TR17_49_54

10. Sand resources, Sandford-South Arm Peninsula.

V.M. Threader

An investigation of the sand resources of the Sandford-South Arm Peninsula area was requested by the Southern Metropolitan Master Planning Authority.

This report details the results of a preliminary surface investigation, a 'Gemco' auger drilling survey and outlines follow-up procedures in selected areas.

GEOLOGY

The bedrock in the area consists of Permian sediments and some associated dolerite intrusions. The lower lying areas contain sediments of the Quaternary system associated with the Derwent and Coal River estuaries.

Geophysical investigations by Leaman (1973) have revealed unconsolidated sediments, probably clay, to a depth of 121 m, in the neck separating the Sandford and South Arm peninsulas and in the Seven Mile Beach mid-bay spit. These sediments have not been studied in detail but are presumed to be of Tertiary age; probably pre basaltic (*i.e.* pre Pliocene?). Auger holes (Table 1) have proved very fine sand, 12 m in thickness, grading into silt and clay with increasing depth. Other holes, drilled in areas where sand pits are situated, have proved only a superficial thickness of sand over clay (Notes on Table 1, Hole Nos. 17, 18, 19, 20, 21, 23).

SAND TYPES

Recent dune sand. These sands occur on the south facing beaches of the area including Hope Beach, Goat Bluff-Cape Contrariety, Clifton Beach and Seven Mile Beach.

This is a uniform sand with a mean grain size in the fine sand range, containing some heavy mineral and yellow in colour due to the presence of hydrated iron oxides.

Tertiary sand. Generally this is a uniform white sand but there are small areas of coarse sand containing heavy minerals, shell fragments and in places, beds of organic material which impart a dark brown to black colouration. The origin of this material is probably estuarine, occurring to depths of 9-12 m in the neck area and to heights of 45 m above sea level in the central area of the Sandford peninsula. The elevated occurrences of Tertiary sand may be remnants of an older dune series which developed from the estuarine sands on an old shore line. Sand pits on Acton Road between Lauderdale and Cambridge and auger holes at Seven Mile Beach indicate extensive deposits of this sand type.

USES AND METHODS OF WORKING

The Tertiary white sand is used in the glass industry after wet screening to remove the clay fraction and organic matter. The coarse sand (Male's lease) is also screened and separated into fractions for the manufacture of concrete blocks, pipes and plaster sheets.

Most of the Tertiary sand and all of the dune sand is unsuitable for use as fine aggregate in the manufacture of concrete (specification A77-1957 in Table 1). The current practice is to mix dune sand with coarse grades of crusher dust to produce the required grading.

The necessity to wash the Tertiary sand doubles its cost and manufacturers of ready mixed concrete state that it is too expensive for their purposes.

The unsightly and wasteful methods of sand mining have been the subject of public protest and a State Government investigation. Sand mining on the peninsula is now being more strictly controlled. An aspect of control which is particularly relevant to the subject of mineral resources is prospecting, which in this area is lacking. It is axiomatic in the mining industry that no exploitation of a deposit should commence until sufficient prospecting has been done to determine the shape and size of the deposit and to enable a systematic programme of operations to be drafted. The lack of systematic method is most evident in the Sandford Peninsula area where the worked Tertiary sand deposits have had a shortened life and the abandoned pits throughout the area have been left in an untidy condition.

SAND RESERVES

Dune sand

Location	*Estimated area* (m^2)	*Estimated thickness* (m)	*Volume* (m^3)
Hope Beach west of the neck	66 200	9	595 800
Hope Beach east of the neck	41 800	9	376 200
Clifton Beach	217 400	9	1 956 600
Seven Mile Beach	5 016 700	9	45 150 300

Allowance has been made for a 90 m foreshore reserve.

The Clarence Commission does not favour dune mining on Clifton and Seven Mile Beaches. The available dune sand reserves are therefore estimated to be 1.3 m^3.

Tertiary sand

Location	*Estimated area* (m^2)	*Estimated thickness* (m)	*Volume* (m^3)
Neck (excluding narrow central portion)	3 344 500	9	30 100 500
Sandford Peninsula	1 672 300	2.5	4 180 750
Lauderdale	3 344 500	9	30 100 500
Seven Mile Beach	37 625 700	9	338 631 300

The estimates are based on insufficient data to be very reliable.

