

I.C. Rust.

Research on Sedimentation in Estuaries

SEDIMENTATION
IN THE BUSHMANS ESTUARY

ROSIE REPORT No2

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Project leader: IC Rust



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October 1981

INTRODUCTION Research on Sedimentation in Estuaries

The estuary of the Bushmans River, Port Elizabeth, South Africa (Fig. 1-2) is a typical example of a macrotidal estuary. Sedimentation processes in such estuaries are highly variable.

This report is a result of a project funded by the Department of Geology, University of Port Elizabeth, in cooperation with the Department of Geology, University of Cape Town.

SEDIMENTATION IN THE BUSHMANS ESTUARY

By: J.S.V. Reddering
K. Esterhuysen

ROSIE REPORT NO 2

The specific objectives of this project were to determine the sedimentation rates and the composition of the sediments in the Bushmans Estuary. The project was carried out during the summer of 1981. The results of the project are presented in this report.

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SEDIMENTATION IN THE BUSHMANS ESTUARY

INTRODUCTION

The estuary of the Bushmans River (fig. 1-1) in the eastern Cape Province (fig. 1-2) is reported to have a high sediment influx. This alleged sedimentation leads to shoaling which is environmentally and recreationally undesirable.

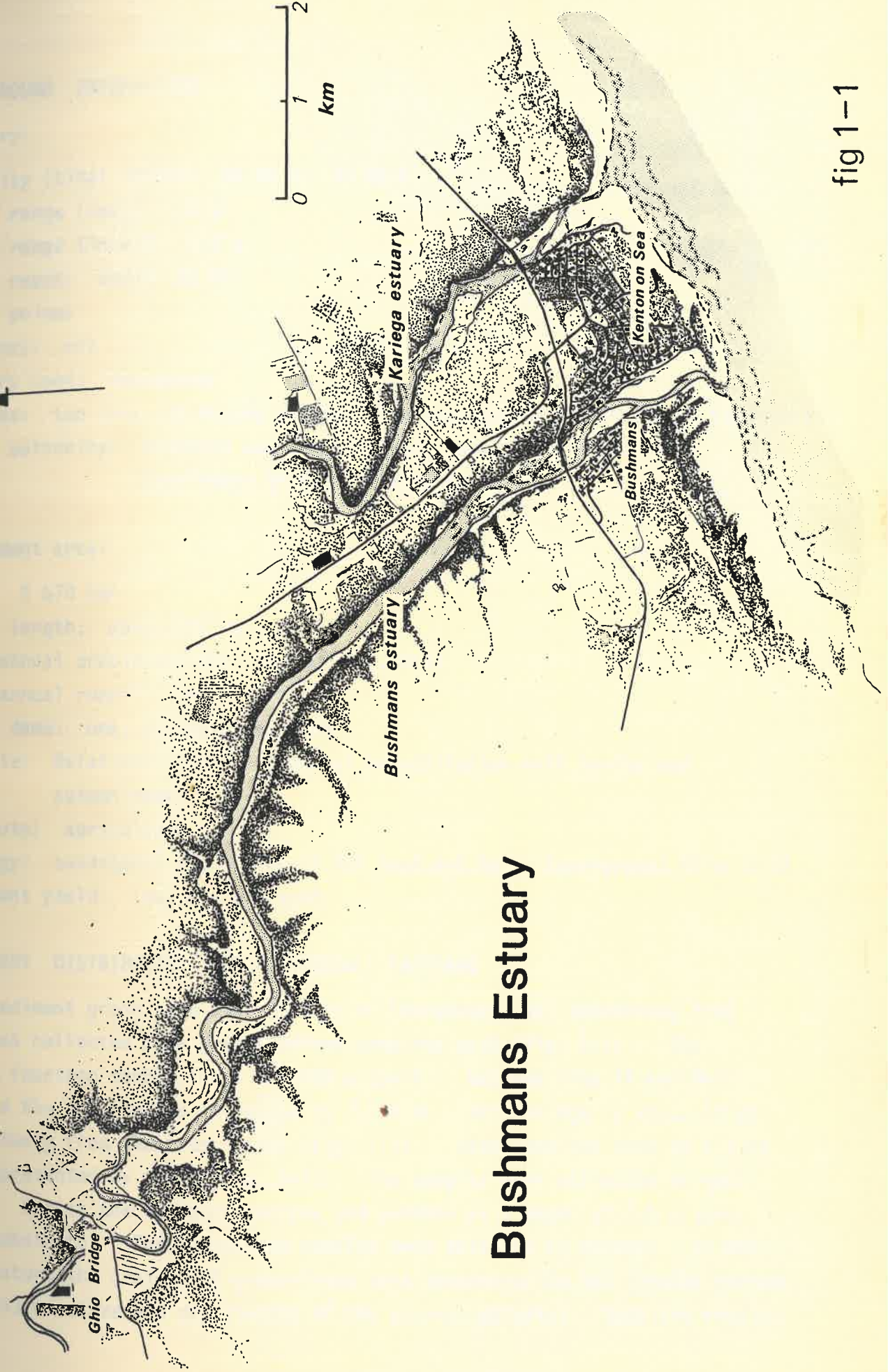
This report is part of an environmental study carried out in co-operation with the Department of Zoology at UPE. The aim is to determine the interaction of the sediment distribution and the hydrodynamic state of the estuary. The hydrodynamic properties of the system were obtained by calibrating a one-dimensional computer simulation model of the estuary (Uncles *et al.*, in prep.).

The specific objectives of this report are to establish whether excessive sedimentation is taking place in the estuary and to find the provenance of the sediments. The report also aims to determine how the sediment dispersal is influenced by the hydrodynamics of the estuary. These data can aid the formulation of management methods.

Dredging has been suggested in selected areas of the estuary in order to remove the existing sediment build-up. Key questions that must be answered before dredging can commence are:

1. How will the dredge spoil be disposed?
2. Will the dredged areas remain at an acceptable depth for long enough to justify the considerable cost of the operation?
3. How will the modified bathymetry of the estuary influence the hydrodynamics of the estuarine system?
4. How will the estuarine environment be influenced
 - (a) during the dredging operation and
 - (b) in the long term?

Reports on the sedimentation in the Bushmans estuary have been compiled by Farquharson (1970); Weaver (1978); Baird *et al.* (1979); Uncles *et al.* (in prep.).



Bushmans Estuary

fig 1-1

2. BACKGROUND INFORMATION

2.1 Estuary:

Locality (tidal inlet): 33 42 S; 26 39 E

Tidal range (sea): 1,6 m

Tidal range (inlet): 1,0 m

Tidal reach: about 32 km

Tidal prism:

Industry: nil

Estuary uses: recreation

Bridges: two (one 1,6 km and another 15 km up-estuary of the inlet; fig. 1-1)

Local authority: Bushmans and Kenton-on-Sea town councils and CPA

Department of Nature Conservation.

2.2 Catchment area:

Area: 2 670 km²

River length: about 230 km

Mean annual precipitation: 516 mm (fig. 2-2)

Mean annual runoff: 38,2 x 10⁶ m³

Major dams: one, the Nuwejaars Dam

Climate: Relatively humid, perennial precipitation with spring and autumn peaks

Land use: agriculture

Geology: sandstones and shales of the Cape and Karoo Supergroups (fig. 2-3)

Sediment yield: low, mud and sand.

3. SEDIMENT DISTRIBUTION AND DISPERSAL PATTERNS

The sediment grain size distribution in the estuary was determined from samples collected on a predetermined sampling grid (fig. 3-1). The first fourteen sample lines are 250 m apart. Between line 14 and Ghio bridge the interval is increased to 1 000 m. Ghio bridge is about 15 km up-estuary from the tidal inlet (fig. 1-1). Each sampling spot on a line is represented by a dot (fig. 3-1). Two samples were collected at each spot; one at the sediment surface and another at a depth of 0,5 m into the substrate. The subsurface samples were obtained by coring. In the laboratory the grain size proportions were determined by wet sieving through a 0,063 mm sieve and dry sieving of the coarser material. Detailed results

