

10. The Sewerage and Main Drainage Systems of Melbourne.

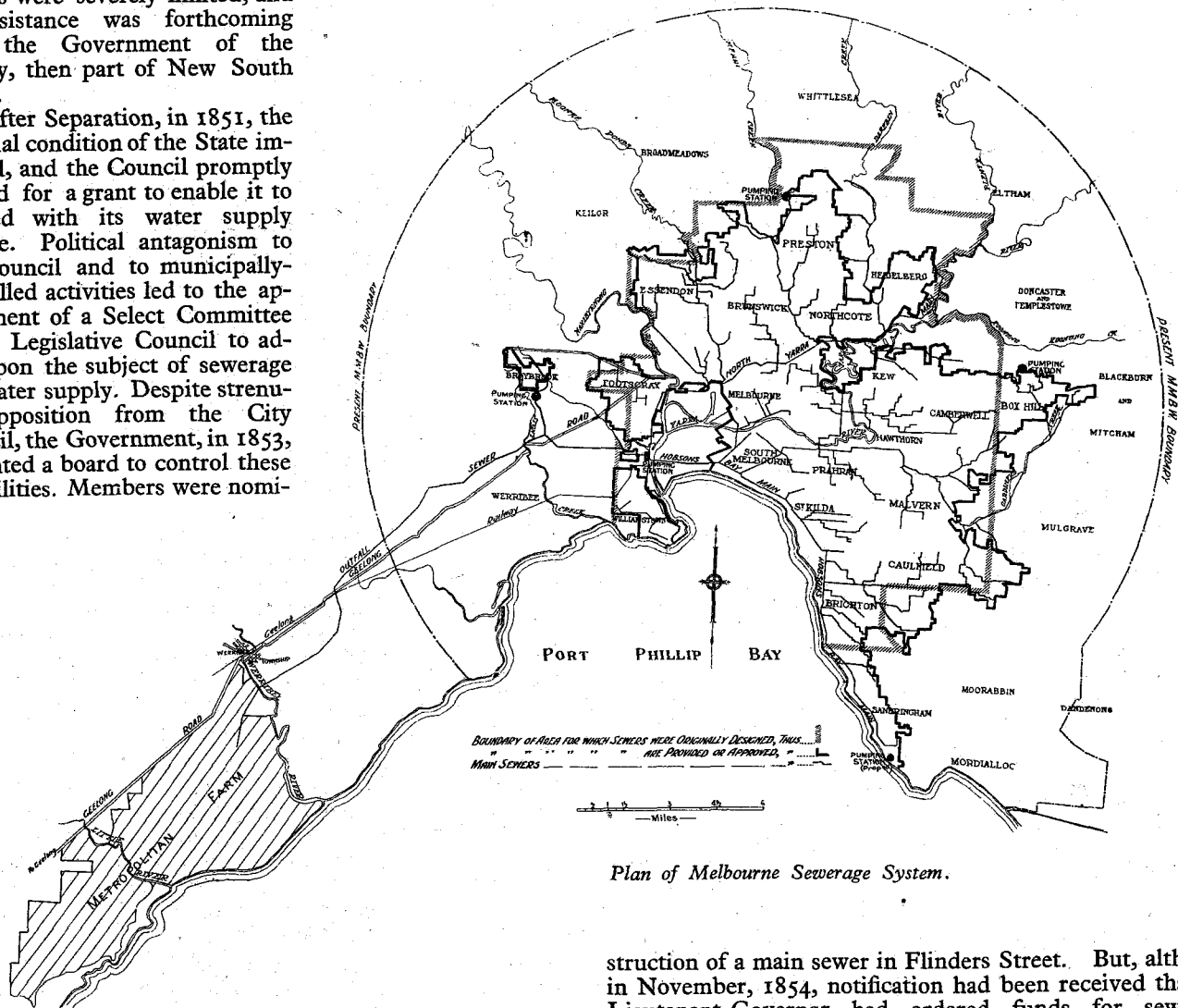
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The provision of sewerage facilities for Melbourne was contemplated as early as 1842. In that year the Melbourne City Council was constituted with power to deal with water supply and sewerage. The Council, however, had no funds, its rating powers were not legally enforceable, its borrowing powers were severely limited, and no assistance was forthcoming from the Government of the Colony, then part of New South Wales.

