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HERDSMAN PARK ESTATE

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Environmental Review and Management Programme

Report and Recommendations
by the
Environmental Protection Authority



Department of Conservation and Environment

Bulletin 111

March 1982



**ENVIRONMENTAL PROTECTION
AUTHORITY**

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HON MINISTER FOR CONSERVATION
AND THE ENVIRONMENT

Your Ref.

Our Ref. 147/73

My Dear Minister

The Environmental Review and Management Programme prepared by the Cooper/Jennings Joint Venture has been considered by the Environmental Protection Authority following submissions by the public and Government departments.

Please find attached the Authority's report and advice (Bulletin 111). You will note that the Authority has identified water quality as the major concern to emerge from the environmental assessment and advises its intention to set up a Technical Committee to evaluate the significance of the perceived problems, to examine research and monitoring data and to recommend on long-term management of pollutants.

I would appreciate it if you would refer the report to the Hon Minister for Urban Development and Town Planning. A letter of transmittal is attached for your consideration. I also seek your concurrence for publication of the report as Department of Conservation and Environment Bulletin No 111.

Yours sincerely


A R MAIN
CHAIRMAN

17 March 1982

HERDSMAN PARK ESTATE

Environmental Review and Management Programme

Report and Recommendations

by the

ENVIRONMENTAL PROTECTION AUTHORITY

*Department of Conservation & Environment
Perth, Western Australia
Bulletin 111,
March 1982*

CONCLUSION

The Environmental Protection Authority identified a number of environmental issues in its evaluation of the Herdsman Park Estate project. These included long term management of the open space, ongoing security of the central wetland area, noise and other nuisances during the development period and road design and construction. However the most serious issue to be identified relates to water quality.

The results of sampling carried out in December 1981 and made available to the Authority indicate that incoming waters from drains are polluted in summer by high levels of nitrogen and phosphorus. A water sample from a drain located centrally within the project area also showed high levels of zinc, lead and chromium.

On the best advice available to it the Authority has concluded that, because of the nature of the catchment and the important drainage function of the lake basin, polluted waters will continue to enter the basin. However, the volume of water and the pollutant loadings entering the lake, and being held or discharged at different times of the year, are not known.

The Environmental Review and Management Programme has suggested that water quality will not be a problem, nevertheless it commits the Proponent to monitoring incoming and lakes water quality.

The man-made lakes to be developed as a consequence of the development should, because of their functions – aesthetics, conservation of water birds and protection of the central wetland – have a high level of water quality.

The Authority believes that the Metropolitan Region Planning Authority, or other body accepting the role of ongoing management, must be provided with the best available information and infrastructure to enable it to maintain suitably high water quality in the lake basin in the long term.

The Authority recommends that the project could proceed if at the same time the problem is clarified and suitable management techniques are developed to ensure that the aim of high quality water is ensured.

SUMMARY OF ADVICE

The use of drainage waters to supply bodies of open water, channels and wetlands, as called for in the Concept Plan, would be an excellent way of making the drainage function subservient to wider management objectives if the risks could be overcome. Central to the assessment of this project is a recognition of the risks and identification of ways to remove or overcome them. Assessment of the project has been made difficult by the lack of baseline data about the Lake and its hydrology which would permit risk assessment and firm management proposals to be made.

In the absence of an understanding of the hydrology and pollutant loadings of the Lake and its catchment, drainage design should be directed towards by-passing the man-made water bodies with all drainage waters, unless they can be shown to be of a quality satisfactory to protect beneficial uses directed towards protection of the biota and aesthetic values.

In the absence of information about the effectiveness of alternative methods, the option of by-passing the man-made water bodies by discharging stormwater from the proposed industrial estate directly into the main drain system should be taken.

Town Planning Scheme No. 30 should be amended to incorporate provisions relating to control, through Council by-laws, of industrial leakage into the drainage system or Herdsman Lake. Further, efforts should be made, through planning initiatives, to site noisy and offensive trades away from the Parks and Recreation Reserve.

There is need for further consideration of implications of depth and extent of water bodies.

As a condition of the Project proceeding, a study of the hydrology of the catchment and the Lake basin should be undertaken.

Such a study should be designed with expert advice, and its results should be used as a basis for future management.

The EPA does not accept the suggestion that it should fund a component of the research and monitoring programme following the first year of intensive data collection. It recognizes, however, that matters related to drainage management and water quality control are of more general concern and could become the subject of wider study.

The Proponents should fund the Research and Monitoring Programme to the level agreed with the MRPA.

The Research and Monitoring Programme should be modified to enlarge upon or add areas identified by expert advice as necessary for a proper understanding of the wetland and its inputs.

Expert advice should come from a Technical Committee to be set up by the Authority. The central functions of the Technical Committee would be to evaluate the significance of the perceived problems, to examine research and monitoring data and recommend on long-term management of pollutants.

Provisions of the Agreement between the Proponent and the MRPA on matters of joint supervision, arbitration in the event of dispute and handover to the MRPA subject to compliance with development conditions, are endorsed as providing management control over the development phase.

Recognition must be given to the complexity of the management effort required and the need for appropriate monitoring and control of water quality.

The EPA would endorse co-ordination of existing funding in an integrated management programme.

Should this project proceed, further excavations on the lake should be limited to those required to complete the moat system around the periphery. No further excavation on the central wetland area should be countenanced unless research shows it to be necessary for habitat management for broad conservation ends, or for drainage control. In the special case of Herdsman Lake, conservation and open space values should be seen to outweigh the value of the relatively small mineral resource.

To avoid future pegging for minerals, the Lake and its environs should be declared a Ministerial Temporary Reserve under the Mining Act.

The Proponent should fulfil its undertaking to determine the prevailing noise climate of adjoining residential areas prior to commencement of the project.

The Proponent should comply fully with provisions of Noise Abatement legislation, and take appropriate corrective action if monitoring shows noise levels to be excessive.

The Proponent should fulfil its responsibilities under the Clean Air Act.

Should 'inorganic rubble' be used for fill in the Project Area, it should comply strictly with the description and be free of material with a potential to pollute the wetland or to provide an unsuitable base for the development.

The important regional road planned for construction as part of this development and the free-way proposed for the north-eastern margin of the Lake could be most obtrusive elements in the landscape. Efforts should be made to reduce the obtrusiveness of the roads to the Parks and Recreation Reserve and adjoining residential areas.

The Authority recognizes the problems in providing a blueprint for a development of this kind and acknowledges that stepwise detailed planning based on a concept is a satisfactory way to proceed. This procedure has the added benefit of allowing environmental data to be taken into account in the design process as it comes to hand in the monitoring programme.

The Authority is in agreement with the MRPA view that at this stage the framework of the open space design should be established rather than a finished project, which subsequently may need to be modified.

The Proponent should place a high priority on its commitment to involve educational and community groups and should undertake to keep the public informed on the progress of the landscaping of the open space.

