Unpublished Report 1971/26

Quantitative feasibility of an underground water supply for George Town

by D. E. Leaman

Introduction

An increasing demand for water in the George Town–Bell Bay region has imposed strain on the pipeline supply from Launceston and an alternative supply is needed. Proposals include an additional pipeline or dam storage. A further source, cheaply available, is groundwater contained in the windblown sand north-east of George Town and north of the track from George Town to Beechford. The area (areas 1, 2, 3, Figure 1) is made up of two small basins of sandy material about 100 feet above sea level.

The following is based on what are considered reasonable but un-measured assumptions, as no field observations have been made.

Hydrological characteristics of sand

The following figures are based on published data by the United States Geological Survey and the Geological Survey of New South Wales.

- Transmissivity: 25,000–50,000 gallons per day per foot.
- Specific capacity: 2–11 gallons per minute per foot (average 4–5).
- Coefficient of storage: 0.10–0.30.
- Typical yield: 100 gallons per minute from a 15 foot screen and 30 foot drawdown (6½" diameter). Sand at Botany Bay, New South Wales, yields 160 gallons per minute with 20 foot drawdown and generally yields two million gallons per day per square mile.

The sand deposits north-east of George Town are variably grained and the above quoted figures are probably reasonable.

Supply estimations

The following estimates are based on the following assumptions:

(i) There is 30-45 feet of saturated sand for yield purposes.

(ii) There is 15 feet of screen at the bottom of the bore.

(iii) The sand has the above properties.

(iv) The pumping rate is 100 gallons per minute.

(v) That 18 inches of an average 30 inch rainfall is absorbed.

(vi) Sand porosity is 20%.

(vii) There is 50 feet of sand (saturated) for storage calculations.

The region has been partitioned into three areas for the purposes of discussion and these are shown in Figure 1. Area 3 differs from the others in that it is composed of currently active beach and dune sand.

Minimum data	*Area 1*	*Area 2*	*Area 3*
Area (square miles)	1.5	2.5	1
Water storage (gallons)	$2.6 \quad 10^9$	$4.3 \quad 10^9$	$1.7 \quad 10^9$
Recharge (gallons)	$3.9 \quad 10^8$	$6.5 \quad 10^8$	$2.6 \quad 10^8$
Safe yield (gallons)	$3.9 \quad 10^8$	$6.5 \quad 10^8$	$2.6 \quad 10^8$
Daily safe yield (gallons)	$1.1 \quad 10^6$	$1.8 \quad 10^6$	$0.7 \quad 10^6$
Number of bores	7–8	11–12	5

The real total area, inclusive of divides and accessory intakes, is 11 to 12 square miles. Thus the total storage could be of the order of $15 \quad 10^9$ to $21 \quad 10^9$ gallons and the annual recharge $3 \quad 10^9$ gallons. This is equivalent to a safe yield of $8.8 \quad 10^6$ gallons per day, requiring 50 to 60 bores.

In addition a 20% porosity could be a relatively low value, further increasing the quantities available.

Bores placed more than 1500 feet apart would not interfere significantly at the above rate of pumping or indeed if doubled. Increased pumping rates and hence fewer bores are dependent on sand thickness.

Increased yields could be sustained for short periods providing that the annual yield was not greatly exceeded.