After Separation, in 1851, the financial condition of the State improved, and the Council promptly applied for a grant to enable it to proceed with its water supply scheme. Political antagonism to the Council and to municipally-controlled activities led to the appointment of a Select Committee of the Legislative Council to advise upon the subject of sewerage and water supply. Despite strenuous opposition from the City Council, the Government, in 1853, appointed a board to control these two utilities. Members were nomi-

The newly-constituted Board of Commissioners of Sewerage and Water Supply held its first meeting on 26th April, 1853. At this and subsequent meetings the sanitary condition of the city was discussed, and on 5th January, 1855, tenders were received from eleven firms for the con-



Plan of Melbourne Sewerage System.

nated by the Government and included the Mayor and Town Clerk of Melbourne. During passage of the enabling bill, the Lieutenant-Governor instructed that an assurance be given that the sewerage scheme would be constructed, without charge to the citizens, with funds from the sale of Crown Lands. In fulfilment of this promise application was eventually made to the Lieutenant-Governor for the sum of £200,000 for sewerage purposes.

struction of a main sewer in Flinders Street. But, although in November, 1854, notification had been received that the Lieutenant-Governor had ordered funds for sewerage purposes to be provided in the estimates, at the end of January, 1855, further intimation was received that no money could be provided. No tenders were, therefore, accepted, but in the meantime, cast iron plates for covering the main sewer had been imported from England at a cost of nearly £38,000. These lay unused for ten years and were eventually erected at Back Creek as a water supply siphon, only to collapse as soon as water was turned on.

Concern at the insanitary condition of the city continued to be expressed by responsible persons, and repeated representations were made to have sewerage works put in hand. Political uncertainty hampered any constructive action, and in 1860 the Board of Commissioners was merged into the Board of Land and Works. Thus the provision of water supply and sewerage facilities became Government responsibilities with the result that the sewerage problem was relegated to the background.

The City Council continued its representations, and in 1880 the then Mayor of Melbourne donated a prize of £200 for the best essay on the sewerage of Melbourne. The increasing insanitary condition of the city, the consequential high mortality from disease, and the persistent agitation for improvement at last led in 1888 to the appointment of a Royal Commission to inquire into and report upon the sanitary condition of Melbourne and suburbs. At this time the population was approximately 427,000 and practically the whole of the fouled liquids, including liquid excremental and manufacturing wastes, found their way, in the first instance, into the open pitched street channels. In some of the more densely populated areas underground drains had been constructed to collect the drainage from the street channels but the whole drainage ultimately found its way into the Yarra and its tributaries or into Hobson's Bay, rendering them foul and unsightly. Solid excremental wastes were dealt with in cess pits or by an inefficient pail system.

In 1889 the Government commissioned Mr. James Mansergh, M.Inst.C.E., of London, to report on the provision of sewerage facilities for the city, and at the end of 1890 an Act was passed constituting the present Melbourne and Metropolitan Board of Works as the controlling body for metropolitan water supply and sewerage. The first meeting of the Board was held on 18th March, 1891, and in June of that year Mr. William Thwaites, M.Inst.C.E., was appointed Engineer-in-Chief.

Consideration was immediately given to the report presented by Mr. Mansergh. In this report Mr. Mansergh analysed several schemes and gave consideration to final disposal at Cape Schanck, Western Port Bay and Port Phillip Bay. He came to the conclusion that there was no spot within a practicable distance of the metropolis where the sewage could be disposed of without treatment to remove the solid impurities.

The scheme recommended by Mr. Mansergh provided for the division of the metropolitan district into two areas with pumping stations at Spotswood, near the site of the present Spotswood pumping station, and at South Yarra, near the site of the present Melbourne High School. At these stations the sewage was to be lifted to outfall sewers and conveyed to sewage farms situated on the east bank of the Werribee River and east of Mordialloc township, respectively. The scheme, as outlined, provided for a population of 1,700,000 or about four times the then tributary population estimated at 430,600. Main sewers were designed for 70 gallons per capita per day running full and subsidiary sewers for 300 gallons, which capacity was considered sufficient to enable the sewers to carry roof and yard drainage equivalent to 0.1 inches of rainfall over the whole tributary area of 85,500 acres.