CONTENTS

Page

FRONTISPIECE	
CONCLUSIONS AND SUMMARY OF ADVICE	vii
INTRODUCTION	
The Project	1
Planning for Herdsman Lake	1
Approaches towards achieving appropriate land use	1
EXISTING ENVIRONMENT	2
THE PROJECT	
Scope of the ERMP	3
Need for Industrial Land in the Area and Factors affecting its Development	3
Mining Claims	4
The Proposal and the MRPA Concept	4
Safeguards and Monitoring	4
Management of the Completed Open Space	5
ENVIRONMENTAL ASSESSMENT	
Submission on the ERMP	5
Adequacy of the ERMP	5
Identification of Significant Issues	5
Water Quality, Drainage and Wetlands	6
Reasons for Concern about Water Quality	6
The Proponent's Responsibility	7
Herdsman Lake in the Urban Drainage System	7
MRPA Urban Runoff Stormwater Discharge Policy	7
Drainage Design	8
Drainage from the Catchment as a Whole	8
Drainage from the Proposed Industrial Land	8
Deep and Shallow Lakes	9
Monitoring and Research	10
Design of the Monitoring and Research Programme	10
The Proponent's Commitment to the Monitoring and Research Programme	11
Control of Development and On-Going Management	11
Development Agreement	12
Ongoing Management	12
Ongoing Security of the Central Wetland	13
Mining Claims	13
Future Activities in the Central Area	13
Potential Nuisance Generated by the Project	14
Noise	14
Dust and Odour	15
Road Construction and Design	15
Open Space Design	15
The Design as a Concept	15
'Blue print' Versus Progressive Planning	16
Workable Framework Versus Finished Product	16
Public Involvement	16
REFERENCES	18
APPENDICES	
Appendix 1 Herdsman Lake: Mineral Tenement Situation	20
Appendix 2 Submission of the Metropolitan Region Planning Authority	22
Appendix 3 Summary of Submissions from other Government Institutions	26
Appendix 4 Summary of Submission from the City of Stirling	28
Appendix 5 Summary of Submissions from Groups and Individuals	30

INTRODUCTION

THE PROJECT

A development is proposed for the north-east sector of Herdsman Lake which would involve the disposal of peat from adjacent industrial land to Crown land reserved for Parks and Recreation, followed by filling of the industrial land with sand dredged from the Crown land. The development would also involve building portion of an important regional road and progressively landscaping the Crown lands. The total project would take three years to complete. Following site preparation, the industrial land would be progressively available for development, and the landscaped Crown lands would be handed over to the MRPA on fulfillment of all development conditions. The Proponents have presented an Environmental Review and Management Programme which concentrates on the aspects of the project affecting Crown lands and land owned by MRPA.

PLANNING FOR HERDSMAN LAKE

Future use of the Lake was the subject of public debate in 1975 when the Metropolitan Region Planning Authority studied the area and produced a concept plan for its development. Following a public review period, the original concept plan was modified to take into account views expressed and to accommodate various community needs. The objectives of the revised Concept Plan were:

to maintain a flood plain and at the same time create a parkland and provide for roads, with a minimum amount of upheaval to the natural environment so as to cater for the needs of drainage, conservation, education and community leisure.¹

The amended Concept Plan was approved by the MRPA in March 1976 as a guide for future development of Herdsman Lake. It has been endorsed by a number of interested bodies, including the EPA and some of the conservation groups.

APPROACHES TOWARDS ACHIEVING APPROPRIATE LAND-USE

Since the approval of the Concept Plan, Herdsman Lake has continued to be a focus of controversy. The Lake basin is reserved for Parks and Recreation, but there is as yet no clear-cut resolution of the question of appropriate management. Issues and activities that have led to public debate include:

- Applications for mining claims on the Lake basin and the conditional granting of two claims to Mallina Holdings* in 1979.
- Excavation of privately-owned land on the south-western sector to provide fill for the **Floreat Waters** housing development and landscaping of the excavation as a permanent lagoon. The resulting lagoon and parkland have now been handed to the MRPA as a condition of subdivision.
- An excavation on the southern side to provide fill for Rental Investments land adjoining **Floreat Waters** and its landscaping as a continuation of the **Floreat Waters** lagoon.
- The decision to establish a study centre as a World Wildlife Fund Project.
- What is perceived by people interested in the conservation values of the Lake as a failure of the appropriate bodies to fund research on the ecology of the Lake as recommended in the Concept Plan (recommendation vi)¹.

* The EPA, after reviewing an exploration programme submitted by the proponents, and considering the applications in the light of the MRPA Concept Plan for Herdsman Lake, recommended that the Mineral Claims be approved under certain conditions including exploration being carried out in accordance with the submitted programme, no developmental or productive mining being carried out without the holders of the tenements supplying the Minister for Mines with an ERMP or until the EPA has considered the ERMP and made recommendations to the Minister for Mines.

While the debate continues without resolution of the issues or implementation of a management programme, the Lake continues to be subject to potentially degrading influences such as, for example:

- summer wildfire in the reed beds, seen to be a threat to the bird habitat²;
- continued inputs of drainage waters which could convey pollutants.

The abundant reed growth in the Lake basin has probably served to minimise the impact of drainage waters, due to the capacity of emergent plants and their associated biota to utilise nutrients and to modify water quality.

The complexities that have grown up and the polarisation of opinion have increasingly clouded the issues and led to a degree of distrust between interested parties. However, there appears to be a wide acceptance of the potential of Herdsman Lake as a resource for recreation and education as well as a bird habitat. At present, the Lake does not achieve this potential.

The MRPA Concept Plan has great importance because it suggests a way to achieve a balance between the various demands. Implementation of the Plan is, however, a large project, and there appears to be little chance of doing so unless as part of a commercial enterprise.

The question that must be considered here is whether the present proposal is a satisfactory way of advancing the Concept Plan, given the environmental constraints imposed by prior and existing land-uses in the catchment, the need to protect a valuable conservation area and the future costs of management.

EXISTING ENVIRONMENT

The part of Herdsman Lake affected by the proposal includes roughly one-third of the Parks and Recreation area reserved under the Metropolitan Region Scheme. It is important, however, to consider the existing environment of the Lake basin as a whole rather than that of the Project Area in isolation. Impacts of development on the north-eastern sector would be felt throughout the Lake basin and would shape decisions on future uses and management. It is also necessary to place the Lake in its urban setting and to recognise prior land-use in its hinterland as an important environmental factor.

Before it was drained in the 1920's, Herdsman Lake was said to be under water for most of the year, drying to a wet and puggy condition as summer advanced. It carried a thick growth of emergent plants and was fringed by a timber association of paperbark and flood gum³.

At present, the Lake is a closed reed swamp subject to seasonal inundation, intersected with drains which contain water throughout the year. Remnant stands of *Melaleuca raphiophylla* and *Eucalyptus rudis* remain, particularly on the northern and western margins. Some areas on the west and north of the Lake continue to be used for market gardens or for grazing.

In its undisturbed state, the Lake, as a surface expression of the water table near the southern extremity of the Gngara Mound, would have had a considerable inflow of groundwater along its northern and north-eastern margins. The distribution of different types of peat (as described by Teakle and Southern³) is no doubt determined by hydrological factors. The water levels in the Lake would have risen gradually during winter as the underlying aquifer became recharged, and have fallen gradually during summer as water was lost by evapotranspiration. Surface runoff would not have been a significant water source.

Now, in contrast, the Lake functions as a compensating basin for drainage waters, receiving flows from both main and local drains. Outflow from the Lake is towards the ocean through a drain on the western side. The catchment for the drains includes the suburbs of Osborne Park, Balcatta, Stirling, Woodlands and Wembley. Both maximum and minimum levels within the Lake are controlled by the MWSS & DB.

Land-uses in the catchment include residential, commercial and industrial, sanitary land-fill, horticulture and market gardening. It would be expected that loadings of nutrients and heavy metals in drainage waters from areas supporting these activities would be high and the small amount of data available bears this expectation out.

On the other hand, the Lake basin in its existing state appears to be coping with the drainage inputs without overt symptoms of pollution. Algal blooms may occur in the drains but are short-lived, the dense emergent vegetation appears healthy and the Lake is known to be a rich bird habitat.

