 | 2 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 8.0 |
| 6Dyg3 | 6Dyg | N | 32 | 3 | | 3 | | | 3 | | 4 | | 4 | 3 | | 3 | 4 | 2 | 4 | | 4 | 2 | 3 | 4 | 4 | | 3 | 4 | | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 19.2 |
| 6Dyg4 | 6G | N | 19 | 3 | | 5 | | | 2 | 2 | | | 5 | 3 | 2 | 2 | 2 | | 5 | | | 3 | 5 | | 5 | | 2 | 3 | | 5 | 4 | | 3 | 2 | 3 | 4 | 6.0 |
| 6Dyg4 | 6DbaV | N | 21 | 4 | 4 | 5 | | 2 | 2 | 3 | | | 5 | 3 | 3 | 2 | 2 | | 5 | | | 5 | 5 | | 5 | | 2 | 3 | | 5 | 4 | | 4 | 2 | 2 | 4 | 12.7 |
| 6DygE | 6Dye | N | 253 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 8.6 |
| 6Dyj | 6Dyj2 | N | 33 | 3 | | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | 2 | 4 | 3 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 83.4 |
| 6Dyj | 6Dyg3 | N | 59 | 3 | | 3 | | | 3 | 2 | 4 | 3 | 4 | 3 | 2 | 3 | 4 | 4 | 4 | 3 | 4 | 3 | | | 4 | | 3 | 4 | 4 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 15.8 |
| 6Dyj | | N | 70 | 3 | 2 | 3 | | | 3 | | 4 | 2 | 4 | 4 | | 3 | 4 | 3 | 4 | 2 | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 0.6 |
| 6Dyj | | N | 74 | 3 | 4 | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | 2 | 4 | 2 | | | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 3.1 |
| 6Dyj | | N | 153 | 3 | 4 | 3 | | 2 | 3 | 3 | 4 | 2 | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 2 | 4 | 3 | | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 2 | 4 | 0.1 |
| 6Dyj | | N | 154 | 3 | 3 | 3 | | | 3 | | 4 | 2 | 4 | 4 | | 3 | 4 | 3 | 4 | 2 | 4 | 2 | | 4 | 4 | 3 | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 1.4 |
| 6Dyj | | N | 163 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 4 | | 3 | 4 | 3 | 4 | 2 | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 14.0 |
| 6Dyj | | N | 167 | 3 | 2 | 3 | | | 3 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | 2 | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 5.0 |

**Table 8** (Cont.)

| ST1 | ST2 | C | UMA | m | pd | id | w | e | Sugar-Cane (S) p | t | so | sa | S | Maize (Mz) ps | t | p | so | sa | Mz | Rice (R) sa | so | t | dd | pd | R | Capsicums (Cap) pd | p | so | sa | Cap | Mango (Mg) so | sa | d | id | w | Mg | AREA ha |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6Dyj | | N | 171 | 3 | 4 | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | 2 | 4 | 3 | | 4 | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 4.2 |
| 6Dyj | | N | 176 | 3 | 2 | 3 | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | 3 | 4 | 3 | 4 | 2 | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 4.7 |
| 6Dyj | | N | 211 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | 2 | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 1.1 |
| 6Dyj | | N | 221 | 3 | | 3 | | | 3 | | 4 | 2 | 4 | 3 | | 3 | 4 | 3 | 4 | 2 | 4 | 2 | | | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | | 4 | 3 | 4 | 3.8 |
| 6Dyj2 | 6Dyj | N | 51 | 3 | 3 | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | 2 | 4 | 2 | 4 | 4 | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 15.8 |
| 6Dyj3 | | N | 88 | 3 | 2 | 3 | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | 2 | 4 | 3 | | 4 | 4 | | 3 | 4 | 3 | 4 | 4 | 4 | 2 | 4 | 3 | 4 | 1.9 |
| 6UgcE | | N | 271 | | | | | 5 | | | | | 5 | | | | | | 5 | | | | | | 5 | | | | | 5 | | | | | | 5 | 7.9 |

ST-Soil Type, C-Complex, Limitations: m-plant water availability, pd-soil distribution complexity, id-internal drainage, w-wetness, e-erosion, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage, d-soil depth. S-Sugar-Cane, Mz-Maize, R-Rice, Cap-Capsicums, Mg-Mangoes.

Within the parcels of more suitable land some distance from HMC, unsuitable areas are interspersed, often as linear shaped areas. This feature will limit the number of farms that can be subdivided from the area and will result in considerable areas of unsuitable (class 4 land) within some farms. This is highly undesireable.

When comparing the land suitability maps for each of the main crops, the potential for rice production seems to be far worse than for sugar-cane. However, as explained more fully in Sections 3.4.4 and 4.3, the widespread occurrence of strongly sodic soils (60 per cent of the total area) and the likelihood of this limitation being more severe than currently assessed, places some doubt on the potential of the area for sugar-cane production. The somewhat isolated nature of Haughton Stage 1 in terms of all weather road access and distance from existing cane railways present further disincentives to the development of the area for cane production.

Some of these features of the area are of course advantageous if a more salt and sodium tolerant crop such as cotton were to be grown in the BRIA. This crop would need to be isolated from areas of cane where aerial application of herbicides is often practised. Approximately 2826 ha of Haughton Stage 1 has been assessed as suitable for the irrigated production of cotton.

### 4.5.2 Incidence of relict alluvial landforms

As discussed in Section 2.2, outbreaks of Oaky Creek and Nine Mile Lagoon Creek over the survey area have been numerous, resulting in a high degree of soil complexity. Some of the resultant relict alluvial landforms will cause problems with subdivision of the area and future irrigation.

In some instances (e.g. UMA 62 and 64 in the south and 224 in the north), these major relict features occur as sandy ridges, elevated above the surrounding land. These highly permeable ridges are flanked by areas of saline and sodic soils which may represent past outflow or discharge areas. Other relict alluvial landforms have been identified as prior streams (e.g. UMAs 38, 42 and 43). These features are often raised above the surrounding land and are characterised by coarse textured permeable soils along the centre of the prior stream, flanked by deep surfaced sodic duplex soils representing flood-outs of the previous stream.

In other areas of Haughton Stage 1, there are less obvious prior streams characterised by permeable sandy soils, traversing areas of less permeable sodic duplex soils and cracking clays (e.g. UMAs 50, 72, 119 and 122). Areas with such soil complexity should be excluded from the subdivision layout where possible to avoid excessive deep drainage losses and difficulties with on farm irrigation layout.

### 4.5.3 Existing erosion and erosion hazard areas

During the field survey many localised areas of soil erosion were observed, mainly along the sloping margins of the area to the north, south and east of the area. In most instances sodic duplex soils occupy the sloping margins and if disturbed will further erode. The location of areas of significant erosion, where observed in the field, have been recorded and can be shown on 1:10 000 scale working plans of the soils of the area.

A number of creeks with eroded margins which act as outlets for surface flow into Barratta Creek have been mapped (e.g. UMAs 96, 103 and 256) and a major erosion gully occurs along the southern boundary of the survey area.

A satisfactory buffer should be established between any planned farms and all of the above areas, whether already severely eroded or highly susceptible to further erosion if disturbed.

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## APPENDIX I

## VEGETATION OF HAUGHTON SECTION STAGE I

## - COMMON AND SCIENTIFIC NAMES

**Trees:**

| | |
|---|---|
| Beefwood | *Grevillea striata* |
| Cabbage gum | *Eucalyptus papuana* |
| Carbeen | *Eucalyptus tessellaris* |
| Cocky apple | *Planchonia careya* |
| Grey bloodwood | *Eucalyptus polycarpa* |
| Pandanus | *Pandanus* spp. |
| Poplar gum | *Eucalyptus alba* |
| Tea-tree | *Melaleuca nervosa* |

**Shrubs:**

| | |
|---|---|
| Beefwood | *Grevillea striata* |
| Broad leaf tea-tree | *Melaleuca viridiflora* |
| False sandalwood | *Eremophila mitchellii* |

**Grasses:**

| | |
|---|---|
| Black spear grass | *Heteropogon contortus* |
| Blue grasses | *Bothriochloa and Dicanthium* spp. |
| Brown sorghum | *Sorghum nitidum* |
| Brown top or button grass | *Eulalia fulva* |
| Cane grass | *Ophiurous exaltatus* |
| Flinders grass | *Iseilema* spp. |
| Giant spear grass | *Heteropogon triticeus* |
| Golden beard grass | *Chrysopogon fallax* |
| Kangaroo grass | *Themeda australis* |
| Purple top Rhodes grass | *Chloris barbata* |

# APPENDIX II

## MORPHOLOGICAL AND ANALYTICAL DATA FOR REPRESENTATIVE SOIL PROFILES - HAUGHTON SECTION - STAGE 1, BURDEKIN RIVER IRRIGATION AREA

SOIL TYPE: 2Ugd
SITE NO: S1A
A.M.G. REFERENCE: 513 970 mE 7 813 995 mN ZONE 55

GREAT SOIL GROUP: Grey clay
PRINCIPAL PROFILE FORM: Ug3.2
SOIL TAXONOMY UNIT:
FAO'UNESCO UNIT:

TYPE OF MICRORELIEF: Normal gilgai
VERTICAL INTERVAL: .25 m
HORIZONTAL INTERVAL: 10 m
COMPONENT OF MICRORELIEF SAMPLED: Mound
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Mid-high open woodland
DOMINANT SPECIES: Eucalyptus alba

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Periodic cracking

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .03 m | Greyish yellow-brown (10YR4/2) moist; silty clay loam; massive; dry; moderately weak. |
| A2sb | .03 to .20 m | Greyish yellow-brown (10YR5/2) moist, dull yellowish orange (10YR7/2) dry, dry sporadically bleached; few fine distinct brown mottles; light medium clay; moderate 2-5mm angular blocky secondary; dry; moderately firm. |
| B21 | .20 to .42 m | Greyish yellow-brown (10YR4/2) moist; many medium prominent brown mottles; medium heavy clay; moderate 2-5mm angular blocky secondary; moist; moderately firm. |
| B22 | .42 to .62 m | Dark greyish yellow (2.5Y4/2) moist; few fine faint brown mottles; medium heavy clay; strong 5-10mm angular blocky secondary; moist; moderately firm; few medium manganiferous nodules. |
| B23k | .62 to .76 m | Yellowish brown (2.5Y5/3) moist; few fine faint brown mottles; medium heavy clay; strong 5-10mm angular blocky secondary; moist; moderately weak; common medium carbonate nodules, very few medium manganiferous nodules. |
| B24 | .76 to 1.62 m | Yellowish brown (2.5Y5/3) moist; medium heavy clay; strong 5-10mm angular blocky secondary, parting to moderate 100-200mm lenticular tertiary; moist; moderately weak; few medium carbonate nodules, very few medium manganiferous nodules. |
| B25 | 1.62 to 1.80 m | Dull yellowish brown (10YR5/3) moist; medium clay; moderate 5-10mm angular blocky secondary, parting to moderate 100-200mm lenticular tertiary; moist; moderately firm. |

| Depth | 1:5 Soil/Water | | | Particle Size | | | | Exch. Cations | | | | | Total Elements | | | Moistures | | | Disp.Ratio | | Exch | Exch | ECEC | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | EC | Cl | CS | FS | S | C | CEC | Ca | Mg | Na | K | P | K | S | ADM | 33* | 1500* | R1 | R2 | Al | Acid | | CaCl2 |
| metres | | dS/m | % | % | | | | m.eq/100g | | | | | % | | | % | | | | | m.eq/100g | | | |
| | @ 40C | | @105C | @ 105C | | | | @ 105C | | | | | @ 80C | | | @ 105C | | | @ 40C | | @ 105C | | | @ 40C |
| B 0.10 | 5.9 | .03 | .001 | | | | | | | | | | | | | | | | | | | | | |
| 0.10 | 5.6 | .04 | .002 | 2 | 33 | 31 | 34 | 14 | 3.3 | 3.1 | .20 | .57 | .019 | 1.20 | .016 | 2.8 | | 10 | .66 | | | | | |
| 0.20 | 6.1 | .02 | .001 | | | | | | | | | | | | | 3.6 | | | | | | | | |
| 0.30 | 6.4 | .02 | .001 | 2 | 12 | 21 | 68 | 30 | 9.8 | 8.1 | 1.3 | .38 | .015 | 1.18 | .011 | 5.4 | | 21 | .45 | | | | | |
| 0.60 | 7.6 | .13 | .015 | 1 | 11 | 23 | 67 | 34 | 16 | 14 | 2.8 | .48 | .009 | 1.39 | .008 | 4.8 | | 21 | .85 | | | | | |
| 0.90 | 8.7 | .53 | .046 | 2 | 11 | 23 | 64 | 30 | 18 | 15 | 4.3 | .43 | .015 | 1.45 | .017 | 4.0 | | 20 | .78 | | | | | |
| 1.20 | 8.6 | .62 | .084 | 2 | 10 | 24 | 65 | 34 | 16 | 15 | 5.3 | .36 | .019 | 1.50 | .015 | 5.8 | | | | | | | | |
| 1.50 | 8.3 | .73 | .084 | | | | | | | | | | | | | 4.0 | | | | | | | | |

| Depth | Org.C | Tot.N | Extr. P | | HCl | CaCl2 Extr | | DTPA-extr. | | | | | Extractable | | | P | | Alternative Cations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (W&B) | | Acid | Bicarb. | K | K | P | Fe | Mn | Cu | Zn | B | SO4S | NO3N | NH4N | Buff Cap | Equil | CEC | Ca | Mg | Na | K |
| metres | % | % | mg/kg | | meq% | mg/kg | | mg/kg | | | | | mg/kg | | | | ug/L | m.eq/100g | | | | |
| | @ 105C | @ 105C | @ 105C | | @105C | @ 105C | | @ 105C | | | | | @ 105C | | | @ 40C | | @ 105C | | | | |
| B 0.10 | 1.6 | .12 | 14 | 9 | .67 | | | 109 | 80 | 1.2 | 0.7 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 2Ugd
SITE NO: S1B
A.M.G. REFERENCE: 513 970 mE 7 813 995 mN ZONE 55

GREAT SOIL GROUP: Grey clay
PRINCIPAL PROFILE FORM: Ug5.24
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: Normal gilgai
VERTICAL INTERVAL: .25 m
HORIZONTAL INTERVAL: 10 m
COMPONENT OF MICRORELIEF SAMPLED: Depression
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Mid-high open woodland
DOMINANT SPECIES: Eucalyptus alba

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Periodic cracking

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A11 | 0 to .02 m | Greyish yellow-brown (10YR4/2) moist, yellowish grey (2.5Y6/1) dry; light medium clay; massive; dry; moderately firm. |
| A12 | .02 to .12 m | Greyish yellow-brown (10YR4/2) moist; common fine distinct pale mottles, very few fine distinct brown mottles; light medium clay; moderate 2-5mm angular blocky secondary; moist; moderately weak. |
| B21 | .12 to .58 m | Greyish yellow-brown (10YR4/2) moist; medium clay; strong 5-10mm angular blocky secondary; moist; moderately firm; very few medium manganiferous nodules. |
| B22 | .58 to 1.22 m | Greyish yellow-brown (10YR4/2); medium heavy clay; strong 5-10mm angular blocky secondary, parting to moderate 100-200mm lenticular tertiary; moist; moderately firm; few medium manganiferous nodules. |
| B23 | 1.22 to 1.42 m | Dark greyish yellow (2.5Y4/2); many medium distinct brown mottles; medium clay; strong 2-5mm angular blocky secondary, parting to moderate 100-200mm lenticular tertiary; moist; moderately firm. |
| B24 | 1.42 to 1.74 m | Yellowish brown (2.5Y5/3); few medium faint grey mottles; medium heavy clay; strong 5-10mm angular blocky secondary, parting to moderate 100-200mm lenticular tertiary; moist; moderately firm. |

| Depth metres | 1:5 Soil/Water pH @ 40C | EC dS/m @ 40C | Cl % @105C | Particle Size CS % @ 105C | FS | S | C | Exch. Cations CEC m.eq/100g @ 105C | Ca | Mg | Na | K | Total Elements P % @ 80C | K | S | Moistures ADM % @ 105C | 33* | 1500* | Disp.Ratio R1 @ 40C | R2 | Exch Al m.eq/100g @ 105C | Exch Acid | ECEC | pH CaCl2 @ 40C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B 0.10 | 5.8 | .06 | .001 | | | | | | | | | | | | | | | | | | | | | |
| 0.10 | 5.6 | .13 | .002 | 3 | 17 | 35 | 44 | 28 | 8.3 | 4.0 | .28 | .87 | .037 | 1.24 | .025 | 3.7 | | 16 | .56 | | | | | |
| 0.20 | 6.1 | .05 | .001 | | | | | | | | | | | | | 3.3 | | | | | | | | |
| 0.30 | 6.1 | .05 | .004 | 3 | 19 | 31 | 49 | 25 | 9.7 | 5.8 | .98 | .38 | .018 | 1.14 | .008 | 5.0 | | 18 | .74 | | | | | |
| 0.60 | 5.9 | .29 | .040 | 3 | 20 | 30 | 49 | 25 | 9.9 | 7.0 | 2.2 | .20 | .012 | 1.12 | .007 | 4.9 | | 18 | .89 | | | | | |
| 0.90 | 6.6 | .43 | .061 | 2 | 19 | 30 | 52 | 26 | 10 | 8.5 | 3.4 | .23 | .010 | 1.17 | .009 | 4.2 | | 17 | .88 | | | | | |
| 1.20 | 7.5 | .52 | .073 | 1 | 14 | 28 | 58 | 30 | 13 | 12 | 5.1 | .23 | .017 | 1.42 | .011 | 7.2 | | | | | | | | |
| 1.50 | 7.7 | .69 | .100 | | | | | | | | | | | | | 8.5 | | | | | | | | |

| Depth metres | Org.C (W&B) % @ 105C | Tot.N % @ 105C | Extr. P Acid mg/kg @ 105C | Extr. P Bicarb. | HCl K meq% @105C | CaCl2 Extr K mg/kg @ 105C | CaCl2 Extr P | DTPA-extr. Fe mg/kg @ 105C | Mn | Cu | Zn | B | Extractable SO4S mg/kg @ 105C | NO3N | NH4N | P Buff Cap @ 40C | P Equil ug/L | Alternative Cations CEC m.eq/100g @ 105C | Ca | Mg | Na | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B 0.10 | 1.6 | .11 | 24 | 19 | .65 | | | 170 | 134 | 2.4 | 1.9 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 2Uge
SITE NO: S2A
A.M.G. REFERENCE: 511 440 mE 7 815 460 mN ZONE 55

GREAT SOIL GROUP: Grey clay
PRINCIPAL PROFILE FORM: Ug3.2
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: Normal gilgai
VERTICAL INTERVAL: .15 m
HORIZONTAL INTERVAL: 9 m
COMPONENT OF MICRORELIEF SAMPLED: Mound
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Low open woodland
DOMINANT SPECIES: Eucalyptus alba, Eucalyptus tessellaris, Eucalyptus papuana

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Hard setting, periodic cracking

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .02 m | Greyish yellow-brown (10YR4/2) moist; light medium clay; weak 2-5mm granular primary; dry; very firm. |
| A2sb | .02 to .06 m | Brownish black (10YR3/2) moist, light grey (2.5Y7/1) dry, dry sporadically bleached; light medium clay; moderate 2-5mm angular blocky primary; dry; very firm. |
| B21 | .06 to .22 m | Yellowish grey (2.5Y4/1) moist; medium clay; strong 2-5mm angular blocky primary; dry; moderately strong; few medium carbonate nodules. |
| B22 | .22 to .60 m | Dark greyish yellow (2.5Y4/2) moist; medium clay; strong 2-5mm angular blocky primary; moderately moist; moderately firm; very few medium carbonate nodules. |
| B23k | .60 to .72 m | Dark greyish yellow (2.5Y4/2) moist; medium clay; moderate 2-5mm angular blocky primary; moderately moist; moderately firm; common medium carbonate nodules. |
| B24 | .72 to 1.10 m | Dark greyish yellow (2.5Y4/2) moist; few fine faint grey mottles; medium clay; strong 5-10mm angular blocky primary; moderately moist; very firm; very few medium carbonate nodules, very few medium manganiferous nodules. |
| D | 1.10 to 1.63 m | Yellowish brown (2.5Y5/4) moist; few fine faint yellow mottles; light medium clay; strong 5-10mm angular blocky primary; moderately moist; very firm; very few medium carbonate nodules, very few medium manganiferous nodules. |

| Depth | 1:5 Soil/Water | | | Particle Size | | | | Exch. Cations | | | | | Total Elements | | | Moistures | | | Disp.Ratio | | Exch | Exch | ECEC | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | EC | Cl | CS | FS | S | C | CEC | Ca | Mg | Na | K | P | K | S | ADM | 33* | 1500* | R1 | R2 | Al | Acid | | CaCl2 |
| metres | | dS/m | % | % | | | | m.eq/100g | | | | | % | | | % | | | | | m.eq/100g | | | |
| | @ 40C | | @105C | @ 105C | | | | @ 105C | | | | | @ 80C | | | @ 105C | | | @ 40C | | @ 105C | | | @ 40C |
| B 0.10 | 7.3 | .05 | .003 | | | | | | | | | | | | | | | | | | | | | |
| 0.06 | 7.7 | .09 | .002 | 8 | 19 | 20 | 54 | 36 | 18 | 13 | 1.3 | .47 | .015 | .804 | .017 | 4.9 | | 17 | .63 | | | | | |
| 0.20 | 8.9 | .17 | .002 | | | | | | | | | | | | | 5.2 | | | | | | | | |
| 0.30 | 9.1 | .22 | .006 | 8 | 15 | 20 | 56 | 34 | 18 | 14 | 2.9 | .20 | .009 | .826 | .013 | 5.8 | | 18 | .71 | | | | | |
| 0.60 | 9.1 | .52 | .046 | 7 | 18 | 23 | 55 | 35 | 13 | 16 | 5.5 | .23 | .009 | .910 | .011 | 5.3 | | 18 | .91 | | | | | |
| 0.90 | 9.1 | .74 | .076 | 7 | 17 | 19 | 54 | 34 | 11 | 16 | 7.4 | .26 | .009 | 1.02 | .010 | 5.3 | | 19 | 1.0 | | | | | |
| 1.20 | 9.1 | .78 | .099 | 6 | 21 | 22 | 48 | 31 | 9.5 | 15 | 7.7 | .24 | .012 | 1.24 | .009 | 7.4 | | | | | | | | |
| 1.50 | 8.7 | .71 | .091 | | | | | | | | | | | | | 4.3 | | | | | | | | |

| Depth | Org.C | Tot.N | Extr. P | | HCl | CaCl2 Extr | | DTPA-extr. | | | | | Extractable | | | P | | Alternative Cations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (W&B) | | Acid | Bicarb. | K | K | P | Fe | Mn | Cu | Zn | B | SO4S | NO3N | NH4N | Buff Cap | Equil | CEC | Ca | Mg | Na | K |
| metres | % | % | mg/kg | | meq% | mg/kg | | mg/kg | | | | | mg/kg | | | | ug/L | m.eq/100g | | | | |
| | @ 105C | @ 105C | @ 105C | | @105C | @ 105C | | @ 105C | | | | | @ 105C | | | @ 40C | | @ 105C | | | | |
| B 0.10 | 0.9 | .06 | 5 | 4 | .39 | | | 34 | 50 | 1.2 | .30 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 2Uge
SITE NO: S2B
A.M.G. REFERENCE: 511 440 mE 7 815 460 mN ZONE 55

GREAT SOIL GROUP: Grey clay
PRINCIPAL PROFILE FORM: Ug3.2
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: Normal gilgai
VERTICAL INTERVAL: .15 m
HORIZONTAL INTERVAL: 9 m
COMPONENT OF MICRORELIEF SAMPLED: Depression
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Low open woodland
DOMINANT SPECIES: Eucalyptus alba, Eucalyptus tessellaris, Eucalyptus papuana

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Hard setting, periodic cracking

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .02 m | Brownish black (10YR3/2) moist; light clay; massive; dry; moderately firm. |
| A2sb | .02 to .14 m | Greyish yellow-brown (10YR5/2) moist, light grey (10YR7/1) dry, dry sporadically bleached; common medium distinct brown mottles; light clay; massive; dry; very firm. |
| B | .14 to .80 m | Greyish yellow-brown (10YR4/2) moist; medium clay; moderate 5-10mm angular blocky primary; moderately moist; moderately firm. |
| D1 | .80 to 1.10 m | Dull yellowish brown (10YR5/3) moist; medium clay; very few small pebbles, subangular quartz; moderate 2-5mm angular blocky primary; moderately moist; moderately firm; very few medium carbonate nodules. |
| D2 | 1.10 to 1.62 m | Dull yellowish orange (10YR6/4) moist; medium clay; moderate 2-5mm angular blocky primary; moderately moist; very firm; few medium manganiferous nodules, very few medium carbonate nodules. |

| Depth | 1:5 Soil/Water | | | Particle Size | | | | Exch. Cations | | | | | Total Elements | | | Moistures | | | Disp.Ratio | | Exch | Exch | ECEC | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | EC | Cl | CS | FS | S | C | CEC | Ca | Mg | Na | K | P | K | S | ADM | 33* | 1500* | R1 | R2 | Al | Acid | | CaCl2 |
| metres | | dS/m | % | % | | | | m.eq/100g | | | | | % | | | % | | | | | m.eq/100g | | | |
| | @ 40C | | @105C | @ 105C | | | | @ 105C | | | | | @ 80C | | | @ 105C | | | @ 40C | | @ 105C | | | @ 40C |
| B 0.10 | 6.1 | .03 | .003 | | | | | | | | | | | | | | | | | | | | | |
| 0.10 | 6.4 | .04 | .003 | 12 | 30 | 22 | 36 | 20 | 5.1 | 6.3 | .97 | .30 | .017 | .769 | .014 | 3.1 | | 12 | .73 | | | | | |
| 0.20 | 6.5 | .09 | .011 | | | | | | | | | | | | | 3.5 | | | | | | | | |
| 0.30 | 6.5 | .17 | .027 | 7 | 27 | 22 | 43 | 23 | 7.5 | 9.1 | 2.8 | .15 | .007 | .736 | .011 | 4.6 | | 15 | .96 | | | | | |
| 0.60 | 7.6 | .45 | .068 | 7 | 25 | 24 | 45 | 26 | 8.6 | 10 | 5.0 | .17 | .006 | .805 | .011 | 3.6 | | 16 | .96 | | | | | |
| 0.90 | 9.2 | .69 | .097 | 9 | 24 | 21 | 48 | 28 | 10 | 12 | 6.1 | .15 | .011 | 1.13 | .011 | 9.3 | | 17 | .95 | | | | | |
| 1.20 | 9.1 | .79 | .089 | 10 | 26 | 19 | 47 | 28 | 9.4 | 13 | 6.3 | .26 | .016 | 1.32 | .014 | 4.5 | | | | | | | | |
| 1.50 | 8.8 | .67 | .086 | | | | | | | | | | | | | 4.2 | | | | | | | | |

| Depth | Org.C | Tot.N | Extr. P | | HCl | CaCl2 Extr | | DTPA-extr. | | | | | Extractable | | | P | | Alternative Cations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (W&B) | | Acid | Bicarb. | K | K | P | Fe | Mn | Cu | Zn | B | SO4S | NO3N | NH4N | Buff | Equil | CEC | Ca | Mg | Na | K |
| metres | % | % | mg/kg | | meq% | mg/kg | | mg/kg | | | | | mg/kg | | | Cap | ug/L | m.eq/100g | | | | |
| | @ 105C | @ 105C | @ 105C | | @105C | @ 105C | | @ 105C | | | | | @ 105C | | | @ 40C | | @ 105C | | | | |
| B 0.10 | 1.2 | .08 | 5 | 7 | .42 | | | 128 | 125 | 1.8 | .82 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 2Ugk
SITE NO: S3A
A.M.G. REFERENCE: 514 150 mE 7 813 050 mN ZONE 55

