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THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

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Pursuant to Statute

By Command

In return to Order

PARLIAMENTARY STANDING COMMITTEE
ON PUBLIC WORKS.

H. H. Rose
Clerk of the Senate.

24th June, 1925.

R E P O R T

TOGETHER WITH

MINUTES OF EVIDENCE

RELATING TO THE PROPOSED CONSTRUCTION OF

NORTHERN MAIN SEWER,
CANBERRA.

Presented pursuant to Statute; ordered to be printed,

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MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

(Fourth Committee.)

The Honorable HENRY GREGORY, M.P., Chairman.

Senate.

Senator John Barnes,†
Senator Hattil Spencer Foll,†
Senator Patrick Joseph Lynch,†
Senator John Newland,‡
Senator William Plain,‡
Senator Matthew Reid,†

* Censed to be a member of the Senate, 30th June, 1923.

House of Representatives.

Arthur Blakeley, Esq., M.P.
Robert Cook, Esq., M.P.
David Sydney Jackson, Esq., M.P.
George Hugh Mackay, Esq., M.P.
James Mathews, Esq., M.P.

† Appointed 5th July, 1923.

‡ Resigned 28th June, 1923.

NORTHERN MAIN SEWER, CANBERRA.

REPORT.

The Parliamentary Standing Committee on Public Works, to which the House of Representatives referred, for investigation and report, the question of the extension of the sewer from the Main Intercepting Sewer on Commonwealth-avenue, across Molonglo River, to serve the northern portion of the city, has the honour to report as follows :—

INTRODUCTORY.

1. The Parliamentary Standing Committee on Public Works has already investigated and submitted to Parliament reports concerning—

- (a) The Main Outfall Sewer at Canberra ;
- (b) The Main Intercepting Sewer within the city boundary ; and
- (c) The Main Sewer serving the southern portion of the city.

2. Following the scheme submitted by the Federal Capital Advisory Committee in its First General Report, it is represented that the time has now arrived when consideration should be given to the construction of the sewer to serve the north-eastern portion of the city.

PRESENT PROPOSAL.

3. The present proposal comprises the construction of a main sewer leading northwards from the junction of the southern and main intercepting sewers on Commonwealth-avenue across the Molonglo River, and extending eastwards as far as Prospect Parkway.

ESTIMATED COST.

4. The estimated cost of the proposal is set down at £82,000, and the time fixed for completion about twelve months from date of commencement.

COMMITTEE'S INVESTIGATIONS.

5. As the Committee had visited Canberra and examined members of the Federal Capital Advisory Committee in connexion with the report on the Main Intercepting Sewer already presented, and as considerable evidence was then taken embracing the whole sewerage scheme for Canberra, the present inquiry has been restricted to such details as concern only this section.

6. The Main Intercepting Sewer is of a size 5 ft. 6 in. by 3 ft. 8 in., oviform in shape, and constructed of concrete built *in situ*. It is proposed that this section shall be constructed of circular pre-cast reinforced concrete pipes of the Monier or similar type.

7. It was ascertained in evidence that the Northern Main Sewer is designed to carry the sewage from a prospective total population in 50 years of 52,000 people. The sizes of the pipe is calculated to take the whole of the sewage in twelve hours, the pipes running two-thirds full.

8. At the present time the northern district is served by local treatment works, the reticulation thereto being so arranged that it may easily be connected with the proposed sewer when constructed. The population on the northern side of the river is said to be increasing, and with the advent of private enterprise and the transfer of the Seat of Government it is anticipated that the works will be inadequate to meet the demand, and that it will be necessary to connect the service with the main city sewerage scheme.

LIST OF WITNESSES.

PAGE

Connell, Henry Gustavus, Chief Civil Engineer, Department of Works and Railways, Melbourne	3
do Burgh, Ernest Macartney, M.Inst.C.E., Chief Engineer for Water Supply and Sewerage, Public Works Department, New South Wales	1
Owen, Percy Thomas, Director-General of Works, Canberra	1

9. The total length of the sewer to be constructed is about 9,550 feet, of which approximately 4,300 feet will be of 30-in. diameter pipes, about 2,000 feet of 24-in. diameter, about 2,300 feet of 15-in. diameter, and about 950 feet will be of 9-in. cast-iron piping carried by means of a tunnel below the Molonglo River in the form of an inverted siphon.

10. On account of the bed of the river being of a sandy nature, the tunnel to be constructed under the river will be cut in rock up to the springing of the arch, and the whole of the arch will be of concrete. To make it large enough for inspection purposes, the internal dimensions will be 6 ft. 7 in. by 6 ft. 6 in. from the invert to the top of the arch. The depth of the top of the arch below the bed of the river will vary from about 12 feet to 8 feet. Within this tunnel it is proposed to put in a 9-in. cast-iron pipe until necessity arises, when this will be replaced by an 18-in. cast-iron pipe. The connexions will be such that all that will be necessary to make the change will be to take out the smaller pipe and replace it by the larger one.