BUSHMANS RIVER CATCHMENT AREA

• Johannesburg



LOCATION OF BUSHMANS RIVER

33° 42' S, 26° 39' E

• Bloemfontein

Durban

Bushmans river

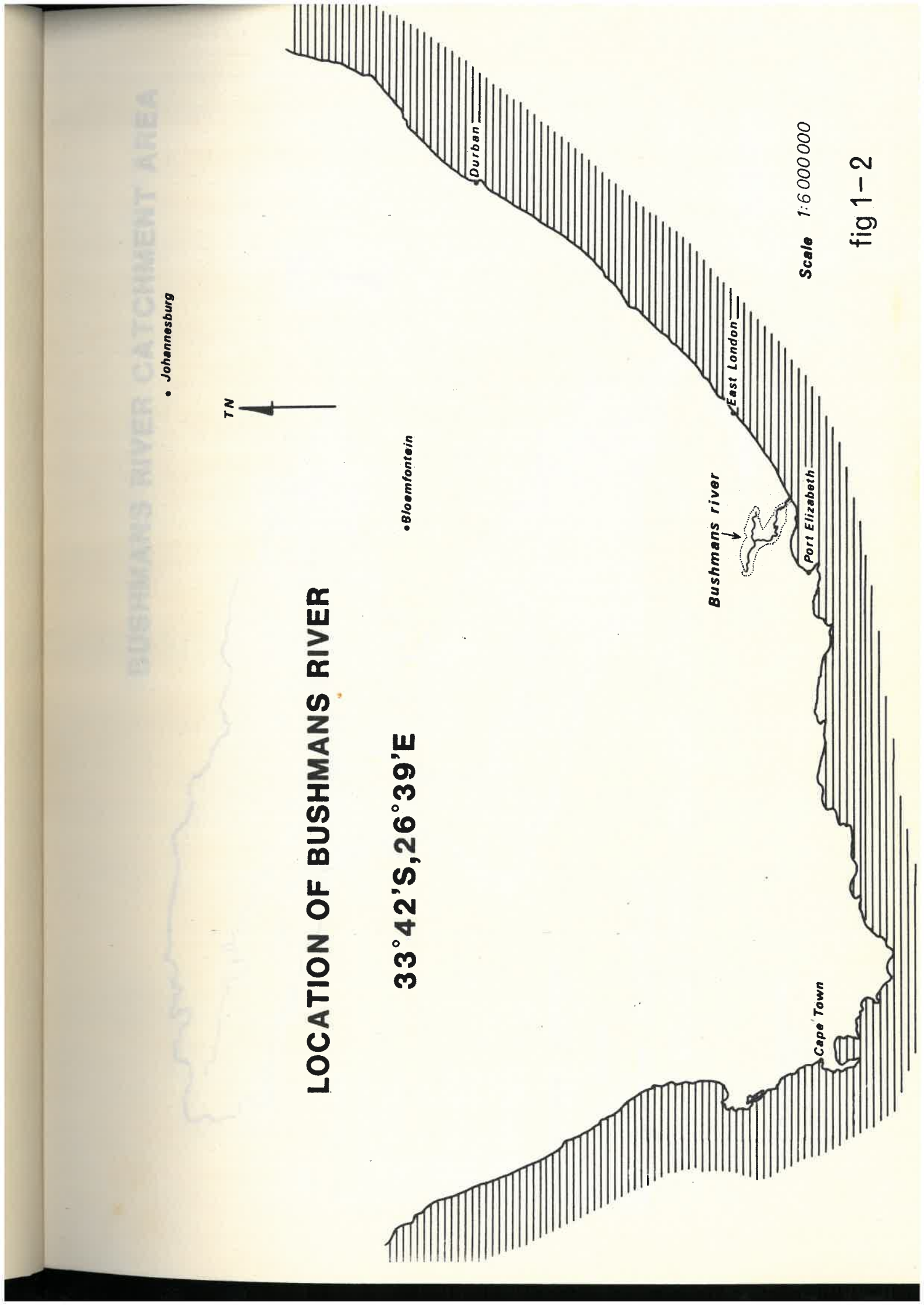
East London

Port Elizabeth

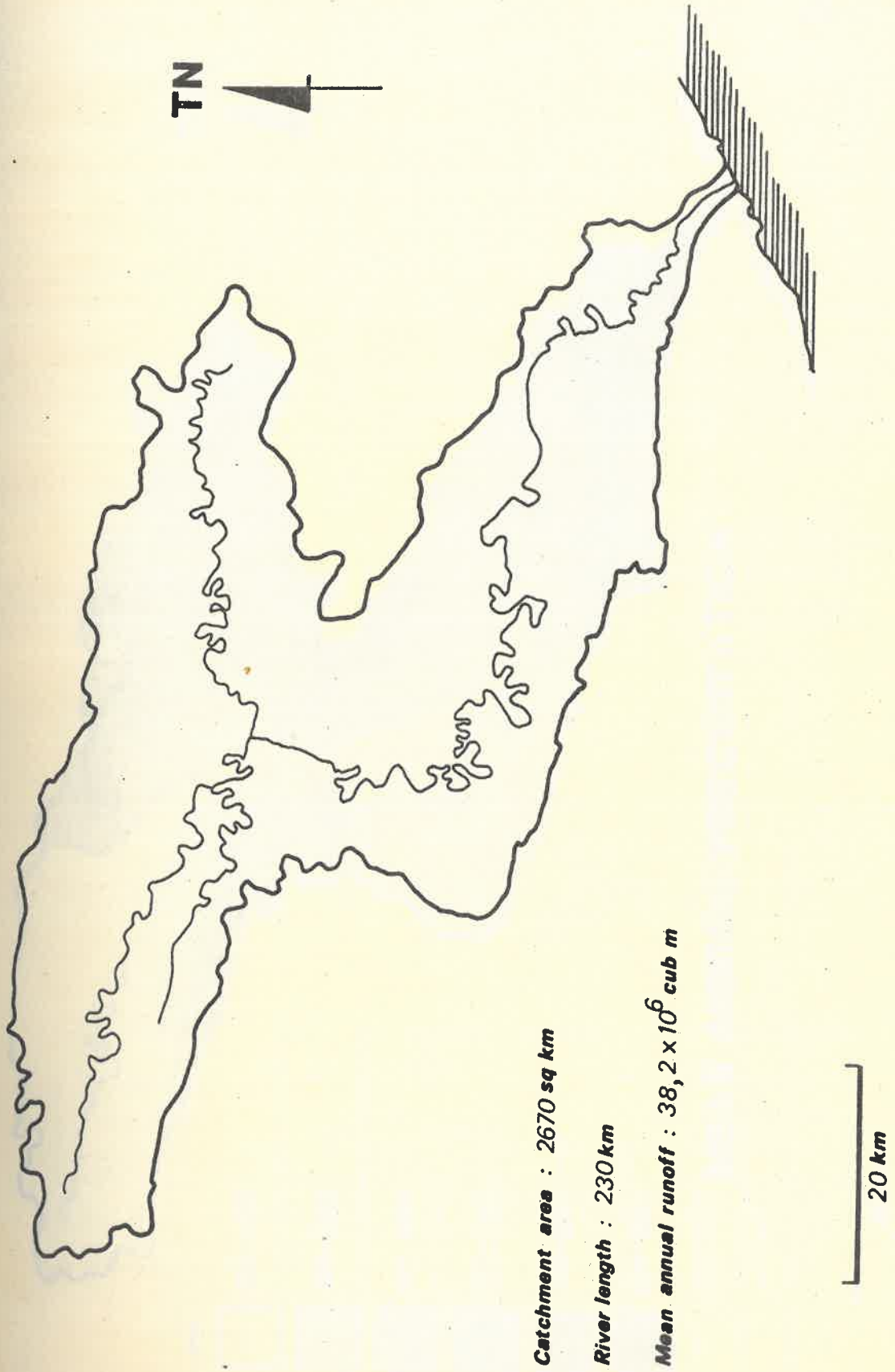
Cape Town

Scale 1:6 000 000

fig 1-2



BUSHMANS RIVER CATCHMENT AREA



BUSHMANS RIVER CATCHMENT AREA

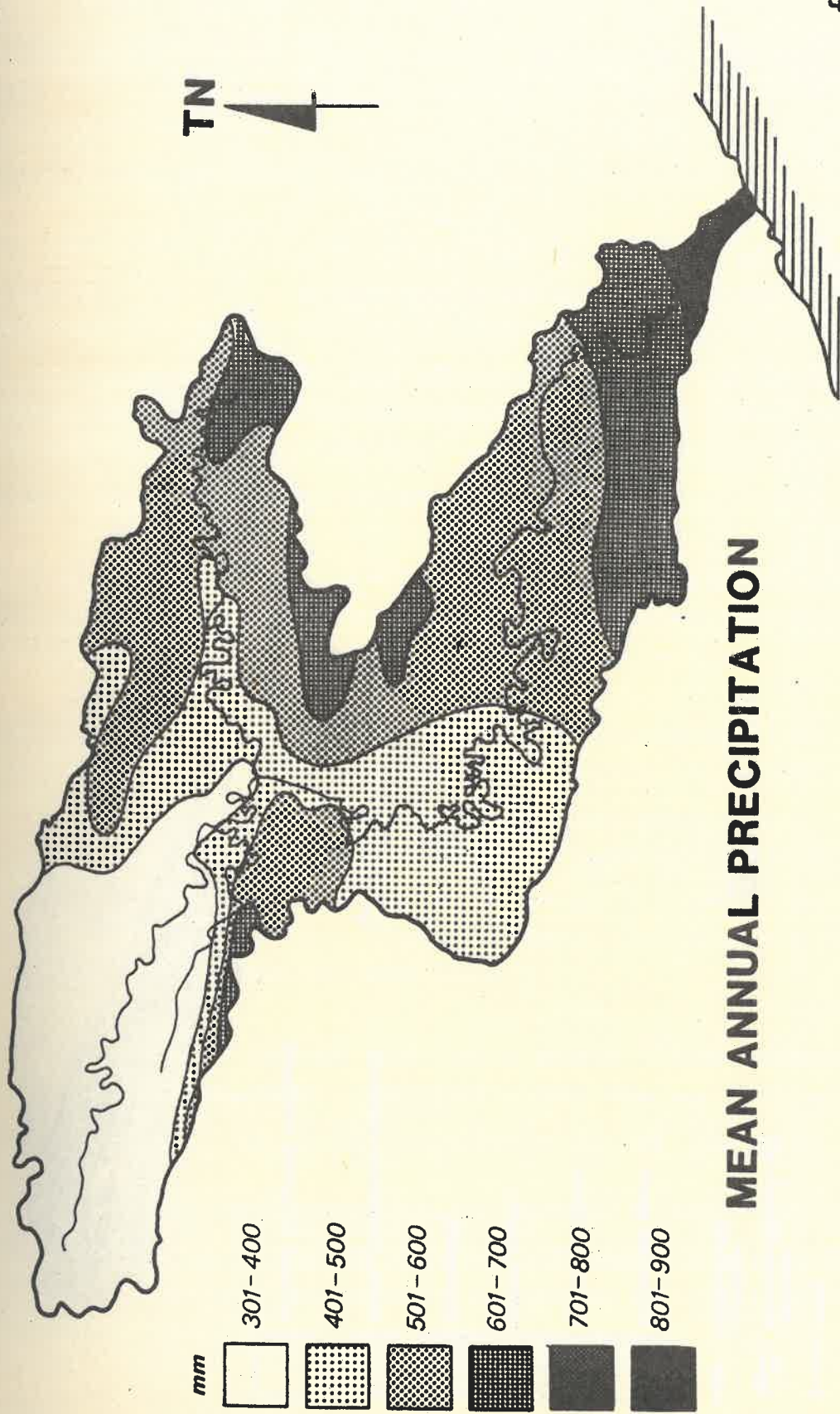


fig 2-2

BUSHMANS RIVER CATCHMENT AREA

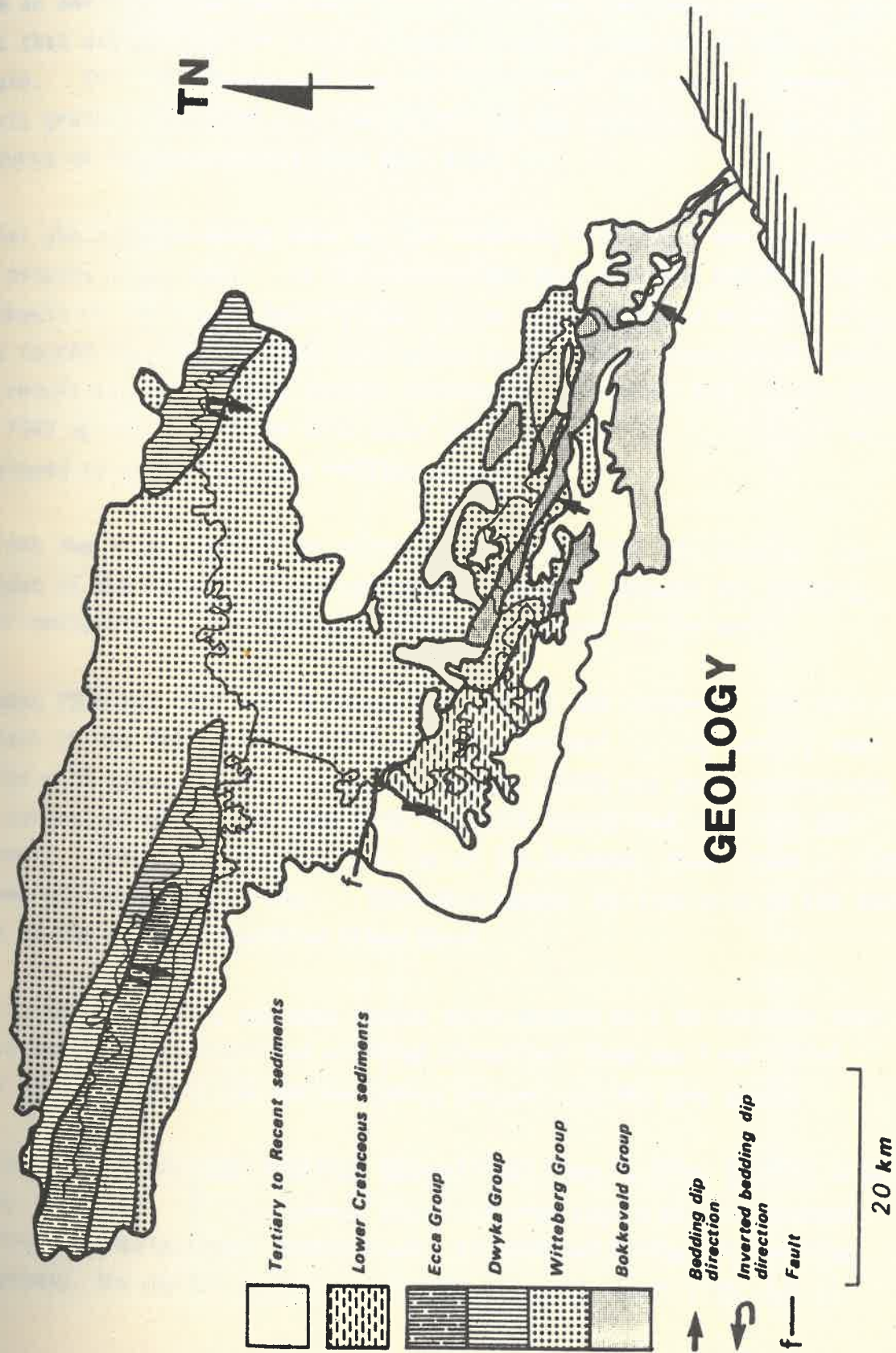


fig 2-3

are given in APPENDIX 1. The more important grain size parameters are contoured on figs. 3-2 and 3-3. All parameters are presented in PHI-units [$\text{PHI} = -\log_2 (\text{grain size in mm} / 1 \text{ mm})$].

From an earlier study (Baird *et al.*, 1979) it was concluded that the sand bars that extend from the inlet to about 3 km upstream are of marine origin. This was determined from the mineralogy, the grain roundness of quartz grains, the grain size parameters and the submicroscopic surface textures of the sand grains from that area.

Aerial photographs dating back to 1942 show the historical development of the estuary (fig. 3-4). In 1942 wind-blown sand from the beach to the southwest of the inlet, had migrated across the previously existing inlet. This forced the inlet channel to migrate northeastward from its old position. The result was a navigable channel forming on the Kenton side of the estuary. The 1942 aerial photograph also shows that Kenton-on-Sea had not yet been developed to any extent as a holiday resort.