On the eastern side of the Sandford Peninsula the auger holes proved clays for their entire depth with the exception of holes 22 and 24 which proved very fine sand to a thickness of 8 m.

In the central area of Sandford Peninsula a concentration of abandoned pits are still estimated to contain substantial reserves of very fine sand.

Sand reserves at Seven Mile Beach cover an area of over 8 km^2 and in

the estimate of reserves only half of this was considered to contain sand to a depth of 9 m.

Sand reserves in the neck area are also considered to be significant, Male's workings on the eastern side of this area currently produce about 7600 m^3 of washed sand annually.

Other areas, such as the South Arm Peninsula, containing pockets of Quaternary sediments, mostly on cultivated land, have not been drilled and so are excluded from the reserve estimates. Similarly, Quaternary sediments around the mouth of Clarence Rivulet and between Lauderdale and Roches Beach are excluded from reserve estimates because they lie in areas where sand mining would be undesirable.

An additional area, to date not examined, is the tidal flat in the northern area of Ralphs Bay. It is known that a deep channel exists in the bedrock beneath the South Arm neck but the localised presence of coarse sand at Male's pit and the occurrence of similar material in auger holes 4-7 adjacent to this area would indicate that minor 'perched' channels do exist. A drilling programme in this area aided by geophysical methods may be able to locate additional reserves of coarse sand.

SAND REQUIREMENTS

The sand production in Hobart is 70 000-80 000 m^3 per annum. Over the last eight years there has been a 5% increase annually and on this basis the requirements in the next 25 years will amount to 4 million m^3. From the tables of reserves it is evident that this quantity could be attained without adverse effect on the environment but supply of dune sand under the limits placed on its removal is likely to be insufficient for the needs over this period. The only material which occurs in the region and which satisfies the requirements of all the sand consumers is the coarse sand already mentioned. It would appear therefore, that a vigorous exploratory programme to locate additional supplies of this material is warranted.

CONCLUSION

Drilling, aided by geophysical prospecting is recommended on the tidal flats of Ralphs Bay at the eastern end of the neck.

REFERENCE

LEAMAN, D.E. 1973. Geophysical survey at Hope Beach, South Arm. *Tech.Rep. Dep.Mines Tasm.* 15:108.

Table 1. AUGER DRILL HOLE LOGS AND SURFACE SAMPLE ANALYSIS

Hole No.	Depth (m)	Mean Grain Size mm	Description	% -0.15 mm	Remarks
1	0-0.9	0.16	Very fine sand	40.5	
	0.9-1.8	0.15	Very fine sand	42.9	
	1.8-2.7	0.14	Very fine sand	55.1	
	2.7-3.6	0.11	Very fine sand	79.1	
	3.6-4.5	0.14	Very fine sand	53.0	
	4.5-5.4	0.14	Very fine sand	53.1	
	5.4-7.3	0.15	Very fine sand	49.3	
	7.3-8.2	0.13	Very fine sand	58.7	
2	0-1.8	0.17	Very fine sand	33.2	Heavy mineral throughout.
	1.8-4.5	0.14	Very fine sand	54.3	
	4.5-8.2	0.13	Very fine sand	63.1	
	8.2-9.1	0.05	Silt	79.3	
3	0-2.7	0.17	Very fine sand	39.8	Shell and heavy mineral throughout.
	2.7-5.4	0.13	Very fine sand	36.9	
	5.4-8.2	0.15	Very fine sand	39.6	
	8.2-10.9	0.16	Very fine sand	38.0	
	10.9-12.8	0.15	Very fine sand	34.3	
	12.8-14.3	0.08	Very fine sand	66.7	
4	0.9-2.7	0.22	Fine sand	32.3	Shell and heavy mineral throughout.
	2.7-5.4	0.47	Medium sand	10.0	
	5.4-8.2	0.30	Fine sand	6.6	
	8.2-10.9	0.26	Fine sand	14.3	
	10.9-12.8	0.26	Fine sand	16.6	
	12.8-13.7	0.09	Silt	65.4	
5	0-2.7	0.20	Fine sand	19.1	Shell and heavy mineral throughout.
	2.7-5.4	0.18	Fine sand	26.9	
	5.4-8.2	0.18	Fine sand	29.1	
6	0-2.7	0.25	Fine sand	22.4	Shell and heavy mineral throughout.
	2.7-5.4	0.16	Very fine sand	44.5	
	5.4-8.2	0.17	Very fine sand	53.0	
	8.2-9.1	0.04	Silt	74.1	
7	0-2.7	0.63	Coarse sand	6.1	Shell and heavy mineral
	2.7-5.4	0.29	Fine sand	21.7	Shell and heavy mineral
	5.4-8.2	0.17	Very fine sand	32.0	Shell and heavy mineral
	8.2-10.0	0.20	Fine sand	38.6	
	10.0-10.9	0.09	Silt	72.5	
9	0-2.7	0.16	Very fine sand	28.6	Heavy mineral
	2.7-5.4	0.16	Very fine sand	26.7	Heavy mineral
	5.4-8.2	0.16	Very fine sand	28.0	
	8.2-9.1	0.17	Very fine sand	29.7	Heavy mineral
	9.1-11.8	0.14	Very fine sand	34.6	
14	0-2.7	0.14	Very fine sand	51.1	
	2.7-5.4	0.15	Very fine sand	36.1	
	5.4-7.3	0.15	Very fine sand	51.6	
	7.3-7.9	0.11	Very fine sand	57.6	