GREAT SOIL GROUP: Grey clay
PRINCIPAL PROFILE FORM: Ug5.25
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: Normal gilgai
VERTICAL INTERVAL: .10 m
HORIZONTAL INTERVAL: 12 m
COMPONENT OF MICRORELIEF SAMPLED: Mound
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Mid-high open woodland
DOMINANT SPECIES: Eucalyptus alba, Eucalyptus tessellaris

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Periodic cracking, self mulching

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A11 | 0 to .02 m | Dark brown (10YR3/3) moist; medium clay; moderate 2-5mm granular primary; dry; very firm. |
| A12 | .02 to .12 m | Greyish yellow-brown (10YR4/2) moist; common fine distinct brown mottles; medium clay; very few small pebbles, subrounded quartz; strong 2-5mm angular blocky secondary; dry; very firm. |
| B21 | .12 to .37 m | Dark greyish yellow (2.5Y4/2) moist; few fine distinct brown mottles; medium heavy clay; very few small pebbles, subrounded quartz; strong 2-5mm angular blocky secondary; moist; moderately firm; very few medium manganiferous nodules. |
| B22 | .37 to 1.22 m | Dark greyish yellow (2.5Y4/2) moist; very few fine faint brown mottles; medium heavy clay; few small pebbles, subrounded quartz; strong 5-10mm angular blocky secondary, parting to strong 100-200mm lenticular tertiary; moist; moderately firm; few medium manganiferous nodules, very few medium carbonate nodules. |
| B23k | 1.22 to 1.52 m | Dull yellowish brown (10YR4/3) moist; medium clay; few small pebbles, subrounded quartz; strong 5-10mm angular blocky secondary, parting to strong 100-200mm lenticular tertiary; moderately moist; moderately firm; few coarse carbonate nodules, very few medium manganiferous nodules. |
| D | 1.52 to 1.83 m | Brown (10YR4/6) moist; medium clay; common small pebbles, subrounded quartz; strong 5-10mm angular blocky secondary; moderately moist; moderately firm; common medium carbonate nodules, very few medium manganiferous nodules. |

| Depth metres | 1:5 Soil/Water pH @ 40C | 1:5 Soil/Water EC dS/m @ 40C | 1:5 Soil/Water Cl % @105C | Particle Size CS % @ 105C | Particle Size FS | Particle Size S | Particle Size C | Exch. Cations CEC m.eq/100g @ 105C | Exch. Cations Ca | Exch. Cations Mg | Exch. Cations Na | Exch. Cations K | Total Elements P % @ 80C | Total Elements K | Total Elements S | Moistures ADM % @ 105C | Moistures 33* | Moistures 1500* | Disp.Ratio R1 @ 40C | Disp.Ratio R2 | Exch Al m.eq/100g @ 105C | Exch Acid | ECEC | pH CaCl2 @ 40C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B 0.10 | 6.4 | .04 | .002 | | | | | | | | | | | | | | | | | | | | | |
| 0.10 | 5.9 | .15 | .016 | 11 | 19 | 15 | 55 | 25 | 8.1 | 8.7 | .74 | .56 | .023 | 1.17 | .017 | 4.9 | | 16 | .40 | | | | | |
| 0.20 | 5.9 | .18 | .023 | | | | | | | | | | | | | 4.6 | | | | | | | | |
| 0.30 | 6.0 | .21 | .030 | 7 | 13 | 15 | 66 | 33 | 12 | 12 | 1.7 | .26 | .011 | 1.06 | .010 | 10.0 | | 20 | .48 | | | | | |
| 0.60 | 6.9 | .40 | .055 | 6 | 13 | 19 | 63 | 35 | 13 | 14 | 3.2 | .34 | .008 | 1.12 | .008 | 8.1 | | 20 | .83 | | | | | |
| 0.90 | 8.0 | .64 | .091 | 6 | 15 | 21 | 59 | 32 | 12 | 15 | 4.8 | .33 | .006 | 1.08 | .007 | 3.6 | | 20 | .91 | | | | | |
| 1.20 | 8.3 | .68 | .089 | 6 | 15 | 21 | 58 | 30 | 13 | 14 | 5.1 | .28 | .007 | 1.15 | .009 | 4.5 | | | | | | | | |
| 1.50 | 8.8 | .76 | .089 | | | | | | | | | | | | | 5.8 | | | | | | | | |
| 1.80 | 8.8 | .58 | .073 | | | | | | | | | | | | | 3.0 | | | | | | | | |

| Depth metres | Org.C (W&B) % @ 105C | Tot.N % @ 105C | Extr. P Acid mg/kg @ 105C | Extr. P Bicarb. | HCl K meq% @105C | CaCl2 Extr K mg/kg @ 105C | CaCl2 Extr P | DTPA-extr. Fe mg/kg @ 105C | DTPA-extr. Mn | DTPA-extr. Cu | DTPA-extr. Zn | B | Extractable SO4S mg/kg @ 105C | Extractable NO3N | Extractable NH4N | P Buff Cap @ 40C | P Equil ug/L | Alternative Cations CEC m.eq/100g @ 105C | Alternative Cations Ca | Alternative Cations Mg | Alternative Cations Na | Alternative Cations K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B 0.10 | 0.8 | .07 | 13 | 6 | .44 | | | 41 | 66 | 1.3 | 0.4 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 2Ugk
SITE NO: S3B
A.M.G. REFERENCE: 514 150 mE 7 813 050 mN ZONE 55

GREAT SOIL GROUP: Grey clay
PRINCIPAL PROFILE FORM: Ug3.2
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: Normal gilgai
VERTICAL INTERVAL: .10 m
HORIZONTAL INTERVAL: 12 m
COMPONENT OF MICRORELIEF SAMPLED: Depression
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Mid-high open woodland
DOMINANT SPECIES: Eucalyptus alba, Eucalyptus tessellaris

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Periodic cracking

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| ASb | 0 to .09 m | Greyish yellow-brown (10YR4/2) moist, light grey (2.5Y7/1) dry; few fine distinct brown mottles; silty clay; weak 2-5mm angular blocky secondary; dry; moderately weak. |
| B21 | .09 to .45 m | Yellowish grey (2.5Y4/1) moist; few fine distinct pale mottles; light medium clay; strong 2-5mm angular blocky secondary; moderately moist; very firm. |
| B22 | .45 to .94 m | Yellowish grey (2.5Y4/1) moist; medium clay; strong 5-10mm angular blocky secondary, parting to moderate 100-200mm lenticular tertiary; moderately moist; very firm; few medium ferromanganiferous nodules. |
| B23k | .94 to 1.05 m | Dark greyish yellow (2.5Y4/2) moist; medium clay; very few small pebbles, subrounded quartz; strong 2-5mm angular blocky secondary, parting to weak 20-50mm lenticular tertiary; moist; moderately weak; few coarse carbonate nodules, very few medium manganiferous nodules. |
| D1 | 1.05 to 1.57 m | Brown (10YR4/4) moist; few fine faint grey mottles; medium clay; few small pebbles, subrounded quartz; strong 2-5mm angular blocky secondary; moist; moderately firm; few medium carbonate nodules, very few medium manganiferous nodules. |
| D2 | 1.57 to 1.78 m | Brown (10YR4/6) moist; few fine distinct grey mottles; light medium clay; common small pebbles, subrounded quartz; strong 2-5mm angular blocky secondary; moderately moist; moderately firm; few medium manganiferous nodules. |

| Depth | 1:5 Soil/Water pH | EC | Cl | Particle Size CS | FS | S | C | Exch. Cations CEC | Ca | Mg | Na | K | Total Elements P | K | S | Moistures ADM | 33* | 1500* | Disp.Ratio R1 | R2 | Exch Al | Exch Acid | ECEC | pH CaCl2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| metres | | dS/m | % | % | | | | m.eq/100g | | | | | % | | | % | | | | | m.eq/100g | | | |
| | @ 40C | | @105C | @ 105C | | | | @ 105C | | | | | @ 80C | | | @ 105C | | | @ 40C | | @ 105C | | | @ 40C |
| B 0.10 | 6.0 | .02 | .001 | | | | | | | | | | | | | | | | | | | | | |
| 0.10 | 5.8 | .03 | .001 | 4 | 19 | 36 | 41 | 21 | 6.3 | 4.1 | .37 | .38 | .021 | 1.21 | .011 | 2.8 | | 14 | .57 | | | | | |
| 0.20 | 6.5 | .02 | .001 | | | | | | | | | | | | | 3.0 | | | | | | | | |
| 0.30 | 6.6 | .05 | .004 | 5 | 12 | 34 | 49 | 25 | 10 | 6.4 | 1.4 | .22 | .014 | 1.11 | .009 | 4.9 | | 19 | .85 | | | | | |
| 0.60 | 6.0 | .33 | .049 | 4 | 13 | 34 | 51 | 24 | 9.2 | 6.7 | 2.4 | .19 | .009 | 1.08 | .008 | 3.8 | | 19 | .89 | | | | | |
| 0.90 | 7.5 | .42 | .059 | 4 | 13 | 28 | 55 | 27 | 13 | 9.6 | 4.2 | .21 | .007 | 1.15 | .007 | 4.2 | | 19 | .92 | | | | | |
| 1.20 | 8.6 | .59 | .073 | 7 | 14 | 25 | 55 | 31 | 15 | 12 | 5.0 | .22 | .016 | 1.50 | .006 | 9.1 | | | | | | | | |
| 1.50 | 8.5 | .56 | .065 | | | | | | | | | | | | | 5.0 | | | | | | | | |
| 1.80 | 8.1 | .33 | .047 | | | | | | | | | | | | | 3.4 | | | | | | | | |

| Depth | Org.C (W&B) | Tot.N | Extr. P Acid | Bicarb. | HCl K | CaCl2 Extr K | P | DTPA-extr. Fe | Mn | Cu | Zn | B | Extractable SO4S | NO3N | NH4N | P Buff Cap | Equil | Alternative Cations CEC | Ca | Mg | Na | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| metres | % | % | mg/kg | | meq% | mg/kg | | mg/kg | | | | | mg/kg | | | | ug/L | m.eq/100g | | | | |
| | @ 105C | @ 105C | @ 105C | | @105C | @ 105C | | @ 105C | | | | | @ 105C | | | @ 40C | | @ 105C | | | | |
| B 0.10 | 1.2 | .09 | 9 | 7 | .37 | | | 118 | 147 | 1.9 | 1.1 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 2Dda
SITE NO: S4
A.M.G. REFERENCE: 511 530 mE 7 818 030 mN ZONE 55

GREAT SOIL GROUP: Solodic soil
PRINCIPAL PROFILE FORM: Dd1.33
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: No microrelief
SURFACE COARSE FRAGMENTS: Very few small pebbles, subangular unspecified coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Tussock grassland
DOMINANT SPECIES

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Hard setting

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .03 m | Dark brown (10YR3/4) moist; clay loam,fine sandy; massive; dry; moderately firm. |
| A2sb | .03 to .06 m | Dull yellowish brown (10YR5/3) moist, dull yellowish orange (10YR7/2) dry, dry sporadically bleached; clay loam,fine sandy; massive; dry; moderately firm. |
| B21 | .06 to .35 m | Brownish black (2.5Y3/2) moist; medium clay; strong 5-10mm angular blocky primary, parting to moderate 50-100mm lenticular secondary; dry; moderately strong. |
| B22 | .35 to .68 m | Dark olive (2.5Y3/3) moist; medium clay; very few small pebbles, subangular quartz; strong 5-10mm angular blocky primary; moderately moist; very firm; very few medium carbonate nodules, very few medium manganiferous nodules. |
| D1 | .68 to .90 m | Brown (10YR4/6) moist; medium clay; moderate 5-10mm angular blocky primary; moderately moist; very firm. |
| D2 | .90 to 1.00 m | Brown (10YR4/6) moist; light clay; many small pebbles, subangular quartz; massive; moderately moist; moderately firm. |
| D3 | 1.00 to 1.14 m | Yellowish brown (10YR5/6) moist; light clay; weak 5-10mm angular blocky primary; moderately moist; moderately firm; many medium manganiferous veins. |
| D4 | 1.14 to 1.62 m | Dull yellowish orange (10YR6/3) moist; many medium distinct brown mottles; light medium clay; moderate 5-10mm angular blocky primary; moderately moist; moderately firm; common medium manganiferous veins. |

| Depth | 1:5 Soil/Water | | | Particle Size | | | | Exch. Cations | | | | | Total Elements | | | Moistures | | | Disp.Ratio | | Exch | Exch | ECEC | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | EC | Cl | CS | FS | S | C | CEC | Ca | Mg | Na | K | P | K | S | ADM | 33* | 1500* | R1 | R2 | Al | Acid | | CaCl2 |
| metres | | dS/m | % | % | | | | m.eq/100g | | | | | % | | | % | | | | | m.eq/100g | | | |
| | @ 40C | | @105C | @ 105C | | | | @ 105C | | | | | @ 80C | | | @ 105C | | | @ 40C | | @ 105C | | | @ 40C |
| B 0.06 | 5.9 | .03 | .003 | | | | | | | | | | | | | | | | | | | | | |
| 0.06 | 6.2 | .04 | .003 | 18 | 32 | 22 | 30 | 16 | 3.4 | 4.3 | 1.2 | .22 | .017 | .649 | .016 | 1.7 | | 9 | .68 | | | | | |
| 0.20 | 7.9 | .13 | .017 | | | | | | | | | | | | | 3.5 | | | | | | | | |
| 0.30 | 8.5 | .28 | .039 | 7 | 17 | 23 | 52 | 28 | 11 | 10 | 5.9 | .12 | .008 | .634 | .022 | 3.2 | | 17 | .97 | | | | | |
| 0.60 | 9.1 | .91 | .101 | 15 | 21 | 22 | 45 | 22 | 7.9 | 8.0 | 8.5 | .13 | .007 | .761 | .030 | 2.9 | | 15 | .97 | | | | | |
| 0.90 | 9.2 | 1.1 | .151 | 16 | 20 | 20 | 46 | 26 | 8.0 | 8.5 | 11 | .11 | .008 | 1.10 | .016 | 7.8 | | 17 | .98 | | | | | |
| 1.20 | 8.7 | .70 | .097 | 27 | 27 | 13 | 34 | 18 | 5.6 | 6.4 | 8.4 | .15 | .011 | .789 | .017 | 2.7 | | | | | | | | |
| 1.50 | 8.5 | .63 | .112 | | | | | | | | | | | | | 3.3 | | | | | | | | |

| Depth | Org.C (W&B) | Tot.N | Extr. P | | HCl | CaCl2 Extr | | DTPA-extr. | | | | | Extractable | | | P | | Alternative Cations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Acid | Bicarb. | K | K | P | Fe | Mn | Cu | Zn | B | SO4S | NO3N | NH4N | Buff Cap | Equil | CEC | Ca | Mg | Na | K |
| metres | % | % | mg/kg | | meq% | mg/kg | | mg/kg | | | | | mg/kg | | | | ug/L | m.eq/100g | | | | |
| | @ 105C | @ 105C | @ 105C | | @105C | @ 105C | | @ 105C | | | | | @ 105C | | | @ 40C | | @ 105C | | | | |
| B 0.06 | 1.0 | .07 | 4 | 4 | .36 | | | 109 | 50 | .86 | .54 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 2Dya
SITE NO: S5
A.M.G. REFERENCE: 511 020 mE 7 815 320 mN ZONE 55

GREAT SOIL GROUP: Solodic soil
PRINCIPAL PROFILE FORM: Dy2.33
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: Normal gilgai
VERTICAL INTERVAL: .05 m
HORIZONTAL INTERVAL: 6 m
COMPONENT OF MICRORELIEF SAMPLED: Mound
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Low open woodland
DOMINANT SPECIES: Eucalyptus alba, Grevillea striata

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Hard setting

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1cb | 0 to .03 m | Greyish yellow-brown (10YR4/2) moist, light grey (10YR7/1) dry, dry conspicuously bleached; clay loam; massive; dry; moderately firm. |
| A2sb | .03 to .08 m | Dull yellowish brown (10YR4/3) moist, dull yellowish orange (10YR7/2) dry, dry sporadically bleached; few fine distinct brown mottles; clay loam; massive; dry; moderately strong. |
| B21 | .08 to .22 m | Greyish yellow-brown (10YR4/2) moist; few fine distinct brown mottles; medium clay; strong 2-5mm angular blocky primary; moderately moist; moderately firm. |
| B22 | .22 to .89 m | Dark greyish yellow (2.5Y4/2) moist; medium clay; strong 2-5mm angular blocky primary; moderately moist; moderately firm; very few medium manganiferous nodules. |
| D1 | .89 to 1.36 m | Yellowish brown (2.5Y5/3) moist; medium clay; moderate 5-10mm angular blocky primary; moderately moist; very firm; very few medium carbonate nodules. |
| D2k | 1.36 to 1.63 m | Yellowish brown (2.5Y5/3) moist; few fine distinct yellow mottles; medium clay; moderate 5-10mm angular blocky primary; moderately moist; moderately strong; few medium carbonate nodules, few medium manganiferous veins. |

| Depth metres | 1:5 Soil/Water pH @ 40C | EC dS/m | Cl % @105C | Particle Size % @ 105C CS | FS | S | C | Exch. Cations m.eq/100g @ 105C CEC | Ca | Mg | Na | K | Total Elements % @ 80C P | K | S | Moistures % @ 105C ADM | 33* | 1500* | Disp.Ratio @ 40C R1 | R2 | Exch Al m.eq/100g @ 105C | Exch Acid | ECEC | pH CaCl2 @ 40C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B 0.08 | 6.3 | .07 | .009 | | | | | | | | | | | | | | | | | | | | | |
| 0.08 | 6.5 | .12 | .014 | 7 | 27 | 22 | 42 | 24 | 5.5 | 10 | 2.3 | .36 | .017 | .827 | .018 | 3.2 | | 14 | .71 | | | | | |
| 0.20 | 7.1 | .32 | .050 | | | | | 35 | 10 | 16 | 5.3 | .26 | | | | 4.3 | | | | | | | | |
| 0.30 | 7.7 | .53 | .082 | 4 | 14 | 20 | 64 | 37 | 10 | 17 | 6.8 | .27 | .008 | .783 | .014 | 4.4 | | 20 | .94 | | | | | |
| 0.60 | 8.3 | .84 | .114 | 3 | 14 | 23 | 61 | 34 | 9.8 | 16 | 9.4 | .28 | .007 | .787 | .013 | 4.5 | | 20 | 1.0 | | | | | |
| 0.90 | 8.6 | .92 | .125 | 3 | 17 | 25 | 58 | 32 | 8.8 | 15 | 9.8 | .32 | .006 | .860 | .011 | 3.8 | | 19 | .98 | | | | | |
| 1.20 | 8.6 | .90 | .121 | 4 | 18 | 21 | 54 | 30 | 8.2 | 16 | 10 | .41 | .012 | 1.27 | .007 | 3.7 | | | | | | | | |
| 1.50 | 8.7 | .88 | .112 | | | | | 32 | 7.9 | 15 | 9.4 | .44 | | | | 3.7 | | | | | | | | |

| Depth metres | Org.C (W&B) % @ 105C | Tot.N % @ 105C | Extr. P mg/kg @ 105C Acid | Bicarb. | HCl K meq% @105C | CaCl2 Extr mg/kg @ 105C K | P | DTPA-extr. mg/kg @ 105C Fe | Mn | Cu | Zn | B | Extractable mg/kg @ 105C SO4S | NO3N | NH4N | P Buff Cap @ 40C | P Equil ug/L | Alternative Cations m.eq/100g @ 105C CEC | Ca | Mg | Na | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B 0.08 | 0.8 | .06 | 4 | 5 | .35 | | | 63 | 84 | 1.4 | .31 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 6Dba
SITE NO: S6
A.M.G. REFERENCE: 511 900 mE 7 812 380 mN ZONE 55

GREAT SOIL GROUP: Solodic soil
PRINCIPAL PROFILE FORM: Dy3.33
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: No microrelief
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Tussock grassland
DOMINANT SPECIES

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Hard setting

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .14 m | Greyish yellow-brown (10YR4/2) moist; sandy loam; massive; moderately moist; moderately weak. |
| A2sb | .14 to .21 m | Greyish yellow-brown (10YR5/2) moist, dull yellowish orange (10YR7/2) dry, dry sporadically bleached; sandy loam; common small pebbles, subrounded unspecified coarse fragments; massive; moderately moist; moderately weak. |
| B21 | .21 to .39 m | Greyish yellow-brown (10YR5/2) moist; common medium prominent yellow mottles; sandy clay; common small pebbles, subangular quartz; moderate 5-10mm angular blocky secondary; moist; moderately firm; few medium manganiferous veins. |
| B22 | .39 to .76 m | Dull yellowish brown (10YR5/3) moist; few medium distinct brown mottles; sandy clay; few small pebbles, subangular quartz; strong 20-50mm angular blocky secondary; moist; moderately strong; very few medium manganiferous soft segregations. |
| D1 | .76 to 1.44 m | Dull yellowish brown (10YR5/4) moist, brown (7.5YR4/4) dry; light medium clay; few small pebbles, subrounded unspecified coarse fragments, few small pebbles, subangular quartz; strong 5-10mm angular blocky secondary; moist; very firm; common coarse carbonate nodules. |
| D2 | 1.44 to 1.76 m | Dull yellowish brown (10YR5/4) moist, brown (10YR4/4) dry; medium clay; very few small pebbles, subangular quartz; strong 2-5mm angular blocky secondary; moist; very firm; few medium carbonate nodules, very few medium manganiferous soft segregations. |

| Depth | 1:5 Soil/Water | | | Particle Size | | | | Exch. Cations | | | | | Total Elements | | | Moistures | | | Disp.Ratio | | Exch | Exch | ECEC | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | EC | Cl | CS | FS | S | C | CEC | Ca | Mg | Na | K | P | K | S | ADM | 33* | 1500* | R1 | R2 | Al | Acid | | CaCl2 |
| metres | | dS/m | % | % | | | | m.eq/100g | | | | | % | | | % | | | | | m.eq/100g | | | |
| | @ 40C | | @105C | @ 105C | | | | @ 105C | | | | | @ 80C | | | @ 105C | | | @ 40C | | @ 105C | | | @ 40C |
| 0.10 | 5.9 | .03 | .003 | 55 | 27 | 11 | 9 | 4 | 0.5 | 0.5 | 0.1 | 0.5 | .007 | 1.41 | .008 | 0.6 | | 3 | .79 | | | | | |
| 0.20 | 6.0 | .03 | .003 | | | | | | | | | | | | | 0.9 | | | | | | | | |
| 0.30 | 6.9 | .41 | .067 | 38 | 19 | 12 | 33 | 13 | 2.5 | 4.0 | 4.5 | 0.1 | .009 | 1.33 | .009 | 2.8 | | 10 | .86 | | | | | |
| 0.60 | 9.9 | .70 | .073 | 32 | 20 | 16 | 34 | 15 | 3.0 | 5.0 | 9.7 | 0.1 | .009 | 1.56 | .024 | 3.3 | | 15 | .99 | | | | | |
| 0.90 | 9.8 | .62 | .073 | 28 | 18 | 17 | 39 | 19 | 3.1 | 6.2 | 13 | 0.2 | .010 | 1.70 | .011 | 5.4 | | 15 | .99 | | | | | |
| 1.20 | 10. | .54 | .049 | 39 | 18 | 12 | 31 | 15 | 2.6 | 4.2 | 8.6 | 0.1 | .012 | 1.73 | .010 | 4.3 | | | | | | | | |
| 1.50 | 10. | .49 | .042 | 31 | 18 | 17 | 35 | 17 | 3.2 | 5.2 | 10 | 0.2 | | | | 5.3 | | | | | | | | |

| Depth | Org.C (W&B) | Tot.N | Extr. P | | HCl | CaCl2 Extr | | DTPA-extr. | | | | | Extractable | | | P | | Alternative Cations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Acid | Bicarb. | K | K | P | Fe | Mn | Cu | Zn | B | SO4S | NO3N | NH4N | Buff Cap | Equil | CEC | Ca | Mg | Na | K |
| metres | % | % | mg/kg | | meq% | mg/kg | | mg/kg | | | | | mg/kg | | | | ug/L | m.eq/100g | | | | |
| | @ 105C | @ 105C | @ 105C | | @105C | @ 105C | | @ 105C | | | | | @ 105C | | | @ 40C | | @ 105C | | | | |
| 0.10 | 0.5 | .03 | 6 | 4 | .45 | | | 35 | 18 | 0.2 | 0.2 | | | 5 | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 6Dda
SITE NO: S7
A.M.G. REFERENCE: 509 640 mE 7 813 580 mN ZONE 55

