EXCAVATION AT THE NEW BRISBANE AIRPORT SITE (LB:C69): EVIDENCE FOR EARLY MID-HOLOCENE COASTAL OCCUPATION IN MORETON BAY, SE QUEENSLAND

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INTRODUCTION

In 1980, during excavation of a floodway connected with the construction of the New Brisbane Airport, stone artefacts were observed within the sediments by Mr. Bill Ward, CSIRO Soils Division. His alerting of the state authorities led to further investigations by one of the authors (JH). Such interest was sparked by the fact that, on geomorphic grounds, the site promised an antiquity of at least 4000 years B.P. Subsequent test excavation (by JH) in 1984 yielded an in situ stone artefact assemblage with a backed blade component which was associated with an anomalous date of about 1,100 B.P. In order to resolve the problem posed by this association, further excavation was undertaken in July-August 1987 by members of the Field Archaeology class (AY225) of the University of Queensland Department of Anthropology and Sociology under the supervision of Jay Hall and Ian Lilley. This paper is a preliminary report combining findings of both excavations and offers substantive support for an early mid-Holocene Aboriginal occupation of the shores of Moreton Bay.

THE SITE AND ITS SETTING

The site is located on the eastern bank of the airport floodway on the western fringe of the tract set aside for the new Brisbane Airport (Lat. 17° 05′ S, Long. 153° 07′E). The site Datum lies at Grid Reference 093698 (Brisbane 1:50,000, Edition 1, Series 733) at the intersection of Landers Pocket Road and an airport haul road. The mouth of the Brisbane River is some 5km to the southeast and Nudgee Beach is about 5km to the north (Figure 1).

The local environment comprises a sandy flood plain of low relative relief (<3.0m a.m.s.l.) which, prior to terraforming by the Department of Transport, exhibited extensive tidal mud flats and mangroves and was often subjected to periodic inundation from the flooding of Kedron Brook and other creeks. Apart from mangroves, vegetation included various herbs and grasses as well as swamp species at lower levels while eucalypts and melaleuca dominated a sparse upper storey. Since European settlement the environment area has been extensively modified, mainly by dairying and mixed farming. In fact, the LB:C69 site lies under now-demolished outbuildings of a former dairy farm. In more recent years, roads, light industry, sewage treatment plants and the Brisbane Airport have significantly affected the original environment.

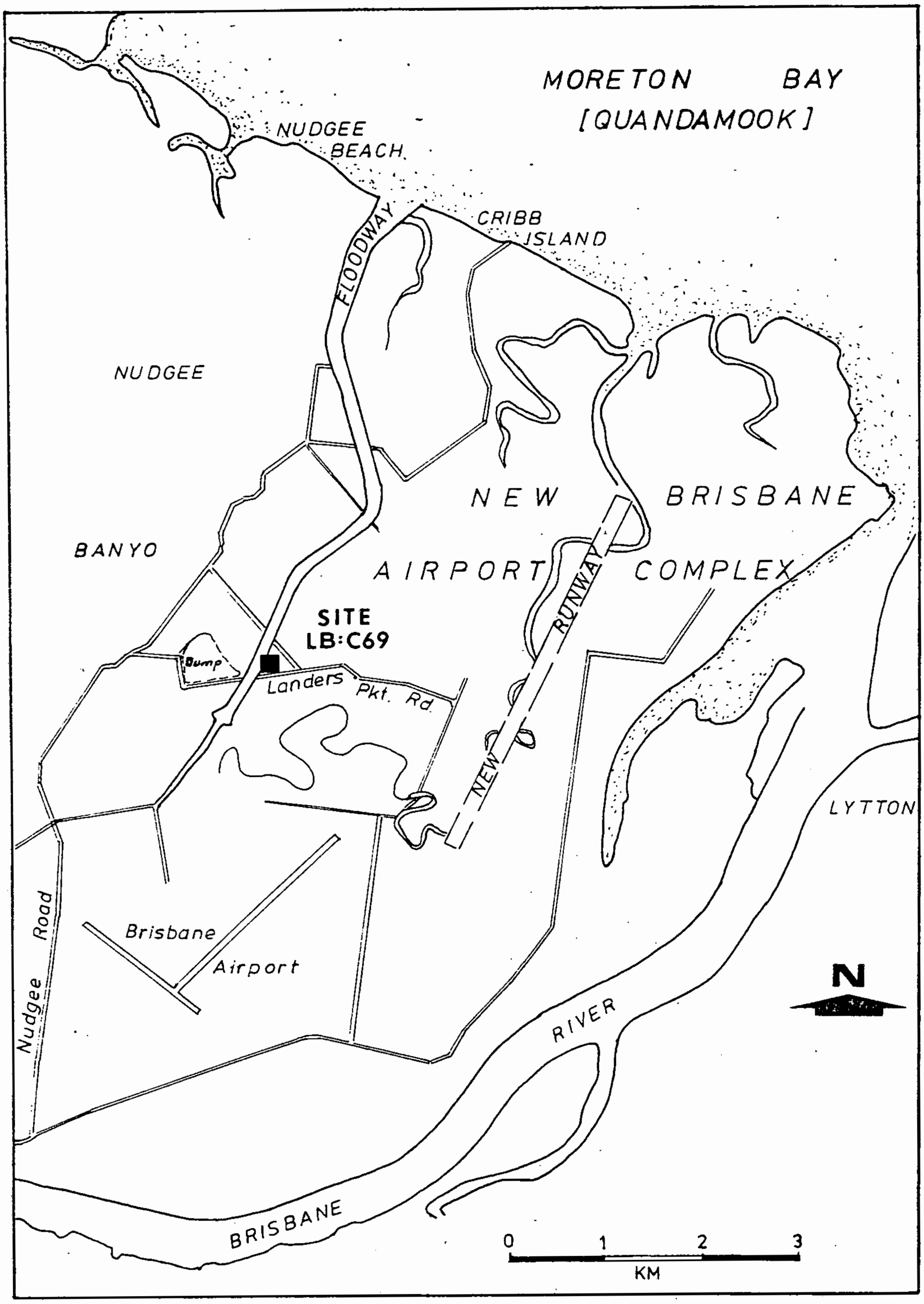

Figure 1. Map of the study area showing location of LB:C69.

Paleoenvironment

Research by Ward and Hacker (1982 and ms. in prep.) into sedimentation and soil development in the Brisbane Airport locality has revealed a number of facts relevant to our understanding of the paleoenvironmental context of LB:C69. The earthworks associated with the airport development, especially those near the new floodway at Landers Pocket, exposed sediments representing some five old ground surfaces reaching back some 7,000 years from the present to the time when Moreton Bay was being formed. This work has permitted a scenario of local sedimentary history largely influenced by changes in sea level during the Holocene.

The post-Pleistocene marine transgression of ca. 170m which began at about 17,000 B.P. (Veeh and Veevers 1970; Flood 1983) had, by 7,230 B.P., influenced sedimentation near the site with marine and alluvial deposits being laid over the old Pleistocene surface (Ward and Hacker, in prep., p.9). This process continued until after 6,800 B.P. when the LB:C69 locality became a spit in Moreton Bay, while marine sedimentation continued until 4,150 B.P. The stratigraphic position of dated samples collected by Ward and Hacker indicate that the sea was some 1.5m higher than at present between 5,280 and 4,150 years ago. This date agrees essentially with results for the Deception Bay area (Flood 1981, 1984). At this time the sea developed a cliffed shoreline against the Pleistocene sediments from Landers Pocket to the Nudgee Golf Course to the north. Evidence for the high sea level is provided at LB:C69 by a thick (3-4m) layer of muddy marine sand lying over Pleistocene alluvium. The site actually sits on the early Holocene spit which projected southwards into Moreton Bay, on top of which a pebble beach developed. It is in the top of these marine sediments that stone artefacts are first found.

This beach was left stranded when the sea began to retreat to present levels and sandy alluvial deposits were again laid down over the marine sediments. Initially local conditions would have been estuarine with mangroves and mud-flats predominating. Although Ward and Hacker note a dating gap between the marine-associated date 4,1250 B.P. and a 1,300 B.P. midden date on the present shoreline, correlations with dates from other geomorphic (e.g. Flood 1981, 1983, 1984) and archaeological (Hall <u>et al</u> 1987) research indicate that this alluvium was probably laid down between about 3,500 and 1,500 B.P.

EXCAVATION AIMS

This piece of research was designed to answer questions about cultural and geomorphological change in the late Holocene which were generated by previous research within the Moreton Region Archaeological Project - Stage I (see Hall 1982). Recent syntheses of the archaeological record of the Moreton Bay area (e.g. Hall 1987; Walters 1987; Hall <u>et al</u> 1987) have pointed to significant changes in discard patterns in the region from about 2000 B.P. and especially after about 800 BP. Walters has argued that the intensive Aboriginal fishery which was witnessed by European colonists began at about 2000 BP and that it culminated in the historic pattern of numerous distinct Aboriginal groups with complex social linkages at about 1000 - 800 years ago. Prior to this time it is hypothesized that people lived at lower population densities and ranged more widely; albeit it is also held that coastal exploitation, including fishing was practiced since well before the rise in sea level which formed Moreton Bay (Hall and Robins

1984; Hall 1987). In order to investigate this latter proposition it was considered necessary to find and excavate coastal sites older than 2000 BP. The New Brisbane Airport site promised to provide such data since artefacts could be observed in profile lying on an old beach, which on geomorphic grounds, dates to at least 4000 years ago (Ward and Hacker - in prep.).

Another thrust of the project is the collection of a representative sample of cultural material for comparison with that collected from excavations in other parts of the Bay. Stone material was required for an analysis within a technological systems approach (see Hiscock 1986) in order to investigate possible technological and raw material shifts during the Holocene which is currently underway as a component of MRAP - Stage II.