A large number of bird species has been observed on the Lake, including both breeding populations and those using the Lake at other stages of their seasonal cycle. Several species of transequatorial waders protected under the terms of the Japan Australian Agreement⁴ and species such as bitterns, crakes and rails, rare elsewhere, are recorded at the Lake. The recent decision to develop the World Wildlife Fund Study Centre at the southern end of the Lake reflects the importance of the Lake as a bird habitat.

According to Curry, 'the diversity of wetland species presently occurring at Herdsman is not known to be surpassed by any other body of freshwater in the south-west'.² The Royal Australasian Ornithologists Union has pointed out that the value of the habitat lies in its ability to support species rare elsewhere, e.g. a breeding population of Little Bitterns, and Long-toed Stints.

Largely through the efforts of amateur naturalists and through the work of Curry, the avifauna of the area is quite well-known. While lists of species making up the remainder of the biota have been compiled, there is, unfortunately, little information about the inter-relationships which go to make up the food web of the Lake.

The existing environment of Herdsman Lake has been shaped in no small way by human intervention. Further intervention directed towards implementing the Concept Plan should be based on an understanding of important aspects of the environment. These include:

- **The hydrology:** sources and volumes of water entering the Lake; flow patterns through the Lake; the relationship of the Lake to the underlying aquifer.
- **Water chemistry:** the quality of the water entering the Lake from various sources; seasonal and short-term changes in quality, relationships between water and sediments; effects of the vegetation on water quality.
- **The sediments:** as substrates for plant growth, as modifiers of water quality; effects of altered water regimes on their characteristics.
- **The role of the emergent vegetation:** as a modifier of water quality and as habitat.
- **The food web.**
- **The capacity of the lake system to accommodate changes** to one or more elements of the environment, e.g., water input, water quality, reduced area of plant cover, changes in flow patterns.

THE PROJECT

SCOPE OF THE ERMP

The Environmental Review and Management Programme provided by the Joint Venture, Cooper/Jennings, is sub-titled: *Proposal for Industrial Land Development under Town Planning Scheme No. 30*. The object of the proposal is to develop land zoned for industrial purposes under the Metropolitan Region Scheme and City of Stirling Town Planning Scheme No. 30 and owned by various bodies including the Industrial Lands Development Authority (ILDA) and Telecom. However, the greater part of the document relates to the impact and implications of the proposed development upon the adjoining land, owned by the Crown and the MRPA and reserved for Parks and Recreation.

NEED FOR INDUSTRIAL LAND IN THE AREA AND FACTORS AFFECTING ITS DEVELOPMENT

A need for additional industrial land in Osborne Park has been established by ILDA and the City of Stirling. In its present state, the land zoned for this purpose is unsuitable for development because it is covered by a layer of peat and because it is too low-lying. The central issue in the development of land affected by TPS No. 30 is the need:

- to dispose of about one million cubic metres of peat from the industrial land; and
- to acquire and place about 1.5 million cubic metres of sand fill onto it.

Earlier plans to develop the land using fill obtained from elsewhere have been judged to be uneconomic. The present Proponent contends that by using the adjoining Parks and Recreation Reserve, both as a site to dispose of the peat and a source of sand fill, economic development can be achieved, using techniques perfected during other dredging projects on Herdsman Lake (Floreat Waters, Rental Investments and the World Wildlife Fund Study Centre Lake).

MINING CLAIMS (see Appendix 1)

The project area includes sections of mining claims currently held by Mallina Holdings for diatomaceous earth, peat, glass sand and silica sand. The claims were granted subject to conditions, including the provision that approval for mining on the Lake would be subject to production of an ERMP. The holders of the mining claims have explored their claims, but no decision whether or not to exploit resources appears to have been taken. The proposed excavations on the mineral claims by Cooper/Jennings would be made under a royalty agreement with the holders of the claims.

Much of the remainder of the project area is the subject of a mining claim by Herdsman Nominees currently before the Mining Warden. While DCE raised no objections to the application because of the stance of the EPA to Mallina Holdings' earlier application, other bodies including the MRPA and the Conservation Council have opposed granting of the claim. As the proposal under consideration in this case involves filling of much of the subject land, and as the proponents would purchase the rights to Herdsman Nominees should they gain approval for the project, the claim appears to be a 'holding operation' rather than a genuine intent to explore and mine.

THE PROPOSAL AND THE MRPA CONCEPT PLAN

The proposal has reached its present status as a result of negotiations between the proponents and the MRPA. Negotiating points have been:

- Rezoning of two areas of reserved land to 'Industrial' to provide additional areas of developable land (MRS amendment No. 415/33A). The proponents contended that the rezoning would assist the viability of the project. The amendment is currently open for public comment.
- Undertakings to dispose of peat and excavate sand and to landscape the modified area in a manner compatible with outlines laid down in the MRPA Concept Plan (1976).
- Undertakings to engage upon a research and monitoring programme during the course of the project.

SAFEGUARDS AND MONITORING

Should the project be approved, the Proponent will enter into legal agreement with:

- the Industrial Lands Development Authority,
- the Metropolitan and Region Planning Authority.

Included in the terms of the draft agreement with the MRPA are undertakings by the Proponent to appoint a consultant who shall have powers to instruct the consulting engineers in planning and supervision, testing and reporting. As concepts are formulated and plans and specifications prepared, they would be submitted to the MRPA for written approval by its duly appointed officer, and works would not commence or proceed until such approval had been obtained. The agreement would also provide for a bond of \$300,000 administered by MRPA for the performance of all obligations of the contractors. In the event of dispute or default, the Hon Minister for Urban Development and Town Planning would arbitrate. Safeguards in relation to clearance of conditions would be included in the agreement.

The MRPA has also advised the Proponent that a monitoring programme will be required as a condition of development approval. The Proponent has agreed, in discussion with the MRPA, to

undertake a programme of monitoring with a programme cost of about \$100,000 during the course of the project.

This is not made clear in the ERMP which states instead that the initial twelve months of the monitoring programme, including the intensive data-gathering process for the whole Lake, would be met in full by the Proponent. The ERMP proposes that subsequent monitoring of the area should be determined between the EPA and the Proponent with ongoing costs shared equally between the EPA and the Proponent, all data being turned over to the EPA for distribution as it sees fit.

MANAGEMENT OF THE COMPLETED OPEN SPACE

The Proponent undertakes to landscape an area of Parks and Recreation Reserve in return for being permitted to use the area to achieve development of adjoining land. At completion of the project and the fulfilment of all conditions, the landscaped area would be handed over to the MRPA, either to be managed under the auspices of that body or some other appropriate body.

ENVIRONMENTAL ASSESSMENT

SUBMISSIONS ON THE ERMP

The Environmental Review and Management Programme produced by the Cooper/Jennings Joint Venture was available for public comment from 28 November to 31 December 1981. Submissions were received from nine State Government authorities, from the City of Stirling and City of Perth.

Four individual submissions were received, including two from people with strong interests in the biology of the Lake and its educational value, and one who knows the bird fauna well. The Royal Australasian Ornithologists Union provided detailed comment as did Habitat Herdsman, but two groups (Conservation Council and the Tree Society) with interests in conservation values of the Lake declined to provide formal comment for a number of reasons. Among the reasons given were a concern about the short period available for public review, reservations about aspects of the ERMP and general concern about the environmental review process in WA. In the absence of the expertise of members of these groups, reliance has been placed on previous correspondence and on views set out in a paper produced by Habitat Herdsman entitled *A New View of Herdsman Lake*. This paper has been endorsed by the Conservation Council.