GREAT SOIL GROUP: Solodic soil
PRINCIPAL PROFILE FORM: Dd2.33
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: No microrelief
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE: 0.0 %
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Tussock grassland
DOMINANT SPECIES

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Hard setting

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .08 m | Brownish black (10YR3/2) moist; loam, fine sandy; massive; moist; very weak. |
| A2sb | .08 to .16 m | Greyish yellow-brown (10YR4/2) moist, dull yellowish orange (10YR7/2) dry, dry sporadically bleached; few fine distinct brown mottles; loam, fine sandy; massive; moist; moderately weak. |
| B2 | .16 to .38 m | Brownish black (10YR3/1) moist; common fine distinct brown mottles; light medium clay; strong 5-10mm angular blocky secondary; moist; very firm. |
| B3 | .38 to .64 m | Brownish black (10YR3/1) moist; many very coarse prominent grey mottles; light medium clay; strong 5-10mm angular blocky secondary; moist; very firm; few medium carbonate nodules, very few medium manganiferous nodules. |
| D1 | .64 to .79 m | Dull yellowish brown (10YR4/3) moist; light clay; very few small pebbles, subangular quartz; moderate 2-5mm angular blocky secondary; moderately moist; moderately firm; few medium carbonate nodules, very few medium manganiferous nodules. |
| D2 | .79 to 1.34 m | Dull yellowish brown (10YR5/4) moist; few fine distinct yellow mottles; medium clay; very few small pebbles, subangular quartz; strong 10-20mm angular blocky secondary; moderately moist; very firm; very few medium manganiferous soft segregations. |
| D3 | 1.34 to 1.75 m | Dull yellow (2.5Y6/3) moist; common fine prominent red mottles, common medium distinct yellow mottles; light clay; few small pebbles, subangular quartz; strong 5-10mm angular blocky secondary; moderately moist; very firm; very few medium manganiferous veins. |

| Depth metres | 1:5 Soil/Water pH @ 40C | EC dS/m @ 40C | Cl % @105C | Particle Size CS % @ 105C | FS | S | C | Exch. Cations CEC m.eq/100g @ 105C | Ca | Mg | Na | K | Total Elements P % @ 80C | K | S | Moistures ADM % @ 105C | 33* | 1500* | Disp.Ratio R1 @ 40C | R2 | Exch Al m.eq/100g @ 105C | Exch Acid | ECEC | pH CaCl2 @ 40C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 6.3 | .02 | .002 | 27 | 33 | 17 | 23 | 10 | 1.9 | 2.9 | 0.3 | 0.2 | .014 | .847 | .009 | 2.0 | | 6 | .74 | | | | | |
| 0.20 | 7.5 | .05 | .002 | | | | | | | | | | | | | 3.5 | | | | | | | | |
| 0.30 | 8.9 | .20 | .007 | 23 | 30 | 16 | 34 | 16 | 6.9 | 6.2 | 2.9 | 0.1 | .007 | .818 | .008 | 3.8 | | 11 | .88 | | | | | |
| 0.60 | 9.6 | .74 | .094 | 25 | 27 | 15 | 34 | 19 | 7.3 | 7.9 | 7.2 | 0.1 | .009 | 1.13 | .012 | 5.4 | | 13 | .91 | | | | | |
| 0.90 | 9.4 | .54 | .068 | 33 | 30 | 10 | 30 | 15 | 4.4 | 5.0 | 5.3 | 0.1 | .010 | 1.12 | .004 | 4.0 | | 9 | .82 | | | | | |
| 1.20 | 9.2 | .51 | .074 | 31 | 31 | 11 | 28 | 16 | 4.7 | 5.4 | 5.8 | 0.1 | .012 | 1.10 | .008 | 4.1 | | | | | | | | |
| 1.50 | 9.2 | .56 | .087 | 30 | 29 | 11 | 32 | 19 | 5.6 | 6.7 | 6.9 | 0.1 | | | | 4.9 | | | | | | | | |

| Depth metres | Org.C (W&B) % @ 105C | Tot.N % @ 105C | Extr. P Acid mg/kg @ 105C | Extr. P Bicarb. | HCl K meq% @105C | CaCl2 Extr K mg/kg @ 105C | CaCl2 Extr P | DTPA-extr. Fe mg/kg @ 105C | Mn | Cu | Zn | B | Extractable SO4S mg/kg @ 105C | NO3N | NH4N | P Buff Cap @ 40C | P Equil ug/L | Alternative Cations CEC m.eq/100g @ 105C | Ca | Mg | Na | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 0.8 | .05 | 5 | 7 | .21 | | | 73 | 53 | 0.6 | 0.3 | | | 1 | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 6Dye
SITE NO: S8
A.M.G. REFERENCE: 511 060 mE 7 812 210 mN ZONE 55

GREAT SOIL GROUP: Solodic soil
PRINCIPAL PROFILE FORM: Dy3.33
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Prior stream
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Mid-high open woodland
DOMINANT SPECIES: Eucalyptus alba, Eucalyptus tessellaris, Eucalyptus polycarpa

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Firm

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .21 m | Brown (7.5YR4/3) moist; loamy sand; massive; moist; very weak. |
| A2sb | .21 to .36 m | Dull yellowish brown (10YR5/3) moist, dull yellowish orange (10YR7/2) dry, dry sporadically bleached; loamy sand; massive; moderately moist; very weak; few medium ferromanganiferous nodules. |
| A3 | .36 to .44 m | Bright yellowish brown (10YR6/6) moist; sandy clay loam,fine sandy; very few small pebbles, subangular quartz; weak 5-10mm angular blocky secondary; moderately moist; moderately weak. |
| B21 | .44 to .73 m | Yellowish brown (10YR5/8) moist; common fine prominent red mottles, few fine distinct brown mottles; light medium clay; very few small pebbles, subangular quartz; moderate 5-10mm angular blocky secondary; moist; moderately firm. |
| B22 | .73 to .89 m | Yellowish brown (10YR5/6) moist; common medium prominent red mottles; medium clay; moderate 5-10mm angular blocky secondary, parting to weak 20-50mm lenticular tertiary; moist; very firm; very few medium manganiferous nodules. |
| B31 | .89 to 1.27 m | Dull yellowish brown (10YR5/4) moist; many medium prominent red mottles; medium clay; very few small pebbles, subangular quartz; strong 5-10mm angular blocky secondary, parting to weak 20-50mm lenticular tertiary; moderately moist; moderately strong; few medium manganiferous nodules. |
| B32 | 1.27 to 1.70 m | Dull yellowish brown (10YR5/4) moist; very few medium distinct red mottles; medium clay; strong 5-10mm angular blocky secondary, parting to strong 20-50mm columnar tertiary; dry; moderately strong; common medium manganiferous veins. |

| Depth | 1:5 Soil/Water | | | Particle Size | | | | Exch. Cations | | | | | Total Elements | | | Moistures | | | Disp.Ratio | | Exch | Exch | ECEC | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | EC | Cl | CS | FS | S | C | CEC | Ca | Mg | Na | K | P | K | S | ADM | 33* | 1500* | R1 | R2 | Al | Acid | | CaCl2 |
| metres | | dS/m | % | % | | | | m.eq/100g | | | | | % | | | % | | | | | m.eq/100g | | | |
| | | @ 40C | @105C | @ 105C | | | | @ 105C | | | | | @ 80C | | | @ 105C | | | @ 40C | | @ 105C | | | @ 40C |
| B 0.10 | 6.2 | .02 | .001 | | | | | | | | | | | | | | | | | | | | | |
| 0.10 | 5.9 | .04 | .001 | 44 | 42 | 12 | 5 | 4 | 1.2 | 0.6 | .02 | .33 | .012 | 1.76 | .007 | 1.7 | | 3 | .61 | | | | | |
| 0.20 | 6.1 | .02 | .001 | | | | | | | | | | | | | 1.4 | | | | | | | | |
| 0.30 | 6.5 | .01 | .001 | 41 | 41 | 13 | 7 | 3 | 0.9 | 0.6 | .04 | .21 | .012 | 1.86 | .004 | 1.3 | | 3 | .66 | | | | | |
| 0.60 | 6.5 | .03 | .003 | 17 | 23 | 11 | 50 | 18 | 6.2 | 4.5 | 1.0 | .29 | .012 | 1.71 | .008 | 3.1 | | 19 | .63 | | | | | |
| 0.90 | 6.6 | .08 | .012 | 13 | 33 | 14 | 41 | 16 | 6.4 | 4.6 | 1.5 | .29 | .013 | 1.84 | .008 | 2.2 | | 16 | .77 | | | | | |
| 1.20 | 8.0 | .16 | .020 | 10 | 39 | 16 | 36 | 16 | 8.4 | 5.7 | 1.9 | .31 | .010 | 1.91 | .005 | 2.5 | | | | | | | | |
| 1.50 | 8.6 | .24 | .030 | | | | | | | | | | | | | 3.3 | | | | | | | | |

| Depth | Org.C | Tot.N | Extr. P | | HCl | CaCl2 Extr | | DTPA-extr. | | | | | Extractable | | | P | | Alternative Cations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (W&B) | | Acid | Bicarb. | K | K | P | Fe | Mn | Cu | Zn | B | SO4S | NO3N | NH4N | Buff | Equil | CEC | Ca | Mg | Na | K |
| metres | % | % | mg/kg | | meq% | mg/kg | | mg/kg | | | | | mg/kg | | | Cap | ug/L | m.eq/100g | | | | |
| | @ 105C | @ 105C | @ 105C | | @105C | @ 105C | | @ 105C | | | | | @ 105C | | | @ 40C | | @ 105C | | | | |
| B 0.10 | 0.5 | .03 | 5 | 3 | .22 | | | 26 | 15 | 0.2 | 0.4 | | | | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 6Dyg2
SITE NO: S9
A.M.G. REFERENCE: 511 690 mE 7 811 950 mN ZONE 55

GREAT SOIL GROUP: Solodic soil
PRINCIPAL PROFILE FORM: Dy3.43
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: No microrelief
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Prior stream
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Mid-high open woodland
DOMINANT SPECIES: Eucalyptus polycarpa, Eucalyptus papuana, Grevillea striata

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Firm

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .14 m | Dark brown (10YR3/3) moist; sandy loam; massive; moderately moist; moderately weak. |
| A2cb | .14 to .21 m | Dull yellowish brown (10YR5/3) moist, dull yellowish orange (10YR7/2) dry; sandy loam; common small pebbles, subrounded unspecified coarse fragments; massive; moderately moist; moderately weak. |
| B21 | .21 to .39 m | Yellowish brown (2.5Y5/3) moist; few fine distinct yellow mottles; medium clay; few medium pebbles, subrounded quartz; strong 5-10mm angular blocky secondary; moist; very firm; very few medium manganiferous soft segregations. |
| B22 | .39 to .70 m | Dull yellowish brown (10YR5/4) moist; medium clay; very few small pebbles, subrounded quartz; moderate 5-10mm angular blocky secondary; moist; very firm. |
| B23 | .70 to 1.04 m | Yellowish brown (10YR5/6) moist; medium clay; moderate 5-10mm angular blocky secondary; moderately moist; moderately strong; few coarse carbonate nodules, very few medium manganiferous soft segregations. |
| D1 | 1.04 to 1.25 m | Dull yellowish brown (10YR5/3) moist; common fine distinct brown mottles; clay loam,sandy; few small pebbles, subangular quartz; weak 10-20mm angular blocky secondary; moderately moist; moderately strong; common coarse carbonate soft segregations. |
| D2 | 1.25 to 1.44 m | Brown (7.5YR4/4) moist; sandy clay loam; very few small pebbles, subangular quartz; weak 10-20mm angular blocky secondary; moderately moist; moderately strong. |
| D3 | 1.44 to 1.72 m | Brown (7.5YR4/4) moist; medium clay; strong 10-20mm angular blocky secondary; moderately moist; moderately strong; many coarse manganiferous veins. |

| Depth metres | 1:5 Soil/Water pH @ 40C | EC dS/m @ 40C | Cl % @105C | Particle Size CS % @ 105C | FS | S | C | Exch. Cations CEC m.eq/100g @ 105C | Ca | Mg | Na | K | Total Elements P % @ 80C | K | S | Moistures ADM % @ 105C | 33* | 1500* | Disp.Ratio R1 @ 40C | R2 | Exch Al m.eq/100g @ 105C | Exch Acid | ECEC | pH CaCl2 @ 40C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 5.9 | .02 | .001 | 48 | 36 | 11 | 7 | 3 | 0.6 | 0.6 | 0.1 | 0.2 | .009 | 1.39 | .007 | 0.6 | | 2 | .86 | | | | | |
| 0.20 | 6.2 | .03 | .002 | | | | | | | | | | | | | 0.6 | | | | | | | | |
| 0.30 | 7.1 | .35 | .065 | 33 | 20 | 12 | 38 | 15 | 2.2 | 5.3 | 5.7 | 0.1 | .007 | 1.28 | .012 | 3.6 | | 13 | .92 | | | | | |
| 0.60 | 9.7 | .43 | .050 | 29 | 24 | 15 | 36 | 15 | 2.7 | 4.9 | 8.6 | 0.1 | .009 | 1.56 | .016 | 4.1 | | 13 | .99 | | | | | |
| 0.90 | 9.9 | .61 | .061 | 12 | 37 | 20 | 35 | 19 | 2.8 | 6.4 | 13 | 0.2 | .016 | 1.70 | .012 | 5.3 | | 17 | .98 | | | | | |
| 1.20 | 9.7 | .58 | .079 | 12 | 39 | 24 | 28 | 19 | 2.7 | 6.5 | 14 | 0.1 | .019 | 1.76 | .007 | 5.0 | | | | | | | | |
| 1.50 | 9.1 | .52 | .087 | 19 | 25 | 26 | 33 | 20 | 2.9 | 6.9 | 14 | 0.1 | | | | 6.8 | | | | | | | | |

| Depth metres | Org.C (W&B) % @ 105C | Tot.N % @ 105C | Extr. P Acid mg/kg @ 105C | Extr. P Bicarb. | HCl K meq% @105C | CaCl2 Extr K mg/kg @ 105C | CaCl2 Extr P | DTPA-extr. Fe mg/kg @ 105C | Mn | Cu | Zn | B | Extractable SO4S mg/kg @ 105C | NO3N | NH4N | P Buff Cap @ 40C | P Equil ug/L | Alternative Cations CEC m.eq/100g @ 105C | Ca | Mg | Na | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 0.4 | .02 | 5 | 4 | .14 | | | 33 | 26 | 0.2 | 0.2 | | | 3 | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 6Dyj2
SITE NO: S10
A.M.G. REFERENCE: 510 575 mE 7 811 550 mN ZONE 55

GREAT SOIL GROUP: Solodic soil
PRINCIPAL PROFILE FORM: Db2.33
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: No microrelief
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Tussock grassland
DOMINANT SPECIES

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Firm

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .04 m | Brownish black (10YR3/2) moist; sandy loam; massive; moderately moist; moderately weak. |
| A2sb | .04 to .11 m | Greyish yellow-brown (10YR5/2) moist, dull yellowish orange (10YR7/3) dry, dry sporadically bleached; sandy loam; weak 2-5mm angular blocky secondary; moderately moist; moderately weak. |
| B2 | .11 to .27 m | Dull yellowish brown (10YR4/3) moist; common fine distinct yellow mottles; medium clay; very few small pebbles, subangular quartz; strong 2-5mm angular blocky secondary; moderately moist; moderately firm. |
| B3 | .27 to .52 m | Brown (10YR4/4) moist; light clay; very few small pebbles, subangular quartz; moderate 5-10mm angular blocky secondary; moderately moist; moderately firm; very few medium carbonate nodules. |
| D1 | .52 to .76 m | Dull yellowish brown (10YR5/4) moist; light medium clay; moderate 2-5mm angular blocky secondary; moderately moist; very firm; common coarse carbonate nodules, few medium manganiferous soft segregations. |
| D2 | .76 to 1.31 m | Dull yellowish brown (10YR5/4) moist; light clay; few small pebbles, subangular quartz; moderate 5-10mm angular blocky secondary; moderately moist; moderately strong; few medium carbonate nodules. |
| D3 | 1.31 to 1.72 m | Brown (10YR4/4) moist; coarse sandy loam; massive; moderately moist; moderately firm; very few medium carbonate soft segregations. |

| Depth metres | 1:5 Soil/Water pH @ 40C | EC dS/m @ 40C | Cl % @105C | Particle Size CS % @ 105C | FS | S | C | Exch. Cations CEC m.eq/100g @ 105C | Ca | Mg | Na | K | Total Elements P % @ 80C | K | S | Moistures ADM % @ 105C | 33* | 1500* | Disp.Ratio R1 @ 40C | R2 | Exch Al m.eq/100g @ 105C | Exch Acid | ECEC | pH CaCl2 @ 40C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 6.0 | .13 | .013 | 35 | 37 | 14 | 14 | 6 | 1.3 | 1.8 | 0.5 | 0.3 | .010 | 1.28 | .008 | 1.0 | | 4 | .77 | | | | | |
| 0.20 | 7.3 | .28 | .039 | | | | | | | | | | | | | 2.2 | | | | | | | | |
| 0.30 | 8.6 | .44 | .066 | 26 | 29 | 18 | 31 | 13 | 3.5 | 4.9 | 6.5 | 0.1 | .007 | 1.16 | .016 | 3.0 | | 10 | .93 | | | | | |
| 0.60 | 9.9 | .86 | .078 | 26 | 30 | 15 | 32 | 17 | 4.4 | 5.8 | 9.8 | 0.2 | .012 | 1.51 | .030 | 3.9 | | 15 | .97 | | | | | |
| 0.90 | 9.7 | .79 | .081 | 24 | 34 | 13 | 31 | 19 | 3.8 | 6.0 | 11 | 0.2 | .019 | 1.72 | .009 | 3.5 | | 14 | .96 | | | | | |
| 1.20 | 9.7 | .69 | .074 | 37 | 30 | 9 | 26 | 15 | 3.4 | 5.1 | 10 | 0.2 | .017 | 1.76 | .015 | 2.6 | | | | | | | | |
| 1.50 | 8.9 | .48 | .062 | 67 | 14 | 4 | 16 | 10 | 2.2 | 3.2 | 6.3 | 0.1 | | | | 1.7 | | | | | | | | |

| Depth metres | Org.C (W&B) % @ 105C | Tot.N % @ 105C | Extr. P Acid mg/kg @ 105C | Extr. P Bicarb. | HCl K meq% @105C | CaCl2 Extr K mg/kg @ 105C | CaCl2 Extr P | DTPA-extr. Fe mg/kg @ 105C | Mn | Cu | Zn | B | Extractable SO4S mg/kg @ 105C | NO3N | NH4N | P Buff Cap @ 40C | P Equil ug/L | Alternative Cations CEC m.eq/100g @ 105C | Ca | Mg | Na | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.10 | 0.5 | .04 | 6 | 7 | .26 | | | 44 | 43 | 0.4 | 0.3 | | | 13 | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

SOIL TYPE: 6Dyj
SITE NO: S11
A.M.G. REFERENCE: 510 090 mE 7 812 200 mN ZONE 55

GREAT SOIL GROUP: Solodic soil
PRINCIPAL PROFILE FORM: Db1.33
SOIL TAXONOMY UNIT:
FAO UNESCO UNIT:

TYPE OF MICRORELIEF: No microrelief
SURFACE COARSE FRAGMENTS: No coarse fragments

SUBSTRATE MATERIAL:
CONFIDENCE SUBSTRATE IS PARENT MATERIAL:

SLOPE:
LANDFORM ELEMENT TYPE: Plain
LANDFORM PATTERN TYPE:

VEGETATION
STRUCTURAL FORM: Tussock grassland
DOMINANT SPECIES

ANNUAL RAINFALL:

PROFILE MORPHOLOGY:

CONDITION OF SURFACE SOIL WHEN DRY: Hard setting

| HORIZON | DEPTH | DESCRIPTION |
|---|---|---|
| A1 | 0 to .07 m | Dark brown (10YR3/3) moist, greyish yellow-brown (10YR6/2) dry; few fine distinct brown mottles; sandy clay loam,fine sandy; massive; dry; moderately firm. |
| A2sb | .07 to .14 m | Dark brown (10YR3/3) moist, dull yellowish orange (10YR7/2) dry, dry sporadically bleached; very few fine distinct brown mottles; sandy clay loam,fine sandy; massive; dry; moderately firm. |
| B21 | .14 to .31 m | Brown (10YR4/4) moist; fine sandy clay; strong 10-20mm angular blocky secondary; moderately moist; moderately strong. |
| B22 | .31 to .44 m | Dull yellowish brown (10YR5/4) moist; fine sandy clay; moderate 5-10mm angular blocky secondary; moderately moist; very firm; very few medium carbonate nodules. |
| B23 | .44 to .82 m | Dull yellowish brown (10YR5/4) moist; very few fine faint red mottles; fine sandy clay; weak 10-20mm angular blocky secondary; moderately moist; very firm; common medium carbonate nodules. |
| D1 | .82 to 1.08 m | Yellowish brown (10YR5/6) moist; common fine distinct brown mottles; clay loam,fine sandy; weak 10-20mm angular blocky secondary; dry; moderately strong; few medium carbonate nodules, few medium manganiferous veins. |
| D2 | 1.08 to 1.72 m | Dull yellowish brown (10YR5/4) moist; few fine distinct brown mottles; sandy clay loam,fine sandy; weak 10-20mm angular blocky secondary; dry; moderately strong; many coarse manganiferous veins, few medium carbonate nodules. |

| Depth | 1:5 Soil/Water | | | Particle Size | | | | Exch. Cations | | | | | Total Elements | | | Moistures | | | Disp.Ratio | | Exch | Exch | ECEC | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | EC | Cl | CS | FS | S | C | CEC | Ca | Mg | Na | K | P | K | S | ADM | 33* | 1500* | R1 | R2 | Al | Acid | | CaCl2 |
| metres | | dS/m | % | % | | | | m.eq/100g | | | | | % | | | % | | | | | m.eq/100g | | | |
| | @ 40C | | @105C | @ 105C | | | | @ 105C | | | | | @ 80C | | | @ 105C | | | @ 40C | | @ 105C | | | @ 40C |
| 0.10 | 6.3 | .03 | .003 | 16 | 49 | 13 | 27 | 12 | 2.7 | 2.6 | 0.4 | 0.3 | .026 | 1.24 | .011 | 1.8 | | 7 | .85 | | | | | |
| 0.20 | 9.1 | .38 | .024 | | | | | | | | | | | | | 4.3 | | | | | | | | |
| 0.30 | 9.5 | .53 | .055 | 15 | 35 | 11 | 43 | 18 | 7.9 | 6.0 | 6.0 | 0.1 | .012 | 1.08 | .011 | 4.1 | | 12 | .98 | | | | | |
| 0.60 | 9.7 | .86 | .093 | 12 | 44 | 9 | 38 | 18 | 5.1 | 4.9 | 8.7 | 0.1 | .010 | 1.32 | .013 | 3.7 | | 13 | .97 | | | | | |
| 0.90 | 9.7 | .81 | .100 | 9 | 53 | 11 | 31 | 17 | 4.4 | 4.3 | 9.4 | 0.1 | .016 | 1.61 | .026 | 3.2 | | 12 | .96 | | | | | |
| 1.20 | 9.7 | .58 | .085 | 21 | 46 | 8 | 27 | 14 | 3.7 | 3.8 | 8.6 | 0.1 | .014 | 1.68 | .003 | 3.1 | | | | | | | | |
| 1.50 | 8.5 | .79 | .116 | | | | | 22 | 5.3 | 5.5 | 14 | 0.2 | .017 | 1.82 | .003 | 4.0 | | | | | | | | |

| Depth | Org.C | Tot.N | Extr. P | | HCl | CaCl2 Extr | | DTPA-extr. | | | | | Extractable | | | P | | Alternative Cations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (W&B) | | Acid | Bicarb. | K | K | P | Fe | Mn | Cu | Zn | B | SO4S | NO3N | NH4N | Buff Cap | Equil | CEC | Ca | Mg | Na | K |
| metres | % | % | mg/kg | | meq% | mg/kg | | mg/kg | | | | | mg/kg | | | | ug/L | m.eq/100g | | | | |
| | @ 105C | @ 105C | @ 105C | | @105C | @ 105C | | @ 105C | | | | | @ 105C | | | @ 40C | | @ 105C | | | | |
| 0.10 | 0.9 | .07 | 9 | 8 | .24 | | | 68 | 57 | 0.6 | 0.3 | | | 3 | | | | | | | | |

* -33kPa (-0.33bar) and -1500kPa (-15 bar) using pressure plate apparatus.

## APPENDIX III
## IRRIGATED LAND SUITABILITY CLASSES, BURDEKIN RIVER IRRIGATION AREA

Five land suitability classes have been defined for use in Queensland, with land suitability decreasing progressively from Class 1 to Class 5. Land is classified on the basis of a specified land use which allows optimum production with minimal degradation to the land resource in the long-term.

Class 1 **Suitable land with negligible limitations.** This is highly productive land requiring only simple management practices to maintain economic production.

Class 2 **Suitable land with minor limitations** which either reduce production or require more than the simple management practices* of class 1 land to maintain economic production.

Class 3 **Suitable land with moderate limitations** which either further lower production or require more than those management practices of class 2 land to maintain economic production.

Class 4 **Marginal land which is presently considered unsuitable due to severe limitations.** The long term significance of these limitations on the proposed land use is unknown. The use of this land is dependent upon undertaking additional studies to determine whether the effects of the limitation(s) can be reduced to achieve sustained economic production.

