

DEPARTMENT OF THE SENATE
PAPER NO. 4213
DATE PRESENTED 29 AUG 1972
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Member of the Senate

1972

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

Parliamentary Standing Committee on Public Works

REPORT

relating to the proposed construction of

CENTRAL ZONE SEWERAGE SCHEME

at

Darwin, Northern Territory

(1972 Reference)

(SEVENTEENTH REPORT OF 1972)

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

CENTRAL ZONE SEWERAGE SCHEME,
DARWIN, NORTHERN TERRITORY

R E P O R T

On 14 July 1972, His Excellency the Administrator in Council referred to the Parliamentary Standing Committee on Public Works for investigation and report to the Parliament, the proposal for the construction of the Central Zone Sewerage Scheme at Darwin in the Northern Territory.

The Committee have the honour to report as follows:

THE REFERENCE

1. The proposal referred to the Committee is for the construction in the central sewerage zone of Darwin, pumping stations, gravity and rising mains and a lime precipitation treatment scheme incorporating sludge incineration and disposal of effluent to Ludmills Creek.

2. This work is estimated to cost \$4.8 million.

THE 1969 REFERENCE

3. On 14 May 1969, the Committee reported to the Parliament on the reference "Augmentation of Sewerage Services, Darwin, Northern Territory".

The reference comprised:

- in the northern sewerage zone, a main trunk sewer, a pumping station and rising main and treatment lagoons at Leanyer Swamp; and
- in the central zone, a main trunk sewer, a pumping station and a comminutor station terminating in a marine outfall off East Point.

4. These facilities were proposed to relieve over-loaded sewerage services in the areas generally north of the city of Darwin and to meet future development. The estimated cost in 1969 was \$4.55 million of which the central zone work was expected to cost \$2.75 million.

5. The Committee noted that to keep pace with development in the city zone, a marine outfall had been constructed off Doctor's Gully at Larrakeyah. This work was not the subject of a reference to the Committee.

6. The Committee's report carried the conclusion that in view of the continuing nature of population growth there was a need to re-plan Darwin's sewerage services. The Committee recommended construction of the work in the reference.

7. The construction of the central zone works was supported as it was felt then that the facilities proposed would provide a satisfactory basis for the disposal of Darwin sewage both in the short and long term.

8. The work on the northern zone phase of the proposal was completed late in 1971.

THE 1971 REFERENCE

9. Before a contract could be let for the work in the central zone persistently strong concern was expressed publicly in Darwin early in 1971 that the marine outfall would not provide a satisfactory means of disposing of sewage. In particular, criticism was directed at the possible health hazards associated with disposing of sewage into Darwin harbour, the likely pollution of the harbour, the long term ecological effects and aesthetic factors.

10. The Government decided that although there was an urgent need to proceed with the work already recommended and approved in 1969, the central zone proposal ought to be referred back to the Committee for further review to give the people of Darwin an opportunity to express their views. Subsequently, the central zone works were referred back to the Committee by resolution in both the House of Representatives and the Senate in August 1971.

11. On the new reference the departmental evidence in essence restated the case submitted at the 1969 enquiry and departmental witnesses re-affirmed that the scheme as proposed, including the marine outfall was considered to be the most suitable in the circumstances. However, a number of alternatives which appeared to have public support were outlined and an indication of the cost of each was given. As a result of this evidence and subsequent investigation by the Department of Works it seemed to the Committee that the Department was then less firm in its support of the marine outfall proposal.

12. Evidence submitted to the Committee from non-official sources came from a wide spread of community organisations and individuals.

Without exception, non-official witnesses were opposed to the marine outfall concept on either health, aesthetic, pollution or ecological grounds.