In assessing the environmental impact of the Herdsman Park Estate Project, the EPA considered these submissions. Officers of the Department of Conservation and Environment held discussions with interested parties and the results of these discussions have been taken into account.

ADEQUACY OF THE ERMP

The EPA considered that the ERMP document contained sufficient information for the public and other Government departments to make an assessment of the proposal. It was recognized, however, that information about the Lake environment was deficient. Such recognition is also implicit in the ERMP which undertook to develop a comprehensive geographic and environmental data base for the Project Area and the entire Lake during the first year of the project.

The ERMP does not seriously examine the prior land-use in the catchment or the quality of water entering the Lake from that catchment. These matters have serious implications for the long-term success of the open space development.

The ERMP does contain commitments for environmental monitoring and management and for regular reporting. There is a need to clarify the mechanism for reporting on and responding to environmental changes.

The Proponent has co-operated by providing additional information where a need has arisen during the assessment period.

IDENTIFICATION OF SIGNIFICANT ISSUES

The EPA is concerned that Herdsman Lake should achieve its full potential as a resource within the Perth Metropolitan Region. It has recognised that the MRPA Concept Plan outlines a means of obtaining recreational use of the area while ensuring that the value of the Lake to a large number of bird species is retained and, where possible, enhanced.

The EPA has also recognised that implementation of the Concept Plan by public funding is likely to be long delayed. With respect to mineral claims on the Lake, it has stated that a controlled mining operation may be a way of implementing the Plan. Its response to objections to the Floreat Waters development was consistent with this view.

The proposal now under consideration can also be seen as consistent with this view. The Plan calls for dredging, within limits seen by the MRPA to be in accord with its Concept Plan, and allows for a high degree of control (performance bond, research and monitoring, joint supervision by the Proponent's consultant and the MRPA).

There appears to be no cause for concern about the engineering feasibility of the proposal and this aspect has not been addressed. There is, however, a need to consider:

- The feasibility of achieving and sustaining water quality suitable for maintenance and preservation of aquatic ecosystems from urban drainage waters; and achieving a balance between bodies of open water and wetlands.
- The feasibility of achieving suitable long-term monitoring and control of drainage waters from the catchment and from the industrial area in particular.
- The overall long-term management of Herdsman Lake.
- The ongoing security of the central wetland area as a bird refuge and conservation area.

Assessment of the project is directed largely to these matters. Other matters are also addressed, including:

- Noise and other nuisances.
- Road Design and Construction.
- Open Space Design.
- Ongoing Public Involvement.

WATER QUALITY, DRAINAGE AND WETLANDS

Reasons for Concern about Water Quality

The achievement of a satisfactory area of open space centred on water is dependent upon water of high quality, particularly where conservation of wildlife is an important objective.

Data on the quality of water entering and leaving the Herdsman Lake basin through the drains, and isolated observations of algal blooms within the drains, indicate that nutrient levels are sufficiently high to cause eutrophication of receiving waters, leading to blooms of nuisance or noxious algae under favourable conditions. Such blooms can result in deaths of aquatic invertebrates, fish and birds, nuisance to residents of nearby areas and reduction of aesthetic values, consequences clearly manifest during the summer of 1981-82 in the Harvey and Peel Estuaries. Another result of nutrient enrichment is the enhancement of conditions suitable for breeding and development of chironomid midges whose larvae are adapted to sediments high in nutrients but low in oxygen. Eutrophication of urban lakes may be responsible for a recent increase in midge populations at Bibra, Yangebup, Thompson, Joondalup and Goollelal Lakes in addition to the long-established problems centred on Monger's Lake.

As well as nutrients, the levels of some heavy metals are high enough to cause concern. Furthermore, there is a history of use of persistent organo-chloride pesticides to control Argentine Ants on the Lake. High heavy metal levels and pesticides residues are not in keeping with activities directed towards conservation, particularly of bird species high in the food chain.

On the other hand, the quality of water entering the Lake basin may vary throughout the year. It may be that, following flushing of the catchment by early winter rains, the drains would yield water from later rains with low levels of pollutants. Such waters would be a valuable resource for the wetland. It is also possible that flow patterns through the drains are such that initial flows effectively by-pass the Lake biota with only later winter flows, following recharge of the ground-

water and elevation of the water table, contributing significantly to the wetland function.

The ERMP does not provide the information from which to assess the significance of the problem or to identify solutions.

The Proponent's Responsibility

The quality of the water entering the Lake basin through urban drains from the catchment in its existing state is, of course, not the Proponent's responsibility. However, it must be recognised that:

- the project is dependent upon making excavations and disposing of otherwise unwanted material on a Parks and Recreation Reserve;
- landscaping of these excavations and peat heaps is a key condition of the project proceeding;
- the quality of drainage waters to the Lake basin and upon which the landscaping will depend may be such that it could cause severe and ongoing management problems and jeopardise conservation values; and
- the project will develop additional industrial land adjacent to the Lake, with a potential to pollute it.

Herdsmen Lake in the Urban Drainage System

Herdsmen Lake is an integral part of the urban drainage system in its area. The MWSS & DB is responsible under its Act for the maintenance and operation of the metropolitan main drainage channels and for the operation of the Lake as a compensating basin. It requires that adequate arrangements be made for the proper functioning and maintenance of constituted main drains both during construction and on completion of the development. The City of Stirling wishes to see the MWSS & DB continue to be responsible for overall management of water levels in the Lake.

The Authority advises that:

The use of drainage waters to supply bodies of open water, channels and wetlands, as called for in the Concept Plan, would be an excellent way of making the drainage function subservient to wider management objectives if the risks could be overcome. Central to the assessment of this project is a recognition of the risks and identification of ways to remove or overcome them. Assessment of the project has been made difficult by the lack of baseline data about the Lake and its hydrology which would permit risk assessment and firm management proposals to be made.

MRPA Urban Runoff Stormwater Discharge Policy

The MRPA, through its Urban Runoff Stormwater Discharge Policy, clearly recognises that risks are involved in the discharge of stormwater to lands reserved for Parks and Recreation.

In summary, this policy opposes the discharge of piped or channelled stormwater drainage to lakes and other wetlands and the construction of sumps on reserved lands, but states that, where no other alternative disposal method is reasonably available and where provision can be made for pretreatment, piped discharge may be accepted. The policy states that, should the Department of Conservation and Environment so advise, reserved lands adjacent to lakes may be used for pretreatment. The level of pretreatment and the method of implementation is to be based on the advice of DCE and to be to the satisfaction of the MRPA.

Notwithstanding the existence of this Policy:

- Herdsmen Lake at present receives water from main and local drains and MWSS & DB requires the proper functioning and maintenance of main drains and compensating basin;
- City of Stirling has stated that, treatment sumps will not be allowed within the industrial area.

Therefore, piped stormwater must be accepted from existing and future development and, unless

City of Stirling changes its stance about sumps, treatment must take place within the Parks and Recreation Reserve. It will, therefore, be necessary to know the volume and quality of the drainage waters and to set quality criteria for the receiving waters if appropriate management objectives are to be set and achieved.

Drainage Design

Drainage design is important at two levels. Firstly, are there risks associated with using drainage waters from the catchment in its existing state to supply relatively large bodies of deep, open water and associated wetlands? Such risks, if they exist, are inherent in the Concept Plan. It must, however, be recognised that the adaptation of the Concept Plan designed for this project, places these areas of deep, open water close to the major inflowing drains and close to the section of the catchment most likely to contribute pollutants, e.g. the Hertha Road Sanitary land-fill site and the existing industrial area.