By 1955 the inlet channel had returned to its original position but the remnant of the channel on the northern bank of the estuary was probably still navigable. Town development was in progress on the banks.

Between 1955 and 1980 little change occurred in the estuary. The Kenton remnant of the 1942 inlet channel was still present but had largely been filled with sand. The national road bridge (1959) had been constructed. The control of wind-blown sand from the beach stabilised the inlet ebb-channel. The small channel which lay at the Bushmans river front in 1955 became smaller and shallower. Town development, particularly on the Kenton side of the estuary, had also taken place.

The morphology of the sediment bodies which extend to 3 km upstream indicates that this sediment has migrated up-estuary from the tidal inlet. This is confirmed by the marine source deduced for the sand grains.

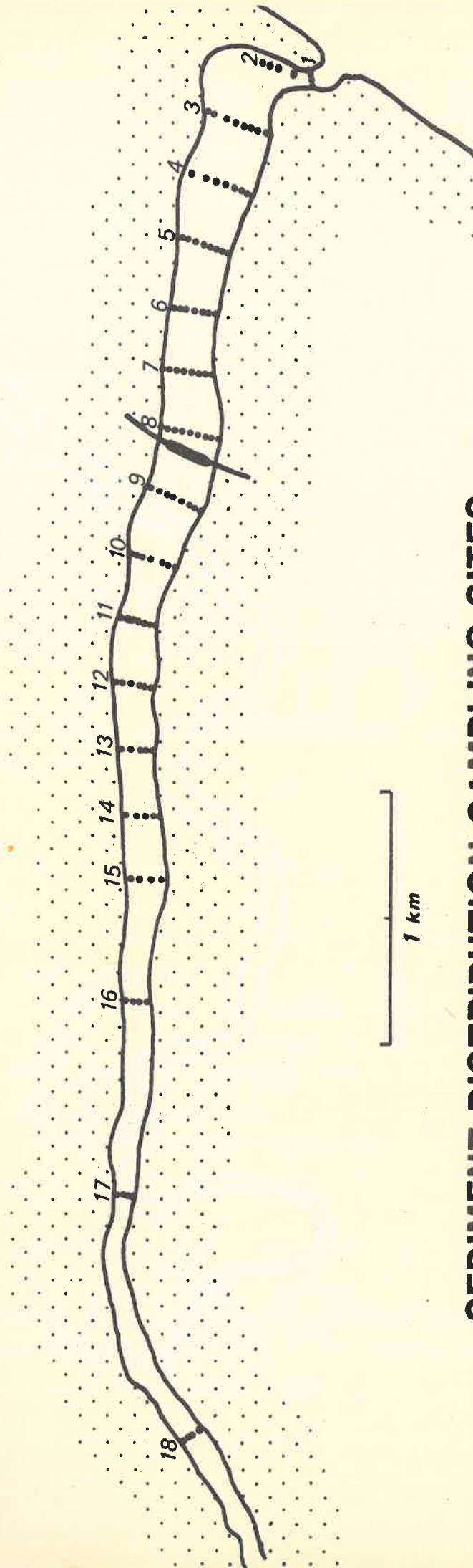
It is reported that the subtidal channel near line 14 (fig. 3-1) is undergoing shoaling. It is proposed that this area should also be dredged. Although no navigational problems were encountered during the sampling programme, the aerial photograph of 1980 shows the shoal (fig. 3-4 c).

TN



BUSHMANS ESTUARY

BUSHMANS ESTUARY



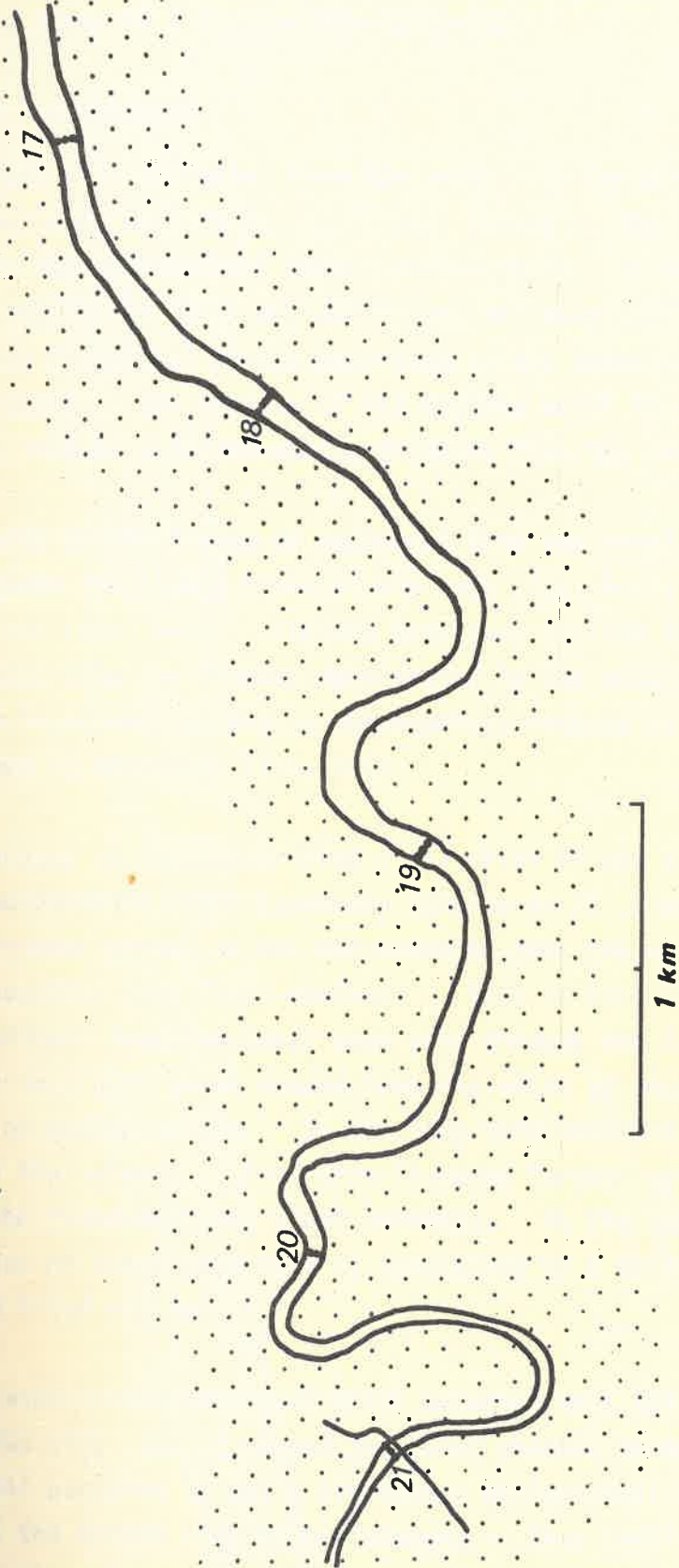
SEDIMENT DISTRIBUTION SAMPLING SITES

fig 3-1

TN



BUSHMANS ESTUARY



SEDIMENT DISTRIBUTION SAMPLING SITES

fig 3-1

Field observation during the sampling programme revealed that the erosion base of the estuary is infrequently encountered at the sediment surface or at a shallow depth (0,5 m) into the substrate.

4. INTERPRETATION OF RESULTS

The average grain size decreases from the inlet into the estuary (fig. 3-2). This corresponds very well to the frictional stress at the bed which was determined from the mathematical model (Uncles *et al.*, in prep.). As the tidal current velocities (both ebb and flood) decrease upstream from the tidal inlet, the frictional stress generated at the water-sediment interface also decreases. The ability of the flowing water to transport sediment grains is reduced with increasing distance from the inlet.

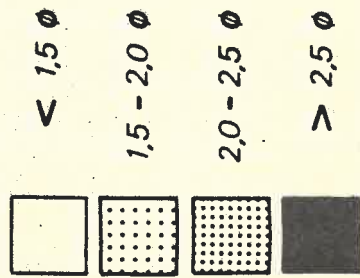
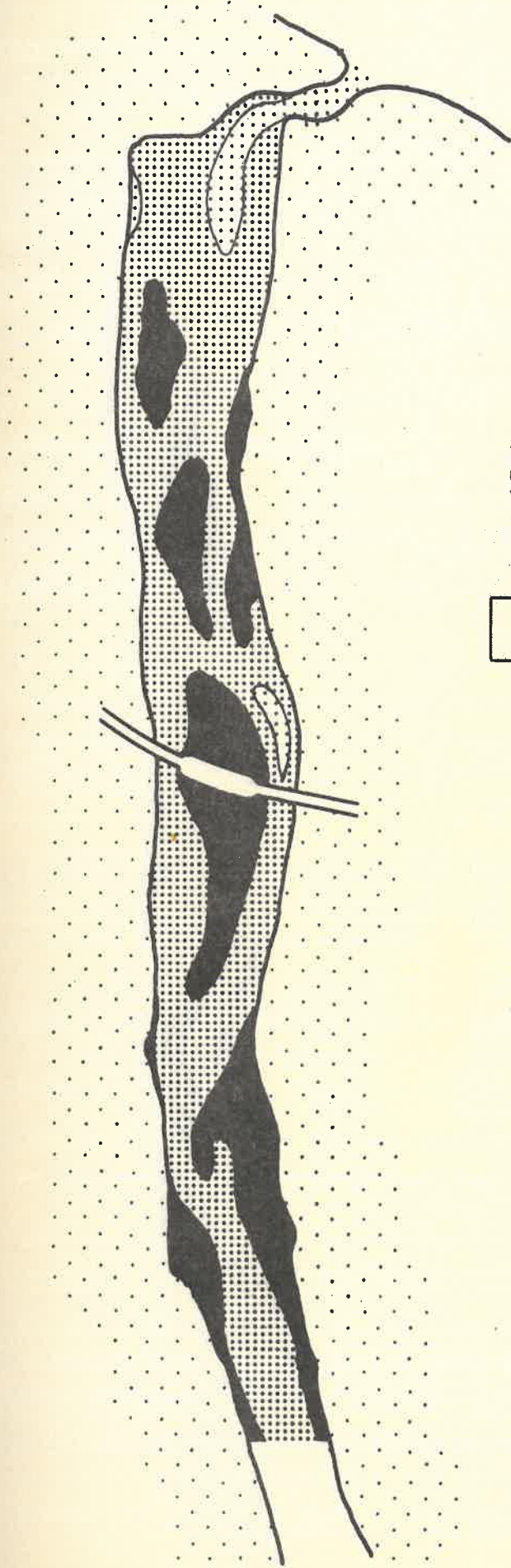
This effect leads to the fining of sediments from the inlet up-estuary. At the inlet where frictional stresses are high (fig. 4-1), the sediment is coarse-grained (fig. 3-2). Further upstream, at line 14 (fig. 3-1), low current velocities are further decelerated by the abruptly deepening channel. The frictional stress is subsequently reduced (fig. 4-1) and fine-grained mud is deposited (fig. 3-3).

Overtides generated in the constricted tidal inlet of the Bushmans estuary lead to a flood-dominant tidal asymmetry (Uncles *et al.*, in prep.). The resultant frictional stress at the bed averaged over the ebb and flood tides is consequently also flood-dominant. This in turn leads to a net movement of sediment from the beach surf zone through the inlet into the estuary. The sand bars which extend from the inlet to about 3 km upstream are therefore of marine origin. In the long term sediment moves through the inlet into the estuary. From here it moves further up-estuary under influence of the flood-dominant tidal currents. In the long term the lateral position of these sand bars is controlled by a balance of tidal deposition and flood erosion.

The tongue of wind-transported sand which extended into the inlet channel during the 1940s (fig. 3-4 a) caused the inlet channel to migrate northwards. In that position it was a convenient navigational channel for small boats on the Kenton side of the estuary. In a similar way a new channel meander lay adjacent to the Bushmans river-front.



