

THOMSONS LAKE URBAN STRUCTURE STUDY AND SOUTH JANDAKOT
DEVELOPMENT WATER RESOURCES MANAGEMENT PLAN

MINISTERIAL CONDITION 2

Report and Recommendations
of the
Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia

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i. SUMMARY

The Environmental Protection Authority has examined a proposal to drain land in South Jandakot east of Thomsons Lake to enable housing development. The Environmental Protection Authority has concluded that the proponent has not demonstrated that the drainage proposal is acceptable. The Authority has been guided towards this conclusion by reports from various expert groups, including the Water Authority of WA, the Department of Conservation and Land Management, a special Technical Advisory Group established to advise the Environmental Protection Authority, and extensive public input.

The Environmental Protection Authority has concluded that the major problems with the drainage proposal, in particular the potential impacts of drainage water on the environment, can be ascribed to the proposal to drain the eastern one third of the development area. This eastern zone is mostly swampy and under water in winter, and draining it to enable housing development would generate up to 70% of the drainage water from the entire development and lead to most of the potential environmental impacts on the Beeliar wetland chain. Also, the eastern zone is important because of its potential for groundwater abstraction for urban water supply. The Environmental Protection Authority now recommends to Government that this eastern zone be excluded from drainage, and urban development, and land use constraints be applied to protect the water resource.

The western one third of the development area is elevated, and has little exceptional in terms of drainage problems. The Environmental Protection Authority has suggested to Government that this land could be developed quickly, after minimal arrangements for drainage, and that this would accommodate immediate needs to release land for housing.

The central one third of the development area is less elevated above the groundwater, and contains both the Kwinana Freeway alignment and the proposed line of bores for the Jandakot groundwater scheme. The Environmental Protection Authority has recommended that studies involving the State Planning Commission and the Water Authority of WA could soon delineate areas to the west which would be suitable for housing, and areas to the east which should be excluded from housing and managed for protection of the water resource.

The Environmental Protection Authority believes that acceptance of these recommendations would greatly reduce the scale of the drainage problem, would protect the critical environments, and would accelerate the decision-making for future housing developments.

1. INTRODUCTION

Two years ago the Environmental Protection Authority was asked to assess a proposal by the State Planning Commission for urban development of land in South Jandakot east of Thomsons Lake (State Planning Commission, 1986). Most of the land had been considered in previous planning studies as part of the "inter-urban wedge", to be excluded from urban development. The land overlays the Jandakot groundwater mound, which is very important for its potential water supply for the Perth Metropolitan Region, and it interacts with critical wetlands, including the Beelihar wetland chain.

Figure 1 shows the area proposed for urban development by the State Planning Commission. Because much of the area is low lying, a substantial portion of the proposed urban cell would require the installation of an intensive system of drainage to reduce high groundwater levels. A water management strategy was proposed by the State Planning Commission involving detention basins, floodways, main drains, sub-soil drainage, a system of buffer lakes, a monitoring programme and recommendations relating to private and public groundwater extraction (Sinclair Knight & Partners Pty Ltd and G B Hill & Partners Pty Ltd, 1987).

The major environmental issues associated with the urban development proposal were considered by the Environmental Protection Authority to be protection of the groundwater resource, and protection of the Beelihar wetlands.

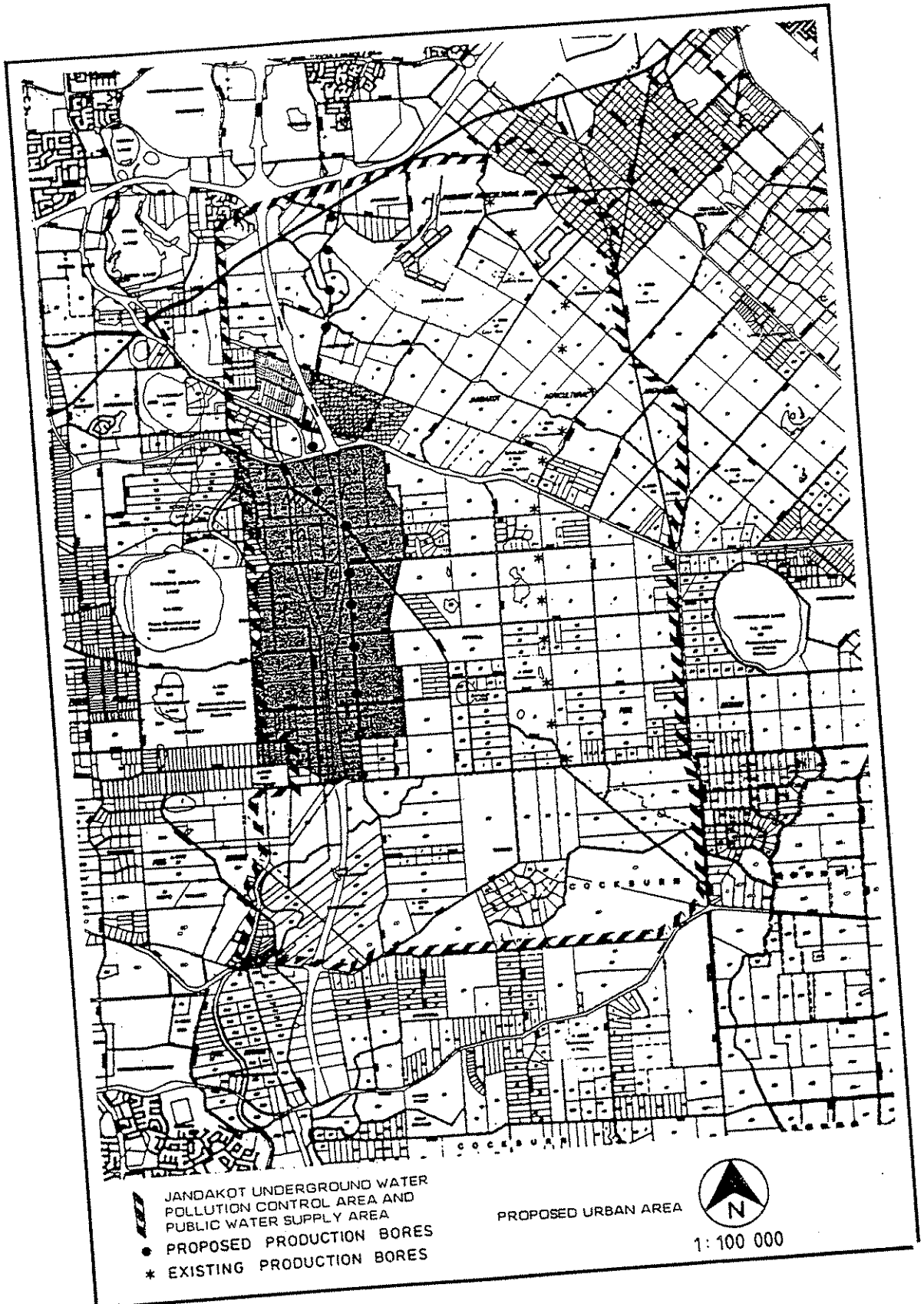
The Environmental Protection Authority expressed concern in its 1987 assessment report that the residential development could contribute contaminants to the shallow groundwater resource and was an undesirable risk to that resource. Specifically, the Environmental Protection Authority stated "...residential development as envisaged could contribute contaminants to the groundwater and in an environmental resource management context should, therefore, be viewed with caution". The Water Authority of WA, however, accepted the concept of residential development on this portion of the Jandakot groundwater mound, leaving the Environmental Protection Authority "prepared to regard residential development on the Jandakot mound as an acceptable (but not necessarily desirable) compromise".

The Environmental Protection Authority therefore turned its attention from water resource protection to protection of the major Beelihar wetland chain from the effects of water drained from the proposed residential development. The Environmental Protection Authority was particularly concerned that the large excess of drainage water in winter be prevented from flooding and polluting Thomsons Lake and other lakes of the Beelihar chain. Although the drainage strategy outlined in the proposal by the State Planning Commission was based on reasonable environmental principles, the Environmental Protection Authority was concerned that difficulties could arise in practice.

Consequently, the Environmental Protection Authority recommended that, prior to the initiation of any rezoning proposals to allow for urban development, an environmentally acceptable drainage scheme should be formulated for the South Jandakot area, giving consideration to:

- . water levels in the urban area and Thomsons Lake;
- . the input of nutrients and toxic contaminants to the groundwater and the wetlands; and
- . beneficial use of drainage waters.

See Bulletin 888 for original



The Environmental Protection Authority also made a number of recommendations regarding implementation and management of the scheme.

A copy of the conditions set by the Minister for Environment for amendment of the Metropolitan Region Scheme as proposed by the State Planning Commission is included in Appendix 1.