Secondly, the project involves development of additional industrial land, the Town Planning Scheme (TPS No. 30) for which has no provisions relating to drainage or pollution control or the restriction of types of industrial activities.

Drainage from the Catchment as a Whole

The ERMP states:

“Use of in-system storage (traps and detention basins) to allow the treatment of stormwater by screening and settling is recognised as vital to the management of Herdsman Lake as a multi-use wetland resource. The Proponent also recognises that the ability to compartmentalise the wetland system and thus manage water quality by input manipulation would be advantageous. The Proponent is prepared to modify its earthwork programmes to assist in reaching this goal should financial restraints permit.”

The MRPA identifies in its submission the need for options to divert by stop logs and/or pumps, water from main drains through the wetlands, into wetland sediment settling areas or into the peripheral water body or other channels.

The Authority advises that:

In the absence of an understanding of the hydrology and pollutant loadings of the Lake and its catchment, drainage design should be directed towards by-passing the man-made water bodies with all drainage waters, unless they can be shown to be of a quality satisfactory to protect beneficial uses directed towards protection of the biota and aesthetic values.

Drainage from the Proposed Industrial Land

The ERMP (page 70) states:

“It is proposed at this stage to channel stormwater drainage from the proposed Industrial Estate into the two tree preservation areas bordering the proposed Important Regional Road.”

This had been proposed in the belief that:

- the trees are adapted to saturated and partly saturated soils and could benefit by the water provided by the drains, and
- the vegetation would act as a biological filter to improve the water quality before it entered the water body.

Directing stormwater from the Industrial Estate to the Tree Protection areas may cause damage to the trees by contaminated flows. While short-lived plants like sedges and rushes may be quickly replaced, long-term and obvious degradation of the environment would result from the loss of slow-growing trees.

The ERMP offers the alternative of by-passing the tree protection areas and discharging stormwater from the proposed industrial estate directly into the Lake system or into the main drain system.

The Authority advises that:

In the absence of information about the effectiveness of alternative methods, the option of discharging stormwater from the proposed industrial estate directly into the main drain system should be taken.

The text of City of Stirling Town Planning Scheme No. 30 – Osborne Park Industrial Area Extension (Gazetted 24 August 1979) contains no provisions limiting the type of industrial development to be permitted nor controlling through Council by-laws industrial leakage into the drainage system or Herdsman Lake.

In a submission to the Town Planning Board on TPS No. 30 on 25 November 1977, the Department of Conservation and Environment noted the absence of drainage provisions. It recommended that, in the absence of settling ponds or sumps situated within the Scheme area, wastewaters should be ponded well away from the areas of Herdsman Lake to be developed for Parks and Recreation.

The omission from the Scheme text of provisions for disposal of industrial effluents not suitable for discharge into the sewerage system was also noted, as was the need to protect the amenity of the Lake by siting more noisy and offensive trades towards the centre of the development.

Despite discussions with officers of Council, Town Planning Board, MWSS & DB and consultants, no drainage provisions were incorporated. These views of the Department are relevant to the current proposal and identify deficiencies in the Scheme.

The Authority advises that:

Town Planning Scheme No. 30 should be amended to incorporate provisions relating to control, through Council by-laws, of industrial leakage into the drainage system or Herdsman Lake. Further, efforts should be made, through planning initiatives, to site noisy and offensive trades away from the Parks and Recreation Reserve.

Deep and Shallow Lakes

The greatest concern about the project was expressed in relation to the size and depth of the proposed water bodies.

It must be recognised that the volume of the water bodies to be produced as a result of this project would be determined by the volume of fill required to develop the industrial area and the volume of peat to be disposed of and not by constraints imposed by open space planning or conservation. Effectively, this means large areas of relatively shallow water or smaller areas of deeper water will be produced. Other matters, of course, will affect the siting and depth of the excavations, e.g. the need to pay royalties for sand extracted from Mallina Holdings' mineral claim, the depth of peat overlying the sand, and the distance which sand and peat must be transported to and from the industrial land.

The problems of the nexus between area and depth are:

- a greater area of open water will result in significant losses of emergent plant communities, which are of proven habitat value;
- a greater water depth will result in management problems arising from the potential of water bodies to stratify at depths greater than 4-5 m with pooling of low oxygen/high nutrient waters in the deeper parts.

A number of submissions were strongly opposed to the development of large, open water areas on Herdsman Lake. It was considered that open water is in abundant supply around the metropolitan area, e.g., at Monger Lake, Perry Lakes, Jackadder Lake, whereas reed swamps are more restricted. The Department of Fisheries and Wildlife sees a need to increase the area of the shallow water relative to deep water.

It is maintained in the ERMP that a depth of water of 1 m at the end of summer is required to prevent the invasion of the water bodies by *Typha*. It may be, however, that the phenology of *Typha* (acknowledged as a most important component of the existing environment) is as yet

imperfectly understood. It is clear that implications of an altered management of Herdsman Lake for the control of *Typha* should be investigated.

There was concern about the constraint placed by the need for fill, demanding relatively large, deep areas of water. A number of submissions recommended that some of the fill be obtained from outside the Lake to minimise environmental damage. These suggestions must be balanced against economic factors and traffic and congestion generated by heavy transport in urban roads.

A major difficulty in the development of water bodies of whatever depth in the Lake basin lies in the dubious quality of the water inputs to the Lake. It is likely that the large existing area of emergent vegetation plays a large part in utilising the nutrients and preventing algal blooms, but there is no information about the effects that a significant reduction in area of emergent vegetation may have on the water quality. The consequences may be to replace a nutrient-using biota which produces organic material in forms that can be used by animals such as protozoans, aquatic and soil invertebrates and birds, with blooms of blue-green algae and green algae having detrimental environmental effects. While the ERMP states that no such effects have yet been observed at Floreat Waters lagoon, it must be recognised that Floreat Waters lagoon has only been complete for a limited time, and it is situated remote from probable sources of high loads or pollutants.

The Authority advises that:

There is need for further consideration of implications of depth and extent of water bodies.

MONITORING AND RESEARCH

The Proponent recognises the lack of baseline data on Herdsman Lake. In order to overcome this, it gives an undertaking for an intensive data gathering process for the whole Lake during the first year of the development.

A number of public submissions referred to environmental monitoring and research, noting the need for an understanding of the ecology of the Lake and the lack of existing baseline data. Several thought that the Proponent had not made sufficient use of existing information. The proposed sampling programme was seen to be vague about sampling procedures and to require much greater attention to studies of the invertebrate fauna. Some submissions considered there was an over-emphasis on the bird fauna to the detriment of less obvious components of the fauna.

The Proponent sees the monitoring programme as providing the nucleus for the total environmental evaluation of Herdsman Lake and suggests that a number of concurrent studies in which its consultants would pursue involvements could be undertaken by other bodies.

Design of the Monitoring and Research Programme

An outline of the proposed research and monitoring programme is presented in the ERMP. The programme involves data collection, collation and analysis to:

- Evaluate the effect of the proposed development upon the Herdsman Lake system.
- Provide a data base for the evaluation of Herdsman Lake as a non-restricted, informal and passive recreation area.
- Provide a data base for the evaluation of the environmental effects of future development within Herdsman Lake.

It includes the assembly of existing data, and generation of additional material from actual photography and ground verification and the production of data maps.

The environmental monitoring programme proposed includes a detailed study of the physico-chemical environment of the waters of Herdsman Lake, studies of aquatic and terrestrial vegetation, zooplankton and aquatic macrofauna and general fauna studies.