11. Inquiries were made as to whether this tunnel could be made to serve for carrying other services as well as the sewage pipes, but the Committee was informed that such a course would be both inadvisable and costly.

C O M M I T T E E ' S R E C O M M E N D A T I O N .

12. After giving the matter due consideration, the Committee is satisfied that for the general development of Canberra on the lines indicated the northern main sewer proposed is necessary, and recommends that the work be proceeded with as early as possible.

H. Gregory
H. GREGORY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Federal Parliament House, Melbourne,
17th March, 1924.

M I N U T E S O F E V I D E N C E .

(*Taken at Sydney.*)

MONDAY, 10th NOVEMBER, 1924.

Present:

Mr. Gregory, Chairman;	
Senator Barnes	Mr. Cook
Senator Reid	Mr. Jackson
Mr. Blakely	Mr. Mathews.

Ernest Macartney de Burgh, M.Inst.C.E., Chief Engineer for Water Supply and Sewerage, New South Wales, and member and Acting Chairman of the Federal Capital Advisory Committee, sworn and examined.

1. *To the Chairman.*—I am aware of the reference submitted to the Committee respecting the extension of the sewerage system at Canberra. The proposed extension will be suitable for the future expansion of the city. The grades and falls of the sewer to the main outfall are satisfactory. The proposed extension will be of pipes. In this case the sewer pipes will be round. When the sewer is less than a certain size it is the practice to adopt a circular pipe. The oval form is not then necessary. In this case the use of a circular sewer will be in accordance with accepted practice. The type of pipe to be used depends a good deal upon cost. In some cases we use small pipes of earthenware, but when the pipes are as large as 24 inches or 30 inches. In such cases we generally use reinforced concrete pipes. In the proposed sewer the size of the pipes will be 15 inches, 24 inches, and 30 inches. Where the pipes will be constructed is a matter entirely for the engineer. Tenders will doubtless be called, and no doubt the pipes will be constructed on the job if thereby a saving can be effected. I understand that tenders were invited for portion of the main sewer, and the result led to the continuance of the day labour system. In this case the Department must use its own judgment. The New South Wales Government has large works in which reinforced pipes are manufactured. At one time those works were privately owned, but were purchased by the Government. We find it economical to manufacture at those works the pipes for the Sydney sewerage. We have an open mind in regard to laying the pipes in position. We would accept satisfactory tenders, but our experience of late of tenders received has generally been to cause us to proceed with the work of laying pipes by day labour. We find it more satisfactory to do the work ourselves. I should not care to make a recommendation whether the extension of the sewer at Canberra should be carried out either by day labour or by contract; the constructing engineers must satisfy themselves which is the more advisable from the point of view both of efficiency and economy.

The witness withdrew.

(*Taken at Sydney.*)

TUESDAY, 11th NOVEMBER, 1924.

Present:

Mr. Gregory, Chairman;	
Senator Barnes	Mr. Cook
Senator Reid	Mr. Jackson
Mr. Blakely	Mr. Mathews.

Percy Thomas Owen, Director-General of Works, Canberra, and member of the Federal Capital Advisory Committee, sworn and examined.

2. *To the Chairman.*—It is proposed that the northern intercepting sewer shall discharge into the main intercepting sewer at Commonwealth-avenue, opposite No. 1 Hostel. Thence it will be carried along and under Commonwealth-avenue, dropping under the Molonglo River by inverted siphon and rising again on the northern side of the Molonglo. It will then carry along and under Commonwealth-avenue to Garden-circuit. From Garden-circuit it will continue to Capitol-terrace. Thence there will be a branch along and under Capitol-terrace, and another branch along and under a street unnamed in the Civic Centre. The proposal is that over the first section to manhole 9, the sewer will be carried in a 30-in. pipe, excepting where it is carried under the river by means of the inverted siphon. The 30-in. pipe will continue as far as manhole 9. From there up to manhole 14 there will be a 24-in. pipe. From manhole 14 a 15-in. pipe will branch along Capitol-terrace. The branch to the Civic Centre will also be a 15-in. pipe. The grades vary. For the 30-in. pipe the grade is 1 in 1,400, for the 24-in. pipe 1 in 850, and for the 15-in. pipe 1 in 400. The northern main sewer is being laid for a prospective total population in 30 years of 52,000 people, distributed as follows:—Capitol Valley, 13,000; West Vernon, 3,000; extension to north, 8,000; Ainslie-avenue Valley, 15,000; Prospect Park-way Valley 10,000; and extension to military college, 3,000. Fifty years has been adopted as a period beyond which it is not sound practice to try to forecast what will be the population. The size of the pipes is calculated to take the whole of the sewage in twelve hours, the pipes running two-thirds full. Smaller pipes could not be used for a population of 52,000. It is proposed that the pipes, excepting those in the inverted siphon, shall be Monier reinforced concrete pipes. The inverted siphon will be carried under the river in a tunnel. The internal dimensions will be 6 ft. 7 in. by 6 ft. 6 in. from the invert to the top of the arch. It is first proposed to put in 9-in. pipes, these to be subsequently replaced by 18-in. pipes. All that will be necessary to make the change will be to take out the pipes. The connexions

