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THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

REPORT
relating to the proposed
**AUGMENTATION OF
WATER SUPPLY**
Darwin, Northern Territory
(Fourth Report of 1969)

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

AUGMENTATION OF WATER SUPPLY, DARWIN
NORTHERN TERRITORY

R E P O R T

By resolution on 23 April 1969, the House of Representatives referred to the Parliamentary Standing Committee on Public Works for investigation and report, a proposal to augment the water supply to Darwin, Northern Territory.

The Committee have the honour to report as follows:

THE COMMITTEE'S INVESTIGATION

1. The Committee received written submissions and drawings from the Northern Territory Administration and the Department of Works and took evidence from representatives of these bodies at public hearings in Canberra. An aerial inspection of the dam site and existing water supply facilities was made on 31 March 1969 when the Committee was in Darwin on other business.

THE REFERENCE

2. The proposal referred to the Committee comprises
- (a) construction on the Darwin River of an earth and rockfill dam with a capacity of 69,300 million gallons;
 - (b) erection of a pumping station at the dam;

- (c) laying a pipeline from the dam to McMinns pumping station, some 19 miles from Darwin; and
- (d) associated works including diversion of a section of the North Australian Railways line and the north-south telegraph/telephone link.

3. The work is estimated to cost \$9 million.

EXISTING WATER SUPPLY AND RETICULATION

4. Darwin's water supply is derived from two sources, the main one being Manton Dam some 42 miles to the south. The other, the McMinns bores, are 20 miles from the city in the same direction.

5. Manton Dam on the Manton River, is a concrete arch structure with a storage capacity of 3,500 million gallons. On the basis of a drought of an intensity expected to occur every 40 years, the safe draft of the Manton Dam is 4.4 million gallons per day. Peak daily pumping capacity using the existing pumps and reticulation is 5.7 million gallons.

6. The McMinns bores can currently provide 1.75 million gallons per day, through three bores which have a capacity of 1.00, 0.40 and 0.35 million gallons per day respectively. Unfortunately, due to the geological structure of the water beds, great difficulty has been experienced in developing these production bores with the required stability and output. Accordingly, when calculating the capacity of the bores, it has been necessary to regard the largest bore as a standby only. The bores as presently developed are therefore considered to have a real daily capacity of only 0.75 million gallons.

7. The present real capacity of the equipped sources of water for Darwin is thus 6.45 million gallons per day, plus one million gallons per day standby. Currently two more bores at McMinns are being equipped, each being expected to provide a further one million gallons per day. If these bores are operational in 1970 as expected, the system's real capacity will then be increased to 8.45 million gallons per day and the total capacity to 9.45 million gallons per day.

8. The Manton and McMinns water is pumped to a 4 million gallon ground level mixing and settling reservoir near the McMinns pumping station. The water is then reticulated to Darwin by pipelines of 30 inches, 15 inches and 12 inches diameter respectively, terminating in seven elevated steel service reservoirs with a total capacity of 1,550,000 gallons and two ground level reservoirs with a combined capacity of 5.5 million gallons.

9. Previous References The Committee have investigated two previous references for augmenting Darwin's water supply. In 1963, the proposals included extension of the reticulation system in the town area, a one million gallon elevated reservoir at Winnellie and two additional pumps. These works were designed principally to ensure an adequate water supply for developing areas in Darwin. Items in the 1965 reference included a 30 in. diameter pipeline from McMinns pumping station to Darwin, two service reservoirs at Casuarina and another at McMinns, a pumping station at the 31-Mile and a rising main from the two bores at McMinns.

10. Apart from the elevated tank at Winnellie which was originally to have been completed in June 1964, and the two tanks at Casuarina which should have been operating no later than 1967-68, the work in these references has been finished. The outstanding items are now scheduled for completion progressively up to 1971.

THE NEED FOR ADDITIONAL WATER SUPPLY

11. The need for a major additional source of water other than the Manton Dam was recognised when evidence was presented to the Committee in 1963. A proposal involving a dam on the Darwin River was subsequently examined, but was deferred temporarily when it was found that there was a prospect of obtaining water from the McMinns bores. The latter then became an important part of the proposals referred to the Committee in 1965.

