3.1.6.2 THE UPPER ROAD CUTTING

The upper road cutting (GR.435310, Royal Australian Survey Corps [ed.1] 1973, sheet 8124 series R652 topographic map 1:100.000) is about 500 m N from the lower road cutting along the Whitfield-Whitlands road. This cutting is at an elevation of about 600 m and represents about 21 m of section. The exact relationship between the lower section and this upper section is not at all clear except to say the same units do not appear in both nor do they appear to be a lateral variation of each other. There does not appear to be any evidence of faulting in the area between the two cutting and it therefore seems reasonable to assume the upper cutting is stratigraphically above the lower. The early form of the upper cutting is shown in plates 28, p.112; 29, p.113 and 30, p.114. The division of the sections into units is a rather awkward exercise: bedding is difficult to recognise, textural variation is not always distinct and the early surface was somewhat weathered. The second more recent form of the cutting is clearly shown by the stereoscopic mosaic (Plates 31.1 to 31.5, p.115. The cutting was relatively fresh when the photographs were taken but it is nevertheless influenced by the effects of weathering induced colour layering. The units which make up the upper section were constructed using features which appeared both on the colour mosaic and the black and white photographs assisted with field experience and detailed colour prints.

The lowermost unit from this cutting was bulk sampled and the heavy minerals removed by hand panning (sample 77/31). The sample was taken from the location indicated on plate 28, p.112. The lowermost unit is about 3m thick and is texturally a gravelly muddy sand . This unit grades into about 8 m of rather more massive sediment which is texturally closer to muddy sandy gravel than gravelly muddy sand. There