EXCAVATION PROCEDURE

Prior to excavation an alphanumeric Site Grid was established over the site, a nail set in a nearby power pole serving as an elevation datum (+3.545m relative to the Australian Height Datum). The Site Grid was set out in 10m x10m units and labelled alphabetically from south to north and numerically from west to east. Grid units were subdivided into 50cm x 50cm units which were numbered from 1 (SW corner) to 400 (NE corner) (Figure 2). A topographic site map was drawn using a contour interval of 0.25m.

Since the site was already exposed by the cutting of the new floodway, it was not necessary to excavate to establish a site stratigraphy. Rather, the floodway bank was cleared of vegetation and subjected to detailed stratigraphic drawing and photography. In order to gain a representative sample of material from the site, four 50x50cm grid subunits were placed at intervals along the profile (M4/002-003, L4/301, L3/219, L3/138 - see Figure 2). L4/320 was the test pit excavated (by JH) in 1984.

Excavation employed a variation of the "bucket technique" developed by Johnson (1979, 1980), whereby each 10 litre bucket of sediment removed constituted one Excavation Unit (XU). As natural strata had already been established, arbitrary excavation by XU was restricted to sediments within these strata. Each of the four pits was dug by a team of two persons, one excavating while the other recorded data on forms developed by Johnson (1980:98). Artefacts and features were recorded in three dimensions. Sediment from XU's was sieved through a two nested sieves (3.0mm and 6.0mm mesh) and artefacts and other materials collected for analysis were put in sealable plastic bags and labelled according to provenance.

STRATIGRAPHY

Four major stratigraphic units (SU) were observed in the site profile exposed by floodway construction (Figure 3a-e). Two or more stratigraphic divisions were noted within each as outlined below.

STRATIGRAPHIC UNIT I - A heterogeneous set of sand and clay strata from the surface to ca. 30-40 cm depth. Upper layers are derived from adjacent canal excavation as well as the transportation of bedding materials for the haul road. The lower material, including a concrete slab, results from the siting of a dairy over the site. Thus, SUI contains artefacts from European as well as pre-European settlement. Five strata were observable in all pits, but they differed slightly in composition from one pit to another.

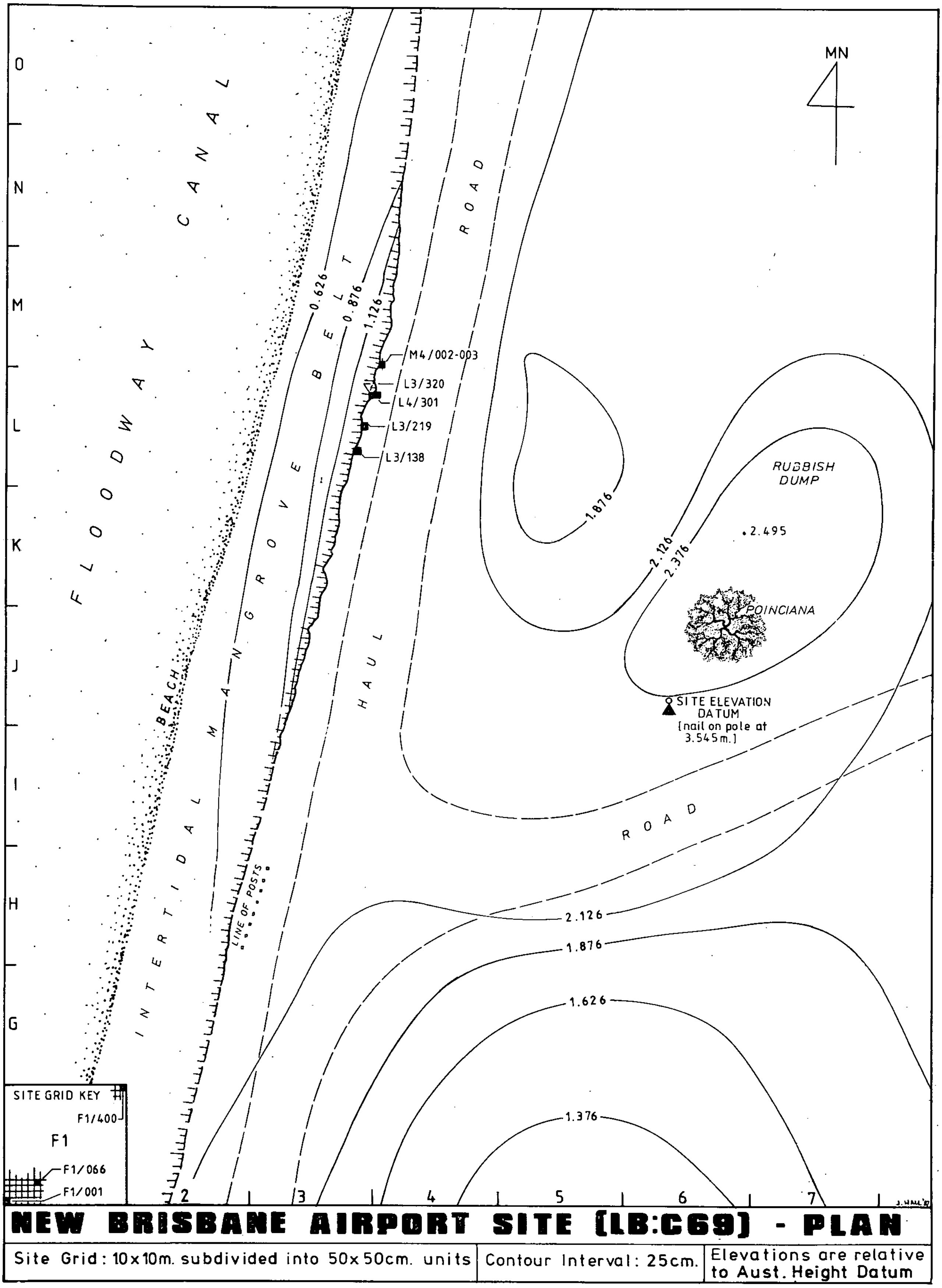

Figure 2. Site plan of LB:C69.

Stratum IA - A grey (10YR 5/2) sandy clay stratum up to ca. 10cm thick and found in all pits. It was quite compacted and contained a fairly thick root mat from grasses. A few silcrete cobbles were found in L3/138 and some shell fragments and cinders in L4/301. The pH level ranged from 5.0 to 7.5.

Stratum IB - An orange (5.7YR 6/8) sandy stratum of variable thickness (2.0 - 15cm) containing both Aboriginal and European artefacts. The pH ranged from 5.5 to 7.0.

Stratum IC - A brownish-grey (10YR 5/2) sandy clay stratum up to ca 15cm thick and containing Aboriginal and European artefacts. The pH varies between 5.5 and 8.0.

Stratum ID - A stratum of clay and sand which varies in colour and texture from one pit to another. In M4/002-003 it is a thin (3.0cm) and fine brownish (10YR 3/2) sandy deposit which by L3/320 and L4/401 grades into a ca. 9.0cm thick greyish sandy clay containing road metal and a mixture of European and Aboriginal artefacts. By L3/219 it thickens to about 12.0cm and changes to a greyish colour (5YR 4/6) and at L3/138 it changes to a more sandy and friable orange (2.5YR 4/4) sandy deposit. The pH was 5.5 to 7.0.

Stratum IE - A 10cm (av.) brown (7.5YR 3/4) sandy layer with a high density of cinders and metal, dense rootlets and a small number of silcrete cobbles and stone artefacts (pH = 7.5). In L3/320, L4/301 and L3/219 it exhibits horizontal slabs of concrete which lay on a thin bed of cinders

STRATIGRAPHIC UNIT II - A continuous and relatively homogeneous brown (10YR 4/2 to 7.5YR 4/4) fine-textured sandy matrix about 30-40cm thick which began just below the concrete slab (where this feature occurs in SUIE). The sediments are alluvial in derivation and were laid down after the sea began retreating to its present position. It exhibited both European and Aboriginal artefacts, the latter dominating in the lower half of this unit. The pH ranged from 5.5 to 6.5.

STRATIGRAPHIC UNIT III - A grey sandy clay layer ca. 30cm thick containing numerous beach-rolled pebbles and cobbles and Aboriginal artefacts. It derives from marine activity and disconforms markedly with SUII above. It is rich in Aboriginal stone artefacts. It is readily dividable into two sub-units in all pits as follows:

Stratum IIIA - A ca. 20cm (av.) layer of ironstone concretion caused by oxidation of the sulfur-rich clay matrix. The rather orange (10YR 4/2) ironstone contains numerous stone artefacts and beach-rolled cobbles as well as charcoal and pumice. L3/138 exhibited a layer of cobbles which capped this stratum (Figure 3e). The pH ranged from 5.0 to 7.0.

Stratum IIIB - A dark grey sandy clay (10YR 3/3) which has not been oxidized into ironstone which contains beach cobbles and stone artefacts, charcoal and pumice but artefacts peter out with increasing depth. It extends to the limit of excavation (high tide mark) in all but M4/002-003. The pH ranged from 5.0 to 6.0.

STRATIGRAPHIC UNIT IV- A light grey and loose marine sand layer below Unit III of unascertained thickness in M4/002-003 only. The sand becomes whiter with depth. A few stone artefacts were found in the topmost XU's.