In November, 1988 the State Planning Commission advertised an amendment to the Metropolitan Region Scheme to rezone land east of Thomsons Lake from Rural to Urban and Urban Deferred (see Figure 2). That initiative was accompanied by release for public comment of the preliminary plan for the management of the drainage waters prepared for the State Planning Commission by G B Hill & Partners Pty Ltd (G B Hill and Partners Pty Ltd, 1988). The plan outlined development of the Beeliar Compensating Channel in conjunction with upstream urban drainage.

The Environmental Protection Authority called for public submissions on the drainage scheme to assist it in determining whether the plan could be implemented to the Authority's satisfaction. An independent engineering assessment of the drainage scheme was completed by Wood & Grieve Pty Ltd, and this document was also made available to the public (Wood & Grieve Pty Ltd, 1989). The public review period closed on 20 January 1989.

The Environmental Protection Authority convened a Technical Advisory Group to provide advice separate from the public submissions. The Advisory Group was asked to examine the relevant documents and comment upon the capability of the drainage management plan to protect the environment.

2. DRAINAGE MANAGEMENT PLAN

The drainage management plan prepared by G B Hill & Partners Pty Ltd outlines a package of measures intended to:

- . control water levels in the proposed development areas;
- . manage water levels and quality in the Beeliar wetlands; and
- . provide options for disposal of the surplus water.

The major components of the proposed plan are:

- . an urban drainage system to provide protection against storm rainfall and to limit the rise of the groundwater table;
- . on-site recharge and nutrient stripping measures within the urban development;
- . buffer lakes upstream of Thomsons Lake;
- . the Beeliar Compensating Channel; and
- . ongoing monitoring and management programme.

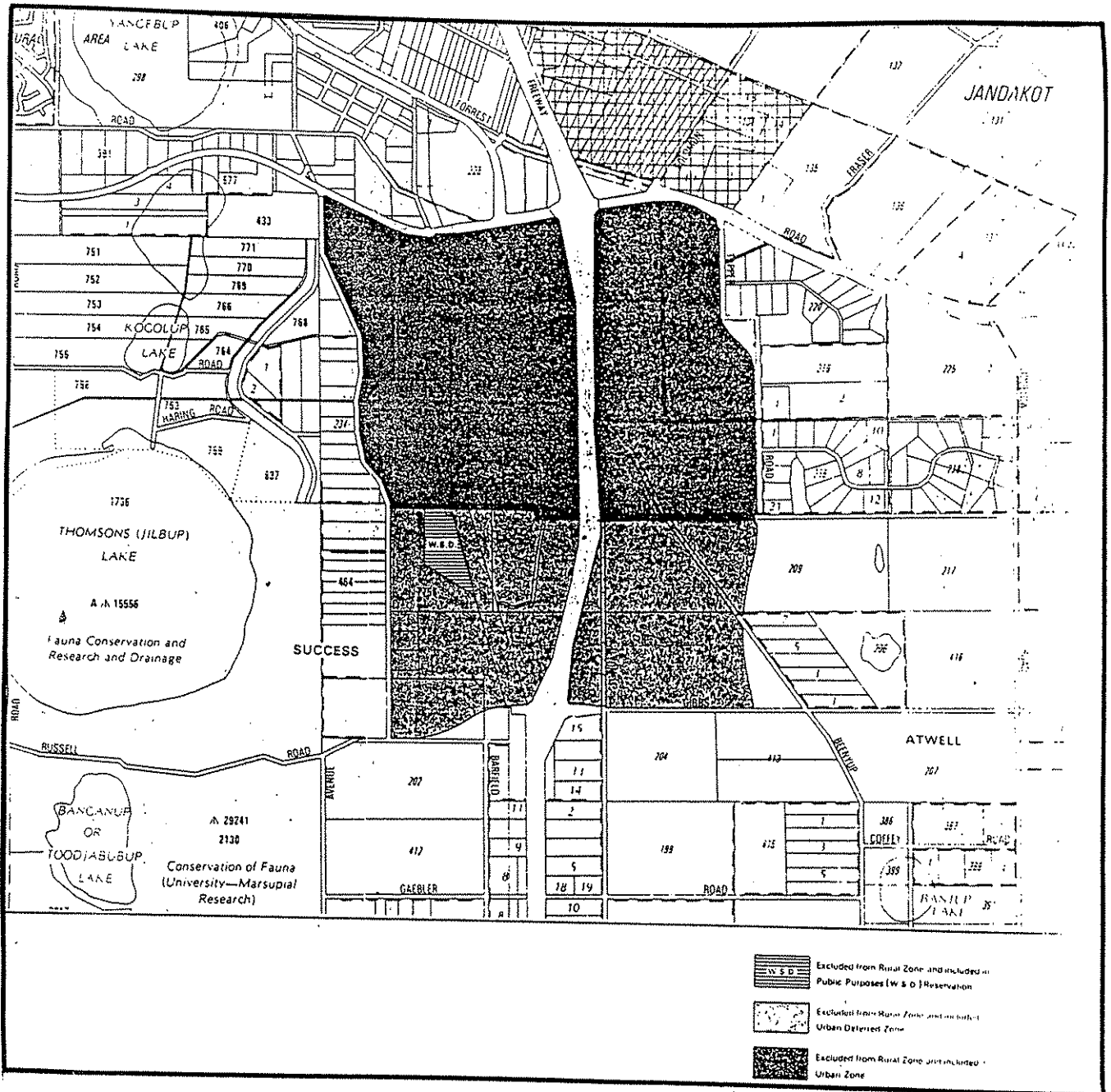
Figures 3 and 4 show the proposed urban drainage system and Beeliar Compensating Channel.




3. PUBLIC AND GOVERNMENT SUBMISSIONS

The Preliminary Proposal for the Drainage Management Plan for the South Jandakot Area by G B Hill and Partners Pty Ltd was released for public comment for a twelve week period, closing 20 January 1989.

A summary of the issues raised in the submissions is presented in Appendix 2.

See Bulletin 388 B, original



-  Excluded from Rural Zone and included in Public Purposes (W & D) Reservation
-  Excluded from Rural Zone and included in Urban Deferred Zone
-  Excluded from Rural Zone and included in Urban Zone

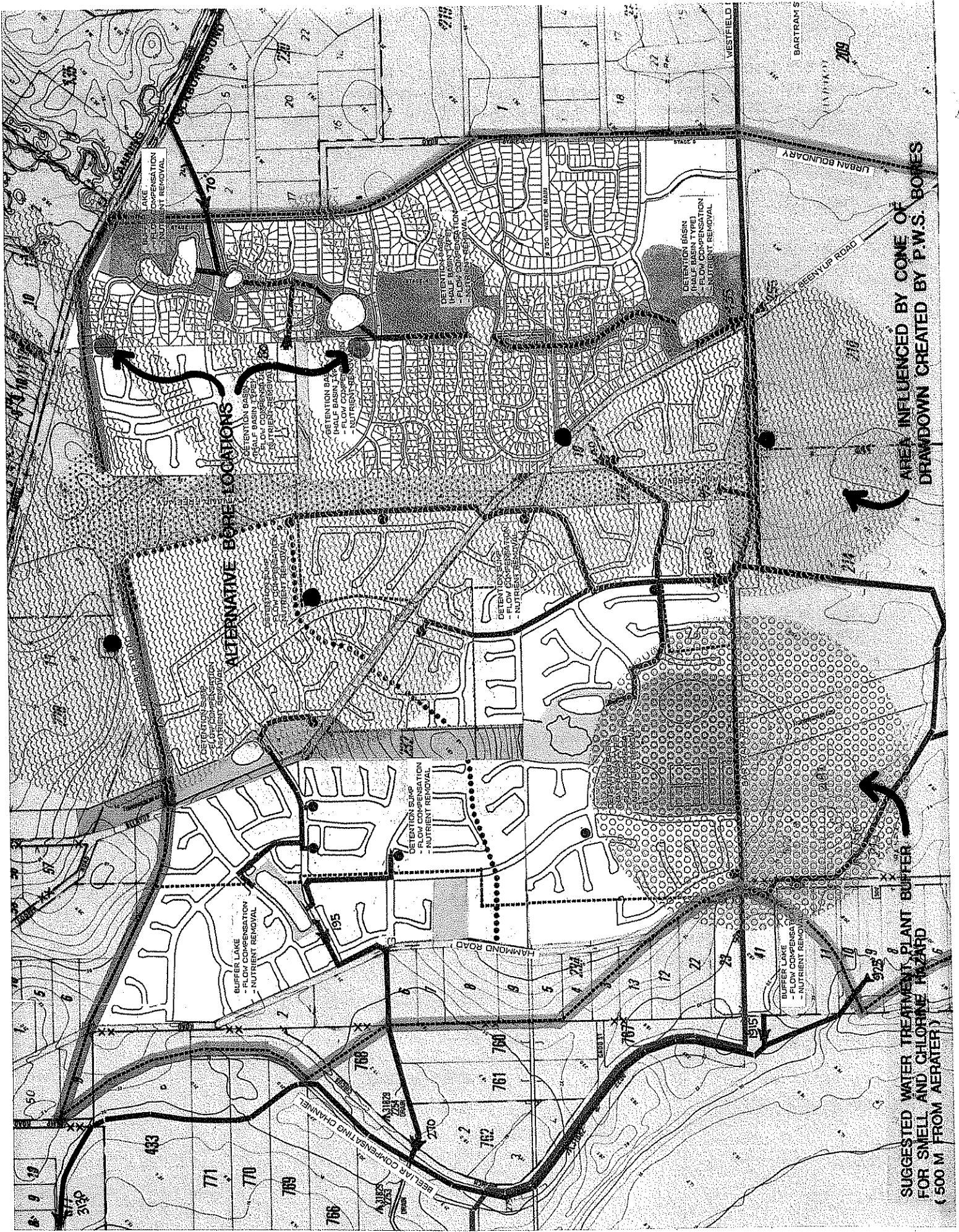


Figure 3. Proposed Urban Drainage System.