Class 5 **Unsuitable land with extreme limitations** that preclude its use.

Land is considered less suitable as the severity of limitations for a land use increase, reflecting either (a) reduced potential for production, and/or (b) increased inputs to achieve an acceptable level of production and/or (c) increased inputs required to prevent land degradation. The first three classes are considered suitable for the specified land use as the benefits from using the land for that land use in the long term should outweigh the inputs required to initiate and maintain production. Decreasing land suitability within a region often reflects the need for increased inputs rather than decreased potential production.

Class 4 is considered presently unsuitable or is used for marginal land where it is doubtful that the inputs required to achieve and maintain production outweigh the benefits in the long term. Additional studies are needed to determine whether the effect of the limitation(s) can be reduced to achieve sustained production.

Class 5 is considered unsuitable having limitations that in aggregate are so severe that the benefits would not justify the inputs required to initiate and maintain production in the long term. It would require a major change in economics, technology or management expertise before the land could be considered suitable for that land use. Some class 5 lands however, such as escarpments, will always remain unsuitable for agriculture.

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* Where more than simple management practices are required, this may involve changes in land preparation, irrigation management, the addition of soil ameliorants and the use of additional measures to prevent land degradation.

## APPENDIX IV
## LAND SUITABILITY CLASSIFICATION FOR FURROW IRRIGATION OF SUGAR-CANE, GRAIN CROPS AND SMALL CROPS, BURDEKIN RIVER IRRIGATION AREA.

| Limiting factor | Assumptions/ comments | Degree of limitation in terms of soil/land attributes | Subclass for various crop groups |
|---|---|---|---|
| **PRODUCTIVITY FACTORS** | | | |
| Nutrients - n | All soils will require some fertiliser input. N assumed to be always low. Minor elements can be added at low cost. S may be required in the future if P not supplied as superphosphate. Soil test interpretations are those of Bruce and Rayment (1982). | P alone very low. | All crops<br>n2 |
| | | P and K very low or 2 to 3 times higher P plus Zn required following exposure of high pH (> 7.5 at 0.2 - 0.3 m) subsoils. | n3 |
| Salinity - sa | Based on the relative salt tolerance of a range of plants expressed in terms of yield reduction (Shaw 1986). Subclass limits taken as 10 to 25% yield reduction for subclass 2; 25 to 50% for subclass 3 and > 50% for subclass 4. | (see below) | (see below) |

| | Field/Grain crops | | | | Sugar-cane | Small crops | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Moderately tolerant | Tolerant | | Very tolerant | Moderately tolerant | Moderately sensitive | Moderately tolerant | | | Tolerant |
| | Maize<br>Kenaf* | Soybeans<br>Sunflower<br>Legume Seeds* | Sorghum | Cotton | | Beans | Tomatoe<br>Capsicum*<br>Eggfruit* | Cucumber<br>Pumpkin* | Rockmelon | Squash<br>Zucchini |
| ECse(dSm$^{-1}$) | Weighted profile mean to 0.9 m | | | | | Weighted profile mean to 0.6 m | | | | |
| 1.5 - 2.5 | | | | | | sa2 | | | | |
| 2.6 - 3.5 | sa2 | | | | | sa3 | sa2 | | | |
| 3.6 - 4.5 | sa3 | | | | sa2 | sa4 | sa3 | sa2 | sa2 | |
| 4.6 - 5.5 | sa3 | | | | sa2 | ↓ | sa3 | sa3 | sa2 | |
| 5.6 - 6.5 | sa3 | sa2 | | | sa2 | | sa4 | sa3 | sa3 | sa2 |
| 6.6 - 7.5 | sa4 | sa3 | | | sa3 | | ↓ | sa4 | sa3 | sa2 |
| 7.6 - 9.0 | ↓ | sa4 | sa2 | | sa3 | | | ↓ | sa3 | sa3 |
| 9.1 - 10.0 | | ↓ | sa3 | | sa3 | | | | sa4 | sa3 |
| 10.1 - 12.5 | | | sa4 | | sa4 | | | | ↓ | sa4 |
| 12.6 - 17.0 | | | ↓ | sa2 | ↓ | | | | | ↓ |
| > 17.0 | | | | sa3 | | | | | | |
| | | | | sa4 | | | | | | |

* Salt tolerance limits specific to these crops not available.
Legume seeds include mungbean, chickpea, pidgeon pea and dolichos.

APPENDIX IV (CONT.)

| Limiting factor | Assumptions/ comments | Degree of limitation in terms of soil/land attributes: ESP | or | Field pH: Clay soils | Field pH: Sodic duplex soils | Subclass for various crop groups: Field/Grain crops: Sorghum, Cotton Legume seeds** | Field/Grain crops: Maize, Sunflower, Kenaf, Soybean | Sugar-cane | Small crops: Tomato | Small crops: Eggfruit Capsicum Beans** | Small crops: Cucurbits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sodicity - so | Assessed on 0.2 to 0.3 m depth. ESP related to pH only for sodic duplex and cracking clay soils (Baker et al. 1983). | | | | | | | | | | |
| | Sodicity classes as per Northcote and Skene (1972) and Landon (1984). | < 6 | | < 8.0 | < 6.5 | | so2 | | | so3 | so2 |
| | Subclass limits taken as 10 to 25% yield reduction for subclass 2; 25 to | 6 - 14 | | 8.0 - 9.5 | 6.5 - 8.0 | so2 | so3 | so2 | so2 | so4 ↓ | so3 |
| | 50% for subclass 3 and > 50% for subclass 4. Subclasses so2 and so3 | 14.1 - 25 | | > 9.5 | 8.1 - 8.5 | so3 | so4 ↓ | so3 | so3 | | so4 ↓ |
| | not differentiated for less tolerant crops. | > 25 | | | > 8.5 | so4 | | so4 | so4 | | |

** Sodium tolerance limits unavailable for beans and legume seeds.

**WATER MANAGEMENT FACTORS (Govern water distribution efficiency and trafficability)**

| Limiting factor | Assumptions/ comments | Effective soil depth (m) (depth to rock or salt bulge) | and/or | PAWC (mm) | All crops |
|---|---|---|---|---|---|
| Water availability - m | PAWC* based on measured or predicted values for major soils (Gardner and Coughlan, 1982). All cracking clays known to have PAWC > 100 mm. | 0.7 - 1.0 | | 75 - 100 mm<br>Non cracking clays; non sodic and weakly sodic duplex soils with medium textured** A horizons < 0.5 m deep; gradational and uniform medium textured soils. | m2 |
| | PAWC subclass limits relate to irrigation frequency as follows: | 0.45 - 0.6 | | 50 - 75 mm<br>Sodic duplex soils; duplex soils with coarse textured sandy loam or coarser A horizons deeper than 0.5 m. | m3 |
| | 75 - 100 mm = 8 - 10 days,<br>50 - 75 mm = 5 - 8 days,<br>< 50 mm = < 5 days | < 0.45 | | < 50 mm<br>Uniform sands. | m4 |

* PAWC = Plant Available Water Capacity
** Texture terms are as defined in Northcote (1979).

APPENDIX IV (CONT.)

| Limiting factor | Assumptions/ comments | Degree of limitation in terms of soil/land attributes | | | Subclass for various crop groups |
|---|---|---|---|---|---|
| Permeability- p | Refers to the permeability of the upper root zone of the soil profile. Affects trafficability and irrigation efficiency and also considers tolerance of crops to short periods of water-logging. | (a) Soils with texture of sands or sandy loams to depths of: | or | All duplex soils with A horizons finer than sandy loam with dry very firm or stronger B horizons at depths of: | All crops |
| | | 0.3 - 0.5 m | | 0.2 - 0.4 m | p2 |
| | | 0.6 - 0.9 m | | < 0.2 m | p3 |
| | | > 0.9 m | | | p4 |

| | Maize, Cotton, Kenaf Sunflower, Legume seeds | Soybean, Sugar-cane, Sorghum | Cucurbits, Tomato Capsicum, Eggfruit | Beans |
|---|---|---|---|---|
| (b) Black earths and clays (Uf and Ug profiles) with A horizon textures of light medium clay and lighter and without mottling and/or bleaching (Northcote 1979). | p2 | p2 | p3 | p4 |
| A horizon textures of medium to heavy clay and/or A horizons that are mottled and/or bleached. | p3 | p2 | p4 | p4 |

| Limiting factor | Assumptions/ comments | Degree of limitation in terms of soil/land attributes | Subclass for various crop groups |
|---|---|---|---|
| Soil complexity - pd | Refers to (i) a complex UMA where no component soil exceeds 70% of the area and (ii) any UMA less than 250 m width for grain crops and sugar cane and 100 m for small crops and a surrounding or adjacent UMA, depending on slope magnitude and direction. Based on a minimum irrigation run length of 250 m for sugar cane and grain crops and 100 m for small crops. * Depth difference determined by multiplication. ** Texture groups as defined by Northcote (1979). | B horizon permeability between soils similar: | All crops |

| A horizon features: Depth | Texture differences | | Depth difference factor | All crops |
|---|---|---|---|---|
| depth of A of both soils < 0.2 m | 1.5 - 2.0 texture** groups | | | pd2 |
| depth of A of one soil > 0.2 m | 1.5 - 2.0 texture groups | or | 1.5 - 2.0 | pd3 |
| depth of A of one soil > 0.2 m | > 2.0 texture groups | and/or | > 2.0 | pd4 |

B horizon permeability markedly different between soils: pd4

APPENDIX IV (CONT.)

| Limiting factor | Assumptions/ comments | Degree of limitation in terms of soil/land attributes | Subclass for various crop groups |
|---|---|---|---|
| | | | All crops |
| Internal Drainage - id | Considers drainage of the whole profile and the affects on crop growth and also losses to groundwater. Terms used are those of (McDonald et al. 1984).<br><br>Soils considered as well drained include 6Dra, 6Drb, 6Gnd and 6Uma. | Moderately well to imperfectly drained soils:<br>clay soils, some non-sodic and weakly sodic duplex soils eg., 6Dyd, 6Drc. | id2 |
| | | Imperfectly to poorly drained soils: sodic duplex soils and better drained soils underlain by pans or prone to the development of high non-saline water tables due to their position in the landscape and in relation to adjacent soils eg. 5Dyb. | id3 |
| | | Well drained soils acting as intake areas: red and yellow non-sodic duplex soils eg. 5Dra, 5Dya. Usually higher in the landscape, drainage losses may cause secondary salinisation downslope. Special irrigation management and design required eg. use of overhead sprinklers or modified furrow irrigation techniques. | id4 |
| | | Very poorly or rapidly drained soils: gleyed duplex or coarse textured soils eg. 4Dga or 6Ucc respectively. Irrigation technique restricted to trickle and drip methods. | id5 |

LAND SURFACE MANAGEMENT FACTORS

| Limiting factor | Assumptions/ comments | % Rock Outcrop (outcrop and boulders > 600 mm). | and/or | % Pebble, cobble and stone on surface or within the upper 0.45 m.<br>6 - 60 mm | or 60 - 600 mm | All crops with outcrop, cobble or stone on surface only. | Soybeans, Sugar-cane and Beans where stone and/or cobble within upper 0.45 m. |
|---|---|---|---|---|---|---|---|
| Rockiness - r | Based on field observation and influence on machinery use (FAO, 1983) and moisture availability.<br><br>Sizes relate to the class intervals in McDonald et al. (1984). Soybeans, sugar-cane and beans need to be harvested closer to the soil surface than in the case of other crops.<br><br>This incidence of rock and stone is considered more limiting when it occurs within the upper 0.45 m as repeated stone picking may be required. | | | 2 - 10 | < 2 | | r2 |
| | | < 2 | | 10 - 20 | 2 - 10 | r2 | r3 |
| | | 2 - 10 | | 20 - 50 | 10 - 20 | r3 | r4 |
| | | 10 - 20 | | > 50 | 20 - 50 | r4 | r5 |
| | | > 20 | | | > 50 | r5 | |

APPENDIX IV (CONT.)

| Limiting factor | Assumptions/ comments | Degree of limitation in terms of soil/land attributes | Subclass for various crop groups | | |
|---|---|---|---|---|---|
| | | | All crops <u>except Sugar-Cane</u> | Land slope % | Sugar-cane |
| Slope - t | Slope limits should be used as a guide only as there have been very few studies on the influence of furrow flow velocity and furrow slopes and lengths currently in use to gauge erosion losses, furrow overtopping and wetting up times for various soils. | (a) Sodic Duplex Soils<br>Land slope % | | | |
| | | 0.2 - 0.5 | t2 | 0.2 - 0.5 | t2 |
| | Suggested furrow slopes for sodic duplex soils in order of preference are:<br>0.1 to 0.2, 0.06 to 0.1 or 0.2 to 0.3; 0.3 to 0.5%. | 0.06 -0.1 or<br>0.6 - 1.0 | t3 | 0.06 - 0.1 or<br>0.6 - 2.0 | t3 |
| | | < 0.06 or<br>1.1 - 2.0 | t4 | < 0.06 or<br>2.1 - 4.0 | t4 |
| | Suggested furrow slopes for other soils in order of preference are:<br>0.1 to 0.25, 0.06 to 0.1 or 0.25 to 0.5; 0.5 to 1.0%. | 2.1 - 4.0 | t5 | > 4.0 | t5 |
| | Furrow irrigation not recommended on slopes > 0.5% in the direction of irrigation for sodic duplex soils and 1% for other soils. | (b) Other Soils<br>Land slope % | | Land slope % | |
| | | 0.25 -0.5 | t2 | 0.25 - 0.5 | t2 |
| | | 0.06 -0.1 or<br>0.5 - 2.0 | t3 | 0.06 - 0.1 or<br>0.6 - 4.0 | t3 |
| | | < 0.06 or<br>2.1 - 4.0 | t4 | < 0.06 or<br>> 4.0 | t4 |
| | | > 4.0% | t5 | | |
| Microrelief - g | Gilgai vertical and horizontal interval related to the amount of levelling required. | (a) Cracking clay soils and sodic duplex soils with gilgai e.g. 2Dyc. | All crops | | |
| | | Normal gilgai - vertical interval 0.1 to 0.3 m, area of mound > depression or area of mound and shelf > depression. or<br>Linear gilgai | g2 | | |
| | | Normal gilgai vertical-interval 0.3 to 0.6 m or 0.1 to 0.3 m if area of mound < depression. | g3 | | |
| | | (b) Sodic duplex soils. | All crops | | |
| | | Vertical interval 0.05 - 0.1 m, A horizon depth < 0.15 m. | g3 | | |
| | Elongated mounds and depressions due to overbank flooding and deposition and other microrelief eg. debil debil. | (c) All soils | | | |
| | | Vertical interval 0.1 - 0.3 m | g2 | | |
| | | 0.4 - 0.6 m | g3 | | |
| | | > 0.6 m | g4 | | |

APPENDIX IV (CONT.)

| Limiting factor | Assumptions/ comments | Degree of limitation in terms of soil/land attributes | | | | | | | | | Subclass for various crop groups |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Surface condition - ps | Applies to soils with properties known to influence seed bed preparation and plant establishment eg. depth to hard, slowly permeable sodic B horizon, surface consistence and potential to surface seal due to particle size distribution. | (a) Cracking clay soils<br>Percentage of dry aggregates of surface horizon > 5 mm in diameter: | | | | | | | | | All crops except Sugar-Cane |
| | | 24 - 45% | | | | | | | | | ps2 |
| | | > 45% | | | | | | | | | ps3 |
| | Cracking clay properties based on Coughlan and Loch (1984), and Gardner and Coughlan (1982). | (b) Other Soils<br>Depth to slowly permeable sodic B horizon | And/or | Condition of surface soil when dry | And/or | Texture* of surface horizon | And/or | Grade of pedality | And/or | Consistence of surface soil when dry | |
| | Adaptation of various crops not accounted for, although it is recognised that some crops may be more difficult to establish e.g. soybeans, or have specific seed bed requirements. | 0.21 - 0.4 m | | Firm or hardsetting | | Sandy loams to clays | | Moderate or strong pedality | | Moderately firm to very firm (3-4) | ps2 |
| | | 0.1 - 0.2 m | | Hardsetting | | Sandy loams to clays | | Massive or weak pedality | | Moderately firm to very firm (3-4) | ps3 |
| | * Textures as defined by Northcote (1979). Other terminology for surface properties are as defined by McDonald et al. (1984). | < 0.1 m | | Hardsetting | | Sandy clay loams to clay loams | | Massive or weak pedality | | Moderately strong to very strong (5-6) | ps4 |
| Wetness - w | | Areas remaining wet for several months, water remains on the surface for long periods and requires filling, special drainage or reclamation eg. small closed depressions. | | | | | | | | | All crops<br>w3 |
| | | Areas which are wet for most of the year or pond water for considerable periods and require major drainage and reclamation works eg. swamps. | | | | | | | | | w4 |

APPENDIX IV (CONT.)

| Limiting factor | Assumptions/ comments | Degree of limitation in terms of soil/land attributes | | | Subclass for various crop groups |
|---|---|---|---|---|---|
| **DEGRADATION FACTORS** | | | | | |
| Erosion - e | Refers to slope limits on cleared fallow land or land irrigated during the wet season in terms of erosion risk only. Slope limits require substantiating with either measured or calculated soil losses for the soils of the area. **Note that any UMA with an eroded soil phase (E) is class 5.** | (a) | Sodic duplex soils Land slope % | | All crops |
| | | | 0.5 - 1.0 | Shorter furrow lengths required and simple conservation practices eg. use of cover crops, contour cultivation. | e2 |
| | | | 1.1 - 2.0 | Shorter furrow lengths required and simple conservation practices as above as well as graded banks to reduce slope length. | e3 |
| | | | > 2.0 | Not recommended for furrow irrigated crops. | e4 |
| | | | | Gully or stream bank erosion severe. | e5 |
| | | (b) | Other soils Land slope % | | |
| | | | 1.0 - 2.0 | Shorter furrow lengths required and simple conservation practices e.g. use of cover crops, contour cultivation. | e2 |
| | | | 2.1 - 4.0 | Shorter furrow lengths required and simple conservation practices as above as well as graded banks to reduce slope length. | e3 |
| | | | > 4.0 | Not recommended for furrow irrigated crops. | e4 |
| | | | | Gully or stream bank erosion severe. | e5 |
| Outflow potential - ss | | Areas susceptible to the development of saline seeps, usually located downslope of permeable soils and confined by either dykes or soils of heavy texture and very low hydraulic conductivity. | | | All crops ss4 |

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**APPENDIX V LAND SUITABILITY CLASSIFICATION FOR FLOOD IRRIGATION OF RICE, BURDEKIN RIVER IRRIGATION AREA.**

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | | | | Subclass |
|---|---|---|---|---|---|---|
| **PRODUCTIVITY FACTORS** | | | | | | |
| Nutrients - n | N always low and applications of 180 kg N/ha for winter crops and 140 kg N/ha for summer crops required | P very low (Bruce and Rayment 1982) and applications of 5 to 10 kg/ha required. | | | | n2 |
| | | Applications of Zn as well as higher applications of P than above (up to 30 kg/ha) required when subsoils exposed after levelling have a pH greater than 7.5. | | | | n3 |
| Salinity - sa | Subclass limits taken as 10 to 25% yield reduction for subclass 2; 25 to 50% for subclass 3 and > 50% for subclass 4 (Shaw et al 1986). | ECse ($dSm^{-1}$) Weighted profile mean to 0.6 m | | | | |
| | | 4.0 -5.0 | | | | sa2 |
| | | 5.1 -7.0 | | | | sa3 |
| | | > 7.0 | | | | sa4 |
| | | **and/or** | | | | |
| | EC 1:5 > 0.6 $dSm^{-1}$ in 0 - 0.2 m depth zone regarded as toxic for rice seedlings. Subclass limits taken as ECse ($dSm^{-1}$) values with the corresponding range of clay percentages. | ECse ($dSm^{-1}$) (0 - 0.2 m) | | | | |
| | | > 7<br>(20 - 40%) | > 4.9<br>(40 - 60%) | > 2.8<br>(60 - 80%) | Clay | sa4 |
| Sodicity - so | Assessed on 0.2 to 0.3 m depth. ESP related to pH only for sodic duplex and cracking clay soils (Baker et al. 1983).<br><br>Sodicity classes as per Northcote and Skene (1972) and Landon (1984). | ESP | **or** | Field pH: Clay soils | Field pH: Sodic duplex soils | |
| | | 6 - 14 | | 8.0 - 9.5 | 6.5 - 8.0 | so2 |
| | | 14.1 - 25 | | > 9.5 | 8.1 - 8.5 | so3 |
| | | >25 | | | > 8.5 | so4 |

**APPENDIX V** (CONT.)

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | Subclass |
|---|---|---|---|
| **WATER MANAGEMENT FACTORS** | | | |
| Deep drainage - dd | Duplex soils with A horizons of < 0.2 m, moderately strong upper B horizons, textures in the clay range from the base of the A horizon to 1.5 m with alkaline soil reaction trends and with ESP > 14 are considered the least permeable. | Clay soils (Ug and Uf profiles) with clay textures extending to 1.5 m, neutral or alkaline soil reaction trend and/or ESP > 14 within the profile. | dd2 |
| | | Duplex soils with A horizons of 0.2 to 0.4 m, moderately strong upper B horizons, textures in the clay range from the base of the A horizon to 1.5 m, alkaline soil reaction trend and ESP > 14 within the profile. | dd3 |
| | | As for dd3 but upper B horizons not moderately strong or all soils with alkaline soil reaction trend and textures coarser than sandy clay between 0.4 and 1.5 m. | dd4 |
| | | All gradational, uniform (excluding Ug and Uf soils) and other duplex soils with acid and neutral soil reaction trends or an alkaline soil reaction trend with ESP < 14 throughout or A horizons > 0.4 m. | |
| | | **or** | |
| | | Land with rock outcrop and/or soils with stone or cobble in the profile and/or BC or C horizon before 1.5 m. | dd5 |

APPENDIX V (CONT.)

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | Subclass |
|---|---|---|---|
| Soil complexity - pd | Affects water use efficiency and applies only to (i) a complex UMA where no component soil exceeds 70% of the area; | Adjacent UMA's and soil types within a complex UMA are suitable and within subclass 2 for all limiting factors. | pd2 |
| | (ii) a UMA less than < 10 ha with a minimum width of 250 m and adjacent UMA's*; (iii) the characteristics of individual soil profiles within a simple UMA | As above but with subclasses of 3 for one or more limiting factors **or** Any suitable UMA < 10 ha and any one adjacent UMA is suitable. | pd3 |
| | * Acceptable minimum size of a rice field is 10 ha with a minimum width of 250 m. If a small UMA (below these criteria) is unsuitable due to other limiting factors, a pd rating is not provided. | Any suitable UMA < 10 ha and the surrounding UMA is unsuitable **or** Any suitable UMA which contains some soil profiles with a dd rating of 4 or 5. | pd4 |

**LAND SURFACE MANAGEMENT FACTORS**

| Limiting factor | Assumptions/comments | Cover % of stone and cobble 60 - 600 mm | **and/or** | Cover % of pebble on surface 6 - 60 mm | Subclass |
|---|---|---|---|---|---|
| Rockiness - r | Based on field observation and influence on machinery use (FAO 1983). Sizes relate to the class intervals in McDonald et al. (1984). | | | | |
| | | 2 - 10 | | 10 - 20 | r2 |
| | | 10 - 20 | | 20 - 50 | r3 |
| | | 20 - 50 | | >50 | r4 |
| | | >50 | | | r5 |

**APPENDIX V** (CONT.)

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | Subclass |
|---|---|---|---|
| Slope - t | The upper slope limit is based on a ponding depth range of 0.05 to 0.2 m with a minimum bay width of 30 m requiring only minor levelling. Slopes of 0.05 to 0.1% regarded as optimum. Major levelling required on land with slopes between 0.5 and 0.75%. Land with a slope <0.03% is considered too flat for flushing of bays. | Land slope % | |
| | | 0.1 - 0.25 | t2 |
| | | 0.03 - 0.05 or 0.26 - 0.5 | t3 |
| | | 0.51 - 0.75 or < 0.03 | t4 |
| | | > 0.75 | t5 |
| Microrelief - g | Gilgai vertical and horizontal interval related to the amount of levelling required. | (a) Cracking clay soils and sodic duplex soils with gilgai e.g. 2Dyc | |
| | | Normal gilgai - vertical interval 0.1 to 0.3 m, area of mound > depression or area of mound and shelf > depression. **or** Linear gilgai | g2 |
| | | Normal gilgai - vertical interval 0.3 to 0.6 m or 0.1 to 0.3 m if area of mound < depression | g3 |
| | | (b) Sodic duplex soils | |
| | | Vertical interval 0.05 to 0.1 m, A horizon depth < 0.15 m. | g3 |
| | Elongated mounds and depressions due to overbank flooding and deposition and other microrelief eg. debil debil. | (c) All soils | |
| | | Vertical interval 0.1 - 0.3 m | g2 |
| | | 0.4 - 0.6 m | g3 |
| | | > 0.6 m | g4 |

**APPENDIX V** (CONT.)

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | Subclass |
|---|---|---|---|
| **DEGRADATION FACTORS** | | | |
| Erosion - e | **Note that any UMA with an eroded soil phase (E) is class 5.** | Gully and streambank erosion severe. | e5 |
| Outflow potential - ss | | Areas susceptible to the development of saline seeps, usually located downslope of permeable soils and confined by either dykes or soils of heavy texture and very low hydraulic conductivity. | ss4 |

**Note that any UMA with a wet soil phase (W) is class 4.**

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**APPENDIX VI**
**LAND SUITABILITY CLASSIFICATION FOR LOW VOLUME IRRIGATION OF MANGOES AND AVOCADOES, BURDEKIN RIVER IRRIGATION AREA.**

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | Subclass | |
|---|---|---|---|---|