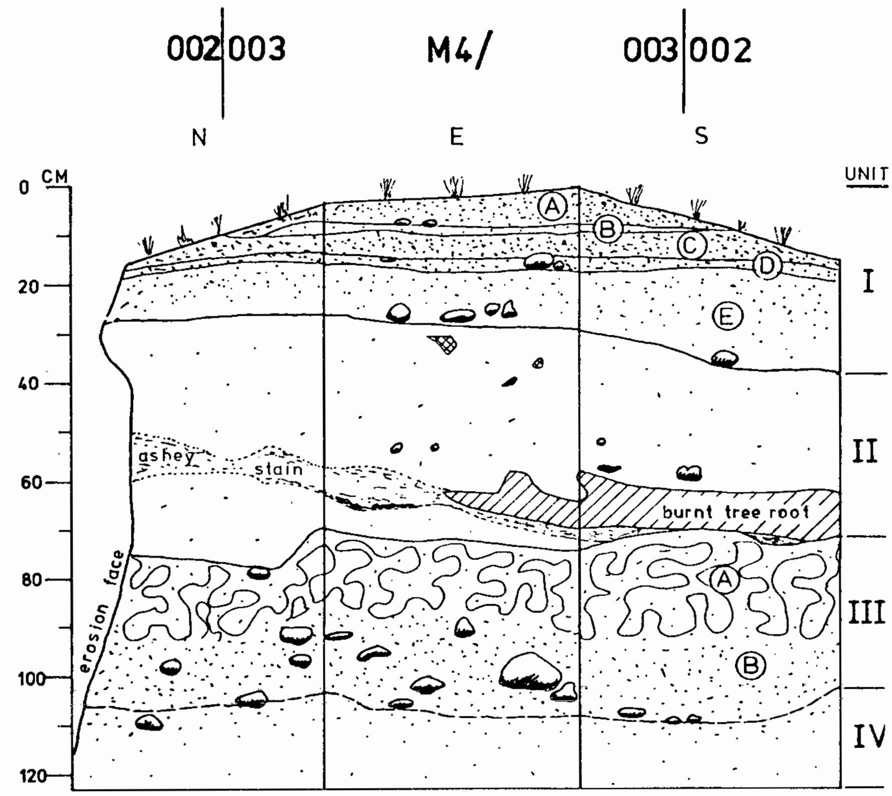

Figure 3a. Stratigraphic profile of M4/002-003

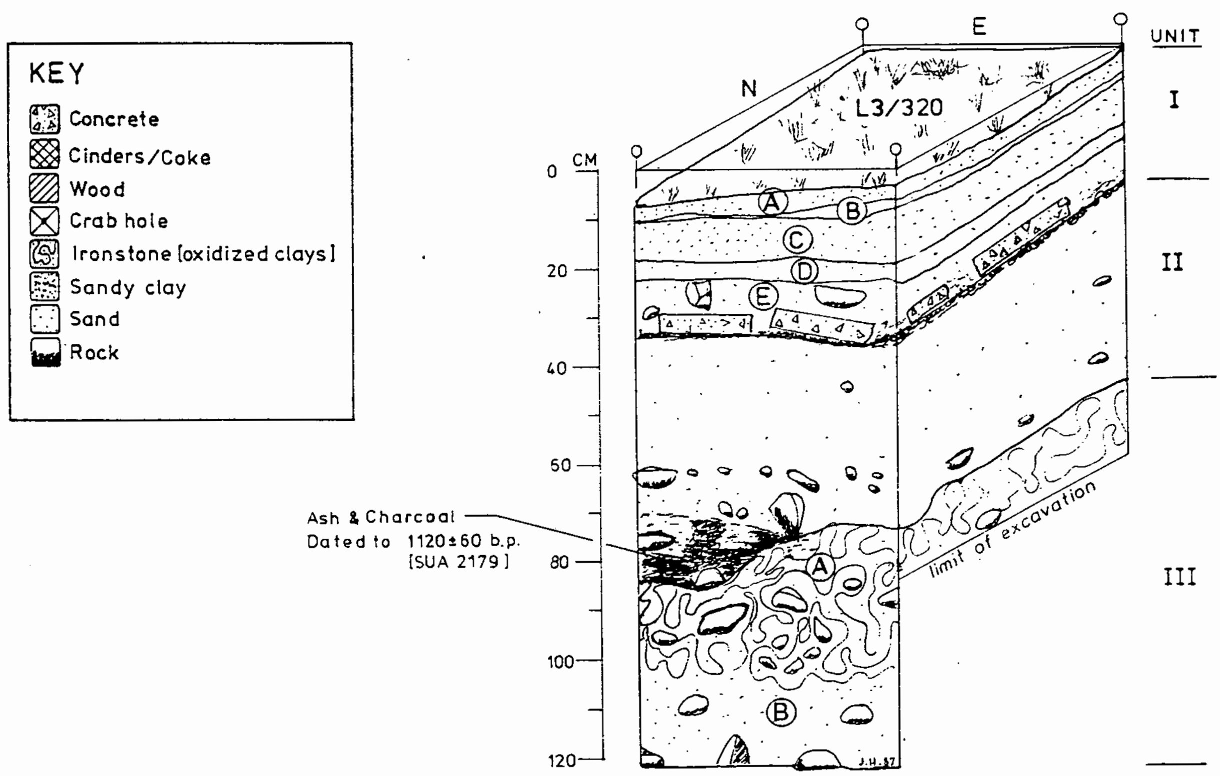

Figure 3b. Stratigraphic profile of West and South walls, L3/320

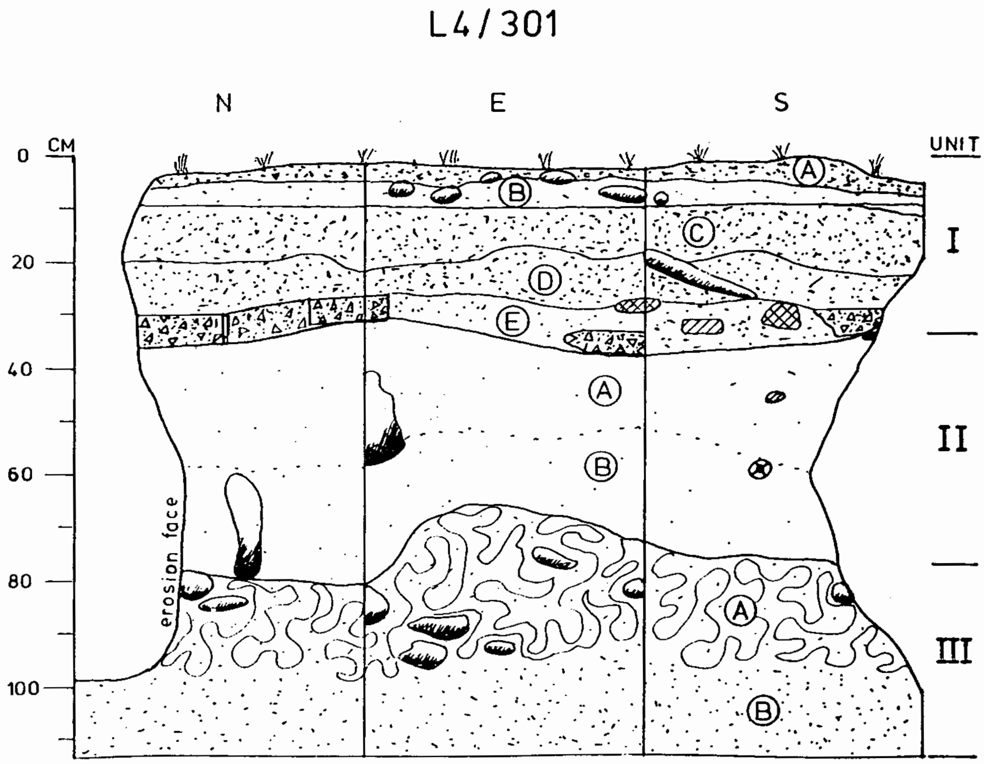

Figure 3c. Stratigraphic profile of L4/301.

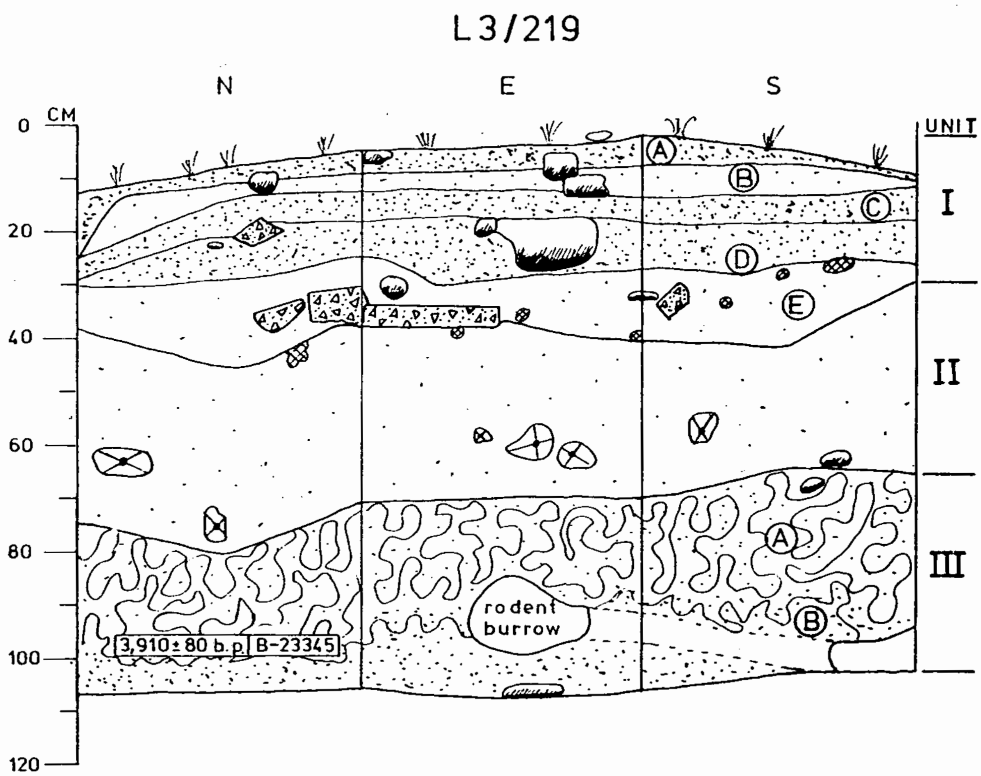

Figure 3d. Stratigraphic profile of L3/219.