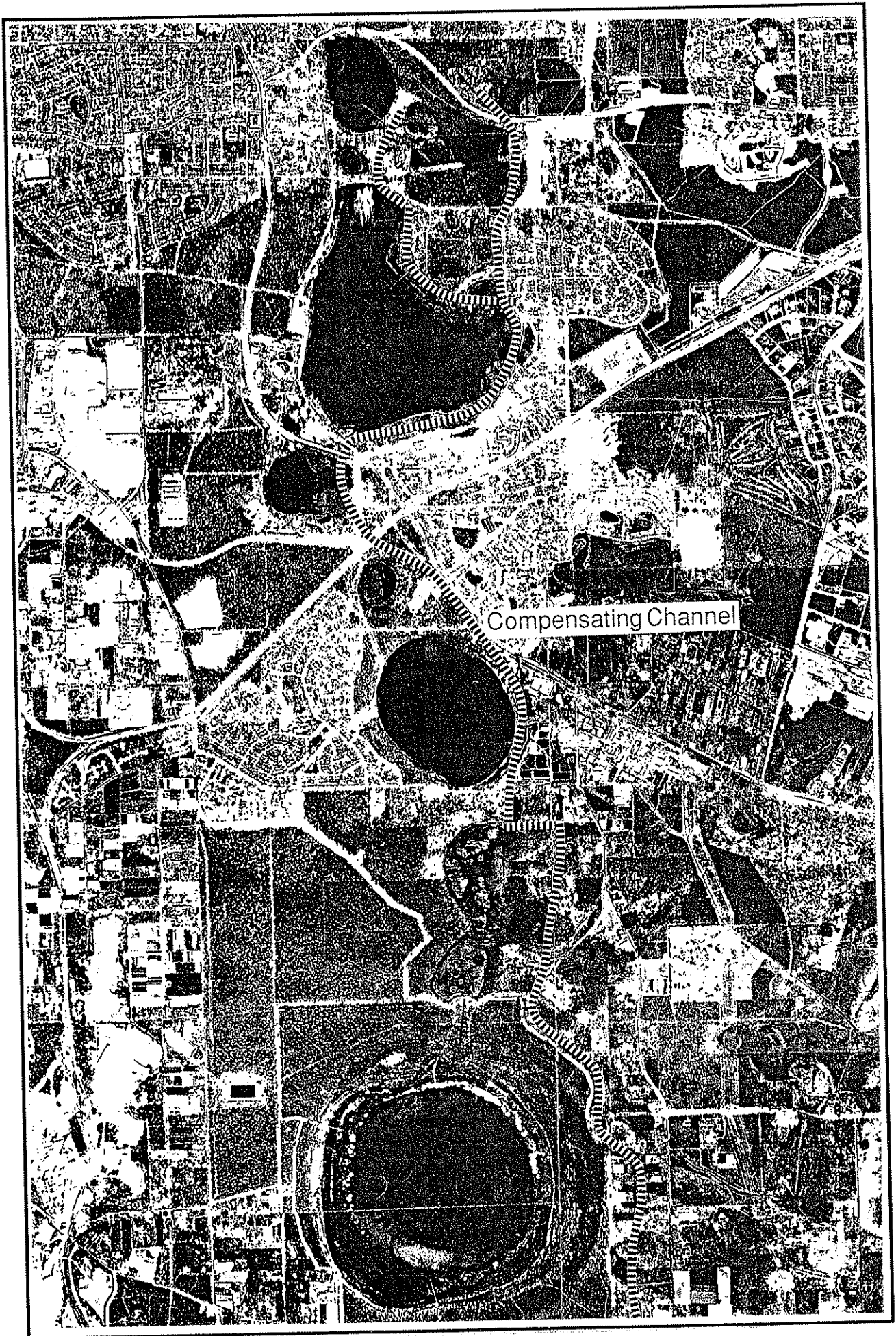


Figure 4. Proposed Beelihar Compensating Channel.

A total of 495 submissions was received; 489 were opposed to the plan or concerned about it and three expressed support for it, although one of these was qualified. Of this total, 416 proforma letters were received, all opposing the plan. The following table summarises the submissions received.

Opposition to the Plan

The majority of submissions received expressed opposition to the plan in one of four standard formats, or in individual submissions. The basis of this opposition is outlined in Appendix 2. A number of environmental concerns identified included pollution of the Beelihar wetlands, use of Lake Kogolup as a storage basin, damage to native vegetation as a result of the Channel, increase in the midge problem, use of insecticides and damage to wildlife. Many submissions warned that urban development was likely to pollute the groundwater resources and damage the proposed Beelihar Regional Park.

Government submissions expressed concern about the vagueness of the drainage management plan and pointed out there were inadequacies in the report, a need to gather more information and expressed the view that more thought needed to be put into the plan.

Support for the Plan

One submission expressed the belief that the proposed channel was attractive and would be a useful engineering exercise. Another submission, while supporting the plan, expressed concern for flora, fauna and pollution. Another submission believed the plan would be successful, a highly managed, sophisticated drainage system, capable of protecting wetlands and accommodating the needs for urban expansion.

Government Submissions

Condition 2 set by the Minister for Environment requires that finalisation of the proposed rezoning and reservation shall not occur until the drainage management plan has been prepared to the satisfaction of the Environmental Protection Authority, Water Authority of WA and the Department of Conservation and Land Management.

Both the Water Authority of WA and the Department of Conservation and Land Management made detailed submissions to the Environmental Protection Authority during the public review period, raising a substantial number of issues which were considered to require further attention by the proponent. These issues included alignment of the Channel, environmental criteria to be met for the Beelihar wetlands, effectiveness of the nutrient stripping wetlands within the development, the lack of a co-ordinated monitoring programme, post-development management of the Channel, interaction of the Channel with the groundwater, life of the sub-soil drainage system, suitable storage facility, pumping rates, and the method of estimating water quantities.

Subsequently, both the Water Authority of WA and the Department of Conservation and Land Management advised that neither were convinced of the adequacy of the drainage management plan for the South Jandakot area, and that the Minister's Condition 2 had not been fulfilled (Appendix 3).

4. TECHNICAL ADVISORY GROUP'S REPORT AND RECOMMENDATIONS

The Technical Advisory Group was established by the Environmental Protection Authority to provide advice on the capability of the drainage management plan to protect the environment. The Terms of Reference for the Advisory Group were to examine the drainage management plan and to advise on:

- . the capability of the plan to protect the Beeliar wetlands; and
- . the availability of options to use and dispose of the drainage waters.

The Technical Advisory Group concluded that, while the concept of the Beeliar Compensating Channel has merit, it was not satisfied that the drainage management plan in its present form demonstrated that the Beeliar wetlands would be adequately protected (Technical Advisory Group, 1989). That is, the Technical Advisory Group advised the Environmental Protection Authority in effect that it did not consider that the Minister's Condition 2 had been fulfilled.

The Technical Advisory Group recommended that, if urban development was to proceed in the South Jandakot area, it should occur on a catchment by catchment basis, commencing with the Hird Road wetland catchment.

The Technical Advisory Group made a number of further recommendations regarding the need for active management of the Beeliar wetlands, and the need for an overall drainage management plan for their catchments. The Technical Advisory Group also recommended that a land use and water resources management strategy be developed for the Jandakot groundwater mound.

The Summary and Recommendations from the Technical Advisory Group are included in Appendix 4.