**PRODUCTIVITY FACTORS**

| Limiting factor | Assumptions/comments | ECse ($dSm^{-1}$) Weighted profile mean to 1.2 m | Mangoes | Avocadoes |
|---|---|---|---|---|
| Salinity - sa | Subclass limits taken as 10 to 25% yield reduction for subclass 2, 25 to 50% for subclass 3 and > 50% for subclass 4. Subclass limits for mangoes and avocados from Shaw et al. (1986). | 1.0 - 1.2 | sa2 | |
| | | 1.3 - 1.7 | sa3 | |
| | | 1.8 - 2.5 | sa4 | sa2 |
| | | 2.6 - 3.7 | | sa3 |
| | | > 3.7 | | sa4 |

| Limiting factor | Assumptions/comments | ESP | or Field pH: Clay soils | Field pH: Sodic duplex soils | Both crops |
|---|---|---|---|---|---|
| Sodicity - so | ESP levels refer to <u>any depth in the profile</u> - ESP related to pH only for sodic duplex soils and cracking clays (Baker et al. 1983). Sodicity classes as per Northcote and Skene (1972) and Landon (1984). | < 6 | < 8.0 | | so2 |
| | | 6 - 14 | 8.0 - 9.5 | 6.5 - 8.0 | so3 |
| | | > 14 | > 9.5 | > 8.0 | so4 |

| Limiting factor | Assumptions/comments | Effective soil depth (depth to decomposing rock, pan or salt bulge). | Mangoes | Avocadoes |
|---|---|---|---|---|
| Soil depth - d | Assessed on depth of soil for root proliferation and anchorage. Derived from Hackett and Carolane (1982), Nel (1983) and Capelin (1987). | 1.51 - 2.0 m | | d2 |
| | | 1.1 - 1.5 m | | d3 |
| | | 0.61 - 1.0 m | d2 | d4 |
| | | 0.45 - 0.6 m | d3 | |
| | | < 0.45 m | d4 | |

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | Subclass | |
|---|---|---|---|---|
| | | | Mangoes | Avocadoes |
| Internal drainage - id | Duplex soils with red to red-brown B horizons and acid to neutral soil reaction trends are considered the most suitable eg. 5Dra, 6Dra. | Rapidly drained soils: | | |
| | | Uniform coarse textured soils with no pan or seasonal water table by 1.5 m. | id2 | id2 |
| | | Well to moderately well drained soils: | | |
| | | (i) uniform medium, gradational and duplex soils with brown to yellow-brown B horizons with acid to neutral soil reaction trends and ESP < 14 throughout eg. 6Dyd, 6Gnd, 5Dya. | id2 | id3 |
| | | (ii) duplex soils with alkaline soil reaction trend with red to red-brown or brown to yellow-brown B horizons with less than 2% calcareous segregations above 0.75m and ESP < 14 throughout eg. 6Dyf, 6Drc. | id3 | id4 |
| | | Imperfectly to poorly drained soils: | | |
| | | Clay soils and other sodic duplex soils together with better drained soils prone to the development of high non-saline water tables due to their position in the landscape in relation to adjacent soils eg. 5Dyb. | id4 | id5 |
| | | Very poorly drained soils: | | |
| | | Gleyed duplex soils eg. 4Dga and rapidly drained soils with a pan or seasonal water table above 1.5 m. | id5 | id5 |

**LAND SURFACE MANAGEMENT FACTORS**

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | | Subclass |
|---|---|---|---|---|
| Rockiness - r | Based on field observation and influence on machinery use (FAO 1983). Sizes relate to the class intervals in McDonald et al. (1984). | % Rock outcrop or boulders (> 600 mm) and/or cobble and stone (60-600 mm) on surface or within profile. | | Both crops |
| | | Outcrop or boulders > 600 mm | Cobble and stone 60 - 600 mm | |
| | | 2 - 10 | 10 - 20 | r2 |
| | | 10 - 20 | 20 - 50 | r3 |
| | | 20 - 50 | 50 - 90 | r4 |
| | | > 50 | > 90 | r5 |

**APPENDIX VI** (CONT.)

| Limiting factor | Assumptions/comments | Degree of limitation in terms of soil/land attributes | Subclass | |
|---|---|---|---|---|
| Wetness - w | | Areas with slopes of: | Mangoes | Avocadoes |
| | | > 2% | | w2 |
| | | 1.1 - 2% | w2 | w3 |
| | | 0.6 - 1% | w2 | w4 |
| | | 0.1 - 0.5% | w3 | w4 |
| | | Areas with water remaining on the surface for several weeks and may require successive levelling eg. gilgaied cracking clays. | w4 | w5 |
| | | Areas < 0.1% slope and/or areas remaining wet for several months which require major drainage and reclamation works eg. closed depressions and swamps. | w5 | w5 |
| <u>**DEGRADATION FACTORS**</u> | | | | |
| | | | Both crops | |
| Erosion - e | **Note that any UMA with an eroded soil phase (E) is class 5.** | Gully or streambank erosion severe. | e5 | |
| Outflow potential - ss | | Areas susceptible to the development of saline seeps, usually located downslope of permeable soils and confined by either dykes or soils of heavy texture and very low hydraulic conductivity. | ss4 | |

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**APPENDIX VII.** SUITABILITY OF EACH UMA FOR SUGAR-CANE, MAIZE AND RICE, HAUGHTON SECTION - STAGE 1, BURDEKIN RIVER IRRIGATION AREA.

| | Land Resource Data | | | | | Common Limitations | | | | | | | | Sugar-Cane(S) | | | | | | Maize(Mz) | | | | | | | Rice(R) Limitations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | pd | id | g | w | e | ss | r | p | t | so | sa | Suit. ! S ! | ps | t | r | p | so | sa | Suit. ! Mz! | n | sa | so | ss | r | t | g | dd | pd | Suit. ! R ! | Area ha |
| 1 | N | 2Dyb | 2Dbb | | 2Ugi | 3 | 3 | | 3 | | | 2 | | | 3 | 2 | 3 | | 3 | 3 | 2 | | 3 | 4 | 2 | 4 | 3 | | 3 | | | 3 | | | | 3 | 59.0 |
| 2 | N | 2Ugh | 2Ugk | | | 3 | | 2 | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | | 2 | 2 | | 3 | 15.6 |
| 3 | N | 2Ugg | 2Ugk | | | 2 | | 2 | 2 | 2 | | | | | 2 | | | | 2 | 2 | | | 3 | 2 | | 3 | 2 | | | | | | 2 | 2 | | 2 | 17.1 |
| 4 | N | 2Ddb | 2Dba | | 2Dyb | 3 | 3 | 2 | 3 | | | 3 | | | 3 | 3 | 4 | 2 | 4 | 4 | 4 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 5 | | | | 5 | 16.2 |
| 5 | N | 2Ugh | 2Uge | | | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 2 | | | 3 | 3 | | 3 | 3 | | 2 | | | | 2 | 2 | | 3 | 36.3 |
| 6 | N | 2Dyb | 2DbdV | | | 2 | 3 | 2 | 3 | | | 3 | | | 3 | 3 | 2 | | 3 | 3 | 4 | | 3 | 3 | 2 | 4 | 2 | | 2 | | | 5 | | | 3 | 5 | 6.5 |
| 7 | Y | 2Dyb | 2Ugd | 35 | 2DycV | 2 | 3 | 2 | 3 | 2 | | 2 | | | 3 | 3 | 2 | | 3 | 3 | 3 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 4 | 2 | | 2 | 4 | 21.4 |
| 8 | N | 2Dba | | | | 3 | 3 | 2 | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 4 | 3 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 4 | | | 4 | 4 | 1.1 |
| 9 | N | 2Ugk | 2Dyb | | 2Ugd | 3 | | 2 | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | | 2 | 2 | | 3 | 14.6 |
| 10 | N | 2Ddb | 2Dyb | | 2Uge | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 3 | 3 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 4 | | | | 4 | 17.0 |
| 11 | N | 2Ugd | 2Uge | | 2Ugc | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | | 2 | 183.8 |
| 12 | N | 2Ugh | | | | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | 3 | 3 | 2.1 |
| 13 | N | 2Ugk | 2Uge | | | 2 | | | 2 | 2 | | | | | 2 | | 2 | | 2 | 3 | | | 3 | 3 | | 3 | 2 | | 2 | | | 2 | 2 | 2 | | 2 | 33.8 |
| 14 | N | 2Ugd | | | | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | | 2 | 2 | 3 | 3 | 6.0 |
| 15 | N | 2Dda2 | | | | 2 | 3 | 2 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 2 | | 4 | 4 | 4 | 5.4 |
| 16 | N | 2Uge2 | 2Uge | | 2Ugc | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 4 | 4 | 4 | 15.4 |
| 17 | N | 2Uge | 2Ugh | | 2Ugd | 2 | | | 2 | 2 | | | | | 2 | | 2 | | 2 | 3 | | | 3 | 3 | | 3 | 2 | | 2 | | | 2 | 2 | | | 3 | 43.7 |
| 18 | Y | 2Dyb | 2Dda | 40 | 2Ddb | 3 | 3 | | 3 | | | 3 | | | 3 | 3 | 3 | | 3 | 3 | 4 | | 3 | 4 | 2 | 4 | 3 | | 3 | | | 5 | | | | 5 | 20.7 |
| 19 | N | 6Dyg4 | 6G | | | 2 | 3 | | 5 | | | | | | 2 | 2 | | | 5 | 3 | 2 | | 2 | 2 | | 5 | 2 | | | | | 3 | | 5 | | 5 | 6.0 |
| 20 | N | 2Dbc2 | 2Dbc3 | | | 2 | 3 | 4 | 3 | 3 | | | | | 2 | 2 | | | 4 | 3 | 2 | | 2 | 2 | | 4 | 2 | | | | | 3 | 3 | 4 | 4 | 4 | 17.1 |
| 21 | N | 6Dyg4 | 6DbaV | | | 2 | 4 | 4 | 5 | | | 2 | | | 2 | 3 | | | 5 | 3 | 3 | | 2 | 2 | | 5 | 2 | | | | | 5 | | 5 | | 5 | 12.7 |
| 22 | N | 2Dyb | | | | 2 | 3 | 2 | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 2 | | | 2 | 2 | 4.1 |
| 23 | N | 2Ugg | 2Ugd | | | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 2 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | | 2 | 22.1 |
| 24 | N | 2Dda2 | 2Dbb2 | | | 3 | 3 | 2 | 3 | | | | | | 3 | | 3 | | 3 | 3 | | | 3 | 4 | 2 | 4 | 3 | | 3 | | | 2 | | 4 | 4 | 4 | 7.9 |
| 25 | Y | 2Dya | 2Dda | 40 | 2Dyb2 | 3 | 3 | | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 2 | | | | 3 | 33.5 |
| 26 | N | 6Dba | | | | 2 | 3 | | 3 | | | | | | 3 | | 4 | 2 | 4 | 3 | | | 3 | 4 | 3 | 4 | 2 | | 4 | | | 2 | | 5 | | 5 | 12.7 |
| 27 | N | 2Ugd2 | 2Ugd | | 2Uge2 | 2 | | | 2 | | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | | 4 | 4 | 4 | 28.7 |
| 28 | N | 2Dyb | | | | 2 | 3 | | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 2 | | | | 2 | 2.6 |
| 29 | N | 6Dba | 6Dba3 | | 6Dyg3 | 2 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 3 | 3 | | 3 | 4 | 3 | 4 | 2 | | 4 | | | 4 | | | | 4 | 35.3 |
| 30 | N | 2Dda2 | 2Dda | | 2Dyb2 | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 3 | | 4 | 4 | 4 | 78.1 |
| 31 | N | 6Dda2 | | | | 2 | 3 | 2 | 3 | | | 2 | | | 3 | 3 | 2 | | 3 | 3 | 3 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 4 | | 4 | 4 | 4 | 14.7 |
| 32 | N | 6Dyg3 | 6Dyg | | 6Dyg2 | 2 | 3 | | 3 | | | | | | 3 | | 4 | | 4 | 3 | | | 3 | 4 | 2 | 4 | 2 | | 4 | | | 2 | | 3 | 4 | 4 | 19.2 |
| 33 | N | 6Dyj | 6Dyj2 | | 6Dyg | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 3 | | | | 4 | 83.4 |
| 34 | N | 6Dyb2 | | | | 2 | 2 | 4 | 2 | 2 | | | | | 2 | 2 | | | 4 | 3 | 2 | | 2 | | | 4 | 2 | | | | | 3 | 2 | 5 | | 5 | 5.0 |
| 35 | N | 6Dba | | | | 2 | 3 | | 3 | | | | | | 3 | | 4 | 2 | 4 | 3 | | | 3 | 4 | 3 | 4 | 2 | | 4 | | | 2 | | | 4 | 4 | 7.8 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, pd-soil distribution complexity, id-internal drainage, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, r-rockiness/stoniness, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage.

**APPENDIX VII (CONT.)**

| UMA | Land Resource Data C | Dom.ST | ST2 | %ST2 | ST3 | Common Limitations n | m | pd | id | g | w | e | ss | Sugar-Cane(S) r | p | t | so | sa | Suit. ! S ! | Maize(Mz) ps | t | r | p | so | sa | Suit. ! Mz! | Rice(R) Limitations n | sa | so | ss | r | t | g | dd | pd | Suit. ! R ! | Area ha |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | N | 6Dyg | | | | 3 | 3 | | 3 | 2 | | | | | 3 | | 4 | | ! 4 ! | 3 | | | 3 | 4 | 2 | ! 4 ! | 3 | | 4 | | | 2 | 2 | | 4 | ! 4 ! | 1.1 |
| 37 | N | 2Ugd2 | 2Ugc | | | 2 | | | 2 | 2 | 3 | | | | 2 | | | | ! 3 ! | 3 | | | 3 | 2 | | ! 3 ! | 2 | | | | | | 2 | 4 | 4 | ! 4 ! | 7.9 |
| 38 | Y | 6Dye | 6Ucb | 40 | 6Dyg3 | 2 | 3 | 4 | 4 | 2 | | | | | 2 | | 2 | | ! 4 ! | 2 | | | 2 | 3 | | ! 4 ! | 2 | | 2 | | | 2 | 2 | 5 | | ! 5 ! | 18.1 |
| 39 | N | 6Dyg2 | 6Dba2 | | 6Dye | 2 | 3 | | 3 | | | | | | 2 | 2 | 4 | | ! 4 ! | 2 | 2 | | 2 | 4 | 2 | ! 4 ! | 2 | | 4 | | | 3 | | 4 | 4 | ! 4 ! | 10.7 |
| 40 | N | 2Dda | 2Dyb2 | | 2Ddb | 3 | 3 | | 3 | | | | | | 3 | 2 | 2 | | ! 3 ! | 3 | 2 | | 3 | 3 | 2 | ! 3 ! | 3 | | 2 | | | 3 | | | | ! 3 ! | 37.3 |
| 41 | N | 6Dbh | | | | 3 | 3 | | 3 | | | | | | 3 | | 4 | 2 | ! 4 ! | 3 | | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 2 | | | | ! 4 ! | 5.3 |
| 42 | N | 6Ucb | | | | 2 | 4 | 4 | 5 | | | | | | 3 | | | | ! 5 ! | 2 | | | 3 | | | ! 5 ! | 2 | | | | | | | 5 | | ! 5 ! | 4.0 |
| 43 | N | 6Ucc | | | | 2 | 4 | 4 | 5 | | | | | | 3 | 2 | | | ! 5 ! | | 2 | | 3 | | | ! 5 ! | 2 | | | | | 3 | | 5 | | ! 5 ! | 4.9 |
| 44 | N | 2Dyb2 | | | | 2 | 3 | | 3 | | | | | | 3 | 2 | | | ! 3 ! | 3 | 2 | | 3 | 2 | 2 | ! 3 ! | 2 | | | | | 3 | | 4 | 4 | ! 4 ! | 2.0 |
| 45 | N | 2Dyb | | | | 3 | 3 | | 3 | | | | | | 3 | | 2 | | ! 3 ! | 3 | | | 3 | 3 | 2 | ! 3 ! | 3 | | 2 | | | | | | 3 | ! 3 ! | 4.3 |
| 46 | Y | 2Dya2 | 2Uge2 | 35 | 2Dba | 3 | 3 | | 3 | | | | | | 3 | | 3 | 2 | ! 3 ! | 3 | | | 3 | 4 | 3 | ! 4 ! | 3 | | 3 | | | 2 | | 4 | 4 | ! 4 ! | 13.4 |
| 47 | N | 2Uge | 2UghV | | | 3 | | | 2 | 2 | | | | | 2 | | | | ! 3 ! | 3 | | | 3 | 2 | | ! 3 ! | 3 | | | | | 2 | 2 | 2 | 3 | ! 3 ! | 14.8 |
| 48 | Y | 2Dda2 | 2Ddb | 30 | 2Dyb2 | 3 | 3 | | 3 | | | | | | 3 | 2 | 2 | 2 | ! 3 ! | 3 | 2 | | 3 | 3 | 3 | ! 3 ! | 3 | | 2 | | | 3 | | 4 | 4 | ! 4 ! | 52.4 |
| 49 | N | 2Ugh | | | | 3 | | 2 | 2 | 2 | | | | | 2 | 2 | 2 | | ! 3 ! | 2 | 2 | | 3 | 3 | | ! 3 ! | 3 | | 2 | | | 3 | 2 | 2 | 4 | ! 4 ! | 3.5 |
| 50 | Y | 6Dba | 6Dyj | 30 | 6Ucb3 | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | ! 4 ! | 3 | 2 | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 3 | | | 4 | ! 4 ! | 30.8 |
| 51 | N | 6Dyj2 | 6Dyj | | | 3 | 3 | 3 | 3 | | | | | | 3 | 2 | 4 | 2 | ! 4 ! | 3 | 2 | | 3 | 4 | 3 | ! 4 ! | 3 | 2 | 4 | | | 2 | | 4 | 4 | ! 4 ! | 15.8 |
| 52 | N | 2Ugd | | | | 2 | | 2 | 2 | 2 | 3 | | | | 2 | | | | ! 3 ! | 3 | | | 3 | 2 | | ! 3 ! | 2 | | | | | | 2 | | 3 | ! 3 ! | 6.1 |
| 53 | N | 2Ugc | | | | 2 | | 2 | 2 | 2 | 3 | | | | 2 | | | | ! 3 ! | 3 | | | 3 | 2 | | ! 3 ! | 2 | | | | | | 2 | 2 | 3 | ! 3 ! | 6.7 |
| 54 | N | 6Dyf | 6Dda2 | | | 2 | 3 | 3 | 3 | | | | | | 2 | | | | ! 3 ! | 2 | | | 2 | 2 | | ! 3 ! | 2 | | | | | | | 5 | 4 | ! 5 ! | 9.4 |
| 55 | Y | 6Dda2 | 6Dyg2 | 35 | 6Dda | 2 | 3 | 2 | 3 | | | | | | 3 | | 2 | | ! 3 ! | 3 | | | 3 | 3 | 2 | ! 3 ! | 2 | | 2 | | | | | 4 | 4 | ! 4 ! | 13.3 |
| 56 | N | 6Dba | | | | 2 | 3 | | 3 | 2 | | | | | 3 | | 4 | 2 | ! 4 ! | 3 | | | 3 | 4 | 3 | ! 4 ! | 2 | | 4 | | | 2 | 2 | | 4 | ! 4 ! | 3.7 |
| 57 | N | 2Ugd | | | | 2 | | 2 | 2 | 2 | 3 | | | | 2 | | | | ! 3 ! | 3 | | | 3 | 2 | | ! 3 ! | | | | | | | 2 | | 4 | ! 4 ! | 2.3 |
| 58 | N | 6Dda | | | | 2 | 3 | 2 | 3 | 2 | | | | | 3 | | 2 | | ! 3 ! | 3 | | | 3 | 3 | 2 | ! 3 ! | 2 | | 2 | | | 2 | 2 | | 4 | ! 4 ! | 1.3 |
| 59 | N | 6Dyj | 6Dyg3 | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 3 | ! 4 ! | 3 | 2 | | 3 | 4 | 4 | ! 4 ! | 3 | 3 | 4 | | | 3 | | | | ! 4 ! | 15.8 |
| 60 | N | 6Dda | 6Dda2 | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | ! 3 ! | 3 | 2 | | 3 | 3 | 2 | ! 3 ! | 2 | | 2 | | | 2 | | 4 | 4 | ! 4 ! | 8.3 |
| 61 | N | 6Dyg2 | 6Dba | | 6Dye2 | 2 | 3 | | 3 | | | | | | 3 | 2 | 4 | | ! 4 ! | 3 | 2 | | 3 | 4 | 2 | ! 4 ! | 2 | | 4 | | | 3 | | 4 | 4 | ! 4 ! | 15.6 |
| 62 | N | 6Dye | 6Ucc | | | 2 | 3 | 4 | 4 | | | | | | 4 | 2 | 2 | | ! 4 ! | | 2 | | 4 | 3 | | ! 4 ! | 2 | | 2 | | | 2 | | 5 | 4 | ! 5 ! | 6.7 |
| 63 | N | 6Dba3 | 6Dba2 | | 6Dye3 | 2 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | ! 4 ! | 3 | 2 | | 3 | 4 | 3 | ! 4 ! | 2 | | 4 | | | 3 | | 4 | | ! 4 ! | 42.1 |
| 64 | N | 6Dya | | | | 2 | 3 | 4 | 4 | | | | | | 3 | | | | ! 4 ! | | | | 3 | | | ! 4 ! | 2 | | | | | 2 | | 5 | | ! 5 ! | 8.4 |
| 65 | N | 2Uge | 2Dya | | | 3 | | | 2 | 2 | | | | | 2 | | 2 | | ! 3 ! | 3 | | | 3 | 3 | | ! 3 ! | 3 | | 2 | | | 2 | 2 | | | ! 3 ! | 12.4 |
| 66 | N | 2Ugd | 6Dyb2 | | | 2 | | | 2 | 2 | | | | | 2 | 2 | | | ! 2 ! | 3 | 2 | | 3 | 2 | | ! 3 ! | 2 | | | | | 3 | 2 | 2 | 4 | ! 4 ! | 10.9 |
| 67 | N | 6Dyg2 | | | | 2 | 3 | 4 | 3 | | | | | | 2 | 2 | 4 | | ! 4 ! | 2 | 2 | | 2 | 4 | 2 | ! 4 ! | 2 | | 4 | | | 3 | | 4 | 4 | ! 4 ! | 0.8 |
| 68 | N | 2Ugk | 2Ugc | | | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | ! 3 ! | 2 | 2 | | 3 | 3 | | ! 3 ! | 3 | | 2 | | | 3 | 2 | 2 | | ! 3 ! | 12.7 |
| 69 | N | 6Dda | 6Dba3 | | 6Gna3 | 2 | 3 | | 3 | | | | | | 3 | 2 | 3 | | ! 3 ! | 3 | 2 | | 3 | 4 | 2 | ! 4 ! | 2 | | 3 | | | 3 | | | | ! 3 ! | 38.7 |
| 70 | N | 6Dyj | | | | 3 | 3 | 2 | 3 | | | | | | 3 | | 4 | 2 | ! 4 ! | 4 | | | 3 | 4 | 3 | ! 4 ! | 3 | 2 | 4 | | | 2 | | | | ! 4 ! | 0.6 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, pd-soil distribution complexity, id-internal drainage, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, r-rockiness/stoniness, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage.

