

GARLICK & STEWART  
CIVIL ENGINEERS & SURVEYORS

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JRP/VD

*Goode House.  
395 Collins Street.  
Melbourne. 3000*

2nd November, 1978.

James A. Harris & Associates Pty. Ltd.,  
882 Whitehorse Road,  
BOX HILL. 3128

Dear Sir,

Proposed Rural Residential Subdivision

As instructed we have examined a proposal for the provision of water supply facilities to a proposed rural residential subdivision off Abbatoirs Road, approx. 2.7 kilometres north of Kyneton.

There are 45 proposed allotments having an average area of approx 0.77 hectares, and the proposal submitted for a "non-domestic uses" water supply comprises a storage reservoir on a watercourse within the subdivision, pumping equipment and associated rising main to convey water to a 100,000 gallon storage tank at the highest point on the property, and a system of reticulation mains.

In our opinion the proposal outlined is satisfactory in principle and the various aspects of the work are referred to in more detail as follows :-

1. STORAGE RESERVOIR

The catchment area of the watercourse which discharges into the proposed storage is 270 acres. The average annual rainfall at Kyneton is 29 inches and in a drought year a rainfall figure of 20 inches and overall run-off co-efficient of 15 per cent could be reasonably assumed. On this basis the yield of the catchment would be 65 acre-feet viz. 17.5 million gallons, which would be adequate for the storage capacity proposed by you of 8.5 million gallons.

Test shafts, up to 2.5 metres deep have been excavated in the storage area, two along the watercourse and two on each side of it. In all cases clay or sandy clay was disclosed to a depth of 1.9 metres, and these materials would be satisfactory for embankment construction and should provide watertightness in the floor of the basin. In one shaft near the centre of the watercourse and the downstream embankment, water bearing gravel and sand was encountered at a depth of 1.9 metres, but it is considered unlikely that this could be a problem due to the nature and extent of the clay material overlying it.

The volume of excavation and filling required to construct embankments, generally as detailed on your drawing, to give a storage capacity of 8.5 million gallons is approx. 10,500 cubic metres (14,000 cubic yards).

Assuming that the work is carried out under favourable weather conditions, a construction cost of not more than \$18,000 could be reasonably anticipated.

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## 2. PUMPING EQUIPMENT, RISING MAIN & STORAGE TANK

Based on 45 consumers with a peak consumption of 1000 gallons per day, the maximum daily demand would be 45,000 gallons. The storage capacity proposed of 100,000 gallons is therefore equivalent to more than two days maximum demand, and this is considered both necessary and adequate, to provide for possible breakdown in pumping equipment or rising main.

Assuming a pumping period of 20 hours during a day of peak demand, the required pump discharge rate would be 37.5 gallons per minute, and we consider 50 gallons per minute, could be adopted for the installation. The electric motor associated with the pump would be 3 H.P. and the rising main from pump to storage tank 100mm (4 inch) diameter.

The storage tank of 100,000 could be constructed in reinforced concrete, 50 feet (15 metres) diameter and 8 feet (2.5 metres) water depth.

## 3. RETICULATION

To serve all the allotments in the subdivision the total length of reticulation mains required is 2160 lineal metres of which a minimum of 800 lineal metres should be not less than 100mm diameter. Some economy could be achieved by constructing branch mains in 50mm dia. uPVC pipes, the maximum length involved being 1360 lineal metres.

A layout plan of the reticulation showing the proposed mains accompanies this letter.

In general the pressures in the subdivision are below the commonly accepted minimum of 15 - 20 metres. The proposed storage tank has a mean water level of approx. R.L. 67 metres, whilst the natural surface level varies in the subdivision from R.L. 66 to about R.L. 44 metres, and hence the static pressure varies between 1 metre and 23 metres, which would result in inadequate working pressures throughout the subdivision. Alternative means for achieving acceptable pressures are as follows :-

- (i) Provide booster pump on outlet side of 100,000 gallon storage tank and operate pump by time switch control.
- (ii) Each property owner be required to provide ground storage tank and small pressure pump in property at nearest point to water main.

The first alternative is favoured, and a pumpset with duty of not less than 60 gallons per minute against a total head of 20 metres is favoured, and this would result in satisfactory conditions throughout the subdivision whilst the pump was operating. Assuming an average of 10 hours pumping per day, the corresponding pumping cost would be in the order of \$1.20 per day based on current tariff rates.

## 4. ESTIMATE OF COST

A preliminary estimate for the cost of the works referred to in this letter is set out as follows :-

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1. Construction of storage reservoir including provision of broken stone beaching on downstream embankment and outlet pipework.	\$22,000
2. Supply of pumping equipment and associated housing at reservoir storage including provision of electrical supply.	\$ 7,000
3. Supply of materials and construction of 100mm dia. rising main to 100,000 gallon storage tank - 450 lin.metres.	\$ 4,500
4. Construction of 100,000 gallon storage tank and associated pipework.	\$12,500
5. Supply of booster pumping equipment and associated housing, pipework and electrical supply on outlet side of 100,000 gallon tank.	\$ 6,000
6. Supply of materials and construction of 100mm dia. -(2160 lin.metres.) mains.	\$21,600
	<u>\$73,600</u>
Allowance for Engineering and overhead charges and contingencies - 20 per cent, say	\$14,400
	<u>\$88,000</u>
Number of Allotments	45 No.
Average Cost per Allotment	\$1,950
<u>Reduction</u> in Item 6 for use of 50mm dia. reticulation pipes in lieu of 100mm dia. pipes.	\$ 9,000
Nett Capital Cost	\$79,000
Average cost per allotment	\$ 1,750

Yours faithfully,

*Robert Stewart*