5. PROPONENT'S RESPONSE TO THE TECHNICAL ADVISORY GROUP'S REPORT

At the request of the Environmental Protection Authority, the engineering consultants Sinclair Knight & Partners Pty Ltd and G B Hill & Partners on behalf of the State Planning Commission have responded to the Technical Advisory Group report. The engineering consultants disagreed with the conclusion reached by the Technical Advisory Group, Water Authority of WA and Conservation and Land Management regarding whether the drainage management plan demonstrated that the Beeliar wetlands would be adequately protected. They acknowledged, however, the usefulness of some of the Technical Advisory Group report's other recommendations and expressed the belief that they were consistent with the proposed development strategy (Sinclair Knight and Partners Pty Ltd and G B Hill and Partners Pty Ltd, 1989).

The engineering consultants' Summary is included in Appendix 5.

6. FUTURE DEVELOPMENT

Since the drainage management plan was prepared last year, there has been ongoing interaction between the State Planning Commission, the engineering consultants, and the government agencies involved (Water Authority of WA, Department of Conservation and Land Management, Environmental Protection Authority). As a result, a number of issues associated with the proposed drainage management plan raised during the public review period and by the Technical Advisory Group have been resolved.

However, in regard to the ability of the drainage management scheme to protect the Beeliar wetlands, two major concerns remain. Firstly, the ability of the drainage scheme to control the impacts on wetland water levels of additional water generated in the area by both drainage flows and reduced evaporation losses. Secondly, the impact on water quality in the wetlands as a result of both the input of drainage water and the natural flow of groundwater from the urban area to the wetlands. Further, in regard to disposal of the drainage waters, the Environmental Protection Authority does not consider discharge to the ocean to be an acceptable long-term solution.

Despite the time and effort expended to date, a drainage management plan acceptable to the relevant experts and responsible bodies has not been prepared. The Environmental Protection Authority is not able to say that the proposed drainage management plan will not work, or that its impacts will not be acceptable, but it is obliged to conclude, at least, that it has not been convinced that the plan would work, nor has it been convinced that resulting impacts would be environmentally acceptable.

Accordingly, the Environmental Protection Authority does not consider a satisfactory drainage management plan has been prepared.

RECOMMENDATION 1

The Environmental Protection Authority concludes that Ministerial Condition 2 for the urban development of the South Jandakot area east of Thomsons Lake has not been satisfied.

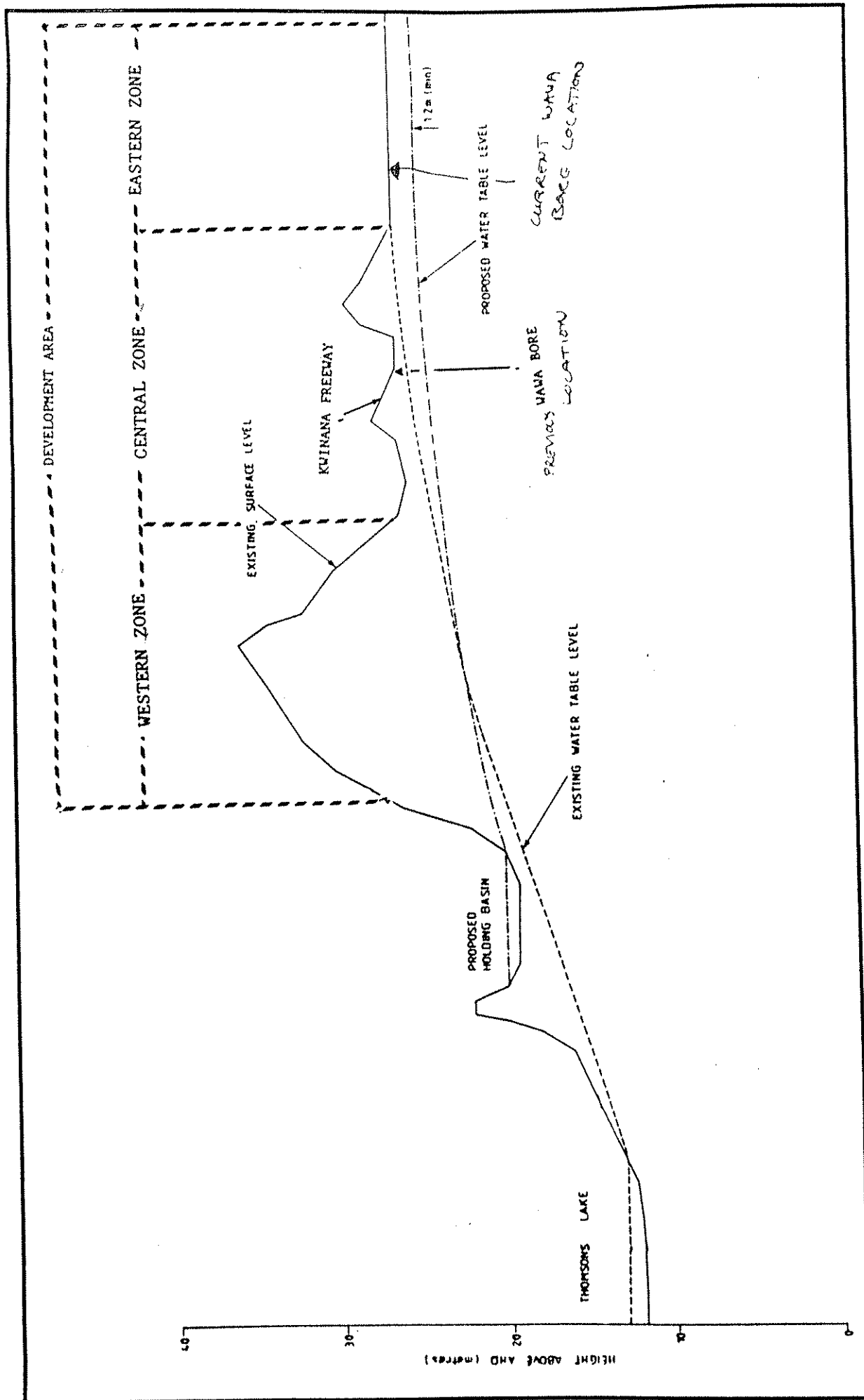
The proponent's response to the Technical Advisory Group's report includes a list of more than 20 reports and submissions which have been prepared over the last three years in connection with the proposed residential development.

The various unsuccessful attempts to develop an acceptable drainage management plan have led the Environmental Protection Authority to conclude that it is probably too difficult to develop an acceptable plan for the whole area.

Furthermore, in the two years since the Environmental Protection Authority assessed the proposal by the State Planning Commission for residential development east of Thomsons Lake, there has been an increase in our knowledge base. It is now known that water resources are even more critical for Perth's future. Continuing growth in urban water consumption, and an increasing uncertainty of future rainfall through Greenhouse impacts strengthens the Environmental Protection Authority's previous qualified conclusion in regard to protection of the key areas of the Jandakot groundwater mound.

The Environmental Protection Authority therefore believes that a modified development plan which recognises and is defined by the natural environment and future public water supply needs would greatly reduce the scale of the drainage problem, and protect the critical environments.

Figure 5 illustrates the existing land contours and water levels along Bartram Road, and the expected effect of urbanisation and drainage on the water levels. The approximate location of the Kwinana Freeway alignment and the proposed public water supply boreline are also indicated. Although this figure is indicative only of land contours and water levels across the



whole of the development area, it does suggest that the existing natural environment dictates a development plan which is defined by the characteristics of that environment.

Land in the eastern one third of the development area (eastern zone) is mostly swampy, is difficult to drain, would generate up to 70% of the drainage water from the entire development, would lead to most of the potential environmental impacts on the Beelihar wetland chain, would generate the major loss of water resource, and is within the recharge area which would supply the Water Authority of WA's proposed borefield. The Environmental Protection Authority now recommends that it is appropriate to exclude this area from urban development and drainage.

RECOMMENDATION 2

The Environmental Protection Authority recommends that Government does not allow residential development on the eastern one third of the development area that is difficult to develop and drain and within the main recharge area for the Jandakot groundwater mound.

Land in the western one third of the development area (western zone) has much less environmental constraints associated with residential development, and the Environmental Protection Authority considers that the focus for development should be in this area. There would still be a requirement to resolve the drainage issue, and any drainage management scheme should also address the need to manage areas immediately to the north. However, residential development in this area would be more easily achieved and would generate only some small part of the drainage water for the whole development, thereby protecting the Beelihar wetland chain and preventing the eventual loss of significant volumes of water resource. The area is also outside of the main recharge area for the Jandakot groundwater mound.

RECOMMENDATION 3

The Environmental Protection Authority recommends that Government focuses residential development on the western one third of the development area that is elevated above the natural water table and is west of the main recharge area for the Jandakot groundwater mound.