MEAN GRAIN SIZE ON SURFACE

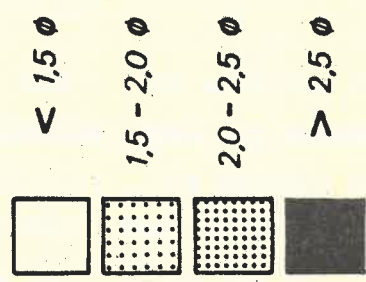
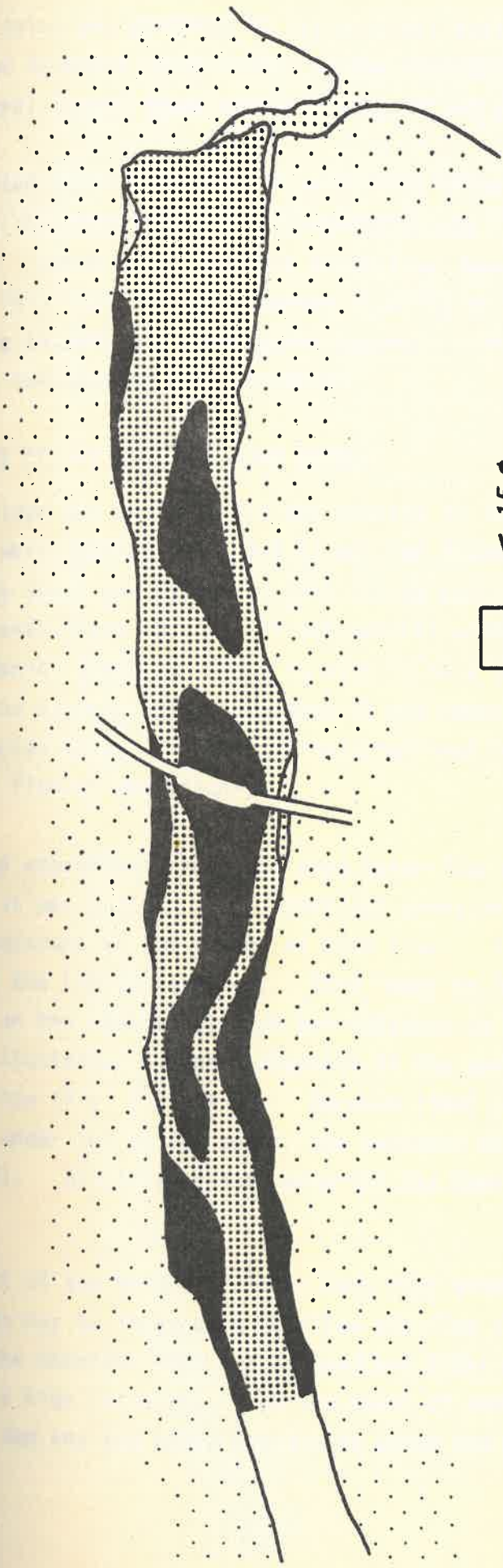


BUSHMANS ESTUARY

fig 3-2a



MEAN GRAIN SIZE AT -0,5m



BUSHMANS ESTUARY

fig 3-2b

When the inlet was restored to its original position the channels at the Kenton and Bushmans river-fronts became redundant as tidal water conduits. As a natural result these channels were filled with sediment.

The reported shoal near line 14 which also shows on the 1980 aerial photo is due to the interaction of ebb-dominated and flood-dominated tidal channels. Where these channels cross they deposit sediment into each other. This leads to the observed shoaling as the weak tidal currents are unable to maintain a navigable channel. This phenomenon is fairly common in the eastern Cape estuaries.

5. THE EFFECT OF THE NATIONAL ROAD BRIDGE

A road bridge was built across the estuary in 1959. Two existing tidal channels were spanned (fig. 3-4 c) but the intertidal sand bar between the bridge spans was filled in with riprap and fill. The estuary was thereby constricted to a 1/4 of its natural width. Construction rubble in the channel under the spans is said to have constricted the natural flow of the estuary until 1975 when it was removed. The mathematical model (Uncles *et al.*, in prep.) indicates that the bridge does not influence the tidal flow of the estuary.

The bridge embankment restricts free water flow across the intertidal flat on which it was built. Two intertidal areas of quiet water are therefore created adjacent to the bridge at high tide. In these areas the frictional stress at the bed is very low. This leads to deposition of fine-grained material on the intertidal sand bar adjacent to the bridge. This is clearly illustrated by the difference in the surface and subsurface mud distribution (fig. 3-3 a & b). Because tidal currents jet through the channels under the bridge spans, the sediment there is coarse-grained (fig. 3-2). All fine-grained material has been winnowed away from these areas.

The effect of the bridge during a very high discharge flood is uncertain. The bridge may be inadequate to allow the flow of a large volume of water because the channels that are spanned are tidal and may not be capable of handling a high discharge. In the event of such a flood the bridge would act as a dam and the water would rise above the normal level. This should

Surface Distribution of Mud

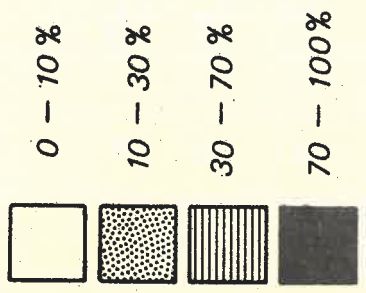
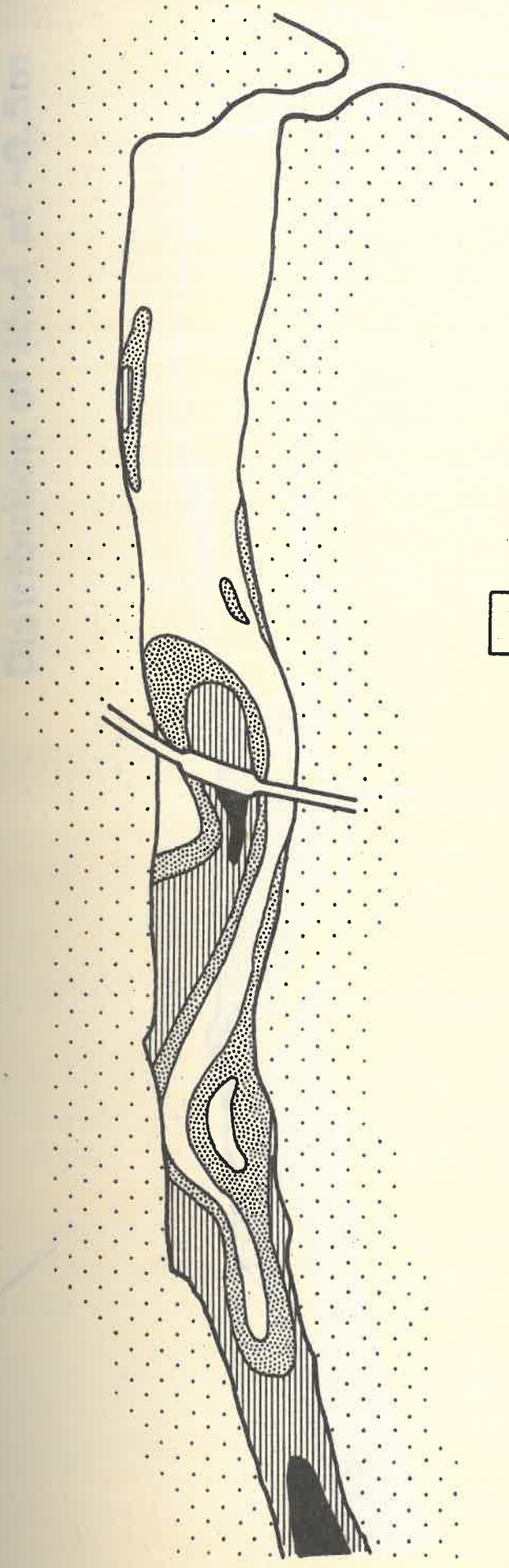


fig 3-3a



Distribution of Mud at -0,5m

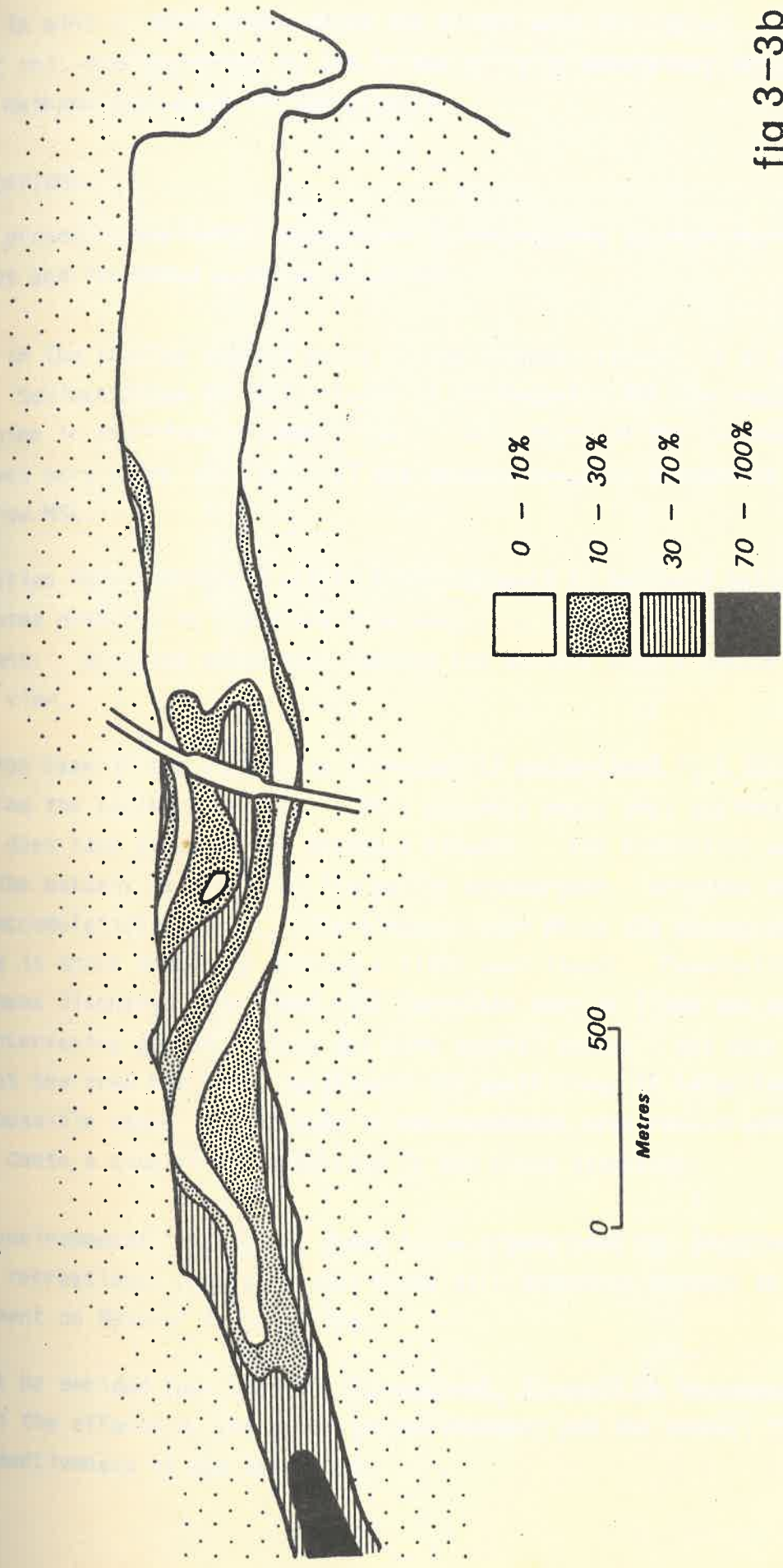


fig 3-3b

be borne in mind if development above the bridge were considered. The extent of this damming effect by the bridge could be determined using the existing mathematical model of the estuary.

6. RECOMMENDATIONS

From the presently available information it is possible to make the following deductions and recommend a course of action.

The sand in the shallow seaward parts of the Bushmans estuary is of marine origin. Sedimentation in this estuary is consequently NOT the result of soil erosion in the river catchment area. UP-estuary of the prograding marine sand bars (line 14; fig. 3-1) the estuary abruptly deepens to about 3,5 m below MSL.

Sedimentation into previously active tidal channels is entirely natural. The proposed dredging is therefore unnecessary to improve the estuarine environment. Dredging would only improve the estuary from a recreational point of view.