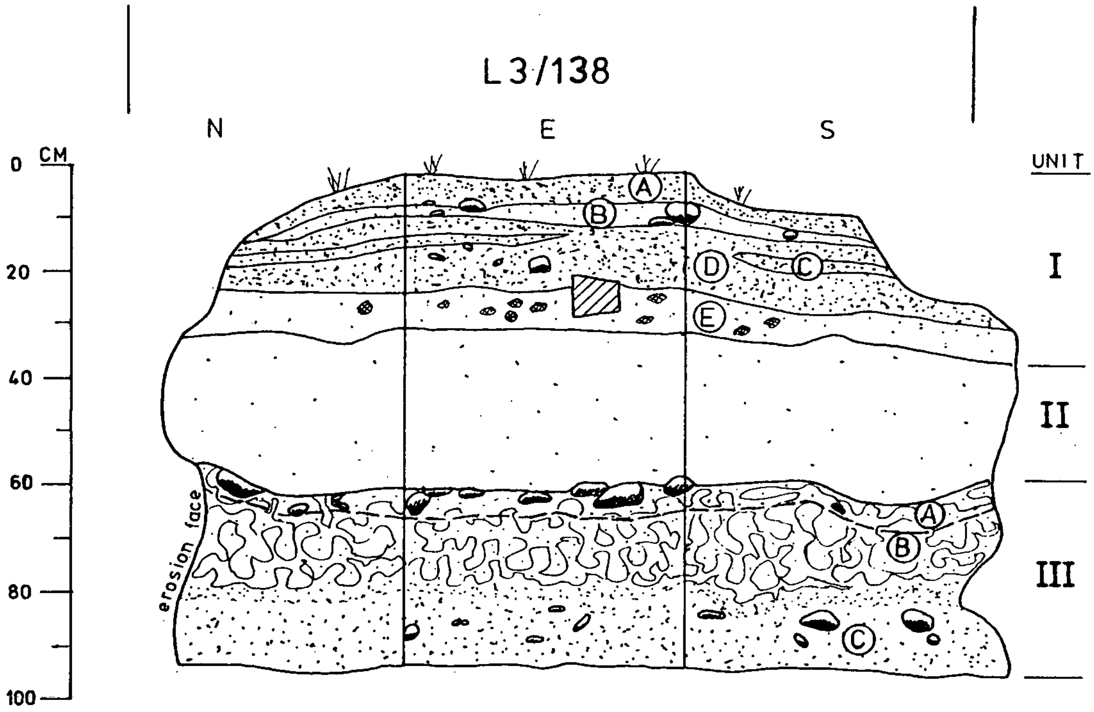

Figure 3e. Stratigraphic profile of L3/138.

DATING

Two samples of wood charcoal were collected for radiocarbon age determination. The first (Sample No. NBIA) was collected from SUII, pit L3/320 during the 1983 test excavation and was submitted at that time to the N. W. G. MacIntosh Centre for Quaternary Dating. The second (Sample No. F.S. 168), came from Unit IIIA, pit L3/219 and was submitted to Beta Analytic Inc. via the above institution in 1987. Table 1 gives the C14 results for these samples.

Table 1. C14 determinations for Brisbane Airport charcoal samples.

Sample No.	Grid	Unit	XU	Depth	Radiocarbon Age	Lab. No.
NBIA	L3/320	III	19	81 cm	1,120 ±60 b.p.	SUA:2179
FS 168(A)	L3/219	III	18	100 cm	3,910 ±80 b.p.	Beta-23345

The large (ca. 3,000 years) age discrepancy between these two dates from the same depositional unit bears some discussion and explanation. The earlier sample was collected from a large charcoal-ash feature in an artefact-rich level of L3/320 which was originally thought to be a hearth (see Figure 3b). Since on geomorphic grounds and associated C14 dating SUIII should date to between ca. 4,120 and 6,500 B.P. (Flood 1981; Ward and Hacker - in prep), this date was considered anomalous. The recent excavation of the adjacent L4/310 and the nearby M4/002-003 pits, revealed that this charcoal derives from a burned-out tree root system which intrudes into the topmost portion of SUIII in places (Figure 3a, 3b). The second date of 3,910 ± 80 b.p., is considered the most correct estimate of the age of this deposit as it is consistent with the geomorphic facts. Moreover, this charcoal sample was collected by freeing it from its ironstone "trap" in SUIIIA, whereas the NBIA sample was not incorporated within this unit but in interstitial sands. Further confirmation of this interpretation will be attempted during further excavations in 1988.

RECOVERED ARCHAEOLOGICAL MATERIAL: PRELIMINARY RESULTS

Although quite detailed information was recorded for this cultural material recovered from the site, due to the preliminary and specific nature of this paper, much of this data has been withheld for incorporation into a fuller analysis to be published in a future comprehensive site report. Thus, information presented herein will address the broader question concerning human occupancy of the site.

Apart from bulk sediment samples, most excavated sediment was sieved in the field, the cultural residue of which was removed for laboratory analysis. The ironstone from SUIIIA, as it could not be sieved, was transported in bulk to the laboratory where it was soaked in water and broken up so that embedded artefacts and charcoal could be removed. Material was first sorted into the broad categories, European and Aboriginal, then subdivided according to raw material and further subdivided in terms of selected attributes. Because stratigraphic units were consistent across the site and because general results for each of the five pits are essentially identical, data is presented in a combined form.

European Material

Artefacts indicative of post-European occupation were sorted into nine categories: wood, ceramic, glass, metal, plastic, fibro, concrete, and cinder. These finds are generally considered to be linked to the activities associated with the dairy farm (homestead and outbuildings) which occupied this site until recently when airport clearance began.

Wood: Although abundant wood fragments were recovered from the excavations, most are interpreted as deriving from tree roots. However, seven pieces exhibited modification by saw or plane or contained nails and/or screws within them. Two from L3/138 (XU5) contain nails (one copper, one ferrous), one of which (F.S. 52) is considered to be the remains of a fence post. Five pieces from L3/320 (XU4) exhibit shaping by saw and/or plane. All were recovered from SUI (Figure 4) and are thought to be associated with the dairy farm at this site.

Ceramic: A single fragment of a building brick was found in L3/219 (XU7), one fragment of orange pottery came from L3/138 (XU6) and five fragments of chinaware came from L3/138 (XU6;n=3 and XU7; n=1) and L4/301 (XU8). The L3/138 china included a cream fragment with a maroon leaf pattern (FS60), one rim sherd and one plain sherd with a blue floral pattern on white (FS76-XU6, FS67-XU7), and one plain white sherd (FS78). The fragment from L4/301 was white and appears to be part of an unidentified ornament. All are are probably associated with the domestic activities of the dairy farm.

Glass: In all, 23 fragments of glass were recovered, 18 from M4/002-003, 4 from L3/320 and one from L4/301 (Figure 4). In M4/002-003, two pieces were conjoined to form part of a glass jar rim and the remainder comprised fragments of scalloped pane glass with a greenish tinge which probably represent a former window. The four fragments from L3/320 are thin rim sherds whose very slight curvature suggest a large class container of some kind. L4/301 (XU6) yielded an opaque blue glass bead.

Metal: Some 34 pieces of both ferrous and non-ferrous metal were recovered with all five pits being represented (Figure 4), but some 62% of which come from L3/138. Ferrous metal objects include 10 nails and 10 unidentified and very rusted iron fragments. Non-ferrous objects include 3 brass screws, 2 brass tacks, one lead head belonging to a roofing nail, one lead pellet for an air gun, one "Creaming Soda" screw-on bottle cap, another unidentified bottle cap fragment, and 5 unidentified and very corroded brass or copper fragments.

Plastic: Six pieces of plastic objects were recovered in situ with another 3 being found in a disturbed context. The former include a fragment of a yellow pen (L3/138, SUI-XU3), part of a circular needle case (L4/301), two fragments of a food wrapper (L4/301), a tiny fragment of white plastic film (L3/320), and a cigarette filter. In addition, two pieces of polystyrene and a plastic wrapper (perhaps from a cigarette packet) were found within a rodent hole in SUIII of L3/219. This anomaly can be explained either by nesting behaviour of the rodent or by the fact that the entrance to the burrow lay at a level subject to inundation by very high tides. In the latter case, the plastic could well have been washed into the burrow.

Fibro: Four fragments of fibro (e.g. Hardiflex type) wall board were found, two each in L3/320 and L3/138 (Figure 4).

Concrete: Concrete, either in fragments or fairly large slabs, was found throughout the site except in M4/002-003. It all comes from the interface of SUI and SUII or levels immediately above an/or below it. It relates to a large unreinforced slab (ca. 5cm thick) laid down for the dairy which has become crazed and broken over time.

Cinders Associated with the concrete slab is a bed of cinders, most of which in embedded in concrete but much of which has been found scattered throughout SUI and the top part of SUII (esp. in L3/320).