A significant environmental factor not included for study in the programme is the hydrology of the Lake basin and its catchment. However, discussions with the Proponent's consultants reveal an awareness of the need to understand this aspect of the system.

The Authority advises that:

As a condition of the Project proceeding, a study of the hydrology of the catchment and the Lake basin should be undertaken.

Such a study should be designed with expert advice, and its results should be used as a basis for future management.

The Proponent's Commitment to the Monitoring and Research Programme

The Proponent proposes that the cost of the initial twelve months of the monitoring and research programme, covering the intensive data gathering process of the entire Lake, be met in full by the Joint Venture. The subsequent monitoring should be determined between the EPA and the Proponent with the ongoing costs of this process over the construction period shared equally between the EPA and the Joint Venture. All data would be made available to the EPA for distribution as it sees fit.

It is proposed that there should be an annual review with production of an Annual Report to be made available to the MRPA and the Department of Conservation and Environment. Because of its proximity to the area, and the potential of Herdsman for field study, Churchlands College natural science groups would be provided with annual reports.

The Proponent gives an undertaking that, should detrimental effects be identified, immediate steps will be taken to remedy the situation **if they can reasonably be undertaken.**

The MRPA has stated that the programme submitted in the ERMP has been examined and is considered to be in line with the understanding reached between the MRPA and the developers that a monitoring programme costing about \$100,000 would be undertaken as a condition of development approval. The proposal that the research and monitoring programme should be partly funded by the EPA after the first year had not been discussed with the MRPA. The MRPA might not object to involvement of the EPA in the programme if the Proponent's contribution remained at about \$100,000. A retreat from the Proponent's original suggestion that its monitoring cover the whole Lake area could be acceptable providing a more intensive programme was undertaken in the immediate surrounds of the development. However, the MRPA has no plans to continue monitoring the Floreat Waters Lagoon after 1982, and there is at present no regular monitoring of drainage waters.

The MRPA suggests that the proposal in the ERMP to involve the EPA may be accommodated if the EPA takes on a co-ordinating role for a larger monitoring exercise involving the Proponent, MRPA, MWSS & DB and academic institutions or workers.

The Authority advises that:

The EPA does not accept the suggestion that it should fund a component of the research and monitoring programme following the first year of intensive data collection. It recognises, however, that matters related to drainage management and water quality control are of more general concern and could become the subject of wider study.

The Proponents should fund the Research and Monitoring Programme to the level agreed with the MRPA.

The Research and Monitoring Programme should be modified to enlarge upon or add areas identified by expert advice as necessary for a proper understanding of the wetland and its inputs.

Expert advice should come from a Technical Committee to be set up by the Authority. The central functions of the Technical Committee would be to evaluate the significance of the perceived problems, to examine research and monitoring data and recommend on long-term management of pollutants.

CONTROL OF DEVELOPMENT AND ONGOING MANAGEMENT

At present, ownership and management responsibility for Herdsman Lake are divided and, while the sum of effort directed to specific tasks may be considerable, there is no integrated management undertaken. Future management of the Parks and Recreation Reserve is addressed by the ERMP. The issues in question are:

- Who will manage the Project Area during development?
- Who will accept responsibility for the Project Area on completion of the development?
- Who will undertake ongoing management of the Project Area?
- How will the Project Area be integrated with the Herdsman Lake Parks and Recreation Reserve as a whole?

The first two questions relating to control during the development phase are answered by the Agreement between the Joint Venture and the MRPA which allows for joint supervision during development and handover to the MRPA once all development conditions are fulfilled.

Development Agreement

The Cooper/Jennings Joint Venture will enter a development Agreement with the MRPA providing a performance bond of \$300,000 covering the performance of all obligations of the Proponent for the whole development. The MRPA believes that the Agreement is an innovative and powerful safeguard against environmental damage. It would provide for the appointment of an Environmental Consultant, satisfactory to the MRPA, to design and supervise the whole development project including the wetland, open space and subdivisional area. This Environmental Consultant will be the principal consultant for the project and will be a party to the Development Agreement. In the event of a disagreement between the Development's Consultant and the MRPA, the Hon Minister for Urban Development and Town Planning would act as arbitrator.

Additional safeguards in regard to clearance of conditions result from the arrangements and conditions of the Town Planning Board and The Industrial Land Development Authority. The transfer of land from ILDA to the Developer, clearance of subdivision conditions and clearance of development conditions will be linked.

The Industrial Land Development Authority also proposes to enter into a formal agreement with Herdsman Nominees Pty Ltd for the Company to acquire the major land holding which the Authority has assembled within Town Planning Scheme No. 30. ILDA would also be obtaining joint and several guarantees from the parent Cooper and Jennings organisations.

Queries raised by the City of Stirling in relation to the bond appear to relate to a misunderstanding of the function of that bond.

The Authority advises that:

Provisions of the Agreement between the Proponent and the MRPA on matters of joint supervision, arbitration in the event of dispute and handover to the MRPA subject to compliance with development conditions, are endorsed as providing management control over the development phase.

Ongoing Management

The two questions relating to ongoing management are less easily resolved. While the long-term management of all or part of Herdsman Lake appears to be outside the Proponent's responsibility, by carrying out the development, it would be placing a more complex management task on the community than might otherwise exist. It is therefore appropriate to consider the issues here. Furthermore, a clear perception of the need for decisions about ongoing management of Herdsman Lake emerges from the public submissions on the ERMP. The City of Stirling has stated that it is unable to accept management responsibility for maintenance of lands and provision of areas for recreation and leisure activities in the Project Area.

The high cost of management is seen as an important issue, and views are expressed that minimal disturbance of the central area would be relatively inexpensive in comparison with costs required for landscaped area. The thrust of the Habitat Herdsman paper *A New View of Herdsman Lake* is towards keeping development and maintenance costs to a minimum and to demonstrate that low cost plans are feasible and desirable.

It must be recognised, however, that high management costs will be imposed on Herdsman Lake

by the need to accommodate drainage waters from the catchment in its existing state and from the newly developed industrial area. At the same time, the reduction of the productivity of the wetland by the replacement of areas of emergent vegetation with relatively unproductive deep, open water places high demands on management skills and resources than may be the case for a less ambitious plan. The Proponents, in this case, including the MRPA, must accept that there has to be an ongoing commitment to monitor water quality, treat poor quality water and control drainage, if the design is to work.

The Authority advises that:

Recognition must be given to the complexity of the management efforts required and the need for appropriate monitoring and control of water quality.

As suggested in the ERMP and by the MRPA in its submission, co-ordination and integration of existing funding for various aspects of management may result in economies and, at the same time, would result in improved environmental management. This would mean utilisation of resources now used for drain maintenance, fire control, pest and weed control and other matters in an integrated management programme.

The Authority advises that:

The EPA would endorse co-ordination of existing funding in an integrated management programme.

The MRPA has pointed out in its submission that a mechanism exists to provide for ongoing management of Herdsman Lake. The Parks and Recreation Committee of the MRPA, formerly the Regional Open Space Committee, was established to deal specifically with the co-ordination of management of Herdsman Lake as one of the areas delegated to the Committee by the Authority. The MRPA has further stated that a Joint Management Committee could be set up to include City of Stirling and WA Wildlife Authority representatives.

ONGOING SECURITY OF THE CENTRAL WETLAND

A key issue in the development is the fate of the central wetland area. Strictly speaking, most of this area lies outside the scope of the ERMP. But, as the development seeks to implement, in part, the MRPA Concept Plan using a resource from the Lake basin, and as mining claims exist over the area of greatest conservation value, it must be a matter for concern that the central area will be secure from disruption in the future.