12. Initial reports on the McMinns area as an underground water source were very favourable. The Committee were informed in 1965 that there was a certain availability of one million gallons per day, and a probable daily availability of between three and five million gallons. The initial assessment did not prove correct and because of the many difficulties which were experienced in establishing and maintaining successful production bores due to the geological structure of the water beds, the field is not now regarded as a reliable source.

13. Population Growth In recent times, a population growth rate of 9% per annum has been assumed for planning the development of the water supply for Darwin. In actual fact, the tempo of activity in Darwin has been increasing at a rate higher than that since 1965 and it is now considered that a rate of 10% per annum is more realistic.

14. Past and expected future population figures for the Darwin water supply area, as distinct from the city itself, and the related consumer peak demand are set out in the following table. In forecasting future peak demands, a consumption of 270 gallons per head on days of maximum consumption, i.e. normally during September/October, is assumed.

<u>Year</u>	<u>Population of Darwin Water Supply Area</u>	<u>Peak Demand (million gallons per day)</u>
1966	22,700	6.05
1967	24,900	6.48
1968	27,400	7.40
1969	30,100	8.20
1970	33,100	9.00
1971	36,400	9.90
1972	40,000	10.90
1973	44,000	12.00
1974	48,400	13.20
1975	53,200	14.50
1976	58,500	16.00
1977	64,400	17.60
1978	70,800	19.40

15. The predictions of population growth seem reasonable in the light of increases in recent years and we are satisfied they form a sound basis for planning future water supply installations.

16. The table shows that by 1970, when the real capacity of the Darwin water supply system will be 8.45 million gallons per day, peak consumer demand may exceed this amount. At that time, it may be possible to bridge the gap between supply and demand by drawing from further bores at McMinns. Unfortunately, experience suggests that this supply cannot be fully relied on, either as an interim measure pending completion of the work in this reference or in the long term. Should this possibility be unproductive, water restrictions in Darwin will be necessary at critical periods.

17. It was therefore quite clear to the Committee, as it has been for some years, that an additional reliable source of supply and supporting facilities are urgently needed to ensure an adequate water supply for Darwin.

SOURCES OF WATER SUPPLY

18. A number of additional sources of supply have been investigated and it has been concluded that the most satisfactory scheme is to construct a storage on the Darwin River. The possibilities considered were:

Berry Springs This supply is located on Berry Creek, 34 miles from Darwin. Investigations have shown that although the water is moderately hard, it could be used if there were no supply or storage problems. As it is, the flow from the spring decreases during the dry months, at the very time consumer demand reaches its peak. Therefore to ensure continuity of supply, a suitable storage basin would be necessary. No such natural site is available in the vicinity.

Raising Wall of Manton Dam A study of the feasibility of raising the dam wall by 5 ft showed this alternative to be an uneconomical short-term benefit. Although the storage capacity of the dam could be increased by this means to 5,400 million gallons, a further major storage would still be necessary within two years. A similar conclusion was also reached about a proposal to lower the off-take level of the dam by 7 ft.

Acacia Gap The Committee were told that Acacia Gap could not be considered a possibility at this stage as the waters of the Manton River, which flow into the Manton Dam, would need to be tapped to take full advantage of the scheme.

Adelaide River This possibility was rejected because of the geographical isolation of the area and the problem of salt water intrusion.

Darwin River Dam In 1967, the Snowy Mountains Hydro-Electric Authority was commissioned to investigate the feasibility and cost of constructing a dam on the Darwin River at a point about ten miles from the Manton Dam and

45 pipeline miles from Darwin. The investigation showed that a suitable storage basin existed and that the catchment area covered some 79 square miles. Because of geological conditions at the dam site, the type of dam recommended was an earth and rockfill structure with a storage capacity of 69,300 million gallons, yielding an average of 30 million gallons per day. This would be sufficient to cater for a population of 175,000 at the present average per capita demand.

19. The recommendation includes a pipeline from the dam to McMinns pumping station designed initially to allow a peak draw-off of 20 million gallons per day. The McMinns pumping station and the reticulation from there to Darwin will be able to handle the demand for water in Darwin until about 1974 when further pumps will be needed. On present population trends the pipeline from McMinns to Darwin will need to be supplemented three or four years later.

20. The Committee believe that the proposal to construct a dam on the Darwin River is the most satisfactory means of providing a storage for augmenting the water supply to Darwin.