Plate 28 Early form of the Whitfield - Whitlands upper road cutting

Plate 28 Early form of the Whitfield - Whitlands upper road cutting

Plate 28 Early form of the Whitfield - Whitlands upper road cutting

Plate 29 Early form of the Whitfield - Whitlands upper road cutting

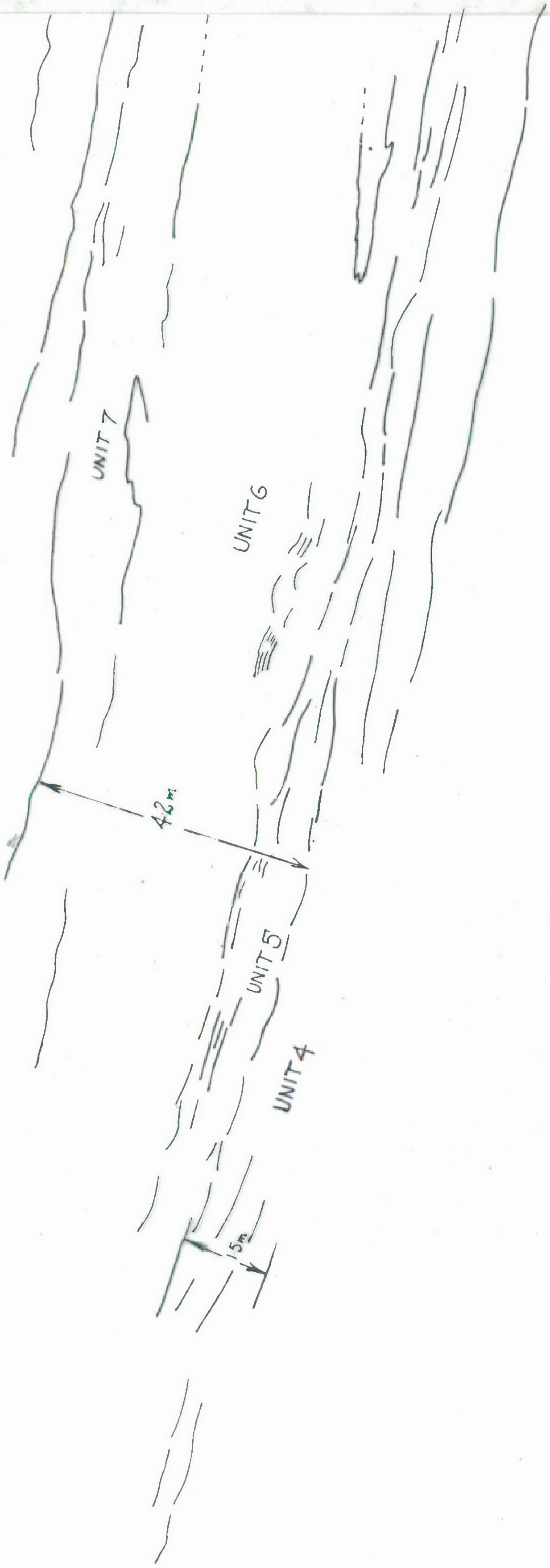

Plate 29 Early form of the Whitfield - Whitlands upper road cutting

Plate 29 Early form of the Whitfield - Whitlands upper road cutting

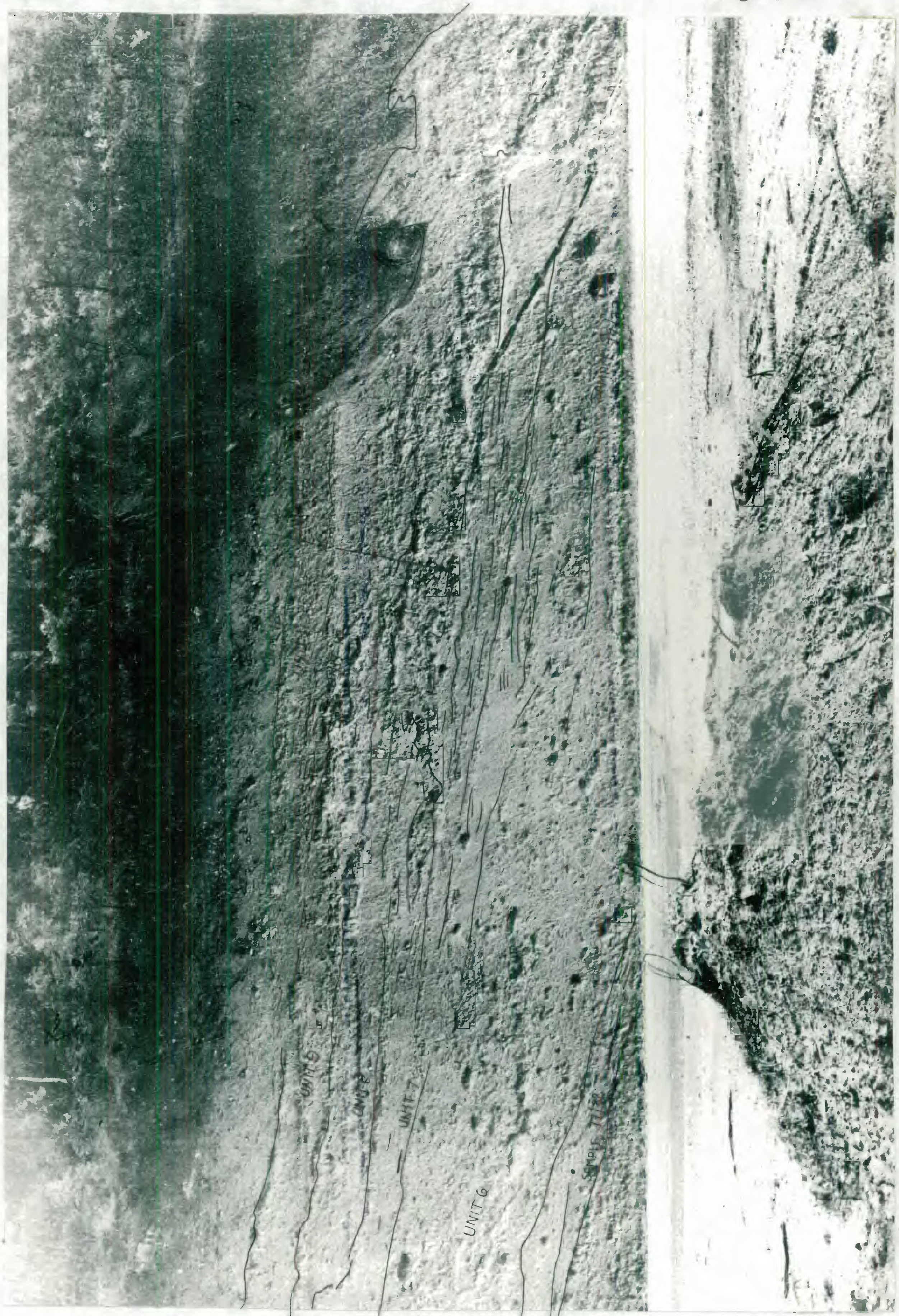

Plate 30 Early form of the Whitfield - Whitlands upper road cutting

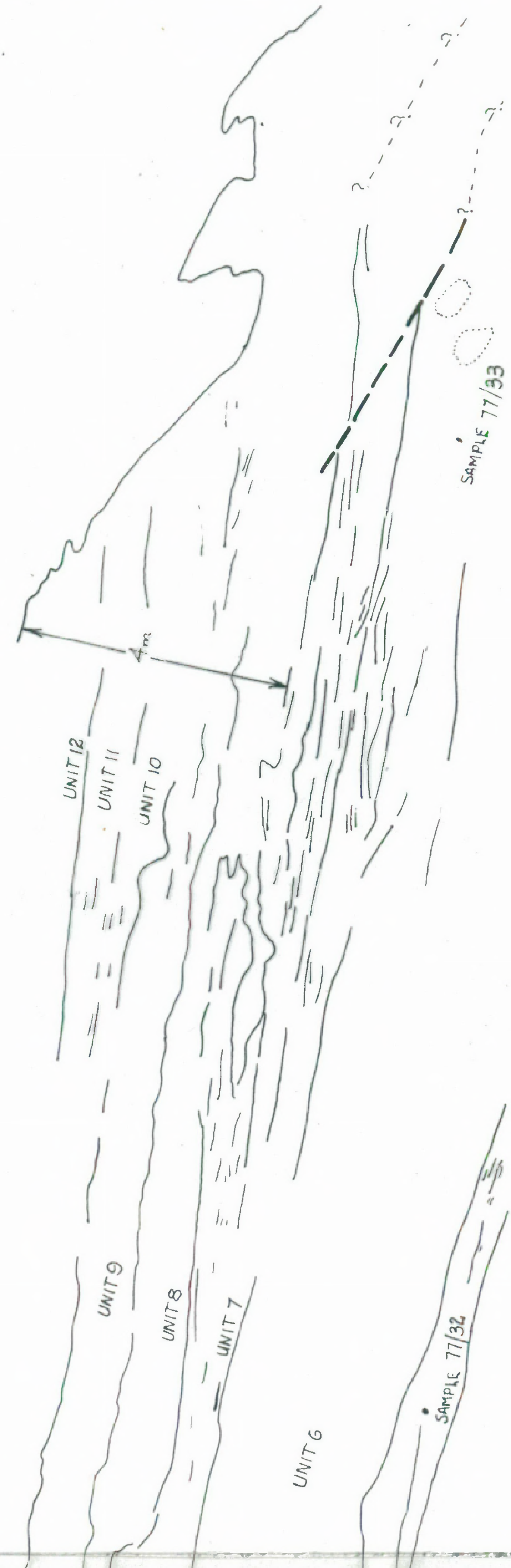

Plate 30 Early form of the Whitfield - Whitlands upper road cutting

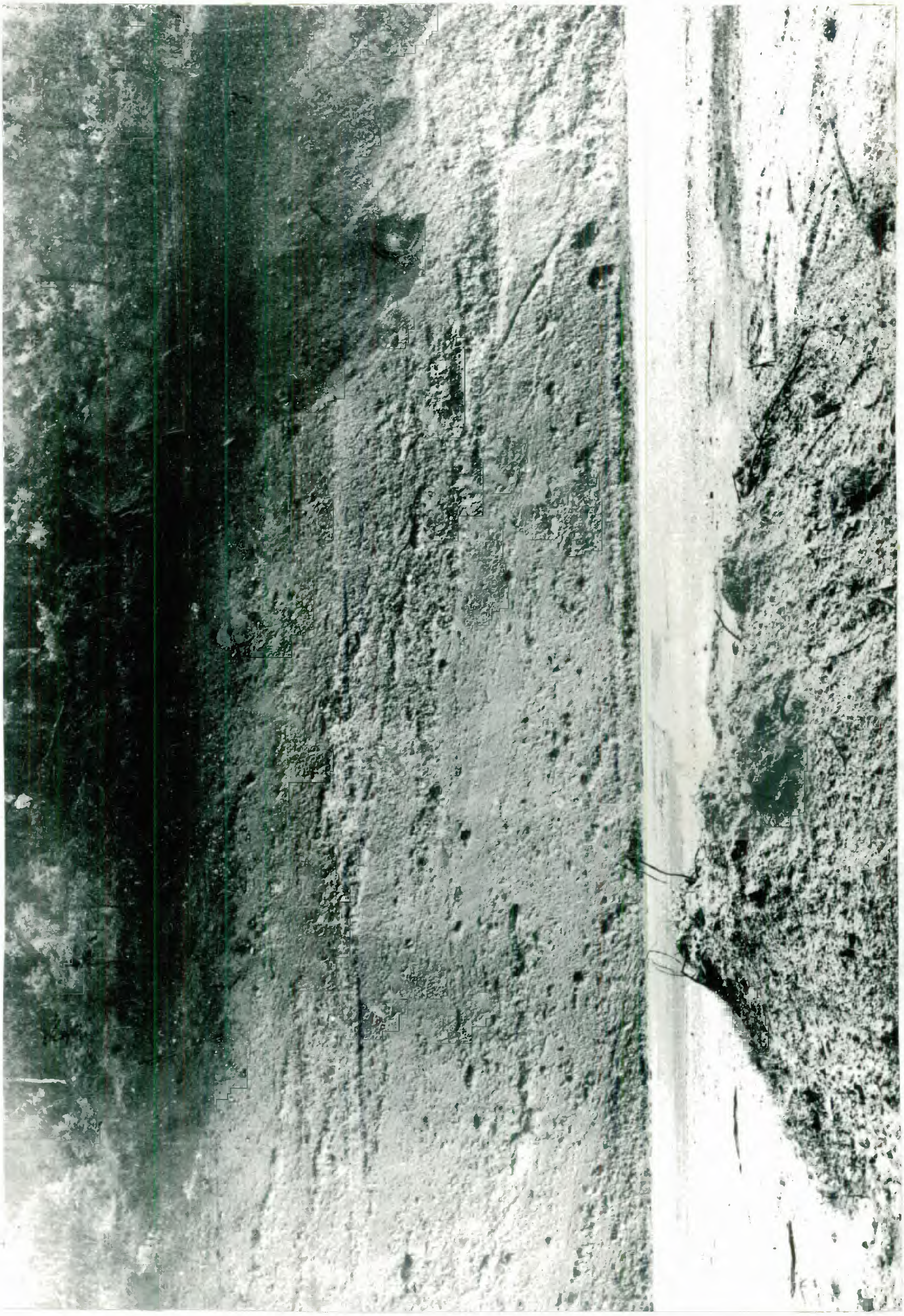

Plate 30 Early form of the Whitfield - Whitlands upper road cutting

Plates 31.1 to 31.5 A five part stereoscopic mosaic of a recent face of the Whitfield - Whitlands upper road cutting (GR.435310, RAS, sheet 8124, 1973, 1:100 000).

are some vague indications of layering in the unit as indicated in plate 28, p.112. This layering appears to be more easily recognised from photographs than at the outcrop. The next definable unit is about 1.5 m thick and is separated on the basis of the presence of sandy lenses and a general increase in the proportion of sand within the matrix. Directly above that unit is another richly