The Environmental Protection Authority proposes that the focus for residential development be in the western portion of the land and the efforts of the agencies and bodies involved (Water Authority of WA, Department of Conservation and Land Management, State Planning Commission, Environmental Protection Authority) should now be directed towards developing an acceptable drainage management plan for that area, giving particular attention to:

- . compensating channel vs piped drainage system;
- . management of drainage flows prior to commissioning of the main drainage works by the Water Authority of WA;
- . effectiveness of nutrient stripping devices;
- . options for disposal and use of surplus water;
- . storm events for which drainage system should be designed;
- . location of pump stations within the Beelihar Regional Park;
- . comprehensive monitoring and management programme.

In the central zone, further investigation is required in order to identify areas suitable for residential development. An acceptable balance between water resource protection and environmentally acceptable residential development could be achieved by detailed examination of:

- . depth to groundwater;
- . the location of the Water Authority of WA bore line; and
- . the cone of draw down associated with the bores, and the desirability of separating housing from these areas.

It would be appropriate for the Water Authority of WA to undertake this detailed examination in consultation with the State Planning Commission. The Environmental Protection Authority understands the modelling currently being undertaken by the Water Authority of WA towards the Public Environmental Report for the Jandakot Groundwater Scheme - Stage 2 would contribute to the examination of the central zone.

As an approximation, the Environmental Protection Authority expects that detailed examination may suggest an eastern limit of residential development coincident with the Kwinana Freeway alignment. There are significant environmental reasons for ensuring the freeway is west of the areas which may yield water for public water supply abstraction.

RECOMMENDATION 4

The Environmental Protection Authority recommends that the Water Authority of WA, in consultation with the State Planning Commission and the Environmental Protection Authority, examines the central zone of the development area to achieve an acceptable balance between environmentally acceptable residential development and water resource protection.

Further, it is important that a land use plan and management strategy is developed for the Jandakot groundwater mound to guarantee ongoing protection of the water resource. The focus of the land use plan and management strategy should be the area between the existing and proposed public water supply borelines (allowing for an area of influence around the bores), and should include the eastern zone and a portion of the central zone (to be defined as per Recommendation 4) of the development area discussed in this report.

RECOMMENDATION 5

The Environmental Protection Authority recommends that specific land use constraints be put in place to protect the Jandakot borefield.

As a final comment, the Environmental Protection Authority recognises that there are significant pressures to develop land for urban purposes in the Metropolitan area, and the State Planning Commission has identified the area east of Thomsons Lake as an opportunity to relieve some of these pressures. However, as discussed above, the Environmental Protection Authority is concerned about the environmental risks associated with developing the eastern portion of this land and has recommended that residential development in that area does not proceed.

A working paper released in conjunction with the State Planning Commission's report, "Planning for the Future of the Perth Metropolitan Region", identified potential urban development areas in the metropolitan region. The working paper, which takes into account environmental constraints, suggests that there are substantial areas south of the Swan River which are relatively unconstrained for urban expansion. A figure from that report has been reproduced here to demonstrate this point (Figure 6).

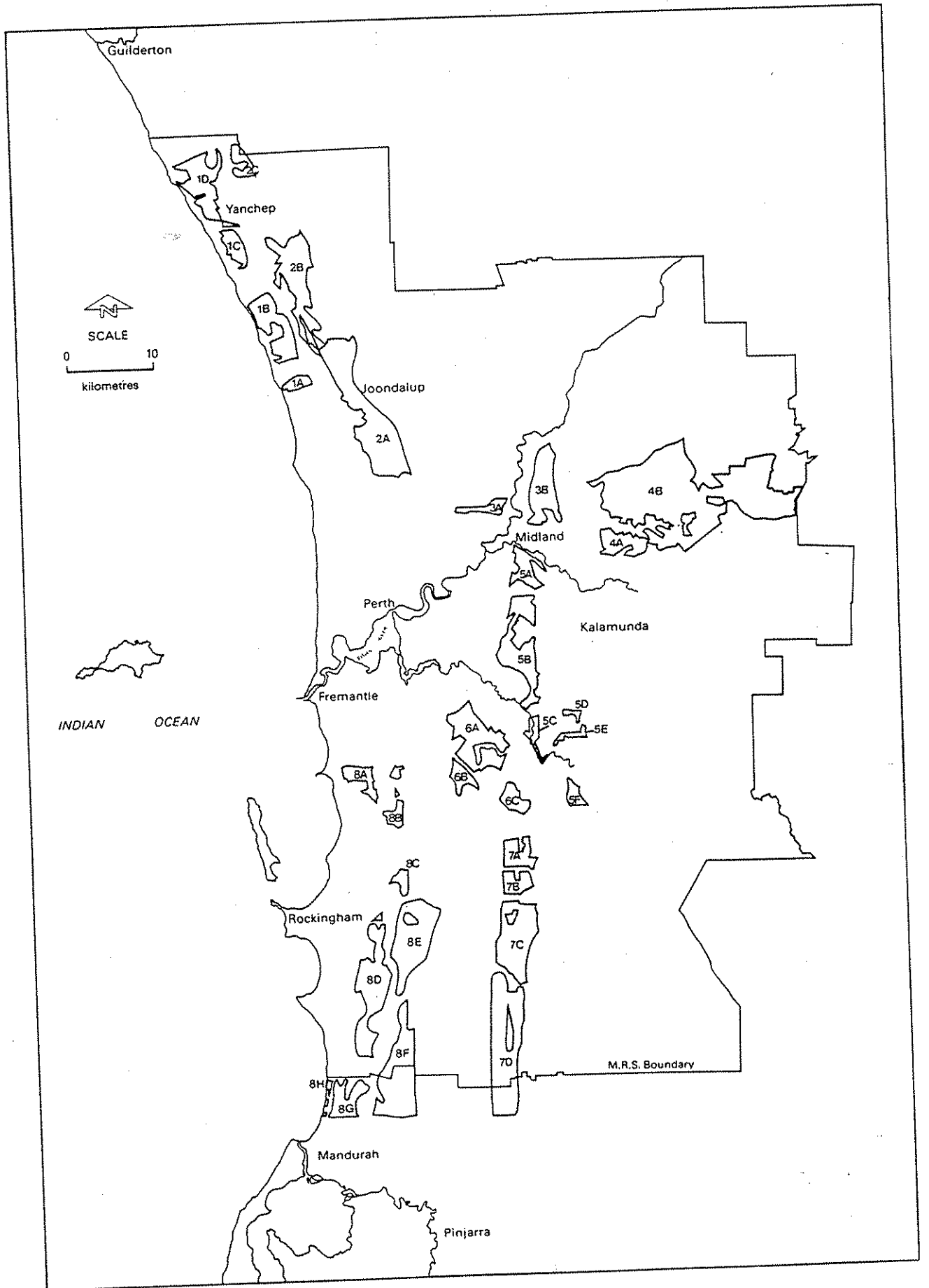


Figure 6. Areas Relatively Unconstrained for Urban Development.

It seems appropriate that land identified in the State Planning Commission's report as being relatively unconstrained for urban development be further investigated and acceptable areas proceeded with as a priority.

7. CONCLUSION

The Environmental Protection Authority has concluded that the proponent has not demonstrated that the drainage proposal for the residential development east of Thomsons Lake is acceptable. Accordingly, the Environmental Protection Authority has recommended the following:

RECOMMENDATION 1

The Environmental Protection Authority concludes that Ministerial Condition 2 for the urban development of the South Jandakot area east of Thomsons Lake has not been satisfied.

The Environmental Protection Authority believes that the major problems with the drainage proposal, in particular the potential impacts of drainage water on the environment, can be ascribed to the proposal to drain the eastern portion of the development area. Also, that portion of the development area is important for water conservation. Accordingly, the Environmental Protection Authority has made the following recommendations:

RECOMMENDATION 2

The Environmental Protection Authority recommends that Government does not allow residential development on the eastern one third of the development area that is difficult to develop and drain and within the main recharge area for the Jandakot groundwater mound.

RECOMMENDATION 3

The Environmental Protection Authority recommends that Government focuses residential development on the western one third of the development area that is elevated above the natural water table and is west of the main recharge area for the Jandakot groundwater mound.

RECOMMENDATION 4

The Environmental Protection Authority recommends that the Water Authority of WA, in consultation with the State Planning Commission and the Environmental Protection Authority, examines the central zone of the development area to achieve an acceptable balance between environmentally acceptable residential development and water resource protection.

RECOMMENDATION 5

The Environmental Protection Authority recommends that specific land use constraints be put in place to protect the Jandakot borefield.

8. REFERENCES

- Environmental Protection Authority (1987), "Thomsons Lake Urban Structure Study and South Jandakot Development Water Resources Management Plan, Report and Recommendations of the Environmental Protection Authority", Bulletin 277, Environmental Protection Authority, Western Australia.
- G B Hill & Partners Pty Ltd (1988), "Preliminary Proposal for the Drainage Management Plan for the South Jandakot Area and the Beeliar Compensating Channel", State Planning Commission, Perth, October 1988.
- Sinclair Knight & Partners Pty Ltd and G B Hill & Partners Pty Ltd (1987), "South Jandakot Water Resources Management Plan", Perth, 1987.
- Sinclair Knight & Partners Pty Ltd and G B Hill & Partners Pty Ltd (1989), "Response to the Technical Advisory Group's Report and Recommendations", Perth 1989.
- State Planning Commission (1986), "Thomsons Lake Urban Structure Study", Perth, Western Australia, October 1986.
- Technical Advisory Group (1989), "Drainage Management in South Jandakot and for the Beeliar Wetlands. Report to the Environmental Protection Authority by Technical Advisory Group", Bulletin 371, Environmental Protection Authority, March 1989.
- Wood and Grieve Pty Ltd (1988), "The Beeliar Compensating Channel and Drainage Management Plan for South Jandakot - An Independent Engineering Assessment", Wood and Grieve, December 1988.

APPENDIX 1
MINISTERIAL CONDITIONS



MINISTER FOR ENVIRONMENT

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

THOMSONS LAKE URBAN STRUCTURE STUDY AND SOUTH JANDAKOT DEVELOPMENT WATER RESERVES MANAGEMENT PLAN

STATE PLANNING COMMISSION

(as proponent for the rezoning under the Metropolitan Regional Scheme)

The proposed urban zoning and Parks and Recreation reservation as generally contained in the Thomson Lake Urban Structure Study Option 1 (Map 10) may be implemented, subject to the following conditions:

1. Prior to the initiation of rezoning and reservation proposals, the proponent shall outline, to the satisfaction of the Minister for Environment a proposal for a drainage management plan for the South Jandakot area, which shall establish a package of mechanisms (including monitoring) to control water levels:
 - (1) In the proposed urban areas, which is acceptable to the Water Authority of Western Australia.
 - (2) In the Thomson Lake open space area and other wetlands within the proposed Beeliar Regional Park, which is acceptable to the Environmental Protection Authority, Department of Conservation and Land Management and the Water Authority of Western Australia;

this outline of the proposal shall be made available to the public by the proponent, prior to the rezoning being advertised.

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Published on
27 OCT 1988

2. Finalisation of the proposed rezoning and reservation shall not occur, until the drainage management plan referred to in condition 1 has been prepared to the satisfaction of the Environmental Protection Authority, Water Authority of Western Australia and the Department of Conservation and Land Management.
3. Once the drainage management plan has been prepared and approved, it shall be progressively and adaptively implemented in parallel with each subdivision stage, including monitoring of the effects of each stage of the drainage management plan. This condition is intended to only require that part of the drainage management plan to be implemented which relates to the portion of land to be subdivided and not for the whole drainage plan to be constructed at once.

Where the Environmental Protection Authority believes that monitoring shows undesirable environmental impacts are occurring, further stages of the proposal shall not proceed, until changes to the drainage management plan, or development proposal are made to the satisfaction of the Environmental Protection Authority.

4. Prior to subdivisional approval being granted, reporting mechanisms (to the satisfaction of the Environmental Protection Authority, Department of Conservation and Land Management and the Water Authority of Western Australia) for monitoring of the drainage management plan shall be established. These should provide for reporting on the progress of the development, the functioning of the drainage plan and the impact on the wetland eco-systems. The reporting shall be as follows:

- . annual reports
- . detailed review of progress after three years, with decisions to be taken at that time on whether or not and under what conditions further subdivision can proceed.

These reports shall be submitted by the proponent (or any other agency which has accepted this responsibility) for review to:

- . Department of Conservation and Land Management
- . Water Authority of Western Australia
- . Environmental Protection Authority, and

with advice from these agencies forming the basis for adjustment or continuation of the drainage management plan.

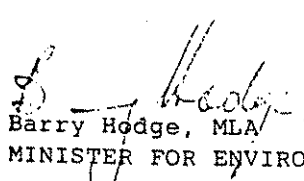
5. (1) Prior to the finalisation of urban rezoning amendments, the proponent shall provide commitments to the satisfaction of the Minister for Environment, for the reduction in hydrogen sulphide levels associated with the Water Treatment Plant of the Water Authority of Western Australia, to levels acceptable to the Environmental Protection Authority.

- 3 -

5. (2) Prior to subdivisional approvals being granted, the level of hydrogen sulphide emitted by the Water Treatment plant must be reduced to a level acceptable to the Environmental Protection Authority.
6. A buffer area, to the satisfaction of the Environmental Protection Authority (within which residential development shall not occur) shall be established around the existing Water Authority of Western Australia water treatment plant.

This buffer is required to ensure that:

- . no residential development occurs within the one in one million risk contour associated with chlorine use and storage at the plant;
 - . no residential development occurs in areas where levels of hydrogen sulphide associated with the plant are unacceptable to the Environmental Protection Authority for residential uses.
7. Monitoring of groundwater quality shall be undertaken within the groundwater control area by the Water Authority of Western Australia. If undesirable levels of pollution are detected the Environmental Protection Authority may impose conditions on future development in the area. If necessary, controls shall be imposed by the Water Authority of Western Australia on land use practices within the existing urban area.


Barry Hodge, MLA
MINISTER FOR ENVIRONMENT

26 03 1991

APPENDIX 2

SUMMARY OF ISSUES RAISED IN PUBLIC AND GOVERNMENT SUBMISSIONS

**SUMMARY OF PUBLIC SUBMISSIONS: DRAINAGE MANAGEMENT PLAN FOR THE SOUTH
JANDAKOT AREA AND THE BEELIAR COMPENSATING CHANNEL**

1. INADEQUACIES OF THE REPORT

Some government Departments believed the management plan was inadequate and seven submissions indicated the proposal was vague. For example the locations of the compensating basins are not shown on maps or discussed, may not work effectively and may therefore be unable to protect the Beelias wetlands.

The vagueness of the report made it difficult for the public and government authorities to comment on the proposal. Certain apparent inadequacies in the proposal including the following:

1. The Western Australian Water Authority is currently considering a different alignment of the sewerage line mentioned in the proposal.
2. Statements concerning urban drainage and increased groundwater extraction conflict.
3. There is an assumption that complete interception of the groundwater will occur.
4. There needs to be greater discussion of the long term expected impact of the development upon groundwater quality.
5. The separation between the channel and the groundwater requires further discussion.
6. More information is required about contaminants in water originating from urban development.
7. Further discussion about wetlands within the development is required. More information needs to be supplied about the impact of the proposal on Kogolup and Yangebup Lakes. More information also needs to be provided to show that the operation of the channel will not have detrimental effects on the hydrology of the proposed Beelias Regional Park.
8. A co-ordinated monitoring programme needs to be identified and started immediately. Funding of this scheme needs to be discussed.
9. Options for the management of waste water are not considered and water treatment methods may need to be adopted.
10. A catchment management committee needs to be set up.
11. More information needs to be provided about opportunities for local interest groups to advise on management of the channel and retention basins.
12. The scenario for the implementation of both sections of the channel proposal needs to be identified.

13. The impact and cost of post-development management need to be addressed.
14. More accurate details on the alignment of the channel are needed. Suggestions are made in the submissions that the alignment needs to be moved in some areas to avoid environmentally valuable areas, homes and factories. It was considered that consideration should be given to acquiring land rather than obtaining easements over land (page 8).
15. Clarification is required as to how the channel will assist in reducing the midge and mosquito problem.
16. There needs to be a clear indication that the drainage system will operate effectively in wet years.
17. More information needs to be provided about the impact of clearing on the proposal and surrounding areas.
18. Some submissions expressed the view that a full Environmental Review and Management Programme should have been prepared.

2. DRAINAGE SYSTEM

- 2.1 Six submissions considered that retention basins will be too small to filter all the nutrients from the drainage system so that water in these ponds and the channel will become enriched resulting in algal blooms, midge and mosquito plagues for surrounding suburbs. The large quantities of algae may result in odour problems and avian botulism and the ponds will be aesthetically offensive.
- 2.2 The opinion was expressed that the channel will be expensive to maintain. It may need to be sprayed with herbicide to keep it flowing due to Macrophyte invasion which would be time consuming and ecologically undesirable. The maintenance of the channel, its clay seal and weed control is not discussed in the report. The clay liners in the drain will eventually leak, it is believed, polluting the lakes. It was also considered that the drain would be unnecessary when the Jandakot Groundwater Scheme is in operation and that there are more appropriate engineering alternatives to the channel for example one submission suggested the use of red mud on land surfaces to absorb water.
- 2.3 The management plan should address the hydraulic and environmental functions of both the northern and southern sections of the proposed channel. According to one submission there is a lack of evidence that the channel will function hydraulically and that the quantities of water to be transported have been accurately assessed. Another submission suggested a drainage system with a greater carrying capacity is required and two others considered that the system may not be sufficient to prevent flooding of the urban development and flow rates in the channel may be underestimated. Concern is expressed about part of the drain near Bartrum Road being below the watertable for six months each year. This conflicts with claims that wetlands near Bartrum Road may be drained by this channel. These wetland were supposed to be protected as part of the Beelihar Regional Park.