will be such that the pipes can be placed in position with the bends and so forth to complete the enlargement. The tunnel will be large enough for inspection purposes. There will be inspection man-holes in the siphon pipes. Sumps will be provided at the end, by which the pipes can be emptied. The sumps will collect the water which will be pumped into the sewer to allow of the inspection of the siphon pipe. In the length of sewer there will be two penstocks, 24 inches and 15 inches. Mr. Connell will be able to give the Committee further information on that subject. The total length of the sewer to be constructed under this proposal, including the length under the river of siphon, from shaft 50 of the main intercepting sewer to manhole 9, with the 30-in. pipe, will be 5,226 feet. From shaft 10 to manhole 19, which includes the 24-in. and 15-in. pipe, 4,324 feet, making a total length of 9,550 feet. The length from manhole 14 to Civic Centre is another 353 feet. The length of the siphon will be approximately 950 feet. In my opinion, the Committee should recommend the construction of the whole of the work, leaving it to the new Commission at Canberra to determine the manner in which it shall be carried out.

2. *To Mr. Mathews.*—The allotments that are to be leased will connect with the length of sewer proposed to be laid from manhole 14 to manhole 3 on the Civic Centre line. It will not affect manhole 19. It is problematical whether the development in the next two years will warrant that section.

3. *To the Chairman.*—In my opinion the Committee should approve of the whole of the scheme so that no hindrance will be occasioned to any future settlement. The estimated cost of the whole work is £82,000. From the time of commencement, it is estimated that it will take 18 months to complete this work. There has been no recommendation to carry out the work by contract, except that in connexion with the southern intercepting sewer, a comparatively small job, I advised the Minister that, in view of the settlement at Blandford, and in view of the fact that we had made good on the main intercepting sewer, we should carry out the work by day labour in order to have it completed by the time Parliament met at Canberra, but that when it came to the construction of the northern sewer, it be left to the powers that be to decide whether tenders should be called or whether the work should be carried out by day labour. That proposal was supported by Mr. de Burgh. I do not know whether it was favoured by Mr. Ross, but it was generally approved by the Federal Capital Advisory Committee. It would not be practicable to have smaller pipes in the main length of tunnel. In the siphon it is proposed to put in 9-in. pipes at the commencement, and 18-in. pipes later. It would not be sound practice to reduce the estimate of a population of 32,000 in 50 years' time. It is a considerable period, and it would be unsafe to forecast a smaller population. The 9-in. pipe in the siphon will be of cast iron. The pipes in the sewer will be of the reinforced Monier type, circular in section. The tunnels of the outfall sewer and main intercepting sewer are oviform, which gives a certain advantage dependent upon the wet perimeter. This is not so important with the smaller pipes. The 9-in. pipe will run for 950 feet. It will be a horizontal length, and will not take into account the vertical rise to the sewer. Tenders will be called for the supply of pipes. The Department would not make them. It is possible that the pipes could be made cheaper on the job, but this would really depend upon the convenience of the contractor. The length of 30-in. pipe is not very great, and might not warrant a plant on the job.

472

4. *To Mr. Blakely.*—The carrying of water pipes and other facilities in the tunnel under the Molonglo has not been contemplated. As a matter of fact, the water pipes are already taken under the Molonglo, across to Mount Russell. The reticulation for the northern side is from Mount Russell, and the pipes are already laid. There is head-room in the tunnel for water and other pipes. Of course, any electric or telegraph lines taken through the tunnel would be subject to possible damage through water. There is provision made for pumping out the tunnel if it becomes full of water. If any other service were carried in the tunnel it would be only a temporary expedient.

5. *To Senator Reid.*—We carry the district sewers under, and 3 feet inside, the footpath, the lessee making his own connexion. Any persons who build on far outlying leasesheds will have to provide temporary expedients, such as septic tanks. The scheme to connect with houses erected in leasehold areas has not, to my knowledge, been finally developed. It was originally thought that the sewage from the end of the district network at the Civic Centre could be pumped into a sub-section of the main sewer, but it might mean pumping to a considerable distance. This would not be necessary if the sewer were put through in 18 months time, because the lessees have two years in which to build. Before there is any very considerable development at Civic Centre, that sevage district will be connected. Wherever we have a considerable number of men employed we provide them with sedimentation tanks. For instance, at the labourers' camp, where there is about 100 men, we have provided a sedimentation tank, also at the Gap and East-Lake settlements, where there are a number of married folk. We provide a sedimentation tank wherever there is a little community. That practice will be followed at every place where no connexion with the sewer can be made.