THE PROPOSAL

21. Land Acquisition The area of land necessary for this project is about 86 square miles comprising a catchment area of 79 square miles, 2 square miles to encompass all property boundaries and a further 5 square miles for the railway diversion. In all, 59 square miles of freehold land representing 151 sections are involved, most of it being virgin bushland.

22. The timing of the project necessitates acquisition in two stages. Compulsory process will be required for the storage area, dam site and

railway diversion, whilst in the catchment area acquisition will be by agreement.

23. Railway Diversion We noted that at present the railway passes through the dam site and storage area and therefore will need to be diverted before there can be any major work on the dam. Accordingly, this is the most critical stage of the construction programme. The diversion will include the construction of a bridge some 400 ft long over the Darwin River downstream of the dam and the relaying of about 10 miles of track. It is expected that this phase of the work will take about one year to complete.

24. Diversión of Telegraph/Telephone Link As the main north-south telegraph/telephone line parallels the railway and thus passes through the storage area, it also is to be diverted.

25. Dam Design and Construction The dam is to be the earth and rockfill structure recommended by the Snowy Mountain Hydro-Electric Authority. The Committee were told that this type of dam is thought to be best suited to the site's geological conditions and is more economical than a concrete gravity dam. It will be 1,850 ft across and 25 ft wide at the tops, with an ungated spillway approximately 100 ft wide on the left abutment. Suitable materials for construction of the dam are available nearby.

26. Reticulation As the waters of the dam cannot be gravity fed to the town reservoirs, a pumping station is to be built at the dam. It is to be sited immediately downstream of the dam, above the flood level of spillway waters. The station, using electrically operated pumps, will be designed with an initial pumping capacity of 20 million gallons per day.

27. A 42 in. diameter pipeline, also with a daily capacity of 20 million gallons, will be laid between the dam and McMinns pumping station. It will run parallel to the railway line to a point south-west of the 31-Mile pumping station and then proceed north-east to meet the line from Manton Dam at that station.

28. Quality and Treatment of Water It is expected that the water from the new dam will be soft and similar in quality to that from Manton. Approval has been given recently for the introduction of fluoride into the Darwin water supply, this work being programmed for 1969-70. Provision has been made to treat water from the proposed new dam. A chlorination plant will be installed as a safeguard against contamination.

29. Fencing The catchment area will be fenced to protect the storage from pollution.

30. Electricity Supply Power will be provided at the dam site by an overhead transmission line from a zone substation at McMinns. The line will be interconnected with the power line to Manton Dam to provide an alternate circuit for each pumping station. Additional circuit breakers and control equipment at the McMinns substation will be required.

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

ESTIMATE OF COST

32. The estimated cost of the proposed work when referred to the Committee was \$9 million made up as follows:

	\$
Main dam and diversion	3,125,000
Pipeline and pumping plant	4,450,000
Electricity supply	300,000
Clearing, fencing, remote control, design development etc.	1,125,000
	9,000,000

PROGRAMME

33. Subject to an early approval to proceed being given, it is planned to call tenders in September 1969 for the initial stages of the work, including the railway diversion and the pipeline. In January 1970, tenders are to be invited for the erection of the pumping station and in May of that year, for the construction of the dam and clearing and burning the storage area. Tenders for fencing the catchment area are to be called in January 1971.

34. The Committee were informed that the earliest practical completion date for the project is April 1972.

OTHER OBSERVATIONS

35. Previous References It will have been noted from paragraph 10 above that construction of several items in the 1963 and 1965 references has not yet been completed, notably a one million gallon elevated tank at Winnellie (1963) and a similar tank and a 6 million gallon ground level reservoir at Casuarina (1965).

36. In respect of the tank at Winnellie, the Committee in May 1965 drew attention to and were critical that this work was then unfinished.

That it is still unfinished nearly six years after the work was approved calls for severe censure, particularly as it is understood that the unavailability of the tank has caused water supply problems in the Winnellie and Coonawarra areas and has tended to inhibit extension of the water supply area in that direction.

37. Failure to complete the works at Casuarina in the 1965 reference has not had such dire results. Nonetheless, the Committee is most concerned that the work is incomplete and that lengthy delays can occur in implementing works after Parliamentary approval has been obtained. According to evidence presented to the Committee in 1965 it was clear that the reservoirs were required by 1966-67 or, at latest, by the following year, to keep ahead of water supply demands in the Casuarina district. If the population growth in the Darwin water supply area had taken a downward turn, it would have been reasonable to expect some deferment of work but as the growth has been greater than was expected, there is no justification for the delay, unless the reliability of the evidence given at the 1965 enquiry is questioned.