- 2.4 One submission pointed out that the channel will limit access to the Beeliar Regional Park.
- 2.5 Concern is expressed about nutrients released into Cockburn Sound and one submission raised the question that the Woodman Point outlet may not have sufficient capacity to cope with the added volume from the Beeliar area. Another submission considered the proposal to divert water to limestone quarries in the Kwinana area, for use by industry, is not feasible.
- 2.6 It was considered that the drainage scheme should identify a suitable storage facility from which surplus water can be pumped at the limited discharge rate.
- 2.7 Two submissions pointed out that the ground water system does not appear to have been modelled. One submission expressed the view that the drainage scheme fails to address the cause of pollution in the northern Beeliar Lakes.
- 2.8 Concern was expressed that water received from the urban development to the east and the freeway may contain undesirable pesticides and heavy metals which will be distributed through out the wetland chain.

3. GROUNDWATER

- 3.1 It was stated in forty three submissions and 14 proforma letters that urban development over the Jandakot Mound is likely to pollute one of Perth's major groundwater resources and could make this unusable within the next 20 to 40 years. Dangers to the groundwater mentioned in one petition included contamination due to sewerage, pesticides and herbicides.
- 3.2 One submission was concerned at the increase abstraction of groundwater depleting the groundwater since the effect of several hundred more private bores on the water resource of the Jandakot Mound has not been assessed.
- 3.3 Eleven submissions and 13 proforma letters expressed the view that the loss of water from the urban supply due to discharge of 4.5 million cubic metres of water into the Beeliar Wetlands or Cockburn Sound was a waste of water when the resource is generally in short supply.

4. WETLANDS

- 4.1 Very little is known about the wetlands which will be affected by the drainage system. A full study to determine the current state of wetland conservation, flora and fauna and wetland types needs to be carried out.
- 4.2 Separate management plans for each lake was suggested in one submission. The proposal will not allow for drying out of lakes, Thomsons Lake should be allowed to dry out on an annual basis to encourage small migratory and local waders. Western Australia is bound by an international agreement to protect migratory birds, many of whom use mud flats for feeding and their habitat. Also water levels in the lakes should be seasonally adjusted to enable drying out from time to time so animals such as Chelodina oblonga

can reproduce and to ensure the survival of invertebrates. Occasional or seasonal drying out of wetlands is advantageous in reducing nutrient levels and reducing the potential for algal blooms.

- 4.3 No detailed ecological evaluation of the consequences of drainage diversion into the Beeliar wetlands has been carried out and yet four of the wetlands North, Bibra, Yangebup and Thomsons Lakes are ranked by the Royal Australian Ornithologists Union as among the forty most important wetlands in the south-west of the State.
- 4.4 Sixteen submissions stated that the drainage system would destroy or damage important wetlands. The channel would deposit urban stormwater into the Beeliar wetlands possibly causing botulism, algal blooms, midge and mosquito plagues and flooding of the fringing vegetation (389 proforma letters and 14 submissions).
- 4.5 Urban stormwater contains high concentrations of fertilizers, petroleum products and heavy metals especially lead. Lake Kogalup is one of the most pristine lakes of the Beeliar chain and should not be used for wastewater storage. Lake Yangebup does not have the capacity to accept further waste water. Polluted water should not be exported to Lake Kogalup from North, Bibra, South and Little Rush Lakes. The pollution problem at the northern lakes should be solved locally (389 proforma letters and 18 submissions). There are no proposals to improve the quality of North Lake, Bibra Lake and Yangebup Lake.
- 4.6 Lake Yangebup is now 3 metres from the Yangebup Road due to rising water levels. It is believed this will create a dangerous possibility of pollution of the lake by toxic chemicals if a vehicle containing toxic chemicals overturns at this location.
- 4.7 The hydrology of the wetlands will be altered and the proposal does not adequately address this issue.
- 4.8 The proposed sewer route around Thomsons Lake is of concern due to the clearing of vegetation required and the possibility of leakage of sewerage as was experienced recently at North Lake.
- 4.9 The report does not mention criteria made for Thomsons Lake by the Department of Conservation and Land Management.

5. FLORA AND FAUNDA

- 5.1 The proposed Beeliar Regional Park will be damaged by the construction of the sewer and drainage system which will service the development (14 proforma letters and 19 submissions). The effectiveness of the proposed Beeliar Park as a conservation area will be jeopardized by the proposed channel. Three submissions mentioned that the use of a proposed Regional Park to service drainage and sewerage problems of an urban development appeared unethical and unnecessary.
- 5.2 The drainage of the estate will lower the watertable and threaten the survival of the wetlands and banksia woodlands which cover the Jandakot mound (22 submissions, 27 proforma letters) including the Harry Waring Marsupial Reserve.

- 5.3 The proposed drain will damage native vegetation around several lakes in the Beeliar Wetlands. This will increase the midge problem, increase insecticide use to control them and degrade wildlife refuges (389 proforma letters and 14 submissions).
- 5.4 The fence and canal will interfere with movements of wildlife restricting feeding and breeding ranges.
- 5.5 Clearing for the channel and sewer line will reduce the number of large trees used for bird nesting and destroy vegetation. Rehabilitation of the sewerage easement will be slow and will result in vegetation which is not as natural as the vegetation it replaced. Rehabilitation should be to the satisfaction of the Department of Conservation and Land Management with advice from the Beeliar Regional Park Consultative Committee. An alternative route for the sewer line to Thomsons Lake Estate is available through jarrah woodland to the west of Lake Kogalup which has been recently constructed.
- 5.6 Not all of the species of wetland flora found in the area are found in conservation reserves and they may be lost if the development goes ahead.

Overall, the proposal will result in the loss of diversity amongst wetlands of the Beeliar Region. Domestic animals may become more of a problem in reserved areas. The movement of water may enhance the spread of dieback.

- 5.7 The lowering of the water table will destroy several important ephemeral wetlands, including Twin Bartrum Swamps, a breeding site for the rare Freckled Duck. Some of these wetlands contain invertebrate fauna no longer found in the Beeliar Lakes.

6. OTHER ISSUES

- 6.1 The opinion was expressed that the drainage system should be built on the developers own land rather than on public land intended for conservation and recreation. It was felt the channel should be financed by the developer (389 proforma letters and 5 submissions).
- 6.2 Private land owners and horse riding activities will be disrupted by the building of the channel and flooding of private land may still occur in wet years. Compensation of private land owners has not been considered.
- 6.3 One submission stated that such developments, as the drainage system, reduce the beauty of Perth and the quality of life.
- 6.4 One submission stated that the proponent is in breach of procedure in so far as re-zoning has been initiated before the EPA is satisfied its conditions have been met.
- 6.5 The proposed drain was considered to be a safety hazard for children (111 proforma letters and 4 submissions.)
- 6.6 One submission stated that a comprehensive survey of aboriginal sites in the area has not been carried out and there are aboriginal sites registered with the Western Australian Museum which may be affected by the proposed drainage plan.

APPENDIX 3

WATER AUTHORITY OF WA AND THE DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
ADVICE TO THE ENVIRONMENTAL PROTECTION AUTHORITY

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

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Your Ref:
Our Ref: O.1.3 (376)
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APPENDIX 3

Chairman
Environmental Protection Authority
1 Mount Street
PERTH WA 6000

ATTENTION: Ms M Andrews

DRAINAGE MANAGEMENT PLAN
URBAN SUBDIVISION - EAST OF THOMSONS LAKE

In response to your request concerning the Ministerial Condition N° 2 for the future urban zoning of the South Jandakot area (27 October 1988) it is the opinion of this Department that no cohesive document that could be considered a drainage management plan has been presented.

The Department had major concerns over the South Jandakot Development Water Resources Management Plan. The latest document 'Preliminary Proposal For The Drainage Management Plan For The South Jandakot Area And The Beelihar Compensating Channel' is viewed as being, as it states, preliminary. This was indicated in our submission to your Authority.

Syd Shea

Syd Shea
EXECUTIVE DIRECTOR

per *A. Haswell*

23 February 1989



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DRAINAGE MANAGEMENT PLAN FOR THE SOUTH JANDAKOT AREA

On October 31, 1988 you wrote to the Water Authority inviting comment on the preliminary proposal for the drainage management plan for the South Jandakot area and the Beelihar Compensating Channel. The Water Authority's concerns were outlined in its written reply of December 21, 1988.

This Authority is aware that since it responded a technical advisory group has been evaluating the proposals and it has assisted the group with information. Although parts of the proposal are now clearer, the Water Authority still believes that the documentation presented to date does not constitute an adequate South Jandakot drainage management plan for the area and the Beelihar Compensating Channel.