The erosion base in the estuary is infrequently encountered at a shallow depth below the sediment surface. This probably means that sediment build-up does take place in the Bushmans estuary. The historical development of the estuary as seen from the aerial photographs, indicates that the rate of accumulation is slow. The timespan over which the photographs are available is short enough to exclude a fifty year flood. Examination of the Bushmans discharge data since 1970 indicates that no flood has occurred in the intervening period. This may have several causes - the most likely being that the area has had a relatively dry spell since at least the 1940s. Another possible cause is that dams in the catchment area retain sufficient water to cause a significant reduction in the flood discharge.

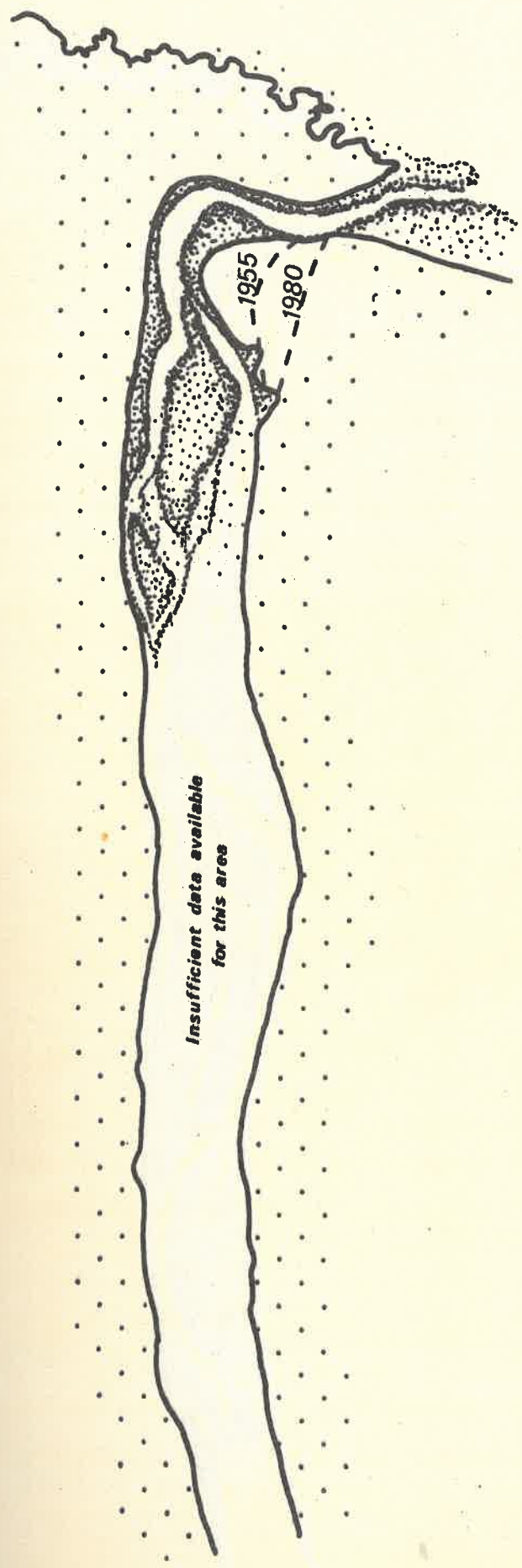
From an environmental standpoint there is no urgent need for dredging. Cost and recreational considerations alone will determine whether this "improvement on Nature" is justified.

Should it be decided that dredging is required, it would be necessary to establish the effects on the estuarine environment and the overall long term productiveness of the operation.

TN

BUSHMANS ESTUARY

1942



Intertidal and subtidal sediment bodies
--- Sand migration

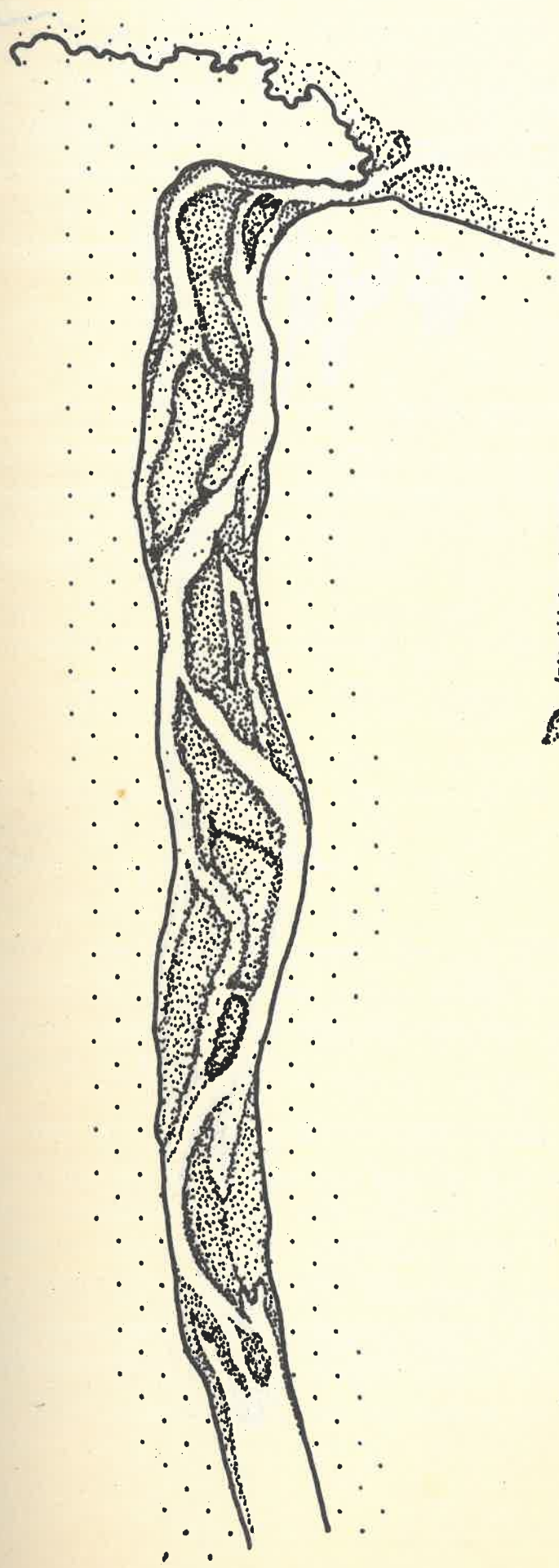
500 m

fig 3-4a

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BUSHMANS ESTUARY

1955



*Intertidal and subtidal
sediment bodies*

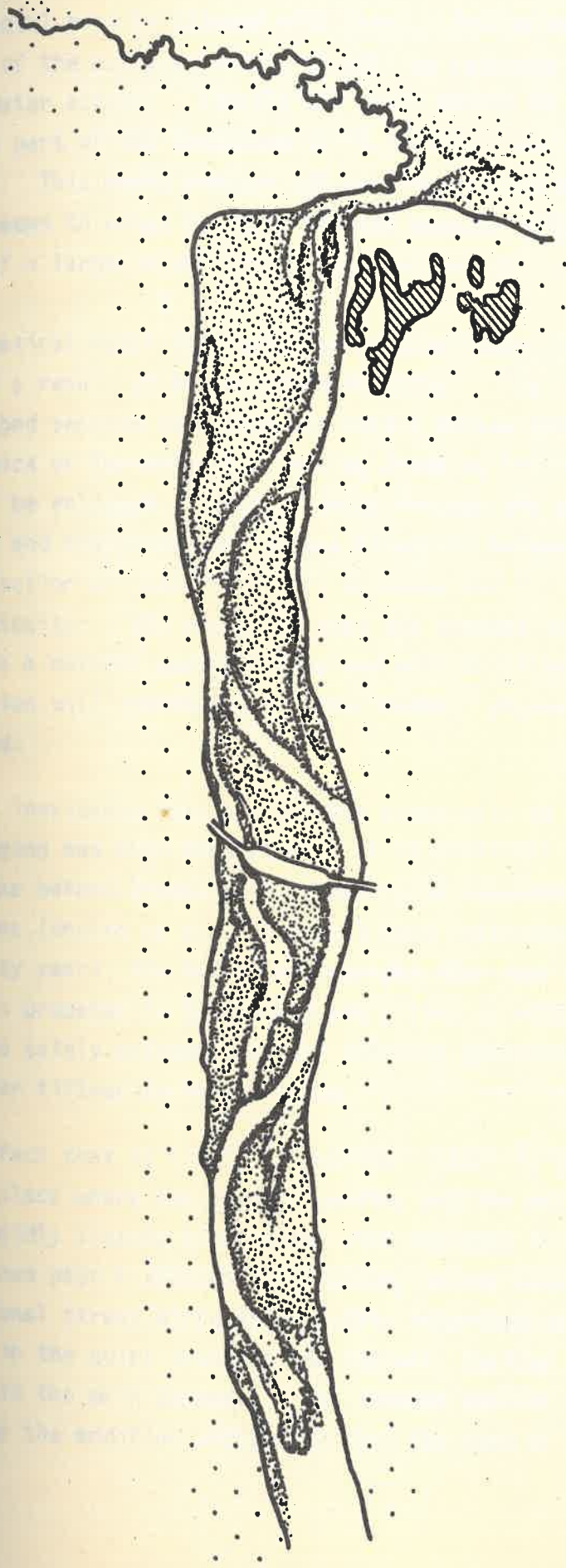
500 m

fig 3-4b

TN

BUSHMANS ESTUARY

1980



*Intertidal and subtidal
sediment bodies*



*Sand stabilizing
vegetation*



500 m

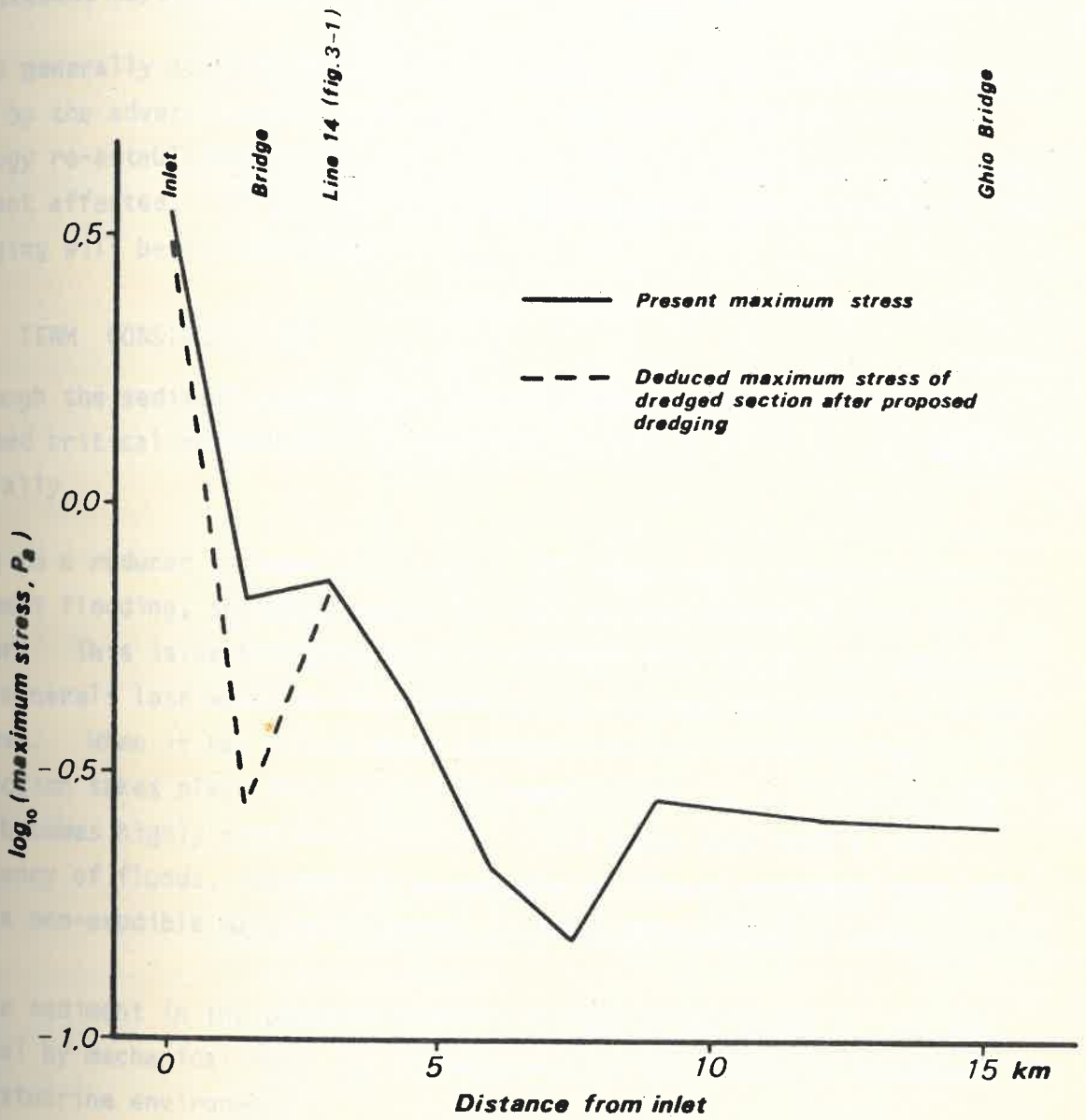
fig 3-4c

For optimal efficiency in the removal of sediment from the estuary, dredge spoil disposal must be planned with care. The sediment cannot be left on the banks of the estuary because it will be returned to the estuary by wind and rain water action. Ideally the spoil should be dumped at sea so that it becomes part of the longshore drift sediment load and dispersed along the coast. This would however add considerably to the cost. No simple solution seems to exist for this problem because suitable areas for the disposal of a large volume dredge spoil do not exist.