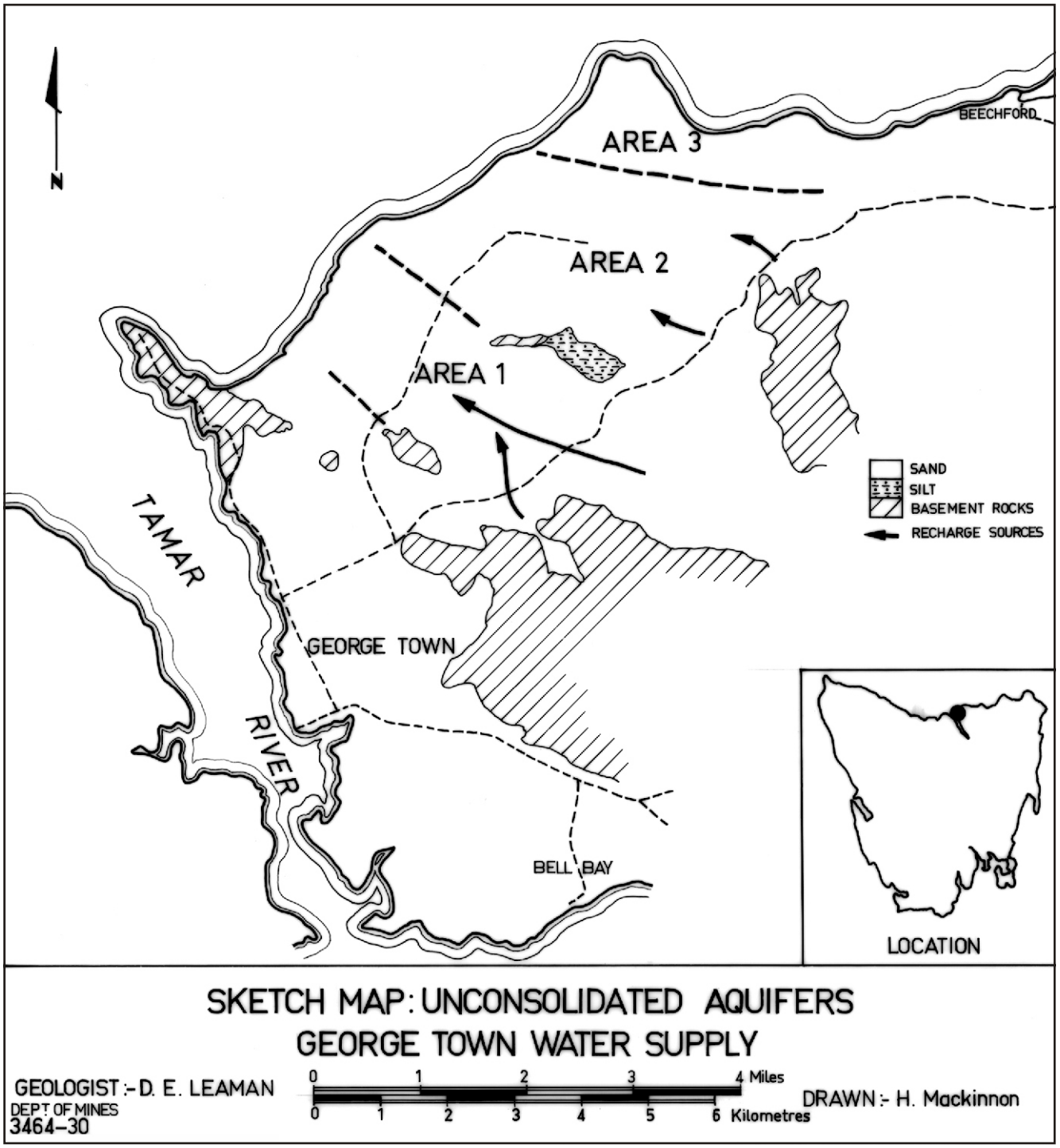
N
BEECHFORD
AREA 3
AREA 2
AREA 1
SAND
SILT
BASEMENT ROCKS
RECHARGE SOURCES
TAMAR
RIVER
GEORGE TOWN
BELL BAY
LOCATION
SKETCH MAP: UNCONSOLIDATED AQUIFERS
GEORGE TOWN WATER SUPPLY
GEOLOGIST :- D. E. LEAMAN
DEPT OF MINES
3464-30
0 1 2 3 4 Miles
0 1 2 3 4 5 6 Kilometres
DRAWN :- H. Mackinnon

Figure 1

Other considerations

A water supply from a sand source would require a series of cased bores with screens and individual (?) pumps connected to a local storage tank of about two million gallons on the pumping field. This local storage would be connected by pipeline to the main storages at Bell Bay. The length of pipeline involved is about 5 to 6 miles. Subsequent bores could be simply connected to the local storage. This system allows for annual incrementation to the supply as the demand increases. It could also, if required, provide an interim supply.

There is also a question of land acquisition, or water rights, as the land is privately owned at present. Removal of some groundwater would be an advantage to landowners as it would lower the water table slightly and free much of the land which is currently marshy for some of the year.

There is no danger of seawater contamination.

Water quality is likely to be of the order of 50 to 100 ppm total dissolved solids (cf. Botany Bay), and therefore soft and suitable for all purposes.

Conclusions

On reasonable figures it appears likely that the areas indicated would comfortably supply the required amount of water. However the following need confirmation by test boring.

(i) The hydrological and yield properties assumed.

(ii) The sand deposits have adequate thickness (geophysical work, seismic/resistivity).

(iii) Water quality must be established.

If three to five square miles of sand, with a saturated thickness of 40–50 feet, can be proven with the above minimal properties then the entire future anticipated demand could be met. A test bore would also enable much of the costing of such a project to be estimated and permit study of unexpected problems.

An alternative area, in many respects far more promising than that described above, is from Greens Beach to Badger Head on the West Tamar. However this is further from the point of water usage and the above described area should be examined first.

[7 May 1971]