Table 1. (continued)

Hole No.	Depth (m)	Mean Grain Size mm	Description	% -0.15 mm	Remarks
16	0-0.9	0.15	Very fine sand	50.1	Shell and heavy mineral
22	0-2.7	0.10	Very fine sand	48.5	
	2.7-5.4	0.25	Fine sand	16.2	
	5.4-8.2	0.18	Very fine sand	17.8	Heavy mineral
24	0-2.7	0.14	Very fine sand	60.1	Heavy mineral throughout.
	2.7-5.4	0.15	Very fine sand	59.5	
	5.4-8.2	0.12	Very fine sand	52.0	
	8.2-10.0	0.09	Silt	56.3	
	10.0-10.9	0.02	Silt	90.8	
26	0-3.6	0.21	Fine sand	20.3	Shell and heavy mineral throughout.
	3.6-6.4	0.15	Very fine sand	64.4	
	6.4-9.1	0.14	Very fine sand	66.9	
Surface samples					
Tertiary sand					
Walkers pit, Acton Road		0.13	Very fine sand	40.3	
Lazenbys pit, Sandford		0.16	Very fine sand	45.4	Large amounts of organic material.
Dune sand					
Hope Beach, Harrisons pit		0.25	Fine sand	3.4	Heavy mineral
Seven Mile Beach (sand pit)		0.18	Fine sand	30.3	Heavy mineral

Notes on Table

(1) Auger holes 1-25 were drilled on road reserves between Lauderdale and South Arm. No. 26 was drilled at the entrance to Loongana Saw Mills plantation at Seven Mile Beach.
(2) The percentage of -0.15 mm is given as an indication of the high proportion of fine material in the samples.
(3) The heavy mineral content of the sand is mainly ilmenite and magnetite derived from weathered basalt and dolerite.
(4) Auger holes 8, 10, 11, 12, 13, 15, 18, 17 and 19 intersected Permian beds or decomposed dolerite at shallow depth.
(5) Auger holes 20, 21, 23 and 25 encountered clay at shallow depth and are excluded from this report.
(6) The depth of drilling was principally determined by the quantity of water in the hole which prevented collection of sand samples.
(7) Grading limits for fine aggregate (Australian Standard A77 1957) are given on the following page.

Screen Size	*Weight % passing*
⅜ inch	100
3/16 inch	90-100
2.36 mm	60-100
1.2 mm	30-100
0.6 mm	15-100
0.3 mm	5-50
0.15 mm	0-15

The mean grain size varies from 0.28 mm for the fine limits to 1.6 mm for the coarse limits; compare with the mean grain size values for the bore holes and surface samples.