6. *To Mr. Mathews.*—I do not think that the increased cost of dealing with sewage from the Civic Centre to provide for the initial population would be very great. The proposal before the Committee will really complete the net-work system for many years to come. There will be branches to any area where settlement takes place.

7. *To Mr. Jackson.*—We do not pay royalty on Monier pipes. We shall call for tenders for reinforced concrete pipes, there being no obligation to use only Monier pipes.

8. *To the Chairman.*—The water-mains are sunk below the river bed in the upper part of the Molonglo River. There is no tunnel for them. If the pipes were found to be defective, they would have to be remedied, but it would not be a difficult business. When the artificial lakes are formed, massive bridges will carry the water supply. If thought desirable, many services could be carried in the tunnel under the Molonglo River. Sewage pipes could not be carried under the bridge. At one time we gave consideration to the possibility of carrying all the services by tunnel, or some other method, so as to concentrate them in one spot. We found that the cost would be enormous, and that the extra cost of rooting up roadways and footpaths occasionally would be much less than the interest on the outlay to provide a tunnel scheme for a sparsely settled town. In my original scheme for Canberra, I made some suggestion of that sort. The bridge over the Molonglo River could carry light services, such as gas and water. I do not think it would be wise to increase the size of the siphon tunnel.

(Taken at Sydney.)

WEDNESDAY, 12TH NOVEMBER, 1924.

Present:

Mr. GREGORY, Chairman;	
Senator Barnes	Mr. Cook
Senator Reid	Mr. Jackson
Mr. Blakely	Mr. Mathews.

Henry Gustavus Connell, Chief Civil Engineer, Department of Works and Railways, sworn and examined.

9. *To the Chairman.*—I have had plans prepared showing the design of the northern main sewer at Canberra. The sewerage system, in conjunction with that sewer, will carry the discharge of 50,000 people. When the estimates were taken out, it was anticipated that the population to be served would not exceed this in 50 years. The sewer pipes would be almost everlasting. There is no reason why they should depreciate to any appreciable extent, excepting in the siphon, where cast-iron pipes will be used. We do not intend, at first, to put full-sized pipes in the siphon. I do not think it would be advisable to enlarge the size of the siphon tunnel to take water or other mains as well. This practice would be very disastrous in the case of a water-main bursting. The men who will be working in the tunnel will be sewerage labourers, men who use rough methods suitable for their own work. They would be liable to damage any electric light or other appliances that might be placed in the tunnel. Electric or telephone cables, running through the tunnel, would be liable to injury. The siphon crosses under the river alongside the bridge. There would be no difficulty in carrying wires under the bridge in the same way as they are carried under the new bridge at Church-street, Prahran. The pipes for the siphon are about as small as can economically be put in. The pipe, of course, depends for discharge upon the grade, and in the design of these pipes we

have striven to keep a proper velocity. If we diminish their size we would have to increase the grades, and it is very doubtful whether we could overcome this difficulty. On the northern side we would have to keep a pretty flat grade in order to get the sewage out. We, therefore, could not decrease the size of the pipes. Three-quarters of this work will be tunnelled; in fact, it may pay us to tunnel the whole of it with the exception of the siphon, which will possibly be put in an open cut. I expect to divert the river. We have a peculiar position in this respect. We have two bridges, one over the main river and another over an old billabong. I expect to divert the river, for the time being, through the billabong, and to put the siphon in an open trench. It is proposed to use Monier pipes, which are a splendidly constructed pipe, giving a beautiful surface. The place of construction would depend upon the contractor. We do not tie ourselves down to any one class of pipe. There will be nothing in the specifications limiting the tenders to one particular firm. It will take about nine months to complete this sewer.

10. *To Senator Reid.*—The pipes will be carried in a concrete tunnel, which will be cut in rock up to the springing of the arch. The whole of the arch will be of concrete.

11. *To Mr. Blakely.*—The depth below the actual river-bed will vary. The depth of the top of the arch, below the bed of the river, will vary from about 12 feet down to about 8 feet. It is a sandy bed, varying from 3 feet to 4 feet. That is why we are keeping the springing of the arch in the rock. One side of the siphon will be 5 feet lower than the other. In the full-sized pipe in the main sewer, there will be a velocity of a little over 4 feet a second. The smaller pipe to be installed in the siphon in the first place will give a velocity of 2½ feet a second, which is quite sufficient to clean out the pipe.

12. *To Mr. Mathews.*—Over a large portion of the excavations for the sewer, we have had to use machine drills to cut through rock, but on this site a lot of the work will be done by hand.