13. Understandably the Committee had difficulty in objectively examining and evaluating the evidence from the opposing factions. Expert engineers experienced in the field were confident that the proposal would radically improve the present unsatisfactory situation and provide an almost nuisance and hazard-free facility, but were unable to guarantee that this would be so. On the other hand non-official witnesses were most apprehensive about the scheme, particularly in relation to long term dangers, environmental contamination and ecological damage. The Committee found that there was a recent but wide spread public awareness of pollution problems and that people were now less willing to accept current expert opinion as to standards for sewage disposal than they would have earlier.

14. In accordance with a resolution which was passed at a meeting of the Committee following the final public hearing and a debate on the evidence, the Committee recommended to the Parliament on 9 November 1971 that:

"(1) It is not expedient to proceed with the proposal as submitted; and

(11) The Government should reconsider the means of treating and disposing of sewage from the Central Sewerage Zone Darwin, including:

- linking the Central Zone with the Northern Zone treatment facilities at Leanyer Swamp;

- construction of biological treatment facilities in the East Point - Ludmilla Creek area; and
- construction of Central Zone treatment lagoons at Reichardt Creek.

15. The Government subsequently announced in the House of Representatives its endorsement of these recommendations. The proposal in this latest reference results from a further detailed investigation and analysis of a number of alternatives for the disposal of sewage from Darwin's central sewerage zone.

THE 1972 REFERENCE

16. In general terms the proposal referred to the Committee is for the treatment of sewage collected in the central zone by a lime precipitation process in a plant to be located near Ludmilla Creek. The process involves treatment of raw sewage to remove sludge, the carbonation and discharge of effluent through an outfall into Ludmilla Creek and incineration of the sludge for disposal as ash. Provision is to be made for the chlorination of the effluent if tests show this to be necessary for health reasons.

17. The estimated cost of \$4.8 million covers the installations required for the first stage of the scheme to cater for an equivalent population up to 40,000 and comprises trunk sewers, pumping stations, treatment plant and effluent disposal. It includes connection of the areas currently discharging through the Seabreeze and Frances Bay south marine outfalls and sizing of the collecting mains to allow for connecting at some future date the areas within the city zone now discharging to the Doctor's Gully outfall.

It was noted that the second stage work and connection of the Doctor's Gully catchment was estimated to cost a further \$1.4 million and would cater for an ultimate equivalent population of 80,000.

18. On completion of the work the miscellaneous facilities discharging sewage or effluent into Darwin harbour and its headwaters with the exception of the Doctor's Gully outfall will be closed down.

THE COMMITTEE'S INVESTIGATION

19. The Committee received written submissions and drawings from the Department of Works and Health and the Northern Territory Administration and took evidence from their representatives at public hearings in Darwin on 8 and 9 August 1972.

20. As was the case at the 1971 enquiry, there was considerable public interest in the proposal and the Committee took evidence from persons representing community bodies or appearing as private individuals and received a number of written submissions.

21. The Committee's proceedings will be published as minutes of evidence.

THE PROPOSAL

22. The Need The need for the proposed work has been discussed in previous reports. That need is now confirmed.

23. Background The Committee were advised that in response to our recommendations on the 1971 reference, the Department of Works in association with its consultants of widely recognised expertise, examined twenty schemes for collection, treatment and disposal of Darwin's central zone sewage.

The outcome of this examination was the selection of the seven best alternatives for investigation in greater detail and these schemes were described, with details of cost, in the Department's submission to the Committee.

24. The Central Zone On the basis that "equivalent population" represents the total population of the area plus a provision for industrial wastes expressed as a number of people, the scheme proposed in 1969 and 1971 was designed to serve an equivalent population of 45,000 persons. For the present reference the equivalent population was increased to 62,000 due to:

- inclusion of the Nightcliff area which currently discharges sewage through the Seabreeze outfall;
- increased allowance for high density development close to Darwin city; and
- the inclusion of the area of the city sewerage zone served by the Frances Bay south outfall.

25. The equivalent population of the central zone is expected to reach 40,000 in 1985 and ultimately 62,000.

26. Selection of Proposed Scheme The scheme selected by the Department of Works and its consultants and endorsed by the Department of Health and the Northern Territory Administration meets health and technical requirements, largely overcomes objections on health, aesthetic, pollution and ecological grounds and is the most economic scheme within these criteria taking into account initial capital costs and operating and maintenance costs. But it is not, in the long term, as economic as the marine outfall scheme previously recommended.

27. The alternatives suggested for further investigation by the Committee in 1971 were examined in detail but were not favoured because:

- linking the central zone to the northern zone treatment facilities at Leanyer Swamp whilst feasible, involves a very high risk of odour nuisance and corrosion because of the long distances involved and is of higher overall cost;
- construction of biological treatment facilities in the East Point - Ludmilla Creek area (in the area proposed for the location of the lime treatment plant) would involve higher capital and operating costs and would be more complex in operation;
- construction of central zone treatment lagoons at Reichardt Creek is not acceptable because of a potential odour nuisance to future residential areas unless development is substantially restricted to provide adequate buffer zones. Whilst capital and operating costs are comparable with the recommended scheme there would be objections to the discharge of effluent from an area of large population into the sheltered waters of the inner harbour particularly when alternatives for open sea disposal are available.

28. The Committee were assured by representatives of the Department of Health that the proposed scheme could provide a very clear effluent which would be bacteriologically of a standard acceptable to the Department.

However, the Department added the proviso that as an additional safeguard provision should be made for chlorination of the effluent if this is necessary on health grounds. We noted the evidence of the Department of Works that the designs allow for this form of treatment to be provided when required.

29. Comparison of 1971 and 1972 Schemes It is difficult to directly compare the 1971 and 1972 proposals because of differences in the service provided. However, it can be recorded that the 1971 scheme was to have cost \$3.2 million (1972 equivalent \$3.7 million) and would have served an equivalent population of 45,000. Running costs were estimated at \$60,000 per annum. If biological treatment had been included in the 1971 scheme the total cost would have been \$4.9 million and operating costs \$119,000 per annum.

30. The present scheme at \$4.8 million capital cost and \$140,000 per annum initial operating cost provides for 40,000 equivalent population. The capital cost includes \$200,000 to increase the sizes of the collecting mains to allow later connection of the Doctor's Gully outfall catchment, if necessary. Additional works required to increase the capacity to 80,000 equivalent population would cost a further \$1.4 million. Operating costs would then rise eventually to around \$325,000 per annum.

31. The Committee's Conclusion It was apparent to the Committee that the scheme now proposed will satisfy most objections raised by opponents of the marine outfall proposal. In particular it will remove the constituents of sewage that are objectionable from the viewpoint of ocean disposal, that is, solid matter, floatables and bacterial concentrations.

Not only will it enable the removal of the existing overloaded units discharging into Darwin harbour including the outfall at Seabreeze Point but it will alleviate apprehensions held about the possible increased pollution of the waters and foreshores from a marine outfall off East Point. The scheme has the added advantage that ultimately the Doctor's Gully outfall discharging to the inner harbour could be phased out if it proves to be unsatisfactory from a health view. However, attention is drawn to the substantially higher operating costs of the proposed scheme against a marine outfall system.

32. Nevertheless the Committee believe from the evidence taken that the scheme proposed is the most economical alternative which will meet recognised technical and health standards and be generally acceptable to the community of Darwin. The Committee, therefore, recommend the adoption of a lime treatment scheme for the central sewerage zone of Darwin.

DOCTOR'S GULLY OUTFALL

33. The Committee were advised that the load on the Doctor's Gully outfall which serves the city zone excluding the areas draining to the Frances Bay south outfall is increasing and it is possible that bacteriological levels in the receiving waters may, under full load conditions, rise above the maximum permissible. Whilst particular attention is being given to testing of the receiving waters by the Department of Health, it is expected that it will be two years before the extent of contamination under full load is known. Thus the Committee endorse the view that it would be prudent to plan that in the event of the Doctor's Gully outfall becoming unacceptable, an alternative means of disposal be provided.

34. We therefore commend the provision in the planning for the central zone, for sewerage now being discharged at Doctor's Gully to be diverted to the lime treatment plant at Ludmilla Creek should this be found necessary. It was noted that sizing of the collection system in the present reference to permit this to occur will cost of the order of \$200,000.

DESCRIPTION OF TREATMENT SCHEME

35. Background The lime treatment process has been known since the last century but has not been widely used in recent years because of the difficulty in handling sludge by the usual digestion methods and because of the high biological oxygen demand of the effluent would be unacceptable for discharge to inland waterways. The scheme has not been used previously for discharge to the sea because in the past marine outfall systems of the type previously proposed have been regarded as satisfactory.

36. Site The proposal submitted to the Committee was based on the location of the treatment plant near the mouth of Ludmilla Creek in an area zoned for sewerage purposes. However it became apparent because of the proximity of the site to the proposed Palmerston arterial road that an alternative site in a more isolated swamp area behind the racecourse is preferable. The Committee endorse the use of the latter site subject to foundation investigations being satisfactory.

37. Trunk Main System The trunk main system will be unchanged from the earlier proposals except that it will be sized to cope with city zone flow if required in the future.

38. Treatment of Sewage Incoming sewage will be mixed with lime, screened, and passed to a reaction basin for settlement of sludge.

Effluent from this process will be treated by recarbonation to reduce its alkalinity to levels suitable for discharge by a short outfall into the mouth of Ludmilla Creek and thence into the sea. Sludge deposited in the reaction tank will be continuously removed for thickening, concentration and dewatering. It will be burnt in a high temperature furnace to reduce it to an inert ash. Recent technical developments have enabled the Department of Works to give assurances that objectionable smoke flumes or odours can be avoided.

39. Effluent Disposal The Committee were assured that the effluent would be relatively sterile and clear and could be safely discharged to the mouth of Ludmilla Creek. Ludmilla Creek is not used to any extent for recreation purposes, its shores being mostly of mudflats and mangroves subject to tidal inundation. However, safeguards against nuisance arising will be provided including tanks for holding effluent for release on the outgoing tides and provision for chlorination, should this become necessary.

40. The Committee's Conclusion The Committee recommend the construction of the work in this reference.

PROGRAMME

41. The Committee were told that if an approval to proceed is given by September 1972 the preparation of detailed designs and tender documents could be completed in time to allow the calling of tenders early in 1973. After the letting of a contract by mid 1973 construction of the work is expected to take 18 months. On this basis it is planned to have the scheme in operation early in 1975.

ESTIMATE OF COST


42. The estimated cost of the work when referred to the Committee was \$4.8 million as follows:

	\$
Civil engineering works including clearing, pipe laying, pump stations, treatment plant and outfall	3.7m
Mechanical and electrical installations	1.1m
	<hr/> \$4.8m <hr/>

RECOMMENDATIONS AND CONCLUSIONS

43. The summary of recommendations and conclusions of the Committee is set out below. Alongside each is shown the paragraph in the report to which it refers:

	<u>Paragraph</u>
1. THERE IS A NEED FOR THE PROPOSED WORK.	22
2. THE COMMITTEE RECOMMEND THE ADOPTION OF A LIME TREATMENT SCHEME FOR THE CENTRAL SEWERAGE ZONE OF DARWIN.	32
3. THE COMMITTEE RECOMMEND THE CONSTRUCTION OF THE WORK IN THIS REFERENCE.	40
4. THE ESTIMATED COST OF THE WORK WHEN REFERRED TO THE COMMITTEE WAS \$4.8 MILLION.	42


(C.R. KELLY)
Chairman.

Parliamentary Standing Committee on Public Works,
Parliament House,
CANBERRA. ACT.

24 August 1972.