Mining Claims

The pattern of mining claims on the Lake basin is complex and is set out in Appendix 1.

The mineral claims held by Mallina Holdings in general have been pegged for testing of their mineral potential. However, the Herdsman Nominees' claim was pegged with the express intention of holding the ground so it could be used for a cut-and-fill operation to expand useful industrial land at the north-east margin of Herdsman Lake. This activity is not intended by the Mining Act, and Mining Wardens should be given authority to disallow such claims.

Future Activities in the Central Area

Some concern by conservation groups about the intention of the MRPA Concept Plan may arise from the wording of a passage in the text. This passage defines the central area as 'a permanent wetland area inter-woven with a canal system . . . maintained as wading and grazing grounds for wildfowls (sic)'. Strictly, 'wildfowl' are gamebirds and the statement appears to ignore the wide range of other species occurring on the Lake at present. However, the intent of the MRPA Concept is clarified in Conclusion (2.1(iii))¹ which states that implementation of the Concept is to be towards ' . . . conservation of wildlife existing in the area'.

From submissions received and views expressed in 'A New View of Herdsman Lake', it is apparent that bodies concerned about protecting conservation values believe that the central area would be best left untouched except for management to achieve some control of water levels and some control of water quality. Provision of bodies of permanent water larger than those needed to establish a moat to prevent disturbance of the central area by predators and vandals add little to the conservation value.

However, the existence of mining claims over this central area can be seen as a constant threat of further excavation. The MRPA in its submission notes that interference with the central wetland area should not occur until an ongoing manager has been appointed. The conservation groups may therefore be justified in their concern, particularly as further development requiring fill is allowed for in regional planning for the surrounding area (e.g. freeway and urban development on the north-western side).

What is at issue is the power of the MRPA Concept Plan to keep excavation on the Lake basin to limits compatible with maintaining the proven conservation values. It is clear that, as the objectives of the plan are clearly towards conservation of wildlife in the central wetland, further excavation in that area should only occur, notwithstanding the mining claims, if it is required in the interests of good habitat management and drainage control.

The Authority advises that:

Should this project proceed, further excavations on the Lake should be limited to those required to complete the moat system around the periphery. No further excavation on the central wetland area should be countenanced unless research shows it to be necessary for habitat management for broad conservation ends, or for drainage control. In the special case of Herdsman Lake, conservation and open space values should be seen to outweigh the value of the relatively small mineral resource.

To avoid future pegging for minerals, the Lake and its environs should be declared a Ministerial Temporary Reserve under the Mining Act.

POTENTIAL NUISANCE GENERATED BY THE PROJECT

During the construction phase, the project has the potential to cause nuisance to residents of adjoining suburbs. These nuisances could include:

- noise from the working dredge, bulldozers, loaders, backhoes and trucks;
- dust generated by working the dewatered peat and fill and, possibly,
- odours emanating from disturbed swamp deposits.

It must be noted that development of the site by disposing of the peat and obtaining fill off-site would generate a different set of nuisances by movement of trucks along the road system of the area.

Noise

The Proponent has undertaken to operate the dredge only during normal working hours 0700-1700 hours daily. No such undertaking is given for other plant.

The Proponents have, in a supplementary submission, stated that they would conduct noise monitoring to assess environmental noise in all residential areas adjacent to the development site. Measurements would be undertaken sufficient to assess the contribution to the noise environment of the earthmoving and servicing works to be undertaken during the successive stages of the development, and under all prevailing weather conditions.

An undertaking given in the ERMP to **attempt** to comply with provisions of the Noise Abatement Act, 1972, and with the Noise Abatement (Neighbourhood Annoyance) Regulations 1979, should be restated to show that the Proponent fully recognises its responsibility to comply with Noise Abatement legislation.

The EPA notes the undertakings made by the Proponent to limit activities and measure the contribution made by its activities to the noise environment.

The Authority advises that:

- a) The Proponent should fulfil its undertaking to determine the prevailing noise climate of adjoining residential areas prior to commencement of the project.

- b) The Proponent should comply fully with provisions of Noise Abatement legislation, and take appropriate corrective action if monitoring shows noise levels to be excessive.

Dust and Odour

The potential problems of dust and odour would be subject to supervision under provisions of the Clean Air Act. The Public Health Department has advised that, before construction work is commenced, it would be advantageous for representatives of the Proponent to have discussions with officers of the Clean Air Section regarding the Proponent's responsibilities under the Clean Air Act.

The Authority advises that:

The Proponent should fulfil its responsibilities under the Clean Air Act.

Acceptance of this advice should overcome issues raised by the City of Stirling concerning noise and clean air matters.

ROAD CONSTRUCTION AND DESIGN

The portion of the important regional road included in the project is to be constructed using techniques perfected by the Main Roads Department and used in constructing the Mitchell Freeway over wetland areas. The City of Stirling has raised questions on the extent and duration of pre-loading to be used on the wetland sediments. The ERMP was referred to the Main Roads Department for comment, but no formal submission was made. It therefore appears that there is no basis for concern on this matter.

The ERMP states that inorganic rubble fill may be supplied by the City of Stirling for part of the road base. The suitability of such fill may be open to question. 'Inorganic Rubble' used by City of Stirling for fill on the Moondine Drive alignment adjacent to the World Wildlife Study Centre and on other road construction in wetland areas contained materials with a potential to pollute the wetland and to provide an unsuitable base for subsequent development.

The Authority advises that:

Should 'inorganic rubble' be used for fill in the Project Area, it should comply strictly with the description and be free of material with a potential to pollute the wetland or to provide an unsuitable base for the development.

The important regional road planned for development as part of this development and the freeway proposed for the north-western margin of the Lake could be most obtrusive elements in the landscape. Efforts should be made to reduce the obtrusiveness of the roads to the Parks and Recreation area and adjoining residential areas.

OPEN SPACE DESIGN

The Design as a Concept

It is important to recognise that many aspects of the development of the open space within the Project Area have not been clearly defined.

The MRPA in its submission states:

. . . the questions of drainage design, landscaping, and lake depths need a great deal of further work.

. . . difficulties will arise in establishing the tree plantations because of watering, pH and compaction problems. The Authority will not give clearance of the landscape work until it is satisfied that the plantations will survive without supplementary watering. This may involve the developers in unforeseen maintenance costs.

. . . It is considered likely that variations in quantities of sand and peat will be encountered by the developer, notwithstanding the extensive quantity surveys that have been made.

. . . A great deal of detailed design remains to be done, but the agreement provides for an environmental scientist to develop and submit detailed designs for approval to the MRPA.

The design of the open space as presented in the ERMP is essentially a concept. Detailed site plans will be prepared and submitted to the MRPA for approval for each stage of the landscaping and contouring works.

'Blueprint' Versus Progressive Planning

The MRPA submission states that experience gained in the Floreat Waters development has confirmed that the blueprint approach to construction works in wetlands is impractical and insufficiently sensitive to environmental conditions, quantities and unforeseen problems. The method proposed in the ERMP means that precise determinations of areas or locations are inappropriate in the design and planning stages.

The Authority recognises:

the problems in providing a blueprint for a development of this kind and acknowledges that step-wise detailed planning based on a concept is a satisfactory way to proceed. This procedure has the added benefit of allowing environmental data to be taken into account in the design process as it comes to hand from the monitoring programme.

Workable Framework Versus Finished Product

The lack of precision in the design of the open space was a matter of concern in several of the submissions on the ERMP.

The City of Stirling saw that more detailed consideration would be required to establish a workable active recreation area and that not enough detail about the construction of open space areas is given. The City was also concerned that no provisions are made for facilities in the recreation areas and that there is no provision of sewer connections for toilet blocks.