38. Present Reference On the timing of the present reference, we noted that although in 1963 it was recognised that it was inevitable that a storage would eventually be required on the Darwin River, it was not until some four years later, in July 1967, that the Snowy Mountains Hydro-Electric Authority was commissioned to commence its study.

39. The Committee think that the three year period allowed for the construction of the work in this reference may be inadequate, particularly considering that before the dam itself can be commenced, the railway diversion, occupying 12 months, will need to be completed. Further critical factors

are the occurrence and duration of the wet seasons, both of which can drastically upset calculations if other than normal weather conditions are experienced. These factors and the past history of work connected with the water supply of Darwin causes us apprehension that the schedule submitted cannot be maintained.

40. The Committee noted that even the Northern Territory Administration, one of the authorities responsible for the planning, is apprehensive at the very tight construction schedule and about the consequences of delays. The Committee felt justified in concluding that the reference of the present work should have been made at least 12 months ago.

41. McMinns Boreas In order to lessen the risk of water restrictions occurring before water will be available from the Darwin River, the possibility of tapping the McMinns underground water source from a wider spread of pump locations should be explored.

42. General We believe that these observations reveal serious discrepancies in the planning and implementation of proposals for augmenting Darwin's water supply. The extent and direction of the growth which is occurring in the water supply area has been definite enough over an extended period for development proposals to be prepared in sufficient time to avoid the delays which have occurred since 1963 and which seem inevitable with the present reference.

43. This is not to say that occasional pressures on the water supply system should not be tolerated but there has been every opportunity in Darwin to avoid these situations. As it is, there are likely to be water restrictions periodically between 1970 and the time when water from the new storage becomes available. The circumstances suggest that a reassessment should be made of the lines on which the planning of Darwin's water supply facilities is being approached.

FOR SENATOR BRAUNSON.

I present the report of the Parliamentary Standing Committee on Public Works relating to the following proposed work,

AUGMENTATION OF WATER SUPPLY, DARWIN,
NORTHERN TERRITORY.

I ask for leave to make a short statement.

(WHEN LEAVE GRANTED)

The summary of recommendations and conclusions of the Committee is as follows:

1. The initial assessment of the McKinnis underground water source did not prove correct.
2. The predictions of population growth submitted to the Committee form a sound basis for planning future water supply installations.
3. By 1970 peak consumer demand may exceed the real capacity of the Darwin water supply system.
4. An additional reliable source of supply and supporting facilities are urgently needed to ensure an adequate water supply for Darwin.
5. The proposal to construct a dam on the Darwin River is the most satisfactory means of providing a storage for augmenting the water supply to Darwin.
6. The Committee recommend the construction of the work in this reference.
7. The estimated cost of the proposed work when referred to the Committee was \$9 million.

2.

8. That the elevated tank at Winnellie is still unfinished nearly six years after the work was approved calls for severe censure.
9. The Committee is most concerned at the failure to complete the works at Casuarina and that lengthy delays can occur in implementing works after Parliamentary approval has been obtained.
10. The time allowed for the construction of the work in this reference may be inadequate.
11. The reference of the present work to the Committee should have been made at least 12 months ago.
12. The possibility of tapping the McMinns underground water source from a wider spread of pump locations should be explored.
13. There have been serious discrepancies in the planning and implementation of proposals for augmenting Darwin's water supply.
14. A reassessment should be made of the lines on which the planning of Darwin's water supply facilities is being approached.

21 May 1969.

RECOMMENDATIONS AND CONCLUSIONS

44. 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.

Paragraph

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|----|--|----|
| 1. | THE INITIAL ASSESSMENT OF THE McMINNS UNDERGROUND WATER SOURCE DID NOT PROVE CORRECT. | 12 |
| 2. | THE PREDICTIONS OF POPULATION GROWTH SUBMITTED TO THE COMMITTEE FORM A SOUND BASIS FOR PLANNING FUTURE WATER SUPPLY INSTALLATIONS. | 15 |
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(F.C. CHANEY)
Chairman.

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

20 May 1969.