The mathematical model has indicated no significant change in the tidal pattern as a result of the proposed dredging. The influence of the proposed dredged section will thus not have a marked effect on the overall hydrodynamics of the estuary. During dredging the channel cross-sectional areas will be enlarged. Water flowing through the dredged section will decelerate and the frictional stress along the bottom will decrease. Sediment in traction or suspension will be deposited in this area of lower current velocity. The result is that the dredged section of the estuary will act as a natural sediment trap and will be filled accordingly. This sedimentation will continue until the "normal" channel area is re-established.

It is thus inevitable that the dredged areas will be re-filled with sediment after dredging has been completed. It is difficult to estimate how long it will take before dredging will have to be repeated. Although empirical calculations (Uncles *et al.*, in prep.) have indicated that it should take about thirty years, the aerial photographs show that an area similar to the one that is proposed to be dredged was filled in within fifteen years. It can thus be safely assumed that the dredging operation will have to be repeated after fifteen to thirty years.

Another effect that is likely to manifest itself is that flow separation will take place where the dredged section and the main part of the channel meet. Rapidly flowing tidal water with sediment in traction and in suspension flows past a stationary or slowly moving body of water. Because the frictional stress difference at this interface is high, sediment is deposited in the quiet water of the channel, leading to shoaling in its "mouth" with the main channel. The dredged section itself is more influenced by the modified bathymetry than the rest of the estuary.



Variation of maximum frictional stress with distance in the Bushmans estuary

(Adapted from Uncles et al., in prep.)

If the shoaled section of the channel near line 14 were to be dredged it is very likely to resume this shoaling as it is the result of the interference of ebb-dominated and flood-dominated tidal channels. It is not clear how long it will take after dredging before the channel shallows to its present depth.

It is generally accepted that estuarine organisms are not influenced for long by the adversities of dredging. In the longer term the estuarine ecology re-establishes itself very soon if the hydrodynamics of the system are not affected. We believe that any hydrodynamic changes resulting from dredging will be insignificant.

7. LONG TERM CONSIDERATIONS

Although the sediment accumulation in the Bushmans estuary has not yet reached critical proportions, it may do so in future if it is not removed naturally.

Owing to a reduced sediment turnover in the estuary as a result of less frequent flooding, sediment compaction will in time become an important factor. This is particularly true of sediment that has a clay component. Clay minerals lose water during compaction and become very cohesive in the process. When it has a high water content, clay is readily eroded. If compaction takes place the clay (or sediment containing as little as 10% mud) becomes highly erosion-resistant. This means that with a lower frequency of floods, sediment in an estuary is allowed to consolidate and form a non-erodible mass which cannot be flushed by natural floods.

If the sediment in the Bushmans estuary becomes consolidated in this way, removal by mechanical means may be necessary in the future to conserve the estuarine environment.

8. CONCLUSIONS

- 8.1 At present it is unnecessary to dredge the proposed sections of the Bushmans estuary to improve the estuarine environment.
- 8.2 The bridge across the lower estuary has a negligible effect on the tidal dynamics of the estuary. It does however cause a cell of flow separation which leads to mud deposition on the areas adjacent to the bridge.

- 8.3 Should cost and recreational considerations justify dredging it must be remembered that it will have to be repeated in fifteen to thirty years from the original operation.
- 8.4 If dredging is to proceed, spoil disposal planning requires attention.
- 8.5 The proposed dredging operation will not have a significant influence on the estuarine hydrodynamics or its ecology.
- 8.6 Environmentally essential dredging may have to be considered in the long term if natural flooding does not remove the accumulated sediment in the estuary.

ACKNOWLEDGEMENTS

This report is part of the SANCOR co-ordinated marine geology programme. It was financed by the CSP of the CSIR. This ROSIE investigation was carried out in co-operation with the Department of Zoology at UPE who were commissioned to carry out an environmental study in the Bushmans estuary. We acknowledge the use of results obtained by that department. Fruitful discussions were held with Prof. Baird of the Department of Zoology and Dr Uncles from the Institute for Marine Environmental Research, Plymouth, U.K., who visited UPE on a post-doctoral research leave.

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APPENDIX 1

This section lists all the sediment distributions and parameters which were obtained from the samples of the Bushmans estuary. The sample lines are marked on fig 3-1 (p 8-9). The positions of the sample station can be found from the coded station numbers listed below. Sample number B09:4T (say) originates from Bushmans estuary; 'B', and was collected on line 9; '9' see fig 3-1. It was taken from the sediment surface, 'T' denotes TOP, at position 4 on the line 9. This sampling spot (indicated as a dot, fig 3-1) is the fourth from the LEFT looking up-estuary. Samples were also collected 0,5m below the sediment surface by coring. These samples are indicated by a 'B' for BOTTOM in the code.

All grain sizes that are listed below are in PHI-units and NOT in millimetres. $\text{PHI} = -\log_2 (\text{grain size in mm}/1\text{mm})$. All data were handled by computer.

The parameters listed below are as follows:

- VCS - Very coarse sand (grain diameters between 1mm and 2mm)
- CS - Coarse sand (grain diameters between 0,5mm and 1mm)
- MS - Medium sand (grain diameters between 0,25mm and 0,5mm)
- FS - Fine sand (grain diameters between 0,125mm and 0,25mm)
- VFS - Very fine sand (grain diameters between 0,063mm and 0,125mm)
- Mud - Silt plus clay (grain diameters less than 0,063mm)

-
- Median ϕ - The distribution median in PHI-units; $Md = P_{50}^*$
 - Mean G.S ϕ - The mean grain size in PHI-units; $M = (P_{16} + P_{84})/2$
 - Sorting ϕ - The grain sorting in PHI-units; $S = (P_{84} - P_{16})/2$
 - Skewness ϕ - The distribution skewness in PHI-units; $Sk = (M - Md)/S$
 - Kurtosis ϕ - The distribution kurtosis in PHI-units; $K = (((P_{95} - P_5)/2) - S)/S$

* P_x = The xth percentile of the cumulative distribution. All parameter formulas were obtained from; Buller, A.T. and McManus, J (1979) Sediment sampling and analysis. In Dyer, K.R. (Edit., Estuarine hydrography and sedimentation. Cambridge University Press. 230pp.

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B01:1T	00,18	07,34	77,61	13,76	00,18	00,92	1,54	1,54	0,43	0,00	1,13
B01:1B	00,00	00,25	63,88	34,64	00,25	00,98	1,90	1,77	0,65	0,19	0,37
B01:2T	00,19	03,44	82,22	13,38	00,00	00,76	1,56	1,56	0,41	0,00	0,97
B01:2B	86,49	01,82	05,97	05,45	00,00	00,26	-0,42	-0,42	0,39	0,00	2,86
B01:3T	00,00	00,48	54,92	43,17	00,24	01,20	1,89	1,96	0,68	0,10	0,33
B01:3B	----	SOLID SUBSTRATE	----								
B02:1T	00,00	01,36	87,73	10,91	00,00	00,00	1,55	1,55	0,39	0,00	0,94
B02:1B	00,25	00,51	81,31	16,92	00,00	01,01	1,60	1,62	0,44	0,10	0,89
B02:2T	00,00	00,23	27,74	69,70	01,17	01,17	2,31	2,18	0,61	-0,21	0,45
B02:2B	00,00	00,00	08,09	80,88	09,56	01,47	2,51	2,51	0,41	0,00	1,26
B02:3T	00,63	01,47	70,65	25,79	00,84	00,63	1,67	1,81	0,61	0,22	0,47
B02:3B	01,39	03,47	79,34	14,58	00,35	00,89	1,56	1,56	0,42	0,00	0,98
B02:4T	00,00	00,00	29,67	68,54	01,79	00,00	2,30	2,17	0,63	-0,21	0,42
B02:4B	00,86	01,94	67,39	28,94	00,43	00,43	1,70	1,83	0,63	0,21	0,43

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
803:1T	00,00	00,00	09,65	87,94	01,32	01,10	2,45	2,45	0,38	0,00	0,89
803:1B	00,21	00,42	30,25	68,07	00,63	00,42	2,28	2,14	0,63	-0,22	0,41
803:2T	00,24	00,49	37,16	60,88	00,24	00,98	2,19	2,08	0,67	-0,17	0,35
803:2B	00,00	00,64	44,97	53,32	00,21	00,86	2,07	2,02	0,68	-0,10	0,33
803:3T	00,00	00,00	28,00	70,00	00,80	01,20	2,31	2,18	0,61	-0,21	0,45
803:3B	00,00	00,00	37,11	61,56	00,44	00,89	2,20	2,09	0,66	-0,17	0,36
803:4T	00,40	04,20	71,20	22,60	00,60	01,00	1,63	1,74	0,58	0,19	0,54
803:4B	00,00	00,00	32,98	65,43	00,71	00,89	2,25	2,12	0,64	-0,20	0,39
803:5T	00,00	00,46	51,49	45,75	01,38	00,92	1,95	1,99	0,69	0,10	0,32
803:5B	00,00	00,45	26,68	70,40	01,57	00,90	2,32	2,19	0,61	-0,22	0,46
803:6T	00,17	00,17	29,87	66,28	02,01	01,51	2,29	2,15	0,64	-0,21	0,41
803:6B	00,00	00,00	13,32	81,02	04,20	01,46	2,44	2,44	0,41	0,00	0,96
803:7T	00,00	00,10	29,39	66,83	02,46	01,15	2,30	2,17	0,63	-0,21	0,42
803:7B	00,00	00,00	14,20	80,49	04,36	00,95	2,44	2,44	0,42	0,00	0,91

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B03:8T	03,65	00,43	61,16	33,26	01,50	00,00	1,75	1,88	0,68	0,19	0,37
B03:8B	00,00	00,48	64,30	33,93	00,65	00,65	1,77	1,90	0,66	0,20	0,38
B04:1T	00,00	00,00	16,47	80,87	01,50	01,16	2,41	2,39	0,43	0,00	0,92
B04:1B	00,00	00,00	11,11	87,38	01,13	00,38	2,44	2,44	0,39	0,00	0,94
B04:2T	00,79	00,40	30,10	66,34	00,59	01,78	2,27	2,13	0,64	-0,22	0,40
B04:2B	02,68	00,41	19,79	74,23	01,03	01,86	2,35	2,22	0,58	-0,23	0,59
B04:3T	00,43	00,22	03,68	91,34	03,03	01,30	2,49	2,49	0,37	0,00	0,32
B04:3B	00,21	00,21	27,48	71,07	00,41	00,62	2,31	2,17	0,61	-0,22	0,45
B04:4T	00,00	00,17	09,24	83,79	04,86	01,94	2,47	2,47	0,40	0,00	0,87
B04:4B	00,00	00,21	19,50	77,80	01,66	00,83	2,38	2,31	0,51	-0,15	0,69
B04:5T	00,00	00,00	15,47	80,58	02,70	01,26	2,42	2,42	0,42	0,00	0,98
B04:5B	00,00	00,19	09,92	81,71	04,86	03,31	2,47	2,47	0,40	0,00	0,91
B04:6T	00,00	00,24	12,26	81,37	04,48	01,65	2,45	2,45	0,41	0,00	0,96
B04:6B	00,00	00,21	16,74	75,21	04,66	03,18	2,42	2,38	0,47	-0,10	0,82