Aboriginal Material - Chipped Stone

The only excavated material which pointed unequivocally to Aboriginal activity was chipped stone. Stone analysis proceeded in essentially the manner outlined by Hiscock (1984) whereby chipped stone was separated from manuports and non-artefactual stone and then subdivided into categories including cores, flakes, flaked pieces and chips (<5.0mm max. dimension). These were further divided according to secondary attributes such as retouch and usewear.

Although a number of attributes were recorded for chipped stone , only those pertinent to the aims of the paper will be discussed in detail. However, the raw data are provided below for the reader's information.

As the tables (2a-e) show, some 232 pieces of chipped stone were found throughout the deposit. The assemblage comprised 91 flakes (39%), 30 flaked pieces (13%), 9 cores (4.0%) and 102 chips (44%). Chert predominated as the raw material, comprising 53% (n=123) of all stone artefacts. Silcrete accounted for 31% (n=73), quartzite for 10% (n=23), the other 6% being made up of chalcedony (n=9), silicified wood (n=2) and quartz (n=2).

KEY to Tables 2-5

SU = Stratigraphic Unit
XU = Excavation Unit
FS = Field Specimen Number

* 1 = 0-25% cortex
2 = 26-50% cortex
3 = 51-75% cortex
4 = >75% cortex

Table 2a. Morphological Attributes of Flakes in M4/002-003, LB:C69

SU	XU	F.S No.	LITHOLOGY	Wt. (gm)	LENGTH (mm)	WIDTH (mm)	CORTEX % *	COMMENT
II	20	103/2	Chert	4.7	29.0	19.0	1	Distal retouch
	20	108/3	Chert	0.6	-	2.7	1	Transverse snap
III	21	105	Chert	4.5	25.0	26.0	1	
	22	107	Chert	4.1	38.0	12.0	1	Retouch
	22	109/2	Chert	3.1	25.0	22.0	3	
IV	25	214/2a	Silcrete	8.6	34.0	23.0	1	
	25	214/2c	Chert	0.4	16.0	13.0	1	
	25	214/2e	Quartzite	0.2	11.0	8.0	1	

Table 2b. Morphological Attributes of Flakes in L3/320, LB:C69

SU	XU	F.S. No.	LITHOLOGY	WT. (gm)	LENGTH (mm)	WIDTH (mm)	CORTEX % *	COMMENT
I	7	12(J)	Chert	9.0	9.0	16.0	1	
II	8	16(J)/1	Silcrete	20.5	36.0	41.5	3	Decortication flake
	8	16(J)/2	Silcrete	8.2	40.0	-	2	Longitudinal snap
	9	2(J)	Quartz	0.1	-	0.5	1	Transverse snap
	10	11(J)	Chert	2.5	15.0	17.0	3	Decortication flake
II/III		17(J)	Chert	0.3	15.0	6.0	1	Backed blade
III	13	10(J)	Silcrete	1.3	-	24.0	1	Transverse snap
	14	3(J)/1	Chert	0.8	16.0	16.0	1	
	14	3(J)/2	Chert	0.1	14.0	6.0	1	
	16	4(J)/1	Silcrete	4.2	30.0	15.0	3	Decortication flake
	16	5(J)	Chert	15.0	45.0	26.0	1	
	18	8(J)/1	Chalced.	1.8	22.0	24.0	1	
	18	8(J)/2	Silcrete	4.1	-	30.0	1	Transverse snap
	19	9(J)	Chalced.	0.5	18.0	7.5	1	

Table 2c. Morphological Attributes of Flakes in L4/301, LB:C69

SU	XU	F.S. No.	LITHOLOGY	WT. (gm)	LENGTH (mm)	WIDTH (mm)	CORTEX % *	COMMENT
I	1	5/1	Silcrete	4.7	-	27.0	1	Transverse snap
	5	20	Quartzite	0.5	17.0	6.0	1	
	6	21	Quartzite	0.5	11.0	14.0	1	
	6	23	Silcrete	4.1	14.0	32.0	1	
	9	33/2	Chert	0.1	11.0	6.0	1	
	9	33/3	Silcrete	0.4	11.0	10.0	1	
	9	33/5	Chert	0.8	15.0	16.0	1	
II	10	34/1	Chert	0.1	5.0	-	1	Transverse snap
	12	115/4	Quartzite	0.3	-	9.0	1	Transverse snap
	12	115/5	Chalced.	0.5	-	19.0	1	Transverse snap
	12	116/1	Chert	0.2	10.0	-	1	Long. snap/potlid
III	13	117	Chert	0.6	7.0	14.0	1	
	13	118/2	Chert	0.1	6.0	9.5	1	Ventral retouch
	13	119/2	Chert	4.5	28.5	21.5	1	
	14	122/3	Chert	1.4	20.5	14.5	1	
	14	123/2	Silcrete	8.9	27.0	30.5	3	Decortication flake
	14	123/4	Silcrete	274.0	94.5	101.0	3	Excav. damage
	14	123/5	Chert	0.4	-	12.0	1	Transverse snap
	14	124/2	Silcrete	5.8	17.0	29.0	1	
	14	124/3	Silcrete	14.9	46.0	-	1	Longitudinal snap
	15	128/2	Chert	3.3	-	19.0	1	Transverse snap
	15	129/2	Silcrete	0.9	21.0	11.0	1	
	15	130/4	Sil. wood	0.6	11.0	15.0	1	
	15	130/5	Chert	1.8	19.0	19.0	1	
	16	211/3	Chert	2.4	-	14.0	1	Transverse snap

Table 2d. Morphological Attributes of Flakes in L3/219, LB:C69

SU	XU	F.S. No.	LITHOLOGY	WT. (gm)	LENGTH (mm)	WIDTH (mm)	CORTEX % *	COMMENT
I	7	93	Silcrete	250.0	90.0	80.0	2	
II	12	95A	Chert	2.2	-	19.0	1	Transverse snap
	12	95B	Chert	1.6	-	20.1	2	Transverse snap
	13	132B	Quartzite	1.2	20.3	12.7	2	
	14	136	Chert	0.1	7.4	7.9	1	Potlid
	14	137B	Chert	0.5	18.0	11.0	1	Backed flake/Ventral retouch/usewear
	15	140	Quartzite	1.9	13.0	12.5	1	
	16	145	Quartzite	5.2	24.0	32.0	1	
III	17	148A	Chert	3.8	21.0	35.0	1	Matrix-embedded
	17	148B	Chert	1.5	19.1	15.6	1	
	17	149B	Chert	14.5	32.9	37.9	1	Retouch
	17	150B	Quartzite	0.9	12.8	23.8	1	
	17	151B	Chert	2.8	-	19.7	1	Transverse snap
	17	152B	Silcrete	1.9	20.5	19.0	1	
	17	151C	Chert	4.0	22.4	26.1	2	
	18	154	Chert	24.6	29.9	40.9	1	Retouch/usewear
	18	157A	Chert	6.9	30.0	38.0	1	
	19	169	Silcrete	0.9	24.0	15.0	1	

Table 2e. Morphological Attributes of Flakes in L3/138, LB:C69

SU	XU	F.S. No.	LITHOLOGY	WT. (gm)	LENGTH (mm)	WIDTH (mm)	CORTEX % *	COMMENT
II	7	72	Silcrete	0.8	15.0	10.0	3	
	8	83	Silcrete	1.4	18.0	12.0	1	Transverse snap
	8	84	Silcrete	5.4	22.5	21.5	1	
	9	173	Chert	3.0	12.0	21.0	2	
	10	175/3	Chert	0.47	12.5	13.0	1	
	10	175/5	Chert	0.6	20.0	30.0	1	
	10	175/6	Chert	0.2	13.0	9.0	1	
	10	177	Silcrete	2.0	20.5	23.0	1	
III	11	181/1	Chert	1.0	22.0	21.5	1	
	11	181/2	Chalced.	4.7	22.0	23.0	1	
	11	182	Silcrete	1.5	21.0	12.0	1	
	11	183	Silcrete	27.4	50.0	34.0	2	Usewear
	11	184	Chert	0.2	9.0	13.0	1	
	11	186	Chert	12.2	34.5	40.5	3	Transverse snap
	11	187	Chert	0.5	11.0	10.0	1	
	11	188	Chert	3.6	22.0	28.0	1	
	11	189	Silcrete	22.9	62.5	44.5	1	
	11	191	Chert	0.2	7.0	16.0	1	
	11	192	Chert	4.9	22.0	22.0	1	Potlid scar
	11	193	Chert	0.5	13.0	15.0	1	
	11	194	Chert	0.6	16.0	10.0	1	Longitudinal snap
	11	195	Chert	0.9	19.5	12.0	3	Primary flake
	11	197/1	Silcrete	2.0	19.0	22.5	2	
	11	197/2	Chert	4.7	20.0	26.0	1	Transverse snap
	12	201/2	Chert	3.6	22.0	19.0	1	Retouch 1 margin
	14	207/1	Silcrete	0.1	6.5	10.0	1	

Table 3. Morphological Attributes of Cores in LB:C69

SU	XU	FS NO.	LITHOL.	WEIGHT (gms)	NO.OF PLAT-FORMS	NO.OF FLAKE SCARS	LONGEST FLAKE SCAR (mm)	CORTEX % *	COMMENT
M4/002-003									
IV	25	214/2d	Chert	27.9	1	1	32.0	3	Heat-crazed
L3/320									
III	18	6(J)	Silcrete	557.0	1	13	40.0	3	Retouched
L4/301									
IB	04	18	Chalced.	25.8	2	4	19.0	4	
III	13	119/1	Chert	105.0	3	3	25.0	2	Heat-crazed
	13	119/3	Silcrete	442.0	1	4	26.0	3	
	14	123/3	Chert	47.0	2	5	35.0	1	
	15	130/3	Sil.Wood	154.0	1	5	36.0	1	
L3/138									
III	10	185	Chert	38.9	2	2	12.0	1	
	11	190	Chert	98.5	1	7	32.0	2	Ret. Flake

Table 4. Morphological Attributes of Flaked Pieces in LB:C69

GRID SQUARE	F.S. No.	SU	XU	LITHOLOGY	WEIGHT (gm)	CORTEX % *	COMMENT
M4/002-003	102	II	20	Silcrete	4.3	1	Snap fracture
	103/3	II	20	Chert	2.6	1	Var. snap fractures
	112/2a	III	23	Silcrete	9.5	1	Possible flake
	112/3	III	23	Chert	0.8	1	Prob. snapped flake
	213/1	IV	25	Silcrete	12.8	1	
	214/2f	IV	25	Silcrete	5.4	1	
	214/2h	IV	25	Chert	7.3	2	
	214/2j	IV	25	Chert	0.4	1	
	214/9a	IV	25	Quartzite	2.6	1	
	214/9b	IV	25	Quartzite	1.1	1	
	214/9c	IV	25	Quartzite	1.0	1	
L3/320	3(J)/3	III	14	Silcrete	0.2	1	
	4(J)/2	III	16	Chert	1.3	1	Potlid
L4/301	31/2	II	8	Chert	4.3	2	Heat-crazed
	33/1	II	9	Chert	0.9	1	Poss. snapped flake
	120	III	14	Silcrete	14.0	1	
	128/3	III	15	Chalcedony	1.6	1	
	130/6	III	15	Chert	0.2	2	
L3/219	132a	II	13	Quartzite	17.0	2	
	132c	II	13	Chert	1.0	1	
	132d	II	13	Quartz	0.1	1	
	132e	II	13	Chert	0.1	1	
	148c	II	17	Chert	1.0	1	
	148d	II	17	Silcrete	1.6	2	Retouch one margin
	150d	II	17	Silcrete	0.5	1	
	151d	II	17	Silcrete	1.1	2	
	151e	II	17	Chert	0.5	1	
	152c	II	17	Chert	1.9	1	Ventral retouch
	155	III	18	Chert	2.5	1	
L3/138	175/4	II	10	Chert	0.2	1	Poss. snapped flake

Table 5. Morphological Attributes of Chips (< 5mm flaked stone), LB:C69

GRID SQUARE	F.S. NO.	SU	XU	TOTAL WT. (gm)	NO.OF CHIPS	LITHOLOGY/COMMENT
M4/002-003	104/3	III	21	1.0	9	5 chert, 4 silcrete,
	104/5	III	21	0.1	1	Chert; positive potlid
	111/1	III	22	0.6	7	4 chert, 3 silcrete
	112/2	III	23	0.03	1	Tiny silcrete flake
L4/301	31/3	II	8	0.09	2	Chert
	33/4	II	9	0.2	2	Chert
	34/2	II	10	0.2	3	1 chalcedony, 2 silcrete
	116/3	II	12	1.22	6	3 chert, 2 q'zite, 1 chalced.
	118/3	III	13	0.3	3	Chert
	122/5	III	14	0.23	3	Chert
	127/2	III	15	1.9	11	6 chert, 5 silcrete; potlids
	209/3	III	16	2.0	26	15 chert, 5 q'zite, 6 sil.
L3/219	152a	III	18	2.7	18	11 sil, 3 chert, 4 q'zite
L3/138	175/1	II	10	0.1	1	Chalcedony
	180/1	II	10	0.15	1	Chert potlid
	180/2	II	10	0.03	1	Chert potlid
	181/3	III	11	0.13	2	Silcrete
	198/2	III	11	0.15	3	2 silcrete, 1 chert
	208/2	III	12	0.20	2	Chert

FAUNA

Only one piece of bone was found in the excavations (top of SUII in L3/219). It is identifiable as a large mammal and saw marks from butchering indicated European origin.

Fragments of highly weathered marine shell were found in SUI layers and the top of SUII (Table 6). Although some pieces could be identified as varieties traditionally used by Aborigines (oyster and cockle), their mixed provenance in the European-derived strata suggests post-contact deposition.

Table 6. Shell found in LB:C69

Grid Square	SU No.	XU No.	F.S. No.	Weight (gm)	No.of Frags..	Identification
M4/002-003	I	8	38	2.0	5	Unidentified
	I	9	39	4.0	13	Oyster
	I	10	40	3.9	18	17 Oyster, 1 cockle
	II	11	43	0.5	7	Oyster
L3/320	ID	4	15(J)	2.2	7	1 Cockle, 6 unident.
L4/301	I	1	6	0.5	9	Oyster
	I	5	19	0.3	9	5 Oyster, 4 unident.
	I	6	24	2.3	3	Oyster
L3/219	I	1	8	0.1	3	Unidentified
	I	4	11	2.0	1	Cockle
	I	5	12	0.3	2	Unidentified
	I	6	87	0.4	1	Cockle
L3/138	IA	1	14	0.03	1	Unidentified
	ID	3	15/2	0.7	15	11 Oyster, 4 unident.
	ID	4	16	0.4	4	2 Oyster, 2 unident.
	ID	5	53	0.4	3	Oyster

FLORA

Floral remains were limited to occasional pieces of tree roots and charcoal. Roots were mainly found in SUII, some of which were associated with the large burnt root system in M4/002-003. Charcoal was found scattered throughout the deposits, many of the larger fragments being found embedded with the ironstone layer (SUIIIA).

DISCUSSION AND INTERPRETATION

In accordance with the aims of this paper five main questions were addressed concerning the site's contents. Two concern the degree of archaeological clarity and integrity exhibited by the site. In short, to what degree is it possible to both distinguish between successive phases of deposition and to ascertain the nature and degree of preservation or post-depositional disturbance (Dancey 1981:20)? Two other questions concern the possibility of determining a site history both in terms of geomorphology and human activities. Finally, does the site provide substantive evidence of human coastal occupation during the mid-Holocene? Each of these questions is developed in turn below.

Archaeological Clarity

As shown in Figure 3, the site may be clearly divided into four discrete and continuous stratigraphic units (SUI - SUIV) on the basis of sediment morphology, texture and colour. These units are considered chronologically sequential. Although SUI is made up of five semi-continuous strata whose temporal origins are mixed (see below), these also exhibit considerable clarity in terms of soil characteristics. Thus, with respect to natural stratification per se, the site exhibits excellent clarity.

Culturally, however, the picture is less clear. As Figure 4 shows, the separation between Aboriginal and European cultural material does not entirely follow Stratigraphic Units. While only Aboriginal stone artefacts are found in SUIII and SUIV, they occur alongside European items in the top XU's of SUII and in SUI. Thus, one must assume some mixing of the SUII sediment and its contents. Given the homogeneous nature of the SUII sediment and the placement on its surface of a concrete slab relating to the operation of a dairy there, it is postulated that this mixing relates to European activities such as ploughing or gardening. The horizontal extent and depth to which such activities reached into SUII can not be ascertained at this time. Thus, we must presume that, at least in some areas, mixing occurs down to the top of SUIII where the ironstone formation (SUIIIA) would have inhibited mixing.

The mixing of European and Aboriginal material in SUI may be explained in at least two ways. First, the European farming activities could well have contributed to SUII/III soils being deposited on the modern surface. More influential however, were the activities relating to the airport construction which dragged older (SUII/III/IV and others) sediments over the site when the floodway was excavated and moved fill to the site from other parts of the airport complex during land-levelling and road-bed building (S. Deaves, Department of Transport, pers. comm. 1987). It is almost entirely due to the latter that the five sub-strata were built up over the concrete slab at the site. Thus, while the sediments in these layers clearly reflect a succession of human terraforming activities, the cultural material within them in no way indicates a coexistence of stone with iron technologies.

In sum, the only part of the site whose clarity may be considered excellent in cultural terms (except for the concrete) is the lower section comprising SUIII and SUIV. Not only are stone artefacts in their greatest density at the top of SUIII (Figure 4), but many were quite embedded within the ironstone formation which caps these units. Fortunately, it is this cultural material which is critical to the original aims of the excavation.

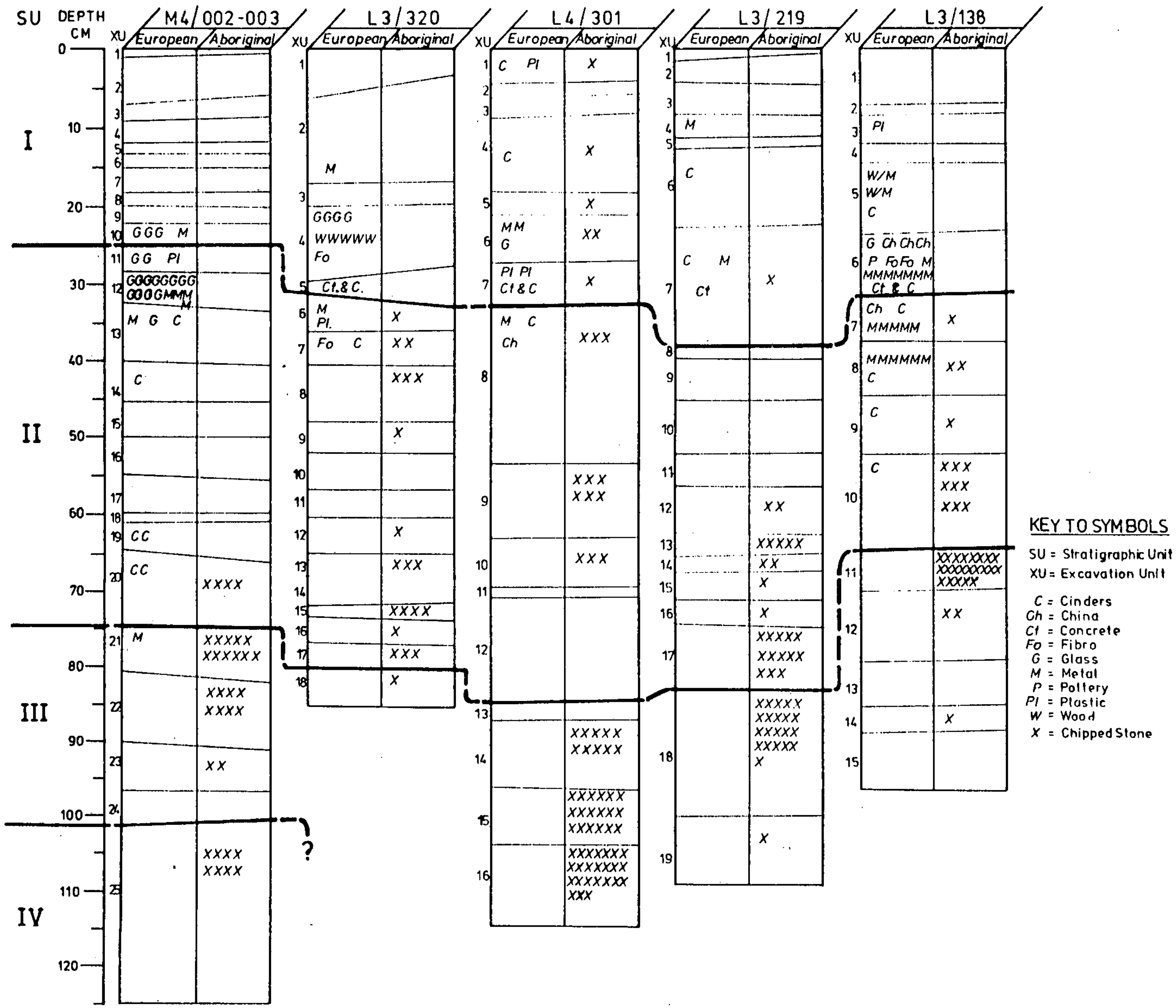

Figure 4. Comparison of vertical distribution and density of European and Aboriginal artefacts in the five trenches excavated in LB:C69.

Archaeological Integrity

One of the significant aspects of this site is the very poor representation of organic remains. Although charcoal was found in relative abundance and in a good state of preservation, wooden artefacts were restricted to SUI (Figure 4). The only bone recovered (top of SUII, L3/219) exhibited post-European saw marks and was soft and friable and marine shell was heavily weathered, fragmentary and limited to upper units (Table 6). No organic remains apart from charcoal were recovered from the stone artefact-rich layers. Given the poor preservation of materials dating to the last 150 years, it is possible that the lack of midden material in lower layers may reflect poor conditions for preservation rather than an original absence from the site. In either case, little information concerning Aboriginal subsistence may be gleaned from the site's early cultural discard.

Another aspect of site integrity is post-depositional disturbance (Dancey 1981:20). LB:C69 exhibited four features which require discussion in this context. Firstly, excavation revealed the presence of numerous ants, and their narrow tunnels were especially prominent within the sands of SUII. Since these animals are well known to cause significant disturbance of archaeological sediments (Wood and Johnson 1978:321; Butzer 1982:113), they may well have been responsible for some of the European/ Aboriginal cultural mixture at this site. Secondly, being in the bank of a tidal floodway the lower sediments are not only being eroded by tidal action but are being subjected to occasional burrowing by crabs, rodents and other animals. An animal burrow was found in the lower portion of SUIII in L3/219, careful excavation revealing a "nest" containing some grass and fragments of plastic film. A few other such holes are present along the face of the site and it is probable that they have caused some disturbance to the deposits.

Thirdly, excavation of M4/002-003 revealed a large burnt tree root system extending into SUII and along the SUII/SUIII interface (Figure 3a). In 1987, this charcoal and ash feature was traced along the face of the floodway wall to the L3/320 pit. When L3/320 was excavated in 1984, it was thought that this patch of ash and charcoal might have represented an old hearth and a sample was collected and submitted for C14 dating. Thus, the resultant age of 1,120±60 B.P. (Table 1) actually dated the death of a tree whose roots had penetrated just below the SUII/SUIII interface rather than the associated cultural material.

Finally, one pedogenic process is thought to have had some positive postdepositional influence. The cemented ironstone layer in the upper part of SUIII involves the transformation of organic-rich sandy sediments through both a reduction and and oxidation phase to produce an iron-bearing sulfate called jarosite (Lynn 1977). One end product of this process is the formation of ironstone which effectively locks the sediments and their embedded artefacts in place. While it is not possible to ascertain the time at which this ironstone formed, it may be stated that the artefacts and charcoal within SUIIIA have not been subjected to recent disturbance. Further, the tree root system noted above did not appear to penetrate this layer, suggesting it was formed prior to ca. 1000 B.P.

Geomorphic History of the Site

The major depositional units at LB:C69 largely reflect geomorphic processes relating to previously discussed shifts in sea levels during the Holocene. The following model of the geomorphic history of the site is based on the work of Ward and Hacker (1982 and in prep.) for the northeast Brisbane area and provides a useful interpretive backdrop to cultural deposition at the site (see also Flood 1981, 1983, 1984).

1. Prior to the Holocene transgression which formed Moreton Bay, the land on which the site now sits looked out over a broad floodplain (Figure 5a).

2. By ca. 6,500 B.P. the sea had formed Moreton Bay and laid down marine sediments over the former floodplain. At this time the site's location was quite close to the shore (Figure 5b).

3. At some time between 5,280 and 4,150 B.P. sea level rose to about +1.5m (see also Flood 1981) creating a wide bay divided by a small SE-projecting spit (Figure 5c) (Ward and Hacker - in prep.). Seas laid down marine sands and eroded cobbles out of the Pleistocene landforms to form stony beaches. It was at this time that Stratigraphic Units IV and III were laid down. At some time during the life of the spit people began to visit and discarded their artefacts, using the beach cobbles and pebbles as raw materials for stone artefacts.

4. The sea level dropped fairly rapidly to about present levels at some time after ca. 3,500 B.P. (see Flood 1981). The spit would have initially seen a development of estuarine conditions with mangrove communities followed by a replacement by open forests and grasses as alluvial sands (SUII) began to cover the marine sediments. During this sequence, the acid sulfidic sediments of Unit III oxidized to form jarosite and the ironstone concretions so common in the top half (SUIIIA) of SUIII (Lynn 1977). This action trapped artefacts and other cultural material within this unit, effectively preventing it from subsequent vertical or horizontal movement.

5. During the build-up of SUII this former spit would have been represented as an elevated ridge stretching from some 50m SE of the site (the end of the spit) and broadening laterally to the NW until it merged some 2.5km away with with the low hill (> 20m) upon which the Banyo Seminary is now sited. Stone artefacts within this unit may thus represent camping discard over the past 3,000 years or so, although, as noted earlier, post-depositional factors may have caused mixing from lower levels.

6. After European settlement, which began some 150 years ago, SUI was laid down by a series of events. The first recognizable event was the siting of the homestead and outbuildings of a dairy farm, the concrete being the base of the now-demolished dairy. SUII was subjected to much disturbance via excavation for fence posts and a kitchen garden which in places reaches almost to Unit III. This interpretation is supported by the admixture of Aboriginal with European artefacts in SUIII (Figure 4).

The final events in this part of the sequence relate to the construction of the New Brisbane Airport. Strata IA, IB, and IC represent an interfingering of fill brought in for road bed material with earlier sediments dredged up onto the banks during floodway construction. These include the artefact-bearing SU's II, III, and IV sediments as well as deeper materials.

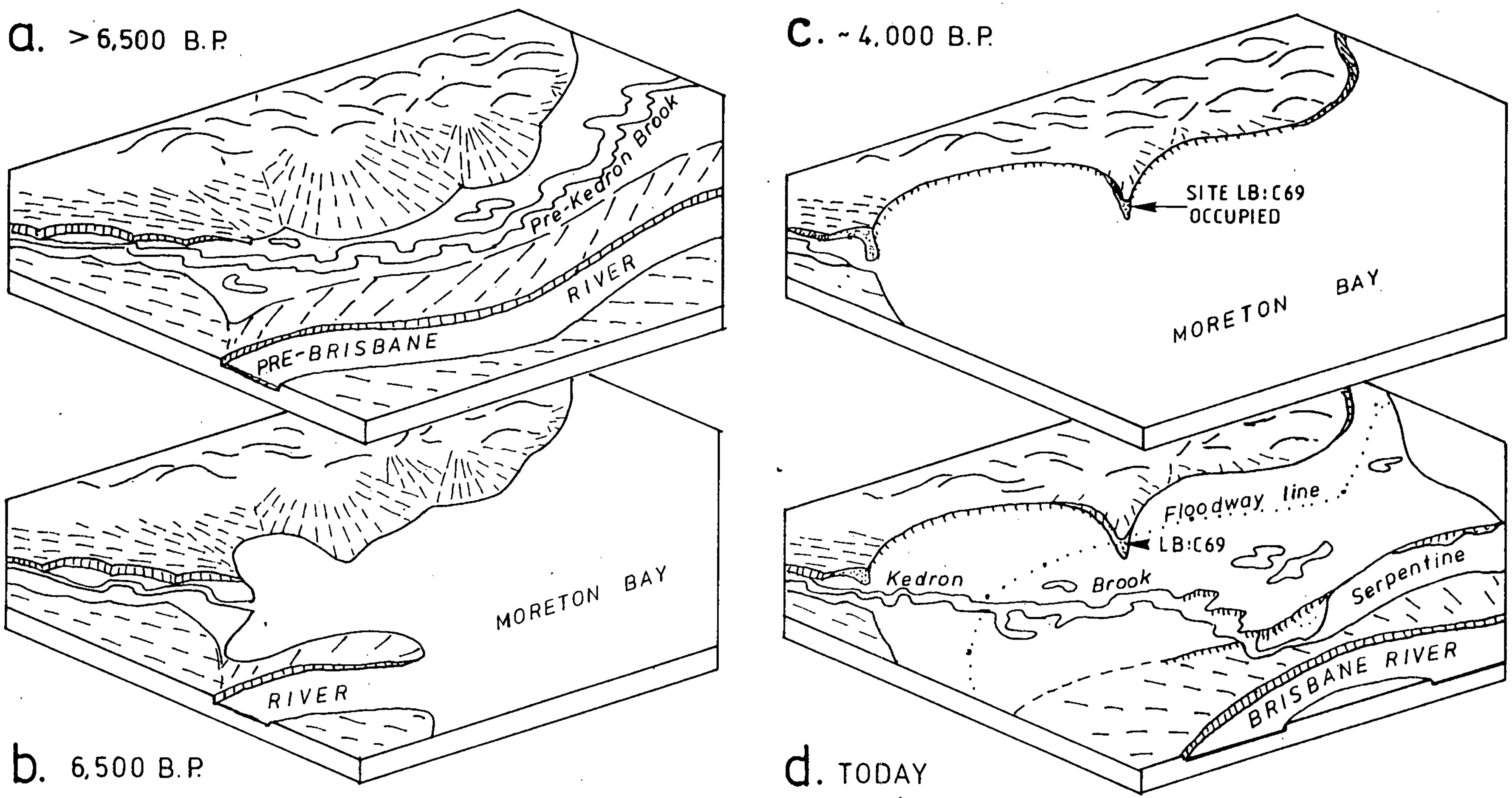

Figure 5. A history of the post-Pleistocene landscape in the study area looking northwards towards Site LB:C69 (adapted from Ward and Hacker - in prep.)

What were the People Doing There?

Interpretation of the nature of prehistoric human activity at the New Brisbane Airport Site is constrained by the lack of cultural material other than stone (and charcoal to some extent). Whether the lack of midden discard is a function of a limited site sampling, poor preservation factors or the nature of Aboriginal behaviour must await further and more extensive excavation. Nevertheless, the stone assemblage does offer lines of evidence which may be used to support the proposition that LB:C69 represents a camp-site on this early mid-Holocene spit in Moreton Bay where people came for economic purposes which included stone raw material procurement as well as camping and perhaps food collecting.

That people used stone from the spit for fashioning artefacts is in little doubt. Within SUIII (esp.) and SUIV lie a profusion of rolled cobbles, the lithology and cortex characteristics of which are mirrored by the stone artefact assemblage. Furthermore, no artefacts were made of material which is not present in this matrix.

If people were solely using the spit as a source of raw material - a quarry - one would expect to find a relatively high percentage of flakes exhibiting initial phases of reduction. Thus, an abundance of decortication and other flakes showing significant proportion of cortex might be expected. Of the 91 flakes in the entire assemblage, 17 (19%) exhibited more than 25% cortex, 9 (10%) of which had more than 50% cortex (Tables 2a-2e). This pattern is similar for the SUIII-SUIV flake component (n=56) with 16% having more than 25% cortex and 7% of which had more than 50% cortex. Further, 8 of the 9 cores recovered were found in these lower levels, 5 of which exhibited >25% cortex (Table 3). Thus, it is apparent that initial reduction of raw material took place at the site during the early mid-Holocene.

However, other aspects of the assemblage indicate more than initial reduction. First, 71 of 91 flakes (80%) exhibited less than 25% cortex, most of which exhibited no cortex surface at all. Second, 10% (n=9) of the flakes had been retouched and/or exhibited usewear, two of which were identified as backed blades (Tables 2a - 2e). Third, although weights for the 91 flakes ranged from 274gm to 0.1gm, 71 (80%) weighed less than 5.0gm, some 50 of which (55% of all flakes) weighed 2.0gm or less (Tables 2a-2e). We take this data as evidence that people were engaging in much later stages of stone reduction, including the manufacture and use of finished implements. Thus, we interpret the site as being used for more than just stone procurement and quarrying and would speculatively argue that it represents a glimpse of a coastal economy operating in this region during the early mid-Holocene.

Early Mid-Holocene Coastal Occupation and Economy in the Moreton Region?

Until quite recently, archaeological research in the coastal part of the Moreton Region over the past decade has yielded an abundance of sites dating to within the past 2,000 years but a dearth of sites prior to this time. At the same time, a number of rockshelters in the sub-coastal zone indicate human occupation of the wider region from ca. 6,000 B.P. (Hall 1986, 1987; Morwood 1986). These facts have led to two main explanatory positions or models. The first (Hall 1982; Hall and Robins 1984) holds that paleo-Australians exploited coastal (marine-littoral as well as lowland terrestrial) resources during the Pleistocene and that when the Holocene marine transgression began to drown the coast, people simply adjusted in situ to changing coastal conditions, continuing basically the same subsistence base to the present. While not necessarily disagreeing with the early coastal colonization model of Bowlder (1977), the model also appreciates Beaton's (1985:2) point that humans are are highly adaptable and that, by some 25,000 B.P. paleo-Australians would have adapted to most of the continent's environmental zones and habitats, their population densities being much lower than those of the more recent past. While MRAP research into the period spanning the past two millennia has indicated significant changes including population increase, coastal resource specialization and increased socio-political complexity (Walters 1987, Hall et al 1987; Nolan 1987), this model argues that people never really left the coastal strip with its marine, littoral and lowland terrestrial food resources at any time during the past 25,000 years.

The second position, put forward by Morwood (1986), contains elements similar to that above but argues that the sudden rise in numbers of coastal sites prior after 2,000 B.P. is a reflection of "a geographical and ecological expansion of resource base from this time, possibly involving technological developments as well as changes in land-use strategy" (1986:117). Morwood stresses the seasonality of resources and also argues that marine resources increased significantly after the marine transgression due to the development of "capture" technologies (1986:90). The main departure from the first model is that Morwood argues that the coastal marine/littoral environment was a "new environmental zone" (1986:117) which was exploited after successful occupation of the hinterland/subcoastal areas, whereas Hall argues that the coast always provided a viable subsistence base and that the sites in the subcoastal zone reflect a steady increase of human activity in this area after the formation of Moreton Bay and the landward dislocation of populations (Hall 1987:21).

The issue revolves around the question of whether or not the greater number of archaeological sites on the coast after 2,000 reflects reality in terms of human occupation or some other variable(s). The first local evidence in favour of the latter came with the discovery at Wallen Wallen Creek, North Stradbroke Island, of a relatively unbroken succession of cultural discard dating from the present and reaching some 20,000 years into the Pleistocene (Neal and Stock 1986). This site clearly indicates that people were inhabiting the general east coast this early but that, just after the formation of Moreton Bay, they began exploiting marine animals. There is also a significant increase in shellfish remains after ca. 2,000 B.P. which accords well with the Hall and Robins (1984) model which argues for a return at this time to offshore islands which were abandoned when these former hills were drowned during the late Pleistocene.

We argue that the new Brisbane Airport Site, Stratigraphic Unit III of which dates at least to 4000 B.P. (the lower layer, SUIV, has still to be dated), offers one more piece of evidence for early coastal exploitation in the region despite the absence of relevant midden remains. In this latter connection, a very timely and important piece of support comes from Walters et al (1987 - this issue QAR) who have received a date of at least 4,300 B.P. for a shell midden site at Hope Island on the Gold Coast. This site offers incontrovertible evidence that marine-littoral resources were being exploited early in the Bay's existence. Also significant is that this site, like LB:C69, lies some distance from the present shore, suggesting that the dearth of sites dating beyond 2,000 B.P. reflects our previous lack of knowledge about where to search for such evidence. In short, the archaeological record is a biased one due to Holocene sea level fluctuation.

The work of Ward and Hacker (1982 and in prep), and Flood (1981) concerning the chrono-geomorphic Holocene succession, argues strongly for LB:C69 being situated on an ancient spit formed during the post-Pleistocene formation of Moreton Bay. This juxtaposition of intertidal and marine resources would have been ideal for peoples with a hunting-fishing-gathering lifeway, offering a range of foodstuffs including marine vertebrates (fish, turtle, dugong) and littoral invertebrates (shellfish, crustaceans and the like). Further excavation will be designed to investigate the site for midden remains of such animals.

CONCLUSION

In light of the foregoing, we suggest that Site LB:C69 at the new Brisbane Airport represents evidence for human coastal exploitation in Moreton Bay during the early Mid-Holocene. This thinking is in line with previously advanced hypotheses (Hall and Robins 1984, Hall 1986, 1987) about human adjustment to a changing natural environment and is further supported by the evidence from the Hope Island Site dating even further back into the Holocene (Walters et al 1987 - this issue, QAR). Also, it is now evident that if we want to find evidence of coastal occupation for the early to mid-Holocene, we must start looking for sites in the right place! That is, we must direct energy towards outlining more of the old high shoreline and begin seeking archaeological sites on or west of it. In the latter connection, if the Ward and Hacker (in prep) and Flood (1981) sea level model holds there may be little remaining of coastal sites caught mbetween the 6000-6500 B.P. and ca 4,500 B.P. stands.

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