Therefore, the Water Authority advises that further to its earlier letter, condition 2 of the Minister for the Environment's October 27, 1988 "Statement that a Proposal may be Implemented" for Thomson's Lake Urban Structure Study still has not been fulfilled to the Water Authority's satisfaction.

Yours faithfully


for MANAGING DIRECTOR

February 22 1989

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APPENDIX 4

TECHNICAL ADVISORY GROUP'S REPORT - SUMMARY AND RECOMMENDATIONS

SUMMARY AND RECOMMENDATIONS OF THE TECHNICAL ADVISORY GROUP

i SUMMARY AND RECOMMENDATIONS

The Technical Advisory Group (TAG) was convened by the Environmental Protection Authority (EPA) in December 1988 to provide advice on the drainage management plan submitted by the State Planning Commission (SPC) for urban development in South Jandakot. The drainage management plan related to a proposed Metropolitan Region Scheme (MRS) Amendment which would rezone an area east of Thomsons Lake from Rural to Urban, and it outlined drainage mechanisms intended to protect wetlands within the Beeliar Regional Park. The terms of reference for the TAG were to examine the drainage management plan and to advise on:

- . the capability of the plan to protect the Beeliar wetlands; and
- . the availability of options to use and dispose of the drainage waters.

As a consequence of consideration of information obtained from published documentation, expert briefings, a field inspection and crude models of nutrient and water flow, the TAG advises the EPA that, while the concept of the Beeliar Compensating Channel has some merit, the drainage management plan in its present form does not demonstrate that the Beeliar wetlands would be adequately protected. That is, the TAG does not believe that the Ministerial Conditions applying to the proposed MRS rezoning have yet been met.

The TAG believes however, there is a very urgent need to remove the excessive water now accumulating in the Beeliar wetland chain as a consequence of urbanisation. There is a need for active management of these wetlands to improve the quality and quantity of water in them. Some method to conduct the water away from the wetlands is required.

There is a need to develop an overall drainage management plan for the catchments that drain into the Beeliar wetlands. The TAG believes that the Water Authority of WA (WA of WA) should exercise its statutory responsibilities for this task and immediately undertake active water management in the area.

In order for the proposed MRS Amendment rezoning and drainage management plans to be set in proper context, the TAG believes that a land use and water resource management strategy should be developed for the Jandakot groundwater mound by the SPC, the Department of Conservation and Land Management (CALM) and the WA of WA with advice from EPA. The strategy should identify areas suitable for development, conservation and groundwater protection.

The TAG believes that, should urban development proceed in the area proposed, then it should proceed on a catchment by catchment basis, commencing with the area of high depth-to-water-table based on the Hird Road wetland catchment, and using best design principles and incorporating facilities to control nutrients.

Insufficient information and time were available to examine the options for use and disposal of drainage waters.

It is important that the efforts of the TAG are sustained to achieve resolution of the issues raised as quickly as possible.

The TAG has made specific recommendations relating to specific components of the issue of drainage in the Beeliar wetlands and South Jandakot area. Our recommendations are:

SUMMARY AND RECOMMENDATIONS OF THE TECHNICAL ADVISORY
GROUP (Cont'd)

RECOMMENDATION ONE

The TAG recommends that the Environmental Protection Authority request the Water Authority of WA undertake active management of water quantity and quality in the North Lake to Yangebup Lake area, both for the protection of these wetlands and to avoid flooding.

RECOMMENDATION TWO

The TAG recommends that the Environmental Protection Authority request the Beeliar Regional Park Consultative Committee to advise on criteria for the protection of the wetlands of the Beeliar Regional Park as a matter of priority. Until alternatives are available the TAG recommends that the criteria presented in this report are used.

RECOMMENDATION THREE

In view of the high conservation value of Kogolup Lake, the TAG recommends that it should not be used as a storage basin.

RECOMMENDATION FOUR

The TAG advises the Environmental Protection Authority to request a specific study on Lake Yangebup, preferably in conjunction with the Department of Conservation and Land Management and the Cockburn City Council. The study should develop a plan of action to overcome the water quality and quantity problems currently present in this Lake.

RECOMMENDATION FIVE

The TAG advises the Environmental Protection Authority that before the rezoning and drainage plans are finalised there should be a land use and water resource management strategy (integrated catchment management plan) developed for the Jandakot groundwater mound by the State Planning Commission, Department of Conservation and Land Management & Water Authority of Western Australia with advice from the Environmental Protection Authority. This strategy need not go into detail initially, but should aim at identifying areas immediately suitable for residential development, conservation and groundwater protection.

RECOMMENDATION SIX

The TAG recommends that the Environmental Protection Authority request the Water Authority of Western Australia to exercise its statutory responsibilities for water resource management and arterial drainage, to take over the development of the drainage management plan for both the South Jandakot area and the Beeliar wetlands. Furthermore, the costs of preparing the plan, carrying out monitoring and assessment, catering for any special environmental provisions and the implementation of the plan, should be incorporated in a special headworks contribution levy payable before any subdivision development is approved.

SUMMARY AND RECOMMENDATIONS OF THE TECHNICAL ADVISORY
GROUP (Cont'd)

RECOMMENDATION SEVEN

The TAG recommends that the Environmental Protection Authority request the Main Roads Department to provide design details of the drainage systems to control runoff from the Kwinana Freeway extension over the Jandakot groundwater mound. It is important that the design of the Freeway drains is compatible with the arterial drainage system and management strategy, particularly for the containment of any accidental spillages or situations hazardous to groundwater.

RECOMMENDATION EIGHT

The TAG advises the Environmental Protection Authority that it believes that the Ministerial conditions applying to the proposed Metropolitan Region Scheme Amendment for rezoning the South Jandakot area have not yet been met.

RECOMMENDATION NINE

The TAG recommends that the Beeliam Compensating Channel as proposed should not be approved, but that alternative piped and open drainage systems need to be investigated to regulate water quantity and quality in the Beeliam wetlands.

RECOMMENDATION 10

The TAG recommends to the EPA that should urban development proceed prior to the finalisation of an Environmental Protection Policy, then:

- it should proceed on a catchment by catchment basis commencing with the area of high depth-to-water-table based on the Hird Road wetland catchment as illustrated in Figures 8 and 9;
- the best design principles for groundwater protection should be incorporated (see Appendix 3);
- the developer, in consultation with the Environmental Protection Authority and the State Planning Commission, should install facilities to prevent, treat, remove or otherwise contain nutrients within the urban area;
- the sale of lots should not proceed until a drainage mechanism from the estate is in place, and until a pump station has been installed to remove excess water; and
- the development and drainage from it should be monitored and extension of the urban rezoning should be conditional on successfully demonstrating that criteria with respect to drainage can be achieved on an ongoing basis.

APPENDIX 5

PROPONENT'S RESPONSE TO TECHNICAL ADVISORY GROUP REPORT - SUMMARY

PROPONENT'S RESPONSE TO TECHNICAL ADVISORY GROUP REPORT - SUMMARY

SUMMARY

The Technical Advisory Group was commissioned to examine the drainage management plan and to advise on:

- . the capability of the plan to protect the Beeliar wetlands,
and
- . the availability of options to use and dispose of the drainage waters.

The TAG report concludes that the drainage management plan in its present form does not demonstrate that the Beeliar wetlands would be adequately protected and that therefore the Ministerial conditions applying to the proposed MRS rezoning have not been met.

It is our opinion that the TAG report does not justify these conclusions and that in fact it has made misleading and incorrect statements in several critical areas. We also consider it has not justified its recommendations that the Beeliar Channel as proposed should not be approved, or that development could proceed only on a catchment by catchment basis.

Particular errors have occurred in the group's discussion of expected nutrient loadings and water storage requirements in Yangebup Lake, both of which have been excessively overestimated. Others are discussed in this response.

Many statements made in the TAG report indicate that the group has overlooked or ignored a large amount of the work done by the developers and government agencies over the last two years, particularly in relation to overall management and development strategies for the area. It has also failed to acknowledge the heavy emphasis on monitoring of water quality and quantity and responsive management included in the water management strategy.

Many of the report's recommendations are consistent with the proposed strategy and we acknowledge the usefulness of its suggestions. This response sets out reasons for not agreeing with its negative conclusions. Even though most of the issues have been dealt with previously in other reports or meetings this response goes into some detail for completeness.

It is our considered opinion that the proposed water management strategy does meet the Ministerial conditions for rezoning and that nothing in the TAG report justifies any further delay in proceeding with rezoning.

The TAG report recognises that most of the wetlands within the proposed Beeliar Regional Park are already severely degraded and in urgent need of management. Urbanisation will impact on these wetlands. However with the management strategies outlined in this report it is considered that these impacts will improve the condition of the Beeliar wetlands.