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B04:7T	00,19	00,19	10,87	59,03	18,25	11,46	2,56	2,64	0,59	0,13	1,03
B04:7B	00,00	00,21	16,91	76,96	03,59	02,33	2,41	2,38	0,47	-0,10	0,83
B04:8T	00,18	00,72	24,46	65,58	06,52	02,54	2,36	2,23	0,63	-0,20	0,66
B04:8B	00,20	00,41	10,45	59,22	22,34	07,38	2,60	2,70	0,64	0,16	0,89
B05:1T	00,00	00,00	01,18	65,17	32,94	00,71	2,74	2,87	0,65	0,20	0,39
B05:1B	----	SOLID SUBSTRATE	----								
B05:2T	00,24	00,24	21,48	76,37	00,72	00,95	2,36	2,26	0,54	-0,19	0,60
B05:2B	00,25	00,25	17,16	79,66	01,96	00,74	2,40	2,36	0,46	-0,10	0,83
B05:3T	00,00	00,25	19,59	78,63	00,57	01,02	2,38	2,30	0,50	-0,15	0,69
B05:3B	00,00	00,00	04,77	90,72	03,18	01,33	2,49	2,49	0,30	0,02	0,32
B05:4T	00,00	00,00	09,09	88,43	01,38	01,10	2,46	2,46	0,38	0,00	0,86
B05:4B	00,00	00,00	02,75	90,25	05,75	01,25	2,52	2,52	0,37	0,00	0,50
B05:5T	01,43	00,48	13,13	82,34	01,19	01,43	2,42	2,42	0,41	0,00	1,12
B05:5B	07,68	01,97	20,39	66,67	02,19	01,10	2,29	2,05	0,75	-0,32	1,22

Heavy minerals.

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ	
805:6T	00,00	00,28	04,51	90,99	03,66	00,56	2,49	2,49	0,37	0,00	0,32	
805:6B	00,00	00,00	05,79	81,51	06,46	06,24	2,50	2,50	0,39	0,00	0,87	
805:7T	00,00	00,32	07,30	80,00	03,81	08,75	2,48	2,48	0,39	0,00	0,81	
805:7B	00,00	00,17	06,88	84,34	03,27	05,34	2,48	2,48	0,38	0,00	0,73	
805:8T	00,57	00,57	08,62	40,80	06,90	42,53	2,46	2,44	0,51	-0,10	1,36	
805:8B	00,15	00,15	26,32	68,27	01,39	03,72	2,32	2,18	0,61	-0,21	0,46	
806:1T	05,22	00,63	05,85	57,41	16,28	14,61	2,54	2,60	0,56	0,1	2,48	
806:1B	----	SOLID SUBSTRATE ----										
806:2T	00,19	00,38	24,25	73,31	00,75	01,13	2,34	2,21	0,58	-0,21	0,51	
806:2B	00,00	00,00	03,33	90,00	05,49	01,18	2,51	2,51	0,37	0,00	0,45	
806:3T	00,22	00,21	11,87	84,40	01,54	01,76	2,44	2,44	0,40	0,00	1,00	
806:3B	00,00	00,00	01,63	92,87	04,07	01,43	2,51	2,51	0,36	0,00	0,32	
806:4T	00,22	0,22	07,59	79,61	06,72	05,64	2,49	2,49	0,40	0,00	1,15	
806:4B	00,00	00,00	02,19	87,52	08,09	02,19	2,53	2,53	0,38	0,00	0,80	

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
806:5T	00,00	00,00	04,23	93,65	00,96	01,15	2,48	2,48	0,36	0,00	0,32
806:5B	00,17	00,17	03,52	83,58	06,20	06,37	2,51	2,51	0,38	0,00	0,62
806:6T	00,25	00,00	02,54	83,72	10,43	03,05	2,55	2,55	0,39	0,00	0,92
806:6B	02,17	01,33	21,83	70,00	02,33	02,33	2,34	2,18	0,63	-0,24	0,51
806:7T	03,36	00,22	06,28	81,17	03,36	05,61	2,46	2,46	0,40	0,00	1,28
806:7B	01,29	00,26	04,91	51,94	05,17	36,43	2,49	2,49	0,42	0,00	1,47
807:1T	02,31	00,38	05,19	60,00	05,96	26,15	2,50	2,50	0,41	0,00	1,24
807:1B	01,09	00,93	08,74	63,75	02,00	23,68	2,43	2,43	0,40	0,00	1,14
807:2T	00,51	00,26	06,39	77,24	11,51	04,09	2,53	2,53	0,42	0,00	1,31
807:2B	00,45	00,30	10,91	84,55	02,42	01,36	2,45	2,45	0,40	0,00	1,00
807:3T	00,00	00,26	04,39	72,42	09,82	11,11	2,53	2,53	0,41	0,00	0,96
807:3B	00,00	00,00	02,69	90,50	05,02	01,79	2,51	2,51	0,37	0,00	0,35
807:4T	00,34	00,34	06,76	82,43	04,39	05,74	2,48	2,48	0,39	0,00	0,80
807:4B	00,20	00,20	07,29	79,76	03,24	09,31	2,47	2,47	0,39	0,00	0,83

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
807:5T	00,00	00,00	03,70	77,78	12,84	05,68	2,56	2,56	0,41	0,00	0,96
807:5B	00,00	00,19	07,91	88,32	01,88	01,69	2,46	2,46	0,38	0,00	0,81
807:6T	00,00	00,23	11,01	85,78	00,92	02,06	2,44	2,44	0,39	0,00	0,97
807:6B	00,26	00,00	06,86	89,71	01,58	0,58	2,47	2,47	0,37	0,00	0,72
807:7T	00,00	00,23	10,81	85,81	01,35	01,81	2,44	2,44	0,39	0,00	0,96
807:7B	00,68	00,68	22,40	74,21	00,90	01,13	2,35	2,22	0,58	-0,21	0,55
807:8T	00,55	00,55	16,61	68,08	05,90	08,30	2,41	2,34	0,53	-0,13	0,91
807:8B	01,01	01,26	23,87	70,10	01,26	02,51	2,32	2,18	0,62	-0,24	0,49
808:1T	-----	SOLID SUBSTRATE	-----								
808:1B	-----	SOLID SUBSTRATE	-----								
808:2T	01,42	03,55	60,43	33,18	00,24	01,18	1,74	1,85	0,68	0,18	0,38
808:2B	03,45	02,30	21,38	47,82	03,22	21,84	2,25	2,06	0,74	-0,25	0,87
808:3T	00,41	00,41	16,08	79,38	02,27	01,44	2,41	2,38	0,45	-0,10	0,90
808:3B	00,24	00,48	25,54	71,81	00,48	01,45	2,32	2,19	0,60	-0,22	0,48

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B08:4T	00,48	00,24	03,14	66,67	09,66	19,81	2,54	2,54	0,41	0,00	0,94
B08:4B	00,57	00,29	01,72	49,00	08,31	40,11	2,56	2,56	0,42	0,00	0,96
B08:5T	00,00	00,24	01,90	47,51	12,11	38,24	2,61	2,67	0,51	0,13	0,69
B08:5B	00,30	00,30	04,56	49,85	07,60	37,39	2,52	2,52	0,73	0,00	1,38
B08:6T	00,35	00,00	04,21	52,63	04,56	38,25	2,50	2,50	0,40	0,00	1,10
B08:6B	00,00	00,00	04,67	85,35	02,34	07,64	2,49	2,49	0,37	0,00	0,34
B08:7T	00,26	00,26	08,99	61,11	05,82	23,54	2,47	2,47	0,43	0,00	1,32
B08:7B	00,00	00,00	04,63	67,11	06,17	22,11	2,51	2,51	0,39	0,00	0,93
B08:8T	00,53	00,27	07,47	36,27	13,87	41,60	2,58	2,68	0,65	0,16	0,93
B08:8B	00,20	00,40	14,00	68,20	04,50	12,60	2,43	2,41	0,46	0,00	0,96
B08:9T	08,13	01,04	16,67	54,17	08,13	11,88	3,06	2,91	0,79	-0,19	0,60
B08:9B	-----	SOLID SUBSTRATE	-----	-----	-----	-----	-----	-----	-----	-----	-----
B09:1T	09,12	03,54	17,69	57,54	04,84	07,26	2,34	2,16	0,69	-0,27	0,77
B09:1B	47,67	05,00	11,00	20,67	01,33	14,33	2,06	1,70	1,04	-0,34	0,60

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
809:2T	08,17	01,56	18,68	62,26	04,28	05,06	2,37	2,23	0,61	-0,22	0,55
809:2B	03,23	01,08	42,77	41,08	00,46	01,38	2,07	2,01	0,69	-0,10	0,33
809:3T	00,00	00,19	02,51	65,44	14,67	17,18	2,59	2,63	0,47	0,10	0,81
809:3B	00,00	00,00	01,57	83,74	12,41	02,27	2,56	2,56	0,40	0,00	0,97
809:4T	00,00	00,00	02,47	21,30	04,01	72,22	2,54	2,54	0,44	0,00	1,36
809:4B	00,40	00,60	04,57	60,44	06,96	27,04	2,51	2,51	0,41	0,00	1,31
809:5T	01,15	00,22	06,49	55,93	08,28	27,96	2,51	2,51	0,43	0,00	1,42
809:5B	02,86	00,48	04,29	40,71	08,10	43,57	2,54	2,54	0,45	0,00	1,46
809:6T	00,98	02,36	46,26	47,24	01,18	01,97	1,99	1,98	0,71	0,00	0,37
809:6B	01,06	01,76	38,98	46,74	01,59	09,88	2,07	2,01	0,71	-0,10	0,33
809:7T	00,67	00,44	14,19	73,84	05,10	05,76	2,43	2,42	0,44	0,00	1,07
809:7B	10,86	00,56	18,38	68,25	00,56	01,39	2,36	2,26	0,54	-0,19	0,62
809:8T	09,07	01,35	28,38	55,98	02,32	02,90	2,25	2,11	0,68	-0,21	0,38
809:8B	00,71	00,24	03,81	54,76	10,24	30,24	2,55	2,55	0,43	0,00	1,30

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B10:1T	47,57	01,27	03,38	26,43	05,50	15,86	2,50	2,50	0,48	0,00	1,81
B10:1B	----	SOLID SUBSTRATE	----								
B10:2T	02,70	01,66	17,05	70,27	01,66	06,65	2,37	2,26	0,55	-0,20	0,66
B10:2B	00,00	00,00	05,42	87,71	05,42	01,46	2,50	2,50	0,38	0,00	0,55
B10:3T	01,16	00,17	01,50	53,65	13,62	29,90	2,61	2,68	0,51	0,14	0,69
B10:3B	02,20	00,49	02,44	36,67	18,83	39,36	2,71	2,84	0,67	0,18	0,46
B10:4T	00,00	00,27	01,61	27,08	05,90	65,15	2,57	2,60	0,46	0,00	0,95
B10:4B	01,46	00,42	05,61	72,77	12,27	07,48	2,54	2,54	0,43	0,00	1,26
B10:5T	00,24	00,48	07,00	42,03	03,38	46,86	2,45	2,45	0,43	0,00	1,25
B10:5B	00,18	00,37	13,92	79,30	03,48	02,75	2,43	2,43	0,42	0,00	1,01
B10:6T	00,00	00,00	03,77	33,33	01,74	61,16	2,47	2,47	0,40	0,00	0,87
B10:6B	00,00	00,22	07,79	70,56	02,81	18,61	2,46	2,46	0,39	0,00	0,90
B10:7T	00,26	00,26	04,16	38,70	05,19	51,43	2,51	2,51	0,43	0,00	1,43
B10:7B	00,00	00,00	09,38	82,50	03,13	05,00	2,46	2,46	0,36	0,00	0,88