The MRPA submission, on the other hand, points out the need to develop the **framework** of the open space at this stage rather than achieving an end result which may be found to be inappropriate in the long term.

The Authority is in agreement with:

the MRPA view that, at this stage, only the framework of the open space design should be established rather than a finished product, which subsequently may need to be modified

PUBLIC INVOLVEMENT

The Proponent undertakes to plant the foreshore areas and proposes that natural history organisations, schools and other interested community organisations should be invited to assist. The Proponent would provide trees, equipment and tools. Planting would be according to detailed plans produced for approval under the terms of the Agreement with the MRPA.

Public participation is proposed by some public submissions, and there is clear interest as evidenced by the Habitat Herdsman paper entitled 'A New View of Herdsman Lake'.

Specific design features which could improve the conservation and educational value or the habitat value of the open space were identified in public submissions, e.g.:

- provision of open, peaty margins with gradients of no greater than 1 in 100 should be established around the margin.
- provision of access to fringe wetlands so that educational use could be made of the plant communities.
- the islands to be designed to provide greatest value to the bird fauna.
- efforts should be made to maintain the present balance between *Typha* and other species.
- shallow water as defined in the ERMP as 1 m is too deep to be useful, it should be defined as less than 0.3 m.

Liaison between users of the open space and the managing body should be established.

The Authority advises that:

The Proponent should place a high priority on its commitment to involve educational and community groups and should undertake to keep the public informed on the progress of the landscaping of the open space.

REFERENCES

1. Metropolitan Region Planning Authority (1975)
Herdsman Lake
MRPA, Perth, WA.
2. Curry, P. (1981) --
"A Survey of the Birds of Herdsman Lake 1980-81"
Bulletin 105, Department of Conservation and Environment, Perth, WA.
3. Teakle, L.J.H. & B.L. Southern (1937)
"The Peat Soils and Related Soils of Herdsman Lake -- A Soil Survey of Herdsman Lake"
Journal Agric WA 14, (Second Series), 404-424.
4. Agreement Between the Government of Japan and the Government of Australia for the
Protection of Migratory Birds and Birds in Danger of Extinction and their Environment.

APPENDICES

APPENDIX 1: HERDSMAN LAKE

Mineral Tenement Situation

W.M.B. Carr, Environmental Officer, February, 1982

Claim No. : 70/18816 (see frontispiece)
Company : Herdsman Nominees Pty Ltd
Pegged for : Diatomaceous earth, silica and glass and, peat, zircon and mineral sands
Approval : Wardens Court Hearing pending.

Land Ownership and Plans for Land

- Recreation reserve vested in Stirling City Council with power to lease. Zoned Parks and Recreation and important regional road. Cooper-Jennings propose peat extraction fill placement and road.
- Vacant Crown land zoned industrial. Proposed Cooper-Jennings Peat extraction and fill area.
- Vacant Crown land zoned Parks and Recreation and important regional road. Cooper-Jennings propose filling and road.
- ILDA land zoned industrial. Proposed Cooper-Jennings peat extraction and fill area.
- Bounded by vacant Crown land strip (Pearson Road Reserve) and drain, vested in Minister for Works.

Company Arrangements

Cooper-Jennings hold an option to acquire Herdsman nominees from its existing shareholders. The mineral claim will then become the property of Cooper-Jennings. It is the intention to use the claim exclusively for the benefit of the Cooper-Jennings industrial development. Jennings Industries, WA is to purchase the ILDA land.

Adjacent Land Without Mineral Claims

- The claim is bounded to the North-west by MRPA land. Cooper-Jennings plan sand excavation, important regional road construction and some fill. The claim is bounded to the North by private land, zoned industrial and already in use.
- City of Stirling land, zoned industrial.
- Private land zoned Parks and Recreation.
- Vacant Crown land zoned industrial on which Cooper-Jennings plan peat removal and sand fill.

Claim No. : 70/16893 and 94 (see frontispiece)
Company : Mallina Holdings, Ltd
Pegged for : Diatomaceous earth, silica and glass sand, peat.
Approval : November 1979

Conditions

Related to exploration with minimal disturbance, rehabilitation, closeness of excavations to roads and an ERMP by Mallina prior to mining. Excision of any portion of private land on S-W margin of claims.

Land Ownership and Plans for Land (Zoning and Developments)

- Vacant Crown land zoned Parks and Recreation. Excavation and some peat in filling by Cooper-Jennings in N-E section.
- Bounded and dissected by drains vested in Minister for Works. Excavation by Cooper-Jennings on some drains.
- Crown Lease for agricultural pursuits. May be filled by Cooper-Jennings Zoned Parks and Recreation.

- A Controlled Access Highway is planned to pass close to the W boundary of the claims.
- Exclusion of private land on S-W allowed development of Floreat Waters project on unpegged private land.

Company Agreements

Mallina Holdings Ltd and Cooper Corporation Pty Ltd have arranged a royalty agreement to excavate material from the Mallina claim for the industrial land fill operation. Mallina have received a copy of the ERMP. Mallina/Coopers intend to supply the ERMP to the Minister for Mines once the EPA response is known and seek approval to use that area of the claim.

Claim No. : 70/20396 (see frontispiece)
 Company : Mallina Holdings, Ltd
 Pegged for : Diatomaceous earth, silica and glass sand
 Approval : Wardens Court Hearing pending – no date set.

Land Ownership and Plans for Land

- Unvested Reserve for parklands and Recreation. This is the site of the World Wildlife Fund study centre. Zoned Parks and Recreation, bounded to the north by a drain vested in Minister for Works.

Claim No. : 70/20572 (see frontispiece)
 Company : Mallina Holdings Ltd
 Pegged for : Diatomaceous earth, silica and glass sand.
 Approval : Wardens Court Hearing pending – no date set.

Land Ownership and Plans for Land

- Vacant Crown land zoned Parks and Recreation and important regional road. Cooper-Jennings propose excavation from the Mallina MC 70/16893 into this claim although no agreement exists at this time for excavation in MC 70/20572.
- MRPA land with important regional road zoning.
- Bounded on three sides by drains vested in Minister for Works, also bounded by urban zoned land and land currently of uncertain zoning.

HERDSMAN LAKE

Tenement	Application	Applicant	Status	Pegged for	Objections Lodged
70/16893	May 1977	Mallina Holdings Ltd	Approved Nov 1979	Dia. Ea., Silica Glass Sand Peat	A B C D
70/16894	May 1977	Mallina Holdings Ltd	Approved Nov 1979	Dia. Ea., Silica Glass Sand Peat	A B C D
70/18816	Nov 1979	Herdsmen Nominees Pty Ltd	Hearing 24 April 1982	Dia. Ea., Silica Glass Sand Peat, Zircon Min Sands	A B C D
70/20396	Oct 1981	Mallina Holdings Ltd	Not yet determined	Dia. Ea., Silica Glass Sand	A D E
70/20572	Jan 1981	Mallina Holdings Ltd	Not yet determined	Dia. Ea., Silica Glass Sand	B D

OBJECTORS: A = Stirling City Council B = MRPA C = Tree Society
 D = Conservation Council WA E = WA Parks & Reserves

APPENDIX 2: SUBMISSION OF THE METROPOLITAN REGION PLANNING AUTHORITY

METROPOLITAN REGION PLANNING AUTHORITY

SUBMISSION TO ENVIRONMENTAL PROTECTION AUTHORITY:

HERDSMAN PARK ESTATE - ENVIRONMENTAL
REVIEