

CATCHMENT BASIN, SYDNEY WATER SUPPLY.

*(A paper read before the Sydney University Engineering Society,
on November 12th, 1902.)*

BY N. J. C. MACTAGGART, B.E., ETC.

ALTHOUGH the object of this paper is to describe the Watershed of the present system of water supply, as records of the previous systems are not easily procurable, short descriptions will be interesting if only to shew the enormous growth of the City of Sydney from nothing to its present size with over half a million of people, in little over 100 years.

The present scheme is the fourth; the others being (1) Tank Stream, (2) Lachlan Swamps, (3) Botany Swamps, and the history of these schemes would be a history of water supply from the time when each man dipped his bucket in the stream at his door, to that of a most elaborate series of engineering works of great magnitude. It is not intended that this paper should be a history, but it is impossible to quite eliminate the historical part and engineering works.

THE TANK STREAM.*

The Tank Stream flowed into Sydney Cove, now called Circular Quay, and according to Collins' History of New South Wales (1804): "The spot chosen (for settlement) was at the head of the cove, near the run of fresh water which stole silently along through a very thick wood."

The whole basin was about 178 acres in area, and was included in a line starting from the Exchange in Bridge Street, along Bridge Street, Macquarie Street to the middle of Hyde Park, across to Bathurst Street thence to George Street, York Street, Church Hill, and Bridge Street to the point of commencement.

In addition to the thick wood referred to however, there was a spongy swamp from King Street to Park Street, and from George Street to Castlereagh Street; and it must have been this swamp that enabled this small stream to supply all the demands of the settlement from the first fleet in 1788 until 1837 when the population was about 10,000.

* For further historical sketch: see "Report of the Royal Commission for S.W.S., 1869."—

Prof. Smith's Appendix.

The first tank (hence the name) was excavated in the bed in November, 1791 ; it held 7,976 gallons.

As the stream was becoming insufficient, except in favourable seasons, to meet the demand it was found necessary to look elsewhere for a larger supply. It seems wonderful that so small a stream could supply such a large population for so many years.

Mr. John Busby, Mineral Surveyor to the Government, being consulted, recommended tapping the Lachlan Swamp by a tunnel to Hyde Park.

LACHLAN SWAMP.

What was once the Lachlan Swamp is now the Centennial Park ; the swamp being now represented by ornamental lakes.

The catchment of the swamp had an area of two square miles, but the estimated area draining into the tunnel was 756 acres.

The supply tunnel, known as Busby's Bore, was started September, 1827, and finished June, 1837 ; but water soaking into the tunnel had been available since 1830.

Although this system was in use for twenty years, the discharge was never measured, but was estimated at from 300,000 to 400,000 gallons per day.

* * * * *

After the 1838-9 drought, a dam was built at Cook's River to cope with the increasing demand, but as it was found on completion, that it did not exclude salt water, it was never used.

BOTANY SWAMPS.*

After the drought of 1848-9 (considered the worst until the one we are now experiencing), a Special Committee of the City Council went into various schemes to augment the water supply to satisfy the increasing population, then about 50,000.

This Committee recommended pumping from the Botany swamps, the scheme was adopted, and in 1858 the pumps were started.

In 1854, a very dry year, a temporary pumping plant had been erected at the lower part of the Lachlan Swamp.

The greater portion of this area in its natural state was a series of marshes draining into Botany Bay. The watershed included parts of Woollahra and Waverley, the boundary being approximately Oxford Street, Cowper Street, Carrington Road, and most of Randwick, Kensington, &c., with a total area of 4,294 acres which might have been increased to 5,553 acres, by including the Cemetery Reserve.

This area included the Lachlan Swamp.

For the water supply for a town, this was an ideal area on account of its formation. The swamps were composed of a few feet of loam, with swamp vegetation, and sixty to one hundred feet of clear sand, being evidently a deep hollow filled with sand ; they were in reality, huge storage reservoirs and filter beds combined. They absorbed rainfall

* For a detailed description of engineering works, &c., in this scheme, see Report of Royal Commission for S.W.S. 1869.—*Mr. W. C. Bennett's Appendix.*

immediately, and consequently little if any ran off. The evaporation from wet sand is less than the evaporation from open water, and the scrub which covered most of the area also served to lessen evaporation, so that the percentage of loss must have been a minimum.

The portions other than swamps were covered by thick scrub and stunted trees with an occasional large tree. In order to meet the demand during droughts however, the authorities cleared the land, and cut drains to conduct the water to the dams that had been built. The result was disastrous. After the cutting down of the scrub, there was nothing to bind the surface particles and no decaying vegetation to form loam, so that parts became dry sand; this sand blowing on to the swamp filling the interstices of the natural peaty soil and making it impervious to rain. The drains allowed the rain which now had a greater surface flow, to get away more quickly; all tending to the rapid discharge of floods and decrease of absorption.

Finally it became necessary to obtain the supply from a larger source, and after years of investigation the present system was adopted.

THE UPPER NEPEAN.

The present system is known as the Upper Nepean (the Lower Nepean Scheme was one to pump from Penrith to the City), and has supplied the city since 1887; the water having been turned into the canals from the river by Mr. W. Harris, and from Prospect Reservoir, to Botany, by the Hon. J. Garrard, then Minister for Public Works, on January 30th, 1886. The Catchment is 354 square miles in extent. The rivers from which the supply is drawn seem to follow the rule of contraries; instead of rising inland and flowing to the sea, they rise almost at the sea and flow inland. They rise to the South, and with Sydney as centre describe a semi-circle flowing into the Hawkesbury to the North. Then they do not rise in mountainous gorges which open out into valleys, but in wide undulating valleys that gradually contract into ravines with vertical sides.

The principal rivers are the Nepean, Cordeaux, and Cataract,—the Burke and Avon are long rivers, but are less important being intermittent. The Cataract Creek is the best of other feeders, in fact above the junction of Cataract Creek—the Cataract River contributes less than it.

The Nepean and Cordeaux have never been known to cease flowing, and the Cataract Creek and Loddon River rarely. The last named ceased for only about a week this year in February. The Cataract Creek ceased from February to March, and the Cataract River above the Cataract Creek, from 5th February to 17th July.

The old residents state that the river now called the Nepean used to be called the Cordeaux (from the name of a resident near the head) and the present Cordeaux used to be the Nepean.

The Nepean rises in the Southerly boundary of the catchment where numerous rivulets join to form the river opposite Mittagong, until that point these rivulets flow through wide valleys of rich soil and have their sources mostly in swamps. The whole of this portion is alienated and occupied by a population mostly carrying on dairying.

After the union of the small streams, the face of the country alters immediately, the river banks close in and become cliffs, the hills become mountains, the open valleys become gorges, and the rich alluvial soil changes to solid rock or boulder strewn mountain land. The river banks from here down to the tunnel mouth are generally cliffs about 200 feet sheer.

The banks of the Burke and Avon are just as precipitous, and also of the Cordeaux from its junction with the Nepean to about half way to its source.

The banks of the Cataract are precipitous from the tunnel mouth up to the junction of Cataract Creek ; above that, both on the river and creek, the banks recede and become more or less steep hills. (The local residents speak of places in the Nepean bed, below the Sydney Tunnel, where the water was in a constant boil and pebbles were kept in motion, being brought up with the water, evidently springs).

SETTLEMENT.

A glance at the map will shew the small amount of settlement on the area, and of this a great portion is only leasehold. A number of blocks shewn are taken up solely for mineral purposes, that is the owners make little or no use of the surface, merely keeping the land until the mine owners who tunnel in from the coast side of the range want to take the coal that may be 1,000 feet below the surface.

The district of Sherbrooke at the head of the Cataract Creek has a scattered population who make little use of the surface.

There is no settlement on the Cataract River.