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B11:1T	00,36	00,36	02,91	45,09	13,45	37,83	2,61	2,70	0,56	0,16	0,74
B11:1B	01,05	00,26	03,40	40,31	19,37	35,60	2,68	2,80	0,66	0,18	0,71
B11:2T	02,76	02,02	29,04	59,19	03,49	03,49	2,27	2,13	0,70	-0,21	0,45
B11:2B	01,12	00,93	12,27	69,52	10,78	05,39	2,48	2,48	00,46	0,00	1,50
B11:3T	00,00	00,00	05,00	84,25	04,50	06,25	2,50	2,50	0,38	0,00	0,40
B11:3B	00,49	00,24	03,91	71,15	07,09	17,11	2,52	2,52	0,40	0,00	0,95
B11:4T	00,26	00,52	10,57	86,34	00,77	01,55	2,44	2,44	0,39	0,00	1,01
B11:4B	00,35	00,35	09,62	85,14	02,27	02,27	2,45	2,45	0,39	0,00	0,97
B11:5T	04,92	00,68	07,97	63,56	06,95	15,93	2,48	2,48	0,43	0,00	1,42
B11:5B	02,43	00,93	08,96	51,68	16,23	19,78	2,56	2,56	0,59	0,13	1,10
B11:6T	00,43	00,22	04,52	55,91	04,95	33,98	2,50	2,50	0,40	0,00	1,17
B11:6B	01,20	00,72	03,85	41,35	06,97	45,91	2,51	2,51	0,44	0,00	1,71
B11:7T	00,64	00,64	15,02	25,56	03,19	54,95	2,24	2,12	0,72	-0,17	0,54
B11:7B	01,44	00,58	09,51	33,14	04,03	51,30	2,40	2,29	0,60	-0,19	0,89

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B12:1T	01,25	01,75	03,00	40,00	10,00	44,00	2,55	2,59	0,52	0,10	1,75
B12:1B	00,84	00,56	03,34	36,77	06,13	52,37	2,52	2,52	0,44	0,00	1,63
B12:2T	00,72	00,72	06,76	29,23	09,18	53,38	2,52	2,54	0,65	0,00	1,01
B12:2B	00,42	00,63	17,12	58,66	03,34	19,83	2,37	2,26	0,57	-0,19	0,58
B12:3T	01,36	02,13	28,10	63,57	01,94	02,91	2,27	2,11	0,68	-0,23	0,40
B12:3B	00,89	00,45	06,90	62,81	05,35	23,61	2,48	2,48	0,41	0,00	1,33
B12:4T	00,00	00,00	02,11	33,12	06,75	58,02	2,57	2,57	0,43	0,00	0,96
B12:4B	00,00	00,26	03,11	78,76	07,51	10,36	2,53	2,53	0,39	0,00	0,80
B12:5T	00,61	01,01	16,02	74,85	04,46	03,04	2,41	2,36	0,49	-0,11	0,82
B12:5B	00,00	00,22	05,19	89,18	02,38	03,03	2,48	2,48	0,37	0,00	0,46
B12:6T	04,59	01,46	28,81	63,88	00,42	00,84	2,26	2,11	0,66	-0,23	0,40
B12:6B	19,43	03,32	28,91	43,92	01,74	02,69	2,13	2,01	0,74	-0,17	0,51
B13:1T	03,72	01,24	05,21	34,00	18,11	37,72	2,66	2,78	0,70	0,16	0,85
B13:1B	03,42	00,57	02,85	31,05	15,38	46,72	2,69	2,81	0,67	0,18	0,69

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B13:2T	00,18	00,18	03,40	67,62	10,20	18,43	2,55	2,55	0,41	0,00	0,94
B13:2B	00,00	00,56	11,39	62,78	06,94	18,33	2,46	2,46	0,44	0,00	1,38
B13:3T	00,44	00,66	23,90	73,03	00,88	01,10	2,33	2,21	0,59	-0,22	0,51
B13:3B	03,75	01,58	31,76	61,14	00,39	01,38	2,22	2,08	0,67	-0,21	0,37
B13:4T	00,00	00,00	02,59	38,44	18,63	40,33	2,71	2,83	0,65	0,19	0,40
B13:4B	00,86	00,29	03,45	25,00	08,33	62,07	2,57	2,67	0,61	0,51	1,11
B13:5T	03,65	01,07	06,44	51,07	12,45	25,32	2,54	2,57	0,51	0,10	1,36
B13:5B	01,60	00,53	04,52	27,93	06,91	58,51	2,53	2,56	0,52	0,10	1,37
B14:1T	01,94	02,26	10,97	53,55	06,45	24,84	2,44	2,39	0,51	-0,10	1,23
B14:1B	08,17	01,99	05,98	36,45	16,33	31,08	2,62	2,73	0,68	0,17	0,91
B14:2T	00,21	00,42	14,38	57,71	03,75	23,54	2,40	2,33	0,52	-0,14	0,70
B14:2B	00,00	00,21	09,05	62,55	03,09	25,10	2,45	2,45	0,41	0,00	0,96
B14:3T	00,59	00,59	17,43	77,03	02,38	01,98	2,39	2,33	0,50	-0,13	0,76
B14:3B	01,55	01,55	26,31	56,87	01,55	12,19	2,27	2,13	0,66	-0,22	0,40

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B14:4T	00,26	00,51	09,18	65,82	08,93	15,31	2,49	2,49	0,44	0,00	1,45
B14:4B	00,19	00,57	12,17	81,94	02,66	02,47	2,44	2,44	0,40	0,00	1,02
B14:5T	04,23	00,85	03,66	18,59	08,73	63,94	2,60	2,71	0,70	0,16	0,95
B14:5B	07,19	02,40	09,28	36,23	08,98	35,93	2,45	2,30	0,69	-0,21	1,15
B15:1T	07,62	00,48	02,86	16,19	10,48	62,38	2,72	2,82	0,73	0,13	0,72
B15:1B	08,02	01,07	04,81	24,87	11,23	50,00	2,61	2,72	0,68	0,16	0,87
B15:2T	00,00	00,00	00,00	02,72	10,87	86,41	03,38	3,30	0,50	-0,15	0,69
B15:2B	00,00	00,00	00,75	05,64	04,89	88,72	2,87	2,91	0,72	0,10	0,48
B15:3T	00,00	00,38	00,38	02,29	07,63	89,31	03,30	03,09	0,68	-0,30	0,86
B15:3B	00,26	00,00	00,51	11,03	10,51	77,69	2,94	2,96	0,70	0,00	0,32
B15:4T	03,66	00,56	03,10	23,66	09,86	59,15	2,63	2,74	0,65	0,18	0,90
B15:4B	05,12	01,71	06,14	35,49	15,36	36,18	2,60	2,70	0,68	0,16	1,00
B16:1T	00,00	00,00	00,33	04,65	11,96	83,06	3,29	3,14	0,63	-0,24	0,44
B16:1B	01,20	00,30	01,81	25,30	17,17	54,22	2,80	2,89	0,69	0,14	0,35

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B16:2T	00,00	00,00	00,00	02,28	01,37	96,35	2,60	2,91	0,66	0,17	0,36
B16:2B	00,00	00,00	00,52	01,05	01,57	96,86	3,00	2,82	0,86	-0,21	0,51
B16:3T	00,00	00,00	00,00	00,00	00,87	99,13	3,50	3,50	0,34	0,00	0,32
B16:3B	00,00	00,00	00,00	00,36	00,35	99,29	3,00	3,00	0,68	0,00	0,32
B16:4T	00,93	00,31	01,86	10,22	06,19	80,50	2,70	2,80	0,72	0,14	0,75
B16:4B	04,58	00,87	06,10	32,68	14,16	41,61	2,62	2,73	0,67	0,17	0,83
B17:1T	00,39	00,00	00,39	04,63	03,47	91,12	2,83	2,91	0,70	0,11	0,34
B17:1B	00,85	00,43	00,43	00,43	00,85	97,02	3,00	2,66	1,02	-0,33	0,32
B17:2T	00,00	00,00	00,00	03,68	03,01	93,31	2,91	2,97	0,68	0,10	0,33
B17:2B	00,00	00,00	00,00	00,00	00,86	99,14	3,50	3,50	0,34	0,00	1,39
B17:3T	04,96	01,42	06,86	45,86	04,73	36,17	2,47	2,47	0,43	0,00	1,39
B17:3B	00,73	00,73	01,83	11,36	06,23	79,12	2,69	2,81	0,69	0,16	0,67
B17:4T	00,00	00,00	00,41	01,23	01,23	97,13	2,83	2,83	0,79	0,00	0,60
B17:4B	03,85	00,61	04,05	29,55	12,55	49,39	2,64	2,76	0,65	0,18	0,76

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B18:1T	00,40	00,80	01,00	52,51	24,45	20,84	2,71	2,84	0,64	0,20	0,41
B18:1B	01,68	00,21	01,68	46,32	19,37	30,74	2,67	2,79	0,63	0,20	0,49
B18:2T	00,44	00,00	00,88	05,70	06,58	86,40	3,00	2,95	0,73	-0,10	0,47
B18:2B	01,19	00,59	01,19	08,01	08,31	80,71	2,93	2,91	0,74	0,00	0,61
B18:3T	00,61	00,00	00,61	07,93	01,22	89,63	2,54	2,54	0,42	0,00	1,15
B18:3B	00,37	00,37	00,73	16,85	04,03	77,66	2,60	2,65	0,49	0,11	0,75
B18:4T	00,00	00,00	00,32	16,40	11,25	72,03	2,83	2,93	0,67	0,14	0,34
B18:4B	00,52	00,52	00,00	00,52	01,55	96,89	3,33	3,21	0,57	-0,21	0,51
B19:1T	00,55	00,55	00,55	11,60	05,52	81,22	2,71	2,84	0,65	0,20	0,40
B19:1B	02,96	00,74	01,48	19,63	12,59	62,59	2,78	2,89	0,69	0,15	0,35
B19:2T	00,41	00,41	01,63	22,86	06,96	67,76	2,60	2,69	0,57	0,16	1,00
B19:2B	01,90	00,38	01,52	18,63	06,46	71,10	2,62	2,73	0,60	0,18	0,79
B19:3T	00,00	00,00	00,45	13,06	09,01	77,48	2,83	2,92	0,68	0,14	0,34
B19:3B	00,00	00,00	00,48	04,78	03,83	90,91	2,85	2,91	0,71	0,10	0,36

Fluvial sand (aeolian origin) from farmlands.

Station number	% VCS	% CS	% MS	% FS	% VFS	% Mud	Median ϕ	Mean grain size ϕ	Sorting ϕ	Skewness ϕ	Kurtosis ϕ
B20:1T	00,40	00,40	00,80	10:04	02,81	85,54	2,54	2,65	0,55	0,13	1,17
B20:1B	00,61	00,61	00,61	01,23	01,84	95,09	3,00	2,82	0,86	-0,21	0,51
B20:2T	00,00	00,00	00,47	02,33	00,93	96,28	2,60	2,71	0,65	0,17	0,84
B20:2B	00,00	00,00	01,14	16,92	06,39	75,56	2,66	2,78	0,61	0,20	0,47
B20:3T	00,86	00,43	01,29	12,02	05,15	80,26	2,73	2,83	0,70	0,15	0,62
B20:3B	04,93	00,99	01,97	13,49	07,24	71,38	2,67	2,78	0,61	0,16	0,84
B21:1T	00,34	00,34	00,68	04,76	05,10	88,78	2,93	2,91	0,75	0,00	0,72
B21:1B	00,21	00,00	01,07	20,39	21,67	56,65	3,00	2,98	0,70	0,00	0,32
B21:2T	00,00	00,40	01,07	08,47	07,66	82,26	2,86	2,89	0,74	0,00	0,67
B21:2B	01,46	00,88	03,80	12,87	11,70	69,30	2,80	2,82	0,78	0,00	0,80
B21:3T	00,00	00,33	00,65	02,61	02,29	94,12	2,75	2,76	0,82	0,00	1,39
B21:3B	05,06	01,87	06,93	38,95	24,91	22,28	2,64	2,65	0,85	0,00	1,39