APPENDIX VII (CONT.)

| UMA | Land Resource Data | | | | | Common Limitations | | | | | | | | Sugar-Cane(S) | | | | | | Maize(Mz) | | | | | | | Rice(R) Limitations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | pd | id | g | w | e | ss | r | p | t | so | sa | Suit. ! S ! | ps | t | r | p | so | sa | Suit. ! Mz! | n | sa | so | ss | r | t | g | dd | pd | Suit. ! R ! | Area ha |
| 71 | N | 6Dyg3 | | | | 2 | 3 | 2 | 3 | | | | | | 3 | 2 | 3 | | 3 | 3 | 2 | | 3 | 4 | 2 | 4 | 2 | | 3 | | | 3 | | | 3 | 3 | 2.4 |
| 72 | Y | 2Ddb | 6Ucb | 40 | 2Dbb2 | 3 | 3 | 4 | 3 | 2 | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | 2 | 5 | 4 | 5 | 48.2 |
| 73 | N | 2Dda | | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 2 | | | 3 | 3 | 2.8 |
| 74 | N | 6Dyj | | | | 3 | 3 | 4 | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 2 | | | | 4 | 3.1 |
| 75 | N | 2Dbb | 2Dyb | | 6Dyg2 | 2 | 3 | 2 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 3 | | | 4 | 4 | 17.3 |
| 76 | N | 6Dyb | | | | 2 | 3 | 4 | 2 | 2 | | | | | 3 | | | | 4 | | | | 3 | | | 4 | 2 | | | | | 2 | 2 | 5 | | 5 | 5.5 |
| 77 | N | 2Dba | | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 2 | | | | 4 | 11.6 |
| 78 | N | 6Ucb | | | | 2 | 4 | 4 | 5 | | | | | | 4 | | | | 5 | | | | 4 | | | 5 | 2 | | | | | 2 | | 5 | | 5 | 4.5 |
| 79 | N | 2Dbb | 2Dyb | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 3 | | | | 3 | 13.6 |
| 80 | N | 2Dda | 2Ddb2 | | | 3 | 3 | | 3 | | | | | | 3 | | 3 | 2 | 3 | 3 | | | 3 | 4 | 3 | 4 | 3 | | 3 | | | 2 | | | 4 | 4 | 25.8 |
| 81 | Y | 2Ddb | 2Dda2 | 30 | 2Dba | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | 4 | | 4 | 35.2 |
| 82 | N | 6Dyg | | | | 3 | 3 | | 3 | 2 | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | | 4 | 4 | 1.9 |
| 83 | N | 2Dyb | | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 3 | | | | 3 | 7.3 |
| 84 | N | 2Uge | 2Dbe | | | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 3 | 2 | | 2 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | | 3 | 12.1 |
| 85 | Y | 2Ddb | 2Dda | 30 | 2Dba | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | | | 4 | 55.7 |
| 86 | N | 2Dba | | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 2 | | | 4 | 4 | 2.1 |
| 87 | N | 6Dyb | | | | 2 | 3 | 4 | 2 | | | | | | 3 | 2 | | | 4 | | 2 | | 3 | | | 4 | 2 | | | | | 3 | | 5 | | 5 | 4.5 |
| 88 | N | 6Dyj3 | | | | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 3 | | | 4 | 4 | 1.9 |
| 89 | Y | 2Uge | 2Dyb | 30 | | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | 3 | 3 | 6.4 |
| 90 | N | 2Dba | 2DbaV | | 2Dbb | 3 | 3 | | 3 | | | | | | 3 | | 4 | 2 | 4 | 3 | | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 2 | | | | 4 | 37.5 |
| 91 | N | 2Uge | | | | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 2 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | 3 | 3 | 5.2 |
| 92 | Y | 2Ugk | 2Dba | 35 | | 3 | 3 | | 3 | 2 | | | | | 2 | | 4 | 2 | 4 | 3 | | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 2 | 2 | 2 | 3 | 4 | 5.4 |
| 93 | Y | 2Uge | 2Ugk | 40 | 2Ugd | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 47.4 |
| 94 | N | 2Ugk | 2Uge | | 2Ugg | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | | 2 | 23.8 |
| 95 | N | 2UgdE | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | 5 | | | | | | | | | | 5 | 1.6 |
| 96 | N | 2DbbE | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | 5 | | | | | | | | | | 5 | 3.3 |
| 97 | N | 2Dba2 | 2Dyb | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | 4 | 4 | 4 | 1.5 |
| 98 | N | 2Dyb | | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 3 | | | | 3 | 10.6 |
| 99 | Y | 2Ddc | 2Ugi | 30 | 2Dbb2 | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 3 | | 2 | 4 | 4 | 10.8 |
| 100 | N | 2Dyb | | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 3 | | | | 3 | 12.0 |
| 101 | N | 2Dbb2 | 2Dyb2 | | 2Ddc | 3 | 3 | 2 | 3 | | | 2 | | | 3 | 3 | 3 | 2 | 3 | 3 | 3 | | 3 | 4 | 3 | 4 | 3 | | 3 | | | 4 | | 4 | | 4 | 21.4 |
| 102 | N | 2Ugh | | | | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 2 | | | 3 | 3 | | 3 | 3 | | 2 | | | | 2 | 2 | | 3 | 23.6 |
| 103 | N | 2DbbE | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | 5 | | | | | | | | | | 5 | 7.3 |
| 104 | N | 2Dyb | 2Dbb | | | 2 | 3 | | 3 | | | 2 | | | 3 | 3 | 2 | | 3 | 3 | 3 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 4 | | | 3 | 4 | 3.6 |
| 105 | N | 2Dba | | | | 3 | 3 | 4 | 3 | | | 3 | | | 3 | 3 | 4 | 2 | 4 | 4 | 4 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 5 | | | | 5 | 2.4 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, pd-soil distribution complexity, id-internal drainage, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, r-rockiness/stoniness, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage.

**APPENDIX VII (CONT.)**

| | | Land Resource Data | | | | Common Limitations | | | | | | | | Sugar-Cane(S) | | | | | | Maize(Mz) | | | | | | | Rice(R) Limitations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | pd | id | g | w | e | ss | r | p | t | so | sa | Suit. ! S ! | ps | t | r | p | so | sa | Suit. ! Mz! | n | sa | so | ss | r | t | g | dd | pd | Suit. ! R ! | Area ha |
| 106 | N | 2Dbd | 2Dbe | | | 2 | 3 | | 3 | | | | | | 2 | 2 | 2 | | 3 | 3 | 2 | | 2 | 3 | | 3 | 2 | | 2 | | | 2 | | 3 | | 3 | 21.7 |
| 107 | N | 2Dba | 2Dba2 | | 2Ddb | 3 | 3 | 4 | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 4 | 3 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 4 | | | 4 | 4 | 11.3 |
| 108 | N | 6Dyf3 | 6Dbd2 | | 6Dyg | 2 | 3 | | 2 | | | 2 | | | 2 | 3 | 2 | | 3 | 2 | 3 | | 2 | 3 | | 3 | 2 | | 2 | | | 4 | | 5 | | 5 | 35.1 |
| 109 | N | 2Dyb2 | 2Dya2 | | 2Dbd2 | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 3 | | 4 | | 4 | 22.7 |
| 110 | N | 2Ugh | | | | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 2 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 26.9 |
| 111 | N | 2Dyb | 2Dbd | | 2Ddb | 3 | 3 | 3 | 3 | | | | | | 3 | 2 | 3 | | 3 | 3 | 2 | | 3 | 4 | 2 | 4 | 3 | | 3 | | | 3 | | | | 3 | 17.7 |
| 112 | N | 2Ugf | | | | 2 | | 2 | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | 3 | 3 | 8.1 |
| 113 | N | 2Ddb | 2Dyb | | | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | | | 4 | 8.1 |
| 114 | Y | 2Uge | 2Ugk2 | 35 | | 2 | | | 2 | 2 | | | | | 2 | 2 | | | 2 | 3 | 2 | | 3 | 2 | | 3 | 2 | | | | | 3 | 2 | 4 | | 4 | 29.9 |
| 115 | Y | 2Uge | 2Dyb | 35 | 2Dyc | 3 | | 2 | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 25.8 |
| 116 | N | 2Dyb | 2Dbb | | | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 3 | | 3 | 3 | 2 | | 3 | 4 | 2 | 4 | 3 | | 3 | | | 3 | | | 3 | 3 | 4.1 |
| 117 | N | 2Uge | | | | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | | 2 | 15.4 |
| 118 | Y | 2Ugk2 | 2Uga | 40 | 2Dyb | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 4 | 4 | 4 | 32.8 |
| 119 | N | 2Ugd | 2Uge | | | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | | 2 | 54.7 |
| 120 | Y | 2Ugh | 2Dyb | 40 | 2Ugg | 3 | | 2 | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | 2 | 3 | 3 | | 2 | | | | 2 | 2 | 3 | 3 | 12.5 |
| 121 | N | 2Dba | 2Dba2 | | 2Ddb | 3 | 3 | | 3 | | | | | | 3 | | 4 | 2 | 4 | 4 | | | 3 | 4 | 3 | 4 | 3 | | 4 | | | | | | | 4 | 16.5 |
| 122 | N | 2Uge | 2Ugk | | 2Dyc | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 78.9 |
| 123 | N | 2Dbb | | | | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | | | 3 | 3 | 4.5 |
| 124 | N | 2Ugh | | | | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | 3 | 3 | 2.9 |
| 125 | N | 6Dba | | | | 2 | 3 | | 3 | | | | | | 2 | 2 | 2 | | 3 | 2 | 2 | | 2 | 3 | | 3 | 2 | | 2 | | | 3 | | 3 | | 3 | 15.1 |
| 126 | N | 6Dyg2 | 6Dyj2 | | | 3 | 3 | 2 | 3 | | | | | | 3 | | 4 | | 4 | 3 | | | 3 | 4 | 2 | 4 | 3 | | 4 | | | | | 4 | | 4 | 3.2 |
| 127 | N | 2UgeE | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | 5 | | | | | | | | | | 5 | 1.6 |
| 128 | N | 2DbaE | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | 5 | | | | | | | | | | 5 | 1.4 |
| 129 | N | 2Dba | | | | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 2 | | | | 4 | 6.2 |
| 130 | Y | 6Dba | 6Dra2 | 40 | | 2 | 3 | 4 | 3 | | | 2 | | | 3 | 3 | 2 | | 4 | 3 | 3 | | 3 | 3 | | 4 | 2 | | 2 | | | 5 | | | 4 | 5 | 11.2 |
| 131 | N | 2Ugh | | | | 3 | | 2 | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 2 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | 3 | 3 | 5.7 |
| 132 | N | 2Dyb2 | 2Dyb | | 2Dbb2 | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 2 | | 3 | 3 | 3 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 5 | | 4 | | 5 | 29.9 |
| 133 | N | 2Ugh | | | | 3 | | 2 | 2 | 2 | | | | | 2 | 3 | 2 | | 3 | 2 | 3 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | 4 | 4 | 2.8 |
| 134 | N | 2Dya | 2Uge | | 2Dda | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 2 | | 2 | | | 3 | | | | 3 | 34.3 |
| 135 | N | 2Dya | | | | 2 | 3 | 2 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 2 | | 2 | | | 2 | | | 3 | 3 | 6.9 |
| 136 | N | 6Dba2 | | | | 2 | 3 | 4 | 3 | | | | | | 2 | 2 | 2 | | 4 | 2 | 2 | | 2 | 3 | | 4 | 2 | | 2 | | | 3 | | 4 | | 4 | 1.1 |
| 137 | N | 2Dyb | 2Dbd | | | 2 | 3 | | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | 2 | 3 | 2 | | 2 | | | | | | 3 | 3 | 6.9 |
| 138 | N | 6Dyb | | | | 2 | 2 | 4 | 2 | | | | | | 3 | | | | 4 | | | | 3 | | | 4 | 2 | | | | | | | 5 | | 5 | 1.1 |
| 139 | N | 2Dya | | | | 3 | 3 | | 3 | | | | | | 3 | | 3 | | 3 | 3 | | | 3 | 4 | | 4 | 3 | | 3 | | | 2 | | | 3 | 3 | 5.8 |
| 140 | Y | 2Ugh | 2Dda | 30 | | 3 | | 2 | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 3 | 2 | 2 | 3 | 3 | 2.7 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, pd-soil distribution complexity, id-internal drainage, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, r-rockiness/stoniness, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage.

APPENDIX VII (CONT.)

| UMA | Land Resource Data: C | Dom.ST | ST2 | %ST2 | ST3 | Common Limitations: n | m | pd | id | g | w | e | ss | Sugar-Cane(S): r | p | t | so | sa | Suit. !S! | Maize(Mz): ps | t | r | p | so | sa | Suit. !Mz! | Rice(R) Limitations: n | sa | so | ss | r | t | g | dd | pd | Suit. !R! | Area ha |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 141 | Y | 2Ugh | 2Ugg | 30 | | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 2 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | | 3 | 37.6 |
| 142 | N | 2Uge | | | | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | 3 | 3 | 3.1 |
| 143 | N | 6Dyf | | | | 2 | 3 | 4 | 3 | | | | | | 2 | 2 | | | 4 | 2 | 2 | | 2 | 2 | | 4 | 2 | | | | | 3 | | 5 | | 5 | 0.9 |
| 144 | N | 2Dda | | | | 2 | 3 | 2 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 3 | | | 3 | 3 | 1.2 |
| 145 | N | 2Dyb | 2Dda | | 2Dbb | 3 | 3 | 2 | 3 | | | 2 | | | 3 | 3 | 2 | | 3 | 3 | 3 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 4 | | | | 4 | 9.9 |
| 146 | N | 6Dra2 | | | | 2 | 2 | 4 | | | | | | | 2 | 2 | | | 4 | 2 | 2 | | 2 | | | 4 | 2 | | | | | 3 | | 5 | | 5 | 3.1 |
| 147 | N | 2Dda2 | | | | 2 | 3 | 2 | 3 | | | 2 | | | 3 | 3 | 2 | | 3 | 3 | 3 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 4 | | 4 | | 4 | 4.2 |
| 148 | N | 6Dyb3 | | | | 2 | 3 | 4 | 2 | | | | | | 3 | 2 | | | 4 | | 2 | | 3 | | | 4 | 2 | | | | | 3 | | 5 | | 5 | 2.2 |
| 149 | N | 6Gna2 | 6Uma2 | | | 2 | 2 | 4 | | | | | | | | | | | 4 | 2 | | | | | | 4 | 2 | | | | | | | 5 | | 5 | 5.1 |
| 150 | Y | 6Dba | 6Dyg | 40 | 6Dyd | 3 | 3 | | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | | | 5 | | 5 | 12.6 |
| 151 | N | 6Dda | | | | 3 | 3 | | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | 2 | 3 | 3 | | 2 | | | | | 5 | 4 | 5 | 2.1 |
| 152 | N | 6Dra2 | | | | 2 | 2 | 4 | | | | 2 | | | 2 | 3 | | | 4 | | 3 | | 2 | | | 4 | 2 | | | | | 5 | | 5 | | 5 | 3.4 |
| 153 | N | 6Dyj | | | | 3 | 3 | 4 | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 4 | 3 | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 3 | | | 4 | 4 | 0.1 |
| 154 | N | 6Dyj | | | | 3 | 3 | 3 | 3 | | | | | | 3 | | 4 | 2 | 4 | 4 | | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 2 | | | 4 | 4 | 1.4 |
| 155 | N | 6Dba2 | | | | 2 | 3 | 4 | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 3 | 4 | | 3 | 4 | 3 | 4 | 2 | | 4 | | | 5 | | 4 | | 5 | 2.3 |
| 156 | N | 2Dbb | | | | 3 | 3 | 2 | 3 | | | 3 | | | 3 | 3 | 2 | | 3 | 3 | 4 | | 3 | 3 | | 4 | 3 | | 2 | | | 5 | | | | 5 | 3.0 |
| 157 | Y | 2Dda | 2Ugk | 35 | 2Ddc | 3 | 3 | 3 | 3 | 2 | | 3 | | | 3 | 3 | 2 | | 3 | 3 | 4 | | 3 | 3 | 2 | 4 | 3 | | 2 | | | 5 | 2 | | | 5 | 7.4 |
| 158 | N | 2Dbb | 2Dyb | | 2Dba | 3 | 3 | 2 | 3 | | | 3 | | | 3 | 3 | 3 | | 3 | 3 | 4 | | 3 | 4 | 2 | 4 | 3 | | 3 | | | 5 | | | | 5 | 18.1 |
| 159 | N | 6Dra2 | | | | 2 | 2 | 4 | | | | | | | 2 | | | | 4 | | | | 2 | | | 4 | 2 | | | | | | | 5 | | 5 | 2.5 |
| 160 | N | 6Dba | | | | 2 | 3 | 3 | 3 | | | | | | 2 | | 2 | | 3 | 2 | | | 2 | 3 | | 3 | 2 | | 2 | | | | | 3 | 4 | 4 | 1.7 |
| 161 | N | 2Ugk | 2Dbb | | 2Dya | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | | 2 | 2 | | 3 | 94.8 |
| 162 | N | 6Dye | | | | 2 | 3 | 4 | 3 | | | | | | 2 | | 2 | | 4 | | | | 2 | 3 | | 4 | 2 | | 2 | | | | | 5 | 5 | 5 | 1.4 |
| 163 | N | 6Dyj | | | | 3 | 3 | | 3 | | | | | | 3 | | 4 | 2 | 4 | 4 | | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 2 | | | | 4 | 14.0 |
| 164 | N | 2Dba | 2Ddb | | 2Dda | 3 | 3 | | 3 | | | | | | 3 | | 4 | 2 | 4 | 4 | | | 3 | 4 | 3 | 4 | 3 | | 4 | | | | | | | 4 | 24.8 |
| 165 | N | 2Ugg | | | | 3 | | | 2 | 2 | | | | | 2 | | | | 3 | 2 | | | 3 | 2 | | 3 | 3 | | | | | 2 | 2 | 2 | | 3 | 4.1 |
| 166 | N | 6Dyg | | | | 2 | 3 | | 3 | | | | | | 3 | | 4 | | 4 | 3 | | | 3 | 4 | 2 | 4 | 2 | | 4 | | | 2 | | | | 4 | 5.3 |
| 167 | N | 6Dyj | | | | 3 | 3 | 2 | 3 | | | | | | 3 | | 4 | 2 | 4 | 3 | | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 2 | | | | 4 | 5.0 |
| 168 | N | 2Uge2 | | | | 3 | | 2 | 2 | | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | | 2 | | 3 | 1.1 |
| 169 | N | 6Dyf | | | | 2 | 3 | 3 | 3 | | | | | | 2 | | | | 3 | 2 | | | 2 | 2 | | 3 | 2 | | | | | | | 5 | | 5 | 2.1 |
| 170 | Y | 6Dya | 6Dyg | 40 | 2Dbb | 2 | 3 | 4 | 3 | | | | | | 3 | 2 | 3 | | 4 | 3 | 2 | | 3 | 4 | 2 | 4 | 2 | | 3 | | | 3 | | 5 | | 5 | 29.5 |
| 171 | N | 6Dyj | | | | 3 | 3 | 4 | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 3 | | | 4 | 4 | 4.2 |
| 172 | N | 2Dbb | 2Ddb | | | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 3 | 3 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 4 | | | | 4 | 11.2 |
| 173 | N | 6Dyg2 | | | | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | | 4 | 3 | 3 | | 3 | 4 | 2 | 4 | 3 | | 4 | | | 4 | | 4 | | 4 | 8.0 |
| 174 | N | 6Dbe2 | 6Dda | | 6Dye2 | 2 | 3 | 3 | 3 | | | 2 | | | 2 | 3 | 2 | | 3 | 2 | 3 | | 2 | 3 | | 3 | 2 | | 2 | | | 4 | | 4 | | 4 | 23.7 |
| 175 | N | 2Uge | | | | 2 | | | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | 2 | 2 | 2 | | 2 | 2.6 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, pd-soil distribution complexity, id-internal drainage, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, r-rockiness/stoniness, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage.

**APPENDIX VII (CONT.)**

| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | pd | id | g | w | e | ss | r | p | t | so | sa | Suit. S | ps | t | r | p | so | sa | Suit. Mz | n | sa | so | ss | r | t | g | dd | pd | Suit. R | Area ha |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Land Resource Data | | | | | Common Limitations | | | | | | | | Sugar-Cans(S) | | | | | | Maize(Mz) | | | | | | | Rice(R) Limitations | | | | | | | | | | |
| 176 | N | 6Dyj | | | | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 2 | | | | 4 | 4.7 |
| 177 | N | 6Ucb3 | | | | 2 | 4 | 4 | 5 | | | | | | 4 | | | | 5 | | | | 4 | | | 5 | 2 | | | | | 2 | | 5 | | 5 | 2.2 |
| 178 | N | 2Dbb | 6Dba | | | 3 | 3 | | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | | | | 3 | 9.0 |
| 179 | N | 6Dyb | | | | 2 | 3 | 4 | 2 | | | | | | 3 | | | | 4 | | | | 3 | | | 4 | 2 | | | | | | | 5 | | 5 | 0.7 |
| 180 | Y | 2Ugk | 2Dyb | 35 | 2Ugc | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | | 2 | 2 | | 3 | 17.0 |
| 181 | N | 6Dba3 | | | | 2 | 3 | | 3 | | | | | | 2 | | 2 | | 3 | 3 | | | 2 | 3 | | 3 | 2 | | 2 | | | | | 3 | | 3 | 0.8 |
| 182 | Y | 2Dbb | 2Ugk | 40 | | 3 | 3 | | 3 | 2 | | | | | 3 | 2 | 3 | | 3 | 3 | 2 | | 3 | 4 | | 4 | 3 | | 3 | | | 3 | 2 | 2 | | 3 | 5.6 |
| 183 | N | 6Dba | | | | 2 | 3 | 2 | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 2 | | 2 | | | | | | | 2 | 1.6 |
| 184 | N | 2Dyb | 2Dbc | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 3 | | 3 | | 3 | 17.1 |
| 185 | N | 2Dda | 2Dya | | 2Ddb | 3 | 3 | | 3 | | | | | | 3 | | 3 | | 3 | 3 | | | 3 | 4 | 2 | 4 | 3 | | 3 | | | 2 | | | | 3 | 95.6 |
| 186 | N | 2Ugk | | | | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 3.3 |
| 187 | N | 6Dba2 | | | | 2 | 3 | 3 | 3 | | | | | | 2 | 2 | 2 | | 3 | 2 | 2 | | 2 | 3 | | 3 | 2 | | 2 | | | 2 | | 4 | | 4 | 5.1 |
| 188 | N | 6Dyb2 | | | | 2 | 2 | | 2 | | | | | | | | | | 2 | 2 | | | | | | 2 | 2 | | | | | 2 | | 5 | | 5 | 16.2 |
| 189 | N | 6Uca | 6UcbV | | | 2 | 4 | | 5 | | | | | | 4 | 2 | | | 5 | | 2 | | 4 | | | 5 | 2 | | | | | 3 | | 5 | | 5 | 6.7 |
| 190 | N | 6Dda | | | | 2 | 3 | | 3 | | | | | | 2 | | 2 | | 3 | 3 | | | 2 | 3 | | 3 | 2 | | 2 | | | 2 | | 3 | 4 | 4 | 4.6 |
| 191 | N | 6Dyf2 | 6Uma2 | | | 2 | 3 | | 3 | | | | | | | 2 | 2 | | 3 | 2 | 2 | | | 3 | | 3 | 2 | | 2 | | | 3 | | 4 | | 4 | 8.9 |
| 192 | N | 6Dba | | | | 2 | 3 | 3 | 3 | | | | | | 2 | 2 | | | 3 | 2 | 2 | | 2 | 2 | | 3 | 2 | | | | | 3 | | 3 | 3 | 3 | 2.1 |
| 193 | N | 2Sp | | | | | | | | | 5 | | | | | | | | 5 | | | | | | | 5 | | | | | | | | | | 5 | 1.3 |
| 194 | Y | 2Dda | 2Dyb | 45 | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 2 | | | | 2 | 7.0 |
| 195 | N | 2Dbb | | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 2 | | 2 | | | 2 | | | | 2 | 1.7 |
| 196 | N | 2Ugk | 2Dbc | | | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | | 3 | 16.0 |
| 197 | N | 2Dyb2 | 2Dyb | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 2 | | 2 | | | 3 | | 4 | | 4 | 17.4 |
| 198 | N | 6DbbE | 6Dbb2 | | 6Uma | | | | | | | 5 | | | | | | | 5 | | | | | | | 5 | | | | | | | | | | 5 | 29.1 |
| 199 | N | 2Ugd | | | | | | | | | | | | | | | | | 2 | | | | | | | 3 | | | | | | | | | | 4 | 0.8 |
| 200 | N | 2Ugd | | | | 2 | | 2 | 2 | 2 | | | | | 2 | | | | 2 | 3 | | | 3 | 2 | | 3 | 2 | | | | | | 2 | 2 | 4 | 4 | 2.6 |
| 201 | N | 2Dba | 2Ddb | | 2Dbb | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | | | 4 | 21.4 |
| 202 | N | 2Ugd | | | | 2 | | | 2 | 2 | | | | | 2 | 2 | | | 2 | 3 | 2 | | 3 | 2 | | 3 | 2 | | | | | 3 | 2 | 2 | | 3 | 3.3 |
| 203 | N | 2DbaE | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | 5 | | | | | | | | | | 5 | 2.0 |
| 204 | N | 2Dba | | | | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 4 | 3 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 5 | | | | 5 | 7.5 |
| 205 | N | 2Dba | 2Dbb2 | | 2Ugk | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | | | 4 | 25.8 |
| 206 | Y | 2Ugk | 2Dya | 45 | 2Dba | 3 | 3 | | 3 | 2 | | | | | 2 | 2 | 3 | | 3 | 3 | 2 | | 3 | 4 | | 4 | 3 | | 3 | | | 3 | 2 | 4 | | 4 | 23.5 |
| 207 | Y | 2Ugk | 2Dbb | 35 | 2Ugk2 | 3 | | | | 2 | | | | | 2 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | | 3 | 16.3 |
| 208 | N | 6Dba | | | | 2 | 3 | 2 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 2 | | 2 | | | 3 | | 3 | | 3 | 0.9 |
| 209 | N | 2Uge | | | | 3 | | | 2 | 2 | | | | | 2 | | | | 3 | 3 | | | 3 | 2 | | 3 | 3 | | | | | 2 | 2 | 2 | | 3 | 10.2 |
| 210 | N | 2Dda | 2Dba | | 6Ddb | 3 | 3 | | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 2 | | | | 3 | 12.1 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, pd-soil distribution complexity, id-internal drainage, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, r-rockiness/stoniness, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage.