With a view to saving capital and working costs, Mr. Thwaites, after consideration of this report, recommended certain modifications, the principal of which were:—

- (a) Sewers to be constructed on the separate system, i.e., rain-water excluded as far as possible.
- (b) The internal sewers to be designed for a population of 1,000,000 and to be capable of carrying 30 cubic feet per head per day, except that in the City of Melbourne the sewers to be of the same size and capacity as in Mansergh's scheme.
- (c) The sewers to be designed to gravitate to one pumping station at Spotswood, all the sewage being concentrated for disposal at Werribee.

These recommendations were ultimately adopted by the Board and formed the basis of the design of the present system.

In 1891, an area of about 8,500 acres on the western bank of the Werribee River was acquired at £17 10s. per acre from Messrs. Chirnside as a sewage farm and a strip of about 160 acres between Brooklyn and Werribee for the construction of the outfall sewer. On 19th May, 1892, work was commenced on the outfall sewer and in August, 1897, the first house was connected to the system.

On 31st May, 1934, the population connected to the Melbourne sewerage system was about 957,000 which will be increased to about 965,000 on the completion of works in progress or approved. Thus the connected population has very nearly reached the population for which the system was designed. The *per capita* sewage flow is, however, substantially less than that allowed originally, and the system has therefore sufficient capacity for a considerably greater population than now connected.

With the exception of the sewage from about 5,000 persons in Sunshine, which will be pumped direct to the outfall sewer at Brooklyn, and that of about 350 persons treated locally at Kew, the whole of the sewage is conveyed to the pumping station at Spotswood. Two main sewers enter the pumping station—the Hobson's Bay main, 9 ft. 0 in. in diameter, which carries sewage from most of the area south of the Yarra, and from the cities of Melbourne, Richmond and Collingwood, and the North Yarra Main, 8 ft. 6 in. in diameter, which serves the remaining suburbs north of the Yarra and portions of Kew and Camberwell. On the outskirts of the system at Preston an automatic pumping station discharges into the gravitational system. A somewhat similar station is under construction at Box Hill and another is proposed at Black Rock. All these stations have been built to avoid the construction of expensive main sewers through undeveloped areas.

At the pumping station, Spotswood, the sewage is lifted 106 feet to Brooklyn. The three rising mains—two six feet and one four feet in diameter—discharge into the 11 feet diameter outfall sewer, which conveys the sewage 16 miles to the Metropolitan farm, Werribee, where it is purified by land treatment. The effluent is discharged into Port Phillip Bay through 8 main drainage channels. The area of the farm is 22,634 acres, but only 10,643 acres are at present in use for purification purposes, the balance being reserved for future extension.

At 30th June, 1934, the total length of sewers constructed was 2,469 miles and the total capital cost of the system, not including house connections, was £12,337,249.

The Melbourne and Metropolitan Board of Works' boundary extends to the 13 mile radius and in this area there are at present about 11,700 premises for which sewers are not provided or approved. Of these about 2,500 are located in Mordialloc and district and cannot be commanded by the present system, but consideration is now being given to a scheme for local treatment of this area. The majority of the remaining houses are scattered around

the fringe of the sewered area and cannot be economically connected to the system.

In November, 1924, the responsibility for the collection and disposal of the nightsoil from unsewered premises was placed on the Board by Act of Parliament. Collection is carried out by the municipal councils under arrangement with the Board. Disposal by earth burial is carried out by the Board at three depots situated at Brooklyn, Campbellfield and Moorabbin, respectively, approximately 14,000 pans being dealt with weekly.

As the sewerage system of the metropolis is designed on the separate system, rainwater and storm flows are conveyed

in stormwater drains and discharged into the Yarra and its tributaries and into Port Phillip Bay. Prior to 1923, all stormwater drainage was controlled by the municipalities, but in that year Parliament placed on the Board the responsibility of dealing with stormwater drains carrying water from two or more municipalities. By an amendment of the *Metropolitan Drainage and Rivers Act* in 1926, the definition of a main drain was left to the Board which, by resolution, has defined a main drain as one carrying water from an area of 150 acres or more. There are now 81 miles of such drains under the Board's control. Of these the Board has constructed 36 miles and has incurred a capital expenditure of £833,112 on drainage improvements.