sandy unit which is about 1 m thick. It is traceable across the entire section and is indicated on plate 29, p.113 as unit five; sample 77/32 represents the unit. Unit six consists of about 2.5 m of muddy sandy gravel with occassional sandy patches; some vaguely lensoidal. Directly overlying this is the seventh unit which consists of between 1 m and 2 m of slightly gravelly muddy sand. The unit thickens to the N end of the section and appears to be intercalated with the upper eighth unit consisting of muddy sandy gravel. The eighth unit varies in thickness from about 0.5 m to about 1 m. The ninth unit is more clearly defined on the photographs and is about 1 m thick with only slightly undulose upper and lower boundaries: variations are only between 10 cm and 20 cm. Unit nine appears to be a little more gravelly than unit eight. Units ten, eleven and twelve are much the same texturally and are basically similar to unit eight: muddy sandy gravel. These upper three units are each about 0.75 m thick. The upper boundary of the twelvth unit is not clearly defined because it merges into the soil profile which has developed from the weathering of overlying Tertiary basalts. The upper surface of the section has the appearance of an irregular erosion surface; this is best displayed in plate 30, p.114 and even more strikingly in the colour stereoscopic mosiac p.115 where the N end of the section has the appearance of the side of a channel.

3.1.6.3 THE MYRRHEE ROAD CUTTING

The final cutting in this area is about 400 m along the Myrrhee Road (GR.436306, same map) at an elevation of about 560 m. As previously stated, the deposit is very weathered and is texturally very similar to a pebbly cobbly sandy clay but still shows a rather crude pebble long axes alignment N. The section is between 1 m and 2 m high; the upper surface merges with the basaltic derived soils above. The approximate elevation suggests it could be related to the lower cutting along the Whitfield-Whitlands road but since there is no substantial evidence to link the two it remains a matter of speculation.

3.2 TRACTION CURRENT DEPOSITS

3.2.1 INTRODUCTION

Not all the northeastern Permian deposits investigated are diamictites (perhaps tillites). Some are best explained as traction current deposits perhaps even associated with an ablation phase where perhaps flow-tills (Boulton, 1968; Lawson, 1982), proglacial streams and lakes have developed. Deposits with a traction current character are shown in the road cuttings near Whitfield and Whitlands, close to the Myrrhee road (see earlier discussion chapter 3), near the glacial pavement SW of Moyhu, and in the Wooragee Valley near Beechworth.

The traction current character of these deposits is shown by bedding, cross-stratification, upward fining graded bedding, small scour structures, ripple marks and erosion channels.

3.2.2 <u>THE LOWER ROAD CUTTING</u> (PLATES 25, 26 AND 27)

In the lower road cutting (defined p.100) cross-stratified sandy traction current beds (units 4 to 12) unconformably overlie diamictite (units 1 to 3). The base of unit 4 (unconformity surface S_1) is irregular with a relative relief of about 1 m and is outlined by cobbles and boulders 100 mm to 1500 mm across. Unit 4 shows cross-stratification but is dominated by laminar bedding toward the top (see plates 25, p.106; 26, p.107 and 27, p.108 and descriptions p.100 to 110. Compaction(?) induced draped and deformed lamination present in unit 4 is not seen in other units. Unit 5 and 6 may be part of unit 4 but the exposure is not sufficiently clear to be sure, so they are treated separately.

An erosional surface S_2 outlined by cobbles and boulders of between 500 mm and 1500 mm across cuts across units 4, 5 and 6. The cobbles and boulders are enclosed at the base of a friable sandstone (unit 7) that overlies S_2, which shows only the faintest planar lamination, (see plates 25, 106 and 27, p.108).

Unit 7 is separated from unit 8 (a granule rich pebbly siltstone) by a surface S_3 which lacks the pebble and cobble armour of S_1 and S_2 but has a marked relative relief of about 0.5 m to 1 m over a short distance.

Unit 8 is separated from unit 9 by another surface, S_4. The origin of surfaces S_3 and S_4 is uncertain. Neither shows the degree irregularity of S_1 nor the degree of regularity of S_2, and in plates 25, p.106 and 27, p.108 both look like deformation surfaces rather than a fluvial erosion surfaces.

Unit 9 appears to be related texturally to units 1 to 3 (diamictites) but without the same ill-defined layering. The simplest explanation is that it is an atypical traction current deposit; but it is more likely an intercalated diamictite. In general, for units 4 to 12 (excluding 9), the textural and sedimentary features point to traction current deposition rather than directly from ice.

3.2.3 THE UPPER ROAD CUTTING

Traction current characteristics are also present in the upper road cutting. Bedding is rudimentary with both open and closed framework conglomeratic beds intercalated by sandy beds and lenses (see plates 28, p.112; 29, p.113; 30, p.114; 31.1 to 31.5, p.115, as well as descriptions p.111 to 116). The textural character and sedimentary structures all point to a traction current environment even though clasts from unit 4 are identified as derived from basal and englacial ice transport zones (see later discussion chapter 6).

3.2.4 THE MYRRHEE ROAD CUTTING

The remaining road cutting along the Myrrhee road is not a matter for straightforward interpretation because exposure is even more retricted than for other cuttings. A rough pebble fabric is visible and the deposit contains a wide range of particle sizes. No bedding, sandy lenses or boulders are present. This sediment framework is generally closed and matrix dominated. I regard the deposit as some form of tillite rather than a traction current deposit.

3.2.5 NEAR THE MOYHU PAVEMENT

In the vicinity of the Moyhu pavement (see p.82) cross-stratified siltstones rest unconformably on Carboniferous basement and are overlain by cross-stratified sandstones. South of the pavement a diamictite overlies the concealed southerly extension of the pavement. North of the pavement, siltstones rest unconformably on basement and are again overlain by diamictite . The outcrops are rather small and weathered.

East of the pavement, pebbly cross-stratified siltstones (with some contorted lamination) are interbedded with thin mudstones (some vaguely varved) (see descriptions p.105), which contain asymmetrical ripple marks. These eastern deposits are separated from the deposits to the west by a ridge of Carboniferous sandstone.

3.2.6 THE WOORAGEE VALLEY

Traction current deposits also occur in the Wooragee Valley near Beechworth and consist of cross-stratified sandstones and siltstones. These deposits are interbedded with diamictites (about five units in the Magpie Creek section). In addition to the diamictites, there are other units with a wide range of grain sizes, but these are called conglomerates or sandstones because of the presence of cross-stratification or some other ill-defined sedimentary structure which precludes the use of the term diamictite. The sandstones and conglomeratic beds belong to a traction current facies but the diamictites are probably tillites.

3.2.7 CONCLUSIONS

The field relationships, with interbedded traction current strata and diamictites suggest, if the diamictites are tillites,an environment close to a wasting ice front where tills have been preserved between fluvially reworked glacial debris.