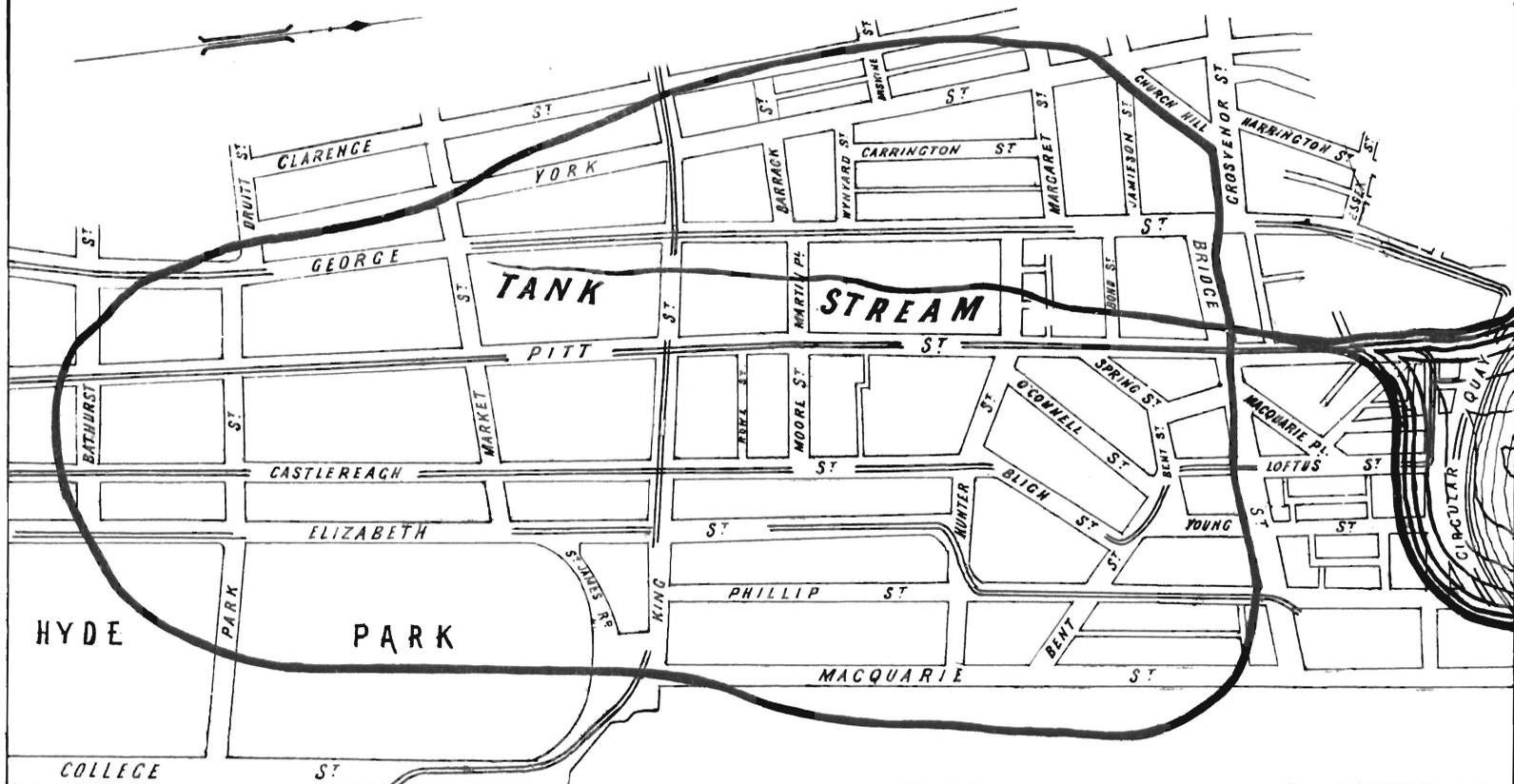
On the Cordeaux River, the head only, is sparsely settled although the map will shew all the land thereabouts to be taken up. The banks of some of the creeks running into the Cordeaux are occupied, principally by orchardists.

At the head of the Nepean River in the Kangaloom district, down to a point about opposite Mittagong, the population is denser, and the industry is almost entirely dairying with the necessary farming.

The total population on the area is only 1,050. It will thus be seen that the catchment is very free from any evils likely to occur through settlement. The effects of population on an area for water supply are all harmful. It requires very rigorous legislation to prevent pollution, and even then it requires actual pollution to have occurred before the law can be appealed to. If the principal occupation be agricultural, the ploughing, &c. will prevent the rain from reaching the river beds, the surface flow will be caught in the furrows, and soak into the loosened earth. If on the other hand the occupation be pastoral, the surface of the ground will be trodden hard, creating sudden floods of no advantage to anyone, in place of the steady stream.

On the Sydney Water Supply area the presence of cattle is objectionable for many reasons, they graze almost entirely on the swamps, and by hardening the surface cause rain water to flow off quickly instead of soaking into the ground and taking months to flow off. Then cattle always dirty the water they drink from, and finally the area is so rugged that it is sometimes extremely difficult to find the carcase of a dead beast.

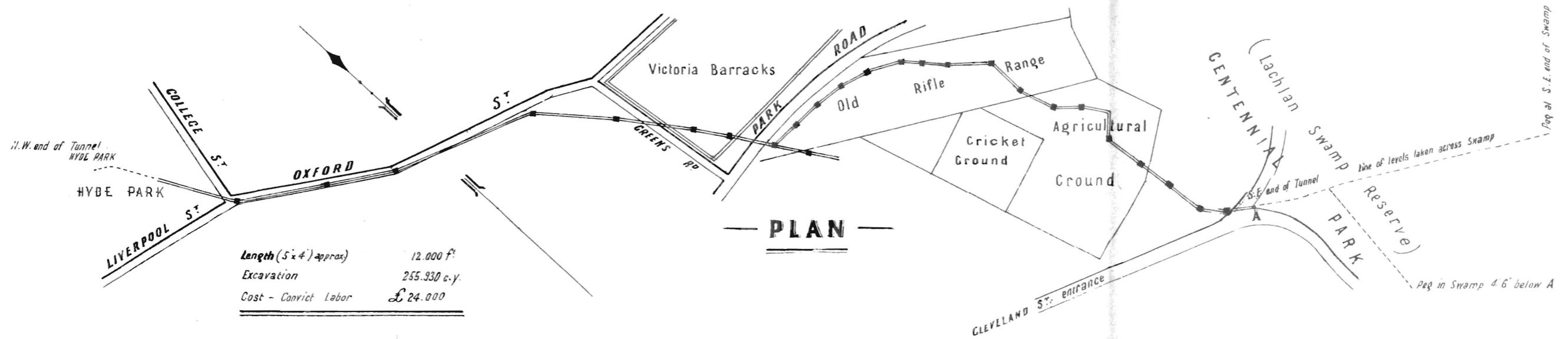
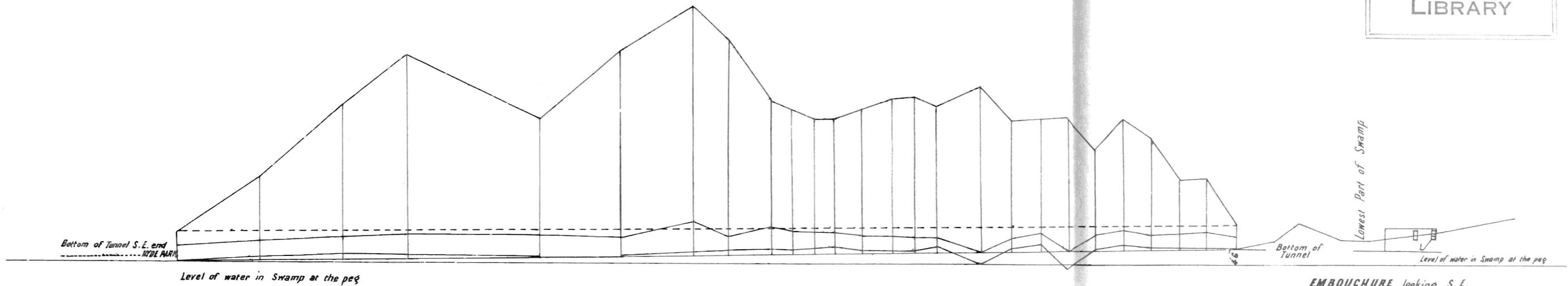
Catchment area of Tank Stream.



THE TUNNEL

from LACHLAN SWAMP to HYDE PARK

P. N. RUSSELL
SCHOOL
OF
ENGINEERING
—
T. H. HOUGHTON
LIBRARY



Length (5' x 4') approx. 12,000 ft.
Excavation 255,330 c.y.
Cost - Convict Labor £24,000

PLAN

LACHLAN SWAMP AND BOTANY BASINS

Drainage area boundaries shewn thus 
 Sand area boundary " " 

P. N. RUSSELL
 SCHOOL
 OF
 ENGINEERING
 —
 T. H. HOUGHTON
 LIBRARY