**APPENDIX VII** (CONT.)

| UMA | Land Resource Data C | Dom.ST | ST2 | %ST2 | ST3 | Common Limitations n | m | pd | id | g | w | e | ss | Sugar-Cane(S) r | p | t | so | sa | Suit. ! S ! | Maize(Mz) ps | t | r | p | so | sa | Suit. ! Mz! | Rice(R) Limitations n | sa | so | ss | r | t | g | dd | pd | Suit. ! R ! | Area ha |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 211 | N | 6Dyj | | | | 3 | 3 | | 3 | | | | | | 3 | | 4 | 2 | 4 | 3 | | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 2 | | | | 4 | 1.1 |
| 212 | Y | 6Ddb2 | 2Uge | 35 | 6Dyj | 3 | 3 | 3 | 3 | 2 | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 4 | | 4 | 5.2 |
| 213 | Y | 6Dyg2 | 2Uge2 | 35 | 6Dyd2 | 3 | 3 | 3 | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | | 4 | | 4 | 6.0 |
| 214 | N | 6Dba | 6Dyg | | | 2 | 3 | | 3 | | | | | | 2 | | 2 | | 3 | 2 | | | 2 | 3 | | 3 | 2 | | 2 | | | 2 | | 3 | | 3 | 5.1 |
| 215 | N | 2Ugg | | | | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 3.2 |
| 216 | N | 6Dyb | | | | 2 | 2 | | 2 | | | 2 | | | 2 | 3 | | | 3 | 2 | 3 | | 2 | | | 3 | 2 | | | | | 5 | | 5 | | 5 | 2.4 |
| 217 | Y | 2Ugk | 2Ugh | 45 | 2Ugg | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 3 | | 2 | | | 3 | 2 | 2 | | 3 | 31.9 |
| 218 | N | 2Dba | 2Ddb | | | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | | | 4 | 4.9 |
| 219 | N | 2Ugh | | | | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 26.5 |
| 220 | Y | 2Dbb | 2Ugk | 40 | 2Ddb | 3 | 3 | 2 | 3 | 2 | | | | | 3 | 2 | 3 | | 3 | 3 | 2 | | 3 | 4 | | 4 | 3 | | 3 | | | 3 | 2 | 2 | | 3 | 32.4 |
| 221 | N | 6Dyj | | | | 3 | 3 | | 3 | | | | | | 3 | | 4 | 2 | 4 | 3 | | | 3 | 4 | 3 | 4 | 3 | 2 | 4 | | | 2 | | | | 4 | 3.8 |
| 222 | N | 2Dya | 2Dbb | | 2Ddb | 3 | 3 | | 3 | | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | | | | 3 | 18.9 |
| 223 | Y | 2Dya | 2Ugk | 40 | 2Dbb | 3 | 3 | 2 | 3 | 2 | | | | | 3 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 50.0 |
| 224 | N | 6Dyb | 6Dya | | 6Dba | 2 | 3 | 3 | 2 | | | | | | 3 | 2 | | | 3 | | 2 | | 3 | | | 3 | 2 | | | | | 3 | | 5 | | 5 | 14.0 |
| 225 | Y | 2Dya | 2Dda | 35 | 2Ddb | 3 | 3 | | 3 | | | | | | 3 | 2 | 3 | | 3 | 3 | 2 | | 3 | 4 | | 4 | 3 | | 3 | | | 3 | | | | 3 | 217.9 |
| 226 | N | 2Dba | | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | | | 4 | 7.8 |
| 227 | N | 2Dda | | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 2 | | | | 3 | 9.0 |
| 228 | N | 2Uge | 2Ugc | | | 3 | | | 2 | 2 | | | | | 2 | | 2 | | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 22.6 |
| 229 | N | 2Dba | | | | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 4 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 3 | | | | 4 | 4.9 |
| 230 | N | 6Dyb | | | | 2 | 2 | 3 | 2 | | | | | | 2 | 2 | | | 3 | 2 | 2 | | 2 | | | 3 | 2 | | | | | 3 | | 5 | | 5 | 2.0 |
| 231 | Y | 2Ugd | 2Dyb | 40 | 2Ugc | 2 | | 2 | 2 | | | 2 | | | 2 | 3 | | | 3 | 3 | 3 | | 3 | 2 | | 3 | 2 | | | | | 4 | | 2 | | 4 | 9.5 |
| 232 | N | 6Dda2 | 6Gnb | | | 2 | 3 | 2 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 2 | | 2 | | | 3 | | 4 | | 4 | 2.7 |
| 233 | N | 2Uge | 2Dbc | | 6Dyd | 3 | | | 3 | 2 | | | | | 2 | | | | 3 | 3 | | | 3 | 2 | | 3 | 3 | | | | | 2 | 2 | | | 3 | 11.3 |
| 234 | N | 6Dyb | 2Dda | | | 2 | 2 | 3 | 2 | | | | | | 2 | 3 | | | 3 | 2 | 3 | | 2 | | | 3 | 2 | | | | | 4 | | 5 | | 5 | 4.6 |
| 235 | Y | 2Dyb | 2Ugk | 35 | 2Dbd | 3 | 3 | 2 | 3 | 2 | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 2 | 2 | 2 | | 3 | 43.8 |
| 236 | Y | 2Dba | 2Ugk | 35 | | 3 | 3 | 2 | 3 | | | | | | 3 | 2 | 4 | 2 | 4 | 3 | 2 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 2 | | | | 4 | 6.8 |
| 237 | N | 6Dyg | | | | 2 | 3 | | 3 | | | | | | 2 | 2 | | | 3 | 2 | 2 | | 2 | 2 | | 3 | 2 | | | | | 3 | | | | 3 | 9.0 |
| 238 | N | 2Dya2 | | | | 2 | 3 | 3 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 2 | | 2 | | | 3 | | 4 | | 4 | 2.6 |
| 239 | Y | 2Dbb | 6Dye | 40 | | 2 | 3 | 3 | 3 | | | | | | 3 | 2 | 2 | | 3 | 3 | 2 | | 3 | 3 | | 3 | 2 | | 2 | | | 2 | | 3 | | 3 | 7.8 |
| 240 | Y | 2Dba | 6Dyb2 | 45 | 6Dye2 | 3 | 3 | 4 | 3 | | | | | | 3 | 4 | 4 | 2 | 4 | 3 | 4 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 5 | | 4 | | 5 | 12.9 |
| 241 | N | 2Dda | 2Dba | | | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 2 | | 3 | 3 | 3 | | 3 | 3 | 2 | 3 | 3 | | 2 | | | 4 | | | | 4 | 6.6 |
| 242 | N | 6Dyb | 6Dya | | | 2 | 3 | 3 | 2 | | | | | | 3 | 3 | | | 3 | 2 | 3 | | 3 | | | 3 | 2 | | | | | 5 | | 5 | | 5 | 6.6 |
| 243 | N | 2Dba | 2Ddb | | 2Dyb | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | 2 | 4 | 4 | 3 | | 3 | 4 | 3 | 4 | 3 | | 4 | | | 4 | | | | 4 | 29.9 |
| 244 | N | 6Dye | | | | 2 | 3 | 4 | 3 | | | 2 | | | 3 | 3 | | | 4 | | 3 | | 3 | 2 | | 4 | 2 | | | | | 5 | | 5 | | 5 | 4.9 |
| 245 | N | 2Ugd | | | | 2 | | | 2 | | | 5 | | | 2 | 3 | | | 5 | 3 | 3 | | 3 | 2 | | 5 | 2 | | | | | 5 | | 2 | | 5 | 6.0 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, pd-soil distribution complexity, id-internal drainage, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, r-rockiness/stoniness, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage.

**APPENDIX VII** (CONT.)

| | Land Resource Data | | | | | Common Limitations | | | | | | | | Sugar-Cane(S) | | | | | | Maize(Mz) | | | | | | | Rice(R) Limitations | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | pd | id | g | w | e | ss | r | p | t | so | sa | Suit. ! S ! | ps | t | r | p | so | sa | Suit. ! Mz! | n | sa | so | ss | r | t | g | dd | pd | Suit. ! R ! | Area ha |
| 246 | N | 2Dya | 2Dda | | 2Dyb | 3 | 3 | | 3 | | | | | | 3 | 2 | 2 | | ! 3 ! | 3 | 2 | | 3 | 3 | | ! 3 ! | 3 | | 2 | | | 3 | | | | ! 3 ! | 28.4 |
| 247 | N | 6Dba | 6Dbd | | | 2 | 3 | 3 | 3 | | | 4 | | | 2 | 5 | 2 | | ! 5 ! | 2 | 5 | | 2 | 3 | | ! 5 ! | 2 | | 2 | | | 5 | | 3 | | ! 5 ! | 1.1 |
| 248 | Y | 2Dya | 2Ugd | 40 | | 2 | 3 | | 3 | 2 | | | | | 3 | 2 | | | ! 3 ! | 3 | 2 | | 3 | 2 | | ! 3 ! | 2 | | | | | 2 | 2 | | | ! 2 ! | 2.9 |
| 249 | N | 2DbdE | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | ! 5 ! | | | | | | | | | | ! 5 ! | 4.8 |
| 250 | N | 2UgdE | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | ! 5 ! | | | | | | | | | | ! 5 ! | 2.8 |
| 251 | Y | 2Dba | 2Ddb | 45 | 2Dda | 3 | 3 | | 3 | | | | | | 3 | 2 | 4 | 2 | ! 4 ! | 4 | 2 | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 3 | | | | ! 4 ! | 42.3 |
| 252 | N | 6Dbh | | | | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | 2 | ! 4 ! | 4 | 3 | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 4 | | | | ! 4 ! | 6.1 |
| 253 | N | 6DygE | 6Dye | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | ! 5 ! | | | | | | | | | | ! 5 ! | 8.6 |
| 254 | N | 6Dda | | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | ! 3 ! | 3 | 2 | | 3 | 3 | | ! 3 ! | 2 | | 2 | | | 3 | | | | ! 3 ! | 9.3 |
| 255 | N | 2Dda | | | | 2 | 3 | | 3 | | | | | | 3 | | 2 | | ! 3 ! | 3 | | | 3 | 3 | 2 | ! 3 ! | 2 | | 2 | | | 2 | | | | ! 2 ! | 11.3 |
| 256 | N | 2DyaE | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | ! 5 ! | | | | | | | | | | ! 5 ! | 11.1 |
| 257 | N | 6Dyb3 | | | | 2 | 2 | 2 | 2 | | | 3 | | | 3 | 3 | | | ! 3 ! | 2 | 4 | | 3 | | | ! 4 ! | 2 | | | | | 5 | | 5 | | ! 5 ! | 0.9 |
| 258 | N | 2Dbc | | | | 2 | 3 | 3 | 3 | | | 3 | | | 2 | 3 | 2 | | ! 3 ! | 2 | 4 | | 2 | 3 | | ! 4 ! | 2 | | 2 | | | 5 | | 3 | | ! 5 ! | 2.4 |
| 259 | N | 2Ugd | 2Ugc | | 2Uge | 2 | | | 2 | 2 | | | | | 2 | | | | ! 2 ! | 3 | | | 3 | 2 | | ! 3 ! | 2 | | | | | | 2 | 2 | | ! 2 ! | 31.9 |
| 260 | N | 2Dba | 2Ddb | | | 3 | 3 | | 3 | | | 3 | | | 3 | 3 | 4 | 2 | ! 4 ! | 4 | 4 | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 5 | | | | ! 5 ! | 13.1 |
| 261 | N | 2Ugk | 2Uge | | | 3 | | | 2 | 2 | | | | | 2 | 2 | 2 | | ! 3 ! | 3 | 2 | | 3 | 3 | | ! 3 ! | 3 | | 2 | | | 3 | 2 | 2 | | ! 3 ! | 11.0 |
| 262 | N | 2Dyb | 2Dbb | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | ! 3 ! | 3 | 2 | | 3 | 3 | 2 | ! 3 ! | 2 | | 2 | | | 3 | | | | ! 3 ! | 15.4 |
| 263 | N | 6Dyf | | | | 2 | 3 | | 3 | | | | | | 2 | 2 | 2 | | ! 3 ! | 2 | 2 | | 2 | 3 | | ! 3 ! | 2 | | 2 | | | 3 | | 5 | 5 | ! 5 ! | 6.7 |
| 264 | N | 2Dbb | 2Dba | | | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | 2 | ! 4 ! | 3 | 3 | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 3 | | | | ! 4 ! | 10.3 |
| 265 | N | 2Dda | 2Dya | | 2Dbb | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | ! 3 ! | 3 | 2 | | 3 | 3 | 2 | ! 3 ! | 2 | | 2 | | | 3 | | | | ! 3 ! | 24.4 |
| 266 | N | 2Dba | 2Dba2 | | 2Dda | 3 | 3 | | 3 | | | 3 | | | 3 | 3 | 4 | 2 | ! 4 ! | 4 | 4 | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 5 | | | | ! 5 ! | 24.9 |
| 267 | N | 2Ugk | 2Uge | | | 3 | | | 2 | 2 | | | | | 2 | | 2 | | ! 3 ! | 3 | | | 3 | 3 | | ! 3 ! | 3 | | 2 | | | | 2 | | | ! 3 ! | 17.8 |
| 268 | N | 2Dyb | 2Dbb | | | 3 | 3 | | 3 | | | 3 | | | 3 | 3 | 3 | | ! 3 ! | 3 | 4 | | 3 | 4 | 2 | ! 4 ! | 3 | | 3 | | | 5 | | | | ! 5 ! | 9.0 |
| 269 | N | 6Dyd | | | | 2 | 2 | 2 | 2 | | | 2 | | | | 3 | | | ! 3 ! | 3 | 3 | | | | | ! 3 ! | 2 | | | | | 5 | | 5 | | ! 5 ! | 2.3 |
| 270 | N | 2Dba | | | | 3 | 3 | | 3 | | | 2 | | | 3 | 3 | 4 | 2 | ! 4 ! | 4 | 3 | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 3 | | | | ! 4 ! | 1.7 |
| 271 | N | 6UgcE | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | ! 5 ! | | | | | | | | | | ! 5 ! | 7.9 |
| 272 | Y | 2Dbb | 2Ddb | 40 | 2Dyb | 3 | 3 | | 3 | | | 3 | | | 3 | 3 | 4 | 2 | ! 4 ! | 3 | 4 | | 3 | 4 | 3 | ! 4 ! | 3 | | 4 | | | 5 | | | | ! 5 ! | 11.8 |
| 273 | N | 2Dbd | 2Dyb | | 2Dda | 2 | 3 | | 3 | | | 3 | | | 2 | 3 | 2 | | ! 3 ! | 2 | 4 | | 2 | 3 | | ! 4 ! | 2 | | 2 | | | 5 | | 3 | | ! 5 ! | 30.2 |
| 274 | N | 2Dyb | | | | 2 | 3 | | 3 | | | | | | 3 | 2 | 2 | | ! 3 ! | 3 | 2 | | 3 | 3 | 2 | ! 3 ! | 2 | | 2 | | | 3 | | | | ! 3 ! | 7.2 |
| 275 | N | 2Dda | | | | 2 | 3 | | 3 | | | 3 | | | 3 | 3 | 2 | | ! 3 ! | 3 | 4 | | 3 | 3 | 2 | ! 4 ! | 2 | | 2 | | | 5 | | | | ! 5 ! | 7.6 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, pd-soil distribution complexity, id-internal drainage, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, r-rockiness/stoniness, p-permeability, t-gradient, so-sodicity, sa-salinity, ps-soil surface conditions, dd-deep drainage.

**APPENDIX VIII** SUITABILITY OF EACH UMA FOR CAPSICUMS AND MANGOES, HAUGHTON SECTION - STAGE 1, BURDEKIN RIVER IRRIGATION AREA.

| | Land Resource Data | | | | | Capsicum(Cap) Limitations | | | | | | | | | | | | | | | Mango(Mg) Limitations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | id | ps | t | g | w | e | ss | pd | r | p | so | sa | Suit. !Cap! | so | ss | r | sa | d | id | w | Suit. !Mg ! | Area ha |
| 1 | N | 2Dyb | 2Dbb | | 2Ugi | 3 | 3 | 3 | 3 | 2 | | | 2 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 59.0 |
| 2 | N | 2Ugh | 2Ugk | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 15.6 |
| 3 | N | 2Ugg | 2Ugk | | | 2 | | 2 | 2 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 4 | 4 | 17.1 |
| 4 | N | 2Ddb | 2Dba | | 2Dyb | 3 | 3 | 3 | 4 | 4 | | | 3 | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 16.2 |
| 5 | N | 2Ugh | 2Uge | | | 3 | | 2 | 2 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 36.3 |
| 6 | N | 2Dyb | 2DbdV | | | 2 | 3 | 3 | 3 | 4 | | | 3 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 6.5 |
| 7 | Y | 2Dyb | 2Ugd | 35 | 2DycV | 2 | 3 | 3 | 3 | 3 | 2 | | 2 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 21.4 |
| 8 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 3 | | | 2 | | 2 | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 1.1 |
| 9 | N | 2Ugk | 2Dyb | | 2Ugd | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 14.6 |
| 10 | N | 2Ddb | 2Dyb | | 2Uge | 3 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 17.0 |
| 11 | N | 2Ugd | 2Uge | | 2Ugc | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 4 | 4 | 183.8 |
| 12 | N | 2Ugh | | | | 3 | | 2 | 3 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 2.1 |
| 13 | N | 2Ugk | 2Uge | | | 2 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 33.8 |
| 14 | N | 2Ugd | | | | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 4 | 4 | 6.0 |
| 15 | N | 2Dda2 | | | | 2 | 3 | 3 | 3 | 2 | | | | | 2 | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 5.4 |
| 16 | N | 2Uge2 | 2Uge | | 2Ugc | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 15.4 |
| 17 | N | 2Uge | 2Ugh | | 2Ugd | 2 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 43.7 |
| 18 | Y | 2Dyb | 2Dda | 40 | 2Ddb | 3 | 3 | 3 | 3 | 4 | | | 3 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 20.7 |
| 19 | N | 6Dyg4 | 6G | | | 2 | 3 | 5 | 3 | 2 | | | | | | | 2 | 3 | | 5 | 4 | | | | 3 | 2 | 3 | 4 | 6.0 |
| 20 | N | 2Dbc2 | 2Dbc3 | | | 2 | 3 | 3 | 3 | 2 | 3 | | | | 4 | | 2 | 3 | | 4 | 4 | | | 3 | 2 | 4 | 3 | 4 | 17.1 |
| 21 | N | 6Dyg4 | 6DbaV | | | 2 | 4 | 5 | 3 | 3 | | | 2 | | | | 2 | 3 | | 5 | 4 | | | | 4 | 2 | 2 | 4 | 12.7 |
| 22 | N | 2Dyb | | | | 2 | 3 | 3 | 3 | | | | | | 2 | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 4.1 |
| 23 | N | 2Ugg | 2Ugd | | | 2 | | 2 | 2 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 4 | 4 | 22.1 |
| 24 | N | 2Dda2 | 2Dbb2 | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 7.9 |
| 25 | Y | 2Dya | 2Dda | 40 | 2Dyb2 | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 33.5 |
| 26 | N | 6Dba | | | | 2 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 3 | 4 | 3 | 4 | 12.7 |
| 27 | N | 2Ugd2 | 2Ugd | | 2Uge2 | 2 | | 2 | 3 | | | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 3 | 4 | 28.7 |
| 28 | N | 2Dyb | | | | 2 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 2.6 |
| 29 | N | 6Dba | 6Dba3 | | 6Dyg3 | 2 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 35.3 |
| 30 | N | 2Dda2 | 2Dda | | 2Dyb2 | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 78.1 |
| 31 | N | 6Dda2 | | | | 2 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 14.7 |
| 32 | N | 6Dyg3 | 6Dyg | | 6Dyg2 | 2 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 19.2 |
| 33 | N | 6Dyj | 6Dyj2 | | 6Dyg | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 83.4 |
| 34 | N | 6Dyb2 | | | | 2 | 2 | 2 | 3 | 2 | 2 | | | | | | 2 | | | 3 | | | | | 3 | 2 | 3 | 3 | 5.0 |
| 35 | N | 6Dba | | | | 2 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 7.8 |
| 36 | N | 6Dyg | | | | 3 | 3 | 3 | 3 | | 2 | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 1.1 |
| 37 | N | 2Ugd2 | 2Ugc | | | 2 | | 2 | 3 | | 2 | 3 | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 5 | 5 | 7.9 |
| 38 | Y | 6Dye | 6Ucb | 40 | 6Dyg3 | 2 | 3 | 4 | 2 | | 2 | | | | 4 | | 2 | 4 | | 4 | 4 | | | | 2 | 4 | 3 | 4 | 18.1 |
| 39 | N | 6Dyg2 | 6Dba2 | | 6Dye | 2 | 3 | 3 | 2 | 2 | | | | | | | 2 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 10.7 |
| 40 | N | 2Dda | 2Dyb2 | | 2Ddb | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 37.3 |
| 41 | N | 6Dbh | | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 3 | 4 | 3 | 4 | 5.3 |
| 42 | N | 6Ucb | | | | 2 | 4 | 5 | 2 | | | | | | 4 | | 3 | | | 5 | | | | | 3 | 2 | 3 | 3 | 4.0 |
| 43 | N | 6Ucc | | | | 2 | 4 | 5 | | 2 | | | | | | | 3 | | | 5 | | | | | | 2 | 3 | 3 | 4.9 |
| 44 | N | 2Dyb2 | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 3 | | 3 | 4 | | | 4 | 2 | 4 | 3 | 4 | 2.0 |
| 45 | N | 2Dyb | | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 4.3 |
| 46 | Y | 2Dya2 | 2Uge2 | 35 | 2Dba | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 13.4 |
| 47 | N | 2Uge | 2UghV | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 14.8 |
| 48 | Y | 2Dda2 | 2Ddb | 30 | 2Dyb2 | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 52.4 |
| 49 | N | 2Ugh | | | | 3 | | 2 | 2 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 3.5 |
| 50 | Y | 6Dba | 6Dyj | 30 | 6Ucb3 | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 30.8 |
| 51 | N | 6Dyj2 | 6Dyj | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 15.8 |
| 52 | N | 2Ugd | | | | 2 | | 2 | 3 | | 2 | 3 | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 5 | 5 | 6.1 |
| 53 | N | 2Ugc | | | | 2 | | 2 | 3 | | 2 | 3 | | | | | 4 | 3 | | 4 | 3 | | | 2 | | 4 | 5 | 5 | 6.7 |
| 54 | N | 6Dyf | 6Dda2 | | | 2 | 3 | 3 | 2 | | | | | | | | 2 | 3 | | 3 | 4 | | | 4 | 2 | 4 | 3 | 4 | 9.4 |
| 55 | Y | 6Dda2 | 6Dyg2 | 35 | 6Dda | 2 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 13.3 |
| 56 | N | 6Dba | | | | 2 | 3 | 3 | 3 | | 2 | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 3.7 |
| 57 | N | 2Ugd | | | | 2 | | 2 | 3 | | 2 | 3 | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 5 | 5 | 2.3 |
| 58 | N | 6Dda | | | | 2 | 3 | 3 | 3 | | 2 | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 1.3 |
| 59 | N | 6Dyj | 6Dyg3 | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 4 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 15.8 |
| 60 | N | 6Dda | 6Dda2 | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 8.3 |
| 61 | N | 6Dyg2 | 6Dba | | 6Dye2 | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 15.6 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, id-internal drainage, ps-soil surface conditions, t-gradient, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, pd-soil distribution complexity, r-rockiness/stoniness, so-sodicity, sa-salinity, d-soil depth, p-permeability.

**APPENDIX VIII (CONT.)**

| | | Land Resource Data | | | | Capsicum(Cap) Limitations | | | | | | | | | | | | | | | Mango(Mg) Limitations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | id | ps | t | g | w | e | ss | pd | r | p | so | sa | Suit. !Cap! | so | ss | r | sa | d | id | w | Suit. !Mg ! | Area ha |
| 62 | N | 6Dye | 6Ucc | | | 2 | 3 | 4 | | 2 | | | | | 4 | | 4 | 4 | | 4 | 4 | | | | | 4 | 3 | 4 | 6.7 |
| 63 | N | 6Dba3 | 6Dba2 | | 6Dye3 | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 42.1 |
| 64 | N | 6Dya | | | | 2 | 3 | 4 | | | | | | | 4 | | 3 | | | 4 | | | | | | 2 | 3 | 3 | 8.4 |
| 65 | N | 2Uge | 2Dya | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 4 | 2 | 4 | 4 | 4 | 12.4 |
| 66 | N | 2Ugd | 6Dyb2 | | | 2 | | 2 | 3 | 2 | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 3 | 4 | 10.9 |
| 67 | N | 6Dyg2 | | | | 2 | 3 | 3 | 2 | 2 | | | | | 4 | | 2 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 0.8 |
| 68 | N | 2Ugk | 2Ugc | | | 3 | | 2 | 2 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 12.7 |
| 69 | N | 6Dda | 6Dba3 | | 6Gna3 | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 38.7 |
| 70 | N | 6Dyj | | | | 3 | 3 | 3 | 4 | | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 0.6 |
| 71 | N | 6Dyg3 | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 2.4 |
| 72 | Y | 2Ddb | 6Ucb | 40 | 2Dbb2 | 3 | 3 | 3 | 4 | 2 | 2 | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 48.2 |
| 73 | N | 2Dda | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 2.8 |
| 74 | N | 6Dyj | | | | 3 | 3 | 3 | 3 | 2 | | | | | 4 | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 3.1 |
| 75 | N | 2Dbb | 2Dyb | | 6Dyg2 | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 17.3 |
| 76 | N | 6Dyb | | | | 2 | 3 | 2 | | | 2 | | | | | | 3 | | | 3 | | | | | | 2 | 3 | 3 | 5.5 |
| 77 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 11.6 |
| 78 | N | 6Ucb | | | | 2 | 4 | 5 | | | | | | | 4 | | 4 | | | 5 | | | | | | 2 | 3 | 3 | 4.5 |
| 79 | N | 2Dbb | 2Dyb | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 13.6 |
| 80 | N | 2Dda | 2Ddb2 | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 25.8 |
| 81 | Y | 2Ddb | 2Dda2 | 30 | 2Dba | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 35.2 |
| 82 | N | 6Dyg | | | | 3 | 3 | 3 | 3 | 2 | 2 | | | | | | 3 | 4 | | 4 | 4 | | | | 2 | 4 | 3 | 4 | 1.9 |
| 83 | N | 2Dyb | | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 7.3 |
| 84 | N | 2Uge | 2Dbe | | | 3 | | 2 | 3 | 2 | 2 | | | | | | 3 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 12.1 |
| 85 | Y | 2Ddb | 2Dda | 30 | 2Dba | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 55.7 |
| 86 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 2.1 |
| 87 | N | 6Dyb | | | | 2 | 3 | 2 | | 2 | | | | | | | 3 | | | 3 | | | | | | 2 | 3 | 3 | 4.5 |
| 88 | N | 6Dyj3 | | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 1.9 |
| 89 | Y | 2Uge | 2Dyb | 30 | | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 6.4 |
| 90 | N | 2Dba | 2DbaV | | 2Dbb | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 37.5 |
| 91 | N | 2Uge | | | | 2 | | 2 | 3 | | 2 | | | | | | 3 | 3 | | 3 | 3 | | | 3 | | 4 | 4 | 4 | 5.2 |
| 92 | Y | 2Ugk | 2Dba | 35 | | 3 | 3 | 3 | 3 | | 2 | | | | | | 4 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 4 | 4 | 5.4 |
| 93 | Y | 2Uge | 2Ugk | 40 | 2Ugd | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 47.4 |
| 94 | N | 2Ugk | 2Uge | | 2Ugg | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 23.8 |
| 95 | N | 2UgdE | | | | | | | | | | 5 | | | | | | | | 5 | | | | | | | | 5 | 1.6 |
| 96 | N | 2DbbE | | | | | | | | | | 5 | | | | | | | | 5 | | | | | | | | 5 | 3.3 |
| 97 | N | 2Dba2 | 2Dyb | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 1.5 |
| 98 | N | 2Dyb | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 10.6 |
| 99 | Y | 2Ddc | 2Ugi | 30 | 2Dbb2 | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 10.8 |
| 100 | N | 2Dyb | | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 12.0 |
| 101 | N | 2Dbb2 | 2Dyb2 | | 2Ddc | 3 | 3 | 3 | 3 | 3 | | 2 | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 21.4 |
| 102 | N | 2Ugh | | | | 3 | | 2 | 2 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 23.6 |
| 103 | N | 2DbbE | | | | | | | | | | 5 | | | | | | | | 5 | | | | | | | | 5 | 7.3 |
| 104 | N | 2Dyb | 2Dbb | | | 2 | 3 | 3 | 3 | 3 | | 2 | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 3.6 |
| 105 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 4 | | 3 | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 2.4 |
| 106 | N | 2Dbd | 2Dbe | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 2 | 4 | | 4 | 4 | | | 3 | 2 | 4 | 3 | 4 | 21.7 |
| 107 | N | 2Dba | 2Dba2 | | 2Ddb | 3 | 3 | 3 | 4 | 3 | | 2 | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 11.3 |
| 108 | N | 6Dyf3 | 6Dbd2 | | 6Dyg | 2 | 3 | 2 | 2 | 3 | | 2 | | | | | 2 | 4 | | 4 | 3 | | | | | 3 | 2 | 3 | 35.1 |
| 109 | N | 2Dyb2 | 2Dya2 | | 2Dbd2 | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 22.7 |
| 110 | N | 2Ugh | | | | 3 | | 2 | 2 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 26.9 |
| 111 | N | 2Dyb | 2Dbd | | 2Ddb | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 17.7 |
| 112 | N | 2Ugf | | | | 2 | | 2 | 3 | | 2 | | | | 2 | | 4 | 3 | | 4 | 3 | | | 2 | | 4 | 4 | 4 | 8.1 |
| 113 | N | 2Ddb | 2Dyb | | | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 8.1 |
| 114 | Y | 2Uge | 2Ugk2 | 35 | | 2 | | 2 | 3 | 2 | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 29.9 |
| 115 | Y | 2Uge | 2Dyb | 35 | 2Dyc | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 25.8 |
| 116 | N | 2Dyb | 2Dbb | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 4.1 |
| 117 | N | 2Uge | | | | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 15.4 |
| 118 | Y | 2Ugk2 | 2Uga | 40 | 2Dyb | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 32.8 |
| 119 | N | 2Ugd | 2Uge | | | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 4 | 4 | 54.7 |
| 120 | Y | 2Ugh | 2Dyb | 40 | 2Ugg | 3 | | 2 | 3 | | 2 | | | | 2 | | 4 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 4 | 4 | 12.5 |
| 121 | N | 2Dba | 2Dba2 | | 2Ddb | 3 | 3 | 3 | 4 | | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 16.5 |
| 122 | N | 2Uge | 2Ugk | | 2Dyc | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 78.9 |
| 123 | N | 2Dbb | | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 4.5 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, id-internal drainage, ps-soil surface conditions, t-gradient, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, pd-soil distribution complexity, r-rockiness/stoniness, so-sodicity, sa-salinity, d-soil depth, p-permeability.

**APPENDIX VIII (CONT.)**

| | Land Resource Data | | | | | Capsicum(Cap) Limitations | | | | | | | | | | | | | | | Mango(Mg) Limitations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | id | ps | t | g | w | e | ss | pd | r | p | so | sa | Suit. !Cap! | so | ss | r | sa | d | id | w | Suit. !Mg ! | Area ha |
| 124 | N | 2Ugh | | | | 3 | | 2 | 3 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 2.9 |
| 125 | N | 6Dba | | | | 2 | 3 | 3 | 2 | 2 | | | | | | | 2 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 15.1 |
| 126 | N | 6Dyg2 | 6Dyj2 | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 3.2 |
| 127 | N | 2UgeE | | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | | 5 | 1.6 |
| 128 | N | 2DbaE | | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | | 5 | 1.4 |
| 129 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 6.2 |
| 130 | Y | 6Dba | 6Dra2 | 40 | | 2 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 11.2 |
| 131 | N | 2Ugh | | | | 3 | | 2 | 2 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 5.7 |
| 132 | N | 2Dyb2 | 2Dyb | | 2Dbb2 | 3 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 29.9 |
| 133 | N | 2Ugh | | | | 3 | | 2 | 2 | 3 | 2 | | | | 2 | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 2.8 |
| 134 | N | 2Dya | 2Uge | | 2Dda | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 34.3 |
| 135 | N | 2Dya | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 6.9 |
| 136 | N | 6Dba2 | | | | 2 | 3 | 3 | 2 | 2 | | | | | 4 | | 2 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 1.1 |
| 137 | N | 2Dyb | 2Dbd | | | 2 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 6.9 |
| 138 | N | 6Dyb | | | | 2 | 2 | 2 | | | | | | | 4 | | 3 | | | 4 | | | | | | 2 | 3 | 3 | 1.1 |
| 139 | N | 2Dya | | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 5.8 |
| 140 | Y | 2Ugh | 2Dda | 30 | | 3 | | 2 | 3 | 2 | 2 | | | | | | 4 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 4 | 4 | 2.7 |
| 141 | Y | 2Ugh | 2Ugg | 30 | | 3 | | 2 | 2 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 37.6 |
| 142 | N | 2Uge | | | | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 3.1 |
| 143 | N | 6Dyf | | | | 2 | 3 | 3 | 2 | 2 | | | | | 4 | | 2 | 3 | | 4 | 3 | | | | | 3 | 3 | 3 | 0.9 |
| 144 | N | 2Dda | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 1.2 |
| 145 | N | 2Dyb | 2Dda | | 2Dbb | 3 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 9.9 |
| 146 | N | 6Dra2 | | | | 2 | 2 | | 2 | 2 | | | | | 4 | | 2 | | | 4 | | | | | | | 3 | 3 | 3.1 |
| 147 | N | 2Dda2 | | | | 2 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 4.2 |
| 148 | N | 6Dyb3 | | | | 2 | 3 | 2 | | 2 | | | | | | | 3 | | | 3 | | | | | | 2 | 3 | 3 | 2.2 |
| 149 | N | 6Gna2 | 6Uma2 | | | 2 | 2 | | 2 | | | | | | | | | | | 2 | | | | | | 2 | 4 | 4 | 5.1 |
| 150 | Y | 6Dba | 6Dyg | 40 | 6Dyd | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 12.6 |
| 151 | N | 6Dda | | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 2.1 |
| 152 | N | 6Dra2 | | | | 2 | 2 | | | 3 | | | 2 | | | | 2 | | | 3 | | | | | | | 2 | 2 | 3.4 |
| 153 | N | 6Dyj | | | | 3 | 3 | 3 | 4 | 3 | | | 2 | | 4 | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 0.1 |
| 154 | N | 6Dyj | | | | 3 | 3 | 3 | 4 | | | | | | 3 | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 1.4 |
| 155 | N | 6Dba2 | | | | 2 | 3 | 3 | 3 | 4 | | | 2 | | 4 | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 2.3 |
| 156 | N | 2Dbb | | | | 3 | 3 | 3 | 3 | 4 | | | 3 | | 2 | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 3.0 |
| 157 | Y | 2Dda | 2Ugk | 35 | 2Ddc | 3 | 3 | 3 | 3 | 4 | 2 | | 3 | | 3 | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 7.4 |
| 158 | N | 2Dbb | 2Dyb | | 2Dba | 3 | 3 | 3 | 3 | 4 | | | 3 | | 2 | | 3 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 18.1 |
| 159 | N | 6Dra2 | | | | 2 | 2 | | | | | | | | 4 | | 2 | | | 4 | | | | | | | 3 | 3 | 2.5 |
| 160 | N | 6Dba | | | | 2 | 3 | 3 | 2 | | | | | | 3 | | 2 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 1.7 |
| 161 | N | 2Ugk | 2Dbb | | 2Dya | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 4 | | 4 | 4 | 4 | 94.8 |
| 162 | N | 6Dye | | | | 2 | 3 | 3 | | | | | | | 4 | | 2 | 4 | | 4 | 4 | | | | | 4 | 3 | 4 | 1.4 |
| 163 | N | 6Dyj | | | | 3 | 3 | 3 | 4 | | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 14.0 |
| 164 | N | 2Dba | 2Ddb | | 2Dda | 3 | 3 | 3 | 4 | | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 24.8 |
| 165 | N | 2Ugg | | | | 3 | | 2 | 2 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 4 | 4 | 4.1 |
| 166 | N | 6Dyg | | | | 2 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 5.3 |
| 167 | N | 6Dyj | | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 5.0 |
| 168 | N | 2Uge2 | | | | 3 | | 2 | 3 | | | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 3 | 4 | 1.1 |
| 169 | N | 6Dyf | | | | 2 | 3 | 3 | 2 | | | | | | | | 2 | 3 | | 3 | 3 | | | | | 3 | 3 | 3 | 2.1 |
| 170 | Y | 6Dya | 6Dyg | 40 | 2Dbb | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 29.5 |
| 171 | N | 6Dyj | | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 4.2 |
| 172 | N | 2Dbb | 2Ddb | | | 3 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 11.2 |
| 173 | N | 6Dyg2 | | | | 3 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 8.0 |
| 174 | N | 6Dbe2 | 6Dda | | 6Dye2 | 2 | 3 | 3 | 2 | 3 | | | 2 | | | | 2 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 2 | 4 | 23.7 |
| 175 | N | 2Uge | | | | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 2.6 |
| 176 | N | 6Dyj | | | | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 4.7 |
| 177 | N | 6Ucb3 | | | | 2 | 4 | 5 | | | | | | | | | 4 | | | 5 | | | | | | 2 | 3 | 3 | 2.2 |
| 178 | N | 2Dbb | 6Dba | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 9.0 |
| 179 | N | 6Dyb | | | | 2 | 3 | 2 | | | | | | | 4 | | 3 | | | 4 | | | | | | 2 | 3 | 3 | 0.7 |
| 180 | Y | 2Ugk | 2Dyb | 35 | 2Ugc | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 4 | | | 3 | | 4 | 4 | 4 | 17.0 |
| 181 | N | 6Dba3 | | | | 2 | 3 | 3 | 3 | | | | | | | | 2 | 4 | | 4 | 4 | | | 4 | 2 | 4 | 3 | 4 | 0.8 |
| 182 | Y | 2Dbb | 2Ugk | 40 | | 3 | 3 | 3 | 3 | 2 | 2 | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 5.6 |
| 183 | N | 6Dba | | | | 2 | 3 | 3 | 3 | | | | | | 2 | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 1.6 |
| 184 | N | 2Dyb | 2Dbc | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 17.1 |
| 185 | N | 2Dda | 2Dya | | 2Ddb | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 95.6 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, id-internal drainage, ps-soil surface conditions, t-gradient, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, pd-soil distribution complexity, r-rockiness/stoniness, so-sodicity, sa-salinity, d-soil depth, p-permeability.

**APPENDIX VIII (CONT.)**

| Land Resource Data | | | | | | Capsicum(Cap) Limitations | | | | | | | | | | | | | | | Mango(Mg) Limitations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | id | ps | t | g | w | e | ss | pd | r | p | so | sa | Suit. !Cap! | so | ss | r | sa | d | id | w | Suit. !Mg ! | Area ha |
| 186 | N | 2Ugk | | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 3.3 |
| 187 | N | 6Dba2 | | | | 2 | 3 | 3 | 2 | 2 | | | | | | | 2 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 5.1 |
| 188 | N | 6Dyb2 | | | | 2 | 2 | 2 | 2 | | | | | | | | | | | 2 | | | | | | 2 | 3 | 3 | 16.2 |
| 189 | N | 6Uca | 6UcbV | | | 2 | 4 | 5 | | 2 | | | | | | | 4 | | | 5 | | | | | | 2 | 3 | 3 | 6.7 |
| 190 | N | 6Dda | | | | 2 | 3 | 3 | 3 | | | | | | | | 2 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 4.6 |
| 191 | N | 6Dyf2 | 6Uma2 | | | 2 | 3 | 3 | 2 | 2 | | | | | | | | 4 | | 4 | 4 | | | | | 3 | 3 | 4 | 8.9 |
| 192 | N | 6Dba | | | | 2 | 3 | 3 | 2 | 2 | | | | | | | 2 | 3 | | 3 | 4 | | | 4 | | 4 | 3 | 4 | 2.1 |
| 193 | N | 2Sp | | | | | | | | | | 5 | | | | | | | | 5 | | | | | | | | 5 | 1.3 |
| 194 | Y | 2Dda | 2Dyb | 45 | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 7.0 |
| 195 | N | 2Dbb | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 1.7 |
| 196 | N | 2Ugk | 2Dbc | | | 3 | | 2 | 3 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 16.0 |
| 197 | N | 2Dyb2 | 2Dyb | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 17.4 |
| 198 | N | 6DbbE | 6Dbb2 | | 6Uma | | | | | | | | 5 | | | | | | | 5 | | | | | | | | 5 | 29.1 |
| 199 | N | 2Ugd | | | | | | | | | | | | | | | | | | 4 | | | | | | | | 4 | 0.8 |
| 200 | N | 2Ugd | | | | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 4 | 4 | 2.6 |
| 201 | N | 2Dba | 2Ddb | | 2Dbb | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 21.4 |
| 202 | N | 2Ugd | | | | 2 | | 2 | 3 | 2 | 2 | | | | | | 4 | 3 | | 4 | 3 | | | | | 4 | 4 | 4 | 3.3 |
| 203 | N | 2DbaE | | | | | | | | | | | 5 | | | | | | | 5 | | | | | | | | 5 | 2.0 |
| 204 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 3 | | | 2 | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 2 | 4 | 7.5 |
| 205 | N | 2Dba | 2Dbb2 | | 2Ugk | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 25.8 |
| 206 | Y | 2Ugk | 2Dya | 45 | 2Dba | 3 | 3 | 3 | 3 | 2 | 2 | | | | | | 4 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 23.5 |
| 207 | Y | 2Ugk | 2Dbb | 35 | 2Ugk2 | 3 | | | 3 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 16.3 |
| 208 | N | 6Dba | | | | 2 | 3 | 3 | 3 | 2 | | | | | 2 | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 0.9 |
| 209 | N | 2Uge | | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 10.2 |
| 210 | N | 2Dda | 2Dba | | 6Ddb | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 12.1 |
| 211 | N | 6Dyj | | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 1.1 |
| 212 | Y | 6Ddb2 | 2Uge | 35 | 6Dyj | 3 | 3 | 3 | 3 | | 2 | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 5.2 |
| 213 | Y | 6Dyg2 | 2Uge2 | 35 | 6Dyd2 | 3 | 3 | 3 | 3 | | | | | | 3 | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 6.0 |
| 214 | N | 6Dba | 6Dyg | | | 2 | 3 | 3 | 2 | | | | | | | | 2 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 5.1 |
| 215 | N | 2Ugg | | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | | | 4 | 4 | 4 | 3.2 |
| 216 | N | 6Dyb | | | | 2 | 2 | 2 | 2 | 3 | | | 2 | | | | 2 | | | 3 | | | | | | 2 | 2 | 2 | 2.4 |
| 217 | Y | 2Ugk | 2Ugh | 45 | 2Ugg | 3 | | 2 | 3 | 2 | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 31.9 |
| 218 | N | 2Dba | 2Ddb | | | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 4.9 |
| 219 | N | 2Ugh | | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 26.5 |
| 220 | Y | 2Dbb | 2Ugk | 40 | 2Ddb | 3 | 3 | 3 | 3 | 2 | 2 | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 32.4 |
| 221 | N | 6Dyj | | | | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 3.8 |
| 222 | N | 2Dya | 2Dbb | | 2Ddb | 3 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 18.9 |
| 223 | Y | 2Dya | 2Ugk | 40 | 2Dbb | 3 | 3 | 3 | 3 | | 2 | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 50.0 |
| 224 | N | 6Dyb | 6Dya | | 6Dba | 2 | 3 | 2 | | 2 | | | | | 3 | | 3 | | | 3 | | | | | | 2 | 3 | 3 | 14.0 |
| 225 | Y | 2Dya | 2Dda | 35 | 2Ddb | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 217.9 |
| 226 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 7.8 |
| 227 | N | 2Dda | | | | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 9.0 |
| 228 | N | 2Uge | 2Ugc | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | 4 | 3 | | | 3 | | 4 | 4 | 4 | 22.6 |
| 229 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 3 | 4 | 4.9 |
| 230 | N | 6Dyb | | | | 2 | 2 | 2 | 2 | 2 | | | | | 3 | | 2 | | | 3 | | | | | | 2 | 3 | 3 | 2.0 |
| 231 | Y | 2Ugd | 2Dyb | 40 | 2Ugc | 2 | | 2 | 3 | 3 | | | 2 | | 2 | | 4 | 3 | | 4 | 3 | | | | | 4 | 2 | 4 | 9.5 |
| 232 | N | 6Dda2 | 6Gnb | | | 2 | 3 | 3 | 3 | 2 | | | | | 2 | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 2.7 |
| 233 | N | 2Uge | 2Dbc | | 6Dyd | 3 | | 3 | 3 | | 2 | | | | | | 3 | 3 | | 3 | 4 | | | 3 | | 4 | 4 | 4 | 11.3 |
| 234 | N | 6Dyb | 2Dda | | | 2 | 2 | 2 | 2 | 3 | | | | | | | 2 | | | 3 | | | | | | 2 | 2 | 2 | 4.6 |
| 235 | Y | 2Dyb | 2Ugk | 35 | 2Dbd | 3 | 3 | 3 | 3 | 2 | 2 | | | | 2 | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 4 | 4 | 43.8 |
| 236 | Y | 2Dba | 2Ugk | 35 | | 3 | 3 | 3 | 3 | 2 | | | | | 2 | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 4 | 4 | 6.8 |
| 237 | N | 6Dyg | | | | 2 | 3 | 3 | 2 | 2 | | | | | | | 2 | 3 | | 3 | 4 | | | 4 | | 4 | 3 | 4 | 9.0 |
| 238 | N | 2Dya2 | | | | 2 | 3 | 3 | 3 | 2 | | | | | 3 | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 2.6 |
| 239 | Y | 2Dbb | 6Dye | 40 | | 2 | 3 | 3 | 3 | 2 | | | | | 3 | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 7.8 |
| 240 | Y | 2Dba | 6Dyb2 | 45 | 6Dye2 | 3 | 3 | 3 | 3 | 4 | | | | | 4 | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 2 | 4 | 12.9 |
| 241 | N | 2Dda | 2Dba | | | 3 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | 2 | 4 | 4 | | | 4 | | 4 | 2 | 4 | 6.6 |
| 242 | N | 6Dyb | 6Dya | | | 2 | 3 | 2 | 2 | 3 | | | | | 3 | | 3 | | | 3 | | | | | | 2 | 2 | 2 | 6.6 |
| 243 | N | 2Dba | 2Ddb | | 2Dyb | 3 | 3 | 3 | 4 | 3 | | | 2 | | | | 3 | 4 | 3 | 4 | 4 | | | 4 | | 4 | 2 | 4 | 29.9 |
| 244 | N | 6Dye | | | | 2 | 3 | 3 | | 3 | | | 2 | | 4 | | 3 | 3 | | 4 | 4 | | | | | 4 | 2 | 4 | 4.9 |
| 245 | N | 2Ugd | | | | 2 | | 2 | 3 | 3 | | | 5 | | | | 4 | 3 | | 5 | 3 | | | | | 4 | 2 | 5 | 6.0 |
| 246 | N | 2Dya | 2Dda | | 2Dyb | 3 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | 4 | 4 | | | 4 | | 4 | 3 | 4 | 28.4 |
| 247 | N | 6Dba | 6Dbd | | | 2 | 3 | 3 | 2 | 5 | | | 4 | | 3 | | 2 | 4 | | 5 | 4 | | | 4 | | 4 | | 4 | 1.1 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, id-internal drainage, ps-soil surface conditions, t-gradient, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, pd-soil distribution complexity, r-rockiness/stoniness, so-sodicity, sa-salinity, d-soil depth, p-permeability.

APPENDIX VIII (CONT.)

| | Land Resource Data | | | | | Capsicum(Cap) Limitations | | | | | | | | | | | | | | | Mango(Mg) Limitations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UMA | C | Dom.ST | ST2 | %ST2 | ST3 | n | m | id | ps | t | g | w | e | ss | pd | r | p | so | sa | Suit. !Cap! | so | ss | r | sa | d | id | w | Suit. !Mg ! | Area ha |
| 248 | Y | 2Dya | 2Ugd | 40 | | 2 | 3 | 3 | 3 | 2 | 2 | | | | | | 3 | 3 | | ! 3 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 2.9 |
| 249 | N | 2DbdE | | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | | ! 5 ! | 4.8 |
| 250 | N | 2UgdE | | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | | ! 5 ! | 2.8 |
| 251 | Y | 2Dba | 2Ddb | 45 | 2Dda | 3 | 3 | 3 | 4 | 2 | | | | | | | 3 | 4 | 3 | ! 4 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 42.3 |
| 252 | N | 6Dbh | | | | 3 | 3 | 3 | 4 | 3 | | | 2 | | | | 3 | 4 | | ! 4 ! | 4 | | | 4 | | 4 | 2 | ! 4 ! | 6.1 |
| 253 | N | 6DygE | 6Dye | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | | ! 5 ! | 8.6 |
| 254 | N | 6Dda | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | ! 4 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 9.3 |
| 255 | N | 2Dda | | | | 2 | 3 | 3 | 3 | | | | | | | | 3 | 4 | | ! 4 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 11.3 |
| 256 | N | 2DyaE | | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | | ! 5 ! | 11.1 |
| 257 | N | 6Dyb3 | | | | 2 | 2 | 2 | 2 | 4 | | | 3 | | 2 | | 3 | | | ! 4 ! | | | | | 2 | 2 | | ! 2 ! | 0.9 |
| 258 | N | 2Dbc | | | | 2 | 3 | 3 | 2 | 4 | | | 3 | | 3 | | 2 | 4 | | ! 4 ! | 4 | | | 3 | | 4 | 2 | ! 4 ! | 2.4 |
| 259 | N | 2Ugd | 2Ugc | | 2Uge | 2 | | 2 | 3 | | 2 | | | | | | 4 | 3 | | ! 4 ! | 3 | | | | | 4 | 4 | ! 4 ! | 31.9 |
| 260 | N | 2Dba | 2Ddb | | | 3 | 3 | 3 | 4 | 4 | | | 3 | | | | 3 | 4 | 3 | ! 4 ! | 4 | | | 4 | | 4 | 2 | ! 4 ! | 13.1 |
| 261 | N | 2Ugk | 2Uge | | | 3 | | 2 | 3 | 2 | 2 | | | | | | 4 | 4 | | ! 4 ! | 3 | | | 3 | | 4 | 4 | ! 4 ! | 11.0 |
| 262 | N | 2Dyb | 2Dbb | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | ! 4 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 15.4 |
| 263 | N | 6Dyf | | | | 2 | 3 | 3 | 2 | 2 | | | | | | | 2 | 4 | | ! 4 ! | 4 | | | | | 3 | 3 | ! 4 ! | 6.7 |
| 264 | N | 2Dbb | 2Dba | | | 3 | 3 | 3 | 3 | 3 | | | 2 | | | | 3 | 4 | 2 | ! 4 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 10.3 |
| 265 | N | 2Dda | 2Dya | | 2Dbb | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | ! 4 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 24.4 |
| 266 | N | 2Dba | 2Dba2 | | 2Dda | 3 | 3 | 3 | 4 | 4 | | | 3 | | | | 3 | 4 | 3 | ! 4 ! | 4 | | | 4 | | 4 | 2 | ! 4 ! | 24.9 |
| 267 | N | 2Ugk | 2Uge | | | 3 | | 2 | 3 | | 2 | | | | | | 4 | 4 | | ! 4 ! | 3 | | | 3 | | 4 | 4 | ! 4 ! | 17.8 |
| 268 | N | 2Dyb | 2Dbb | | | 3 | 3 | 3 | 3 | 4 | | | 3 | | | | 3 | 4 | | ! 4 ! | 4 | | | 4 | | 4 | 2 | ! 4 ! | 9.0 |
| 269 | N | 6Dyd | | | | 2 | 2 | 2 | 3 | 3 | | | 2 | | 2 | | | | | ! 3 ! | | | | | | 2 | 2 | ! 2 ! | 2.3 |
| 270 | N | 2Dba | | | | 3 | 3 | 3 | 4 | 3 | | | 2 | | | | 3 | 4 | 3 | ! 4 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 1.7 |
| 271 | N | 6UgcE | | | | | | | | | | | 5 | | | | | | | ! 5 ! | | | | | | | | ! 5 ! | 7.9 |
| 272 | Y | 2Dbb | 2Ddb | 40 | 2Dyb | 3 | 3 | 3 | 3 | 4 | | | 3 | | | | 3 | 4 | 2 | ! 4 ! | 4 | | | 4 | | 4 | 2 | ! 4 ! | 11.8 |
| 273 | N | 2Dbd | 2Dyb | | 2Dda | 2 | 3 | 3 | 2 | 4 | | | 3 | | | | 2 | 4 | | ! 4 ! | 4 | | | 3 | | 4 | 2 | ! 4 ! | 30.2 |
| 274 | N | 2Dyb | | | | 2 | 3 | 3 | 3 | 2 | | | | | | | 3 | 4 | | ! 4 ! | 4 | | | 4 | | 4 | 3 | ! 4 ! | 7.2 |
| 275 | N | 2Dda | | | | 2 | 3 | 3 | 3 | 4 | | | 3 | | | | 3 | 4 | | ! 4 ! | 4 | | | 4 | | 4 | 2 | ! 4 ! | 7.6 |

C-Complex, ST-Soil Type, n-fertility, m-plant water availability, id-internal drainage, ps-soil surface conditions, t-gradient, g-microrelief, w-wetness, e-erosion, ss-secondary salinisation, pd-soil distribution complexity, r-rockiness/stoniness, so-sodicity, sa-salinity, d-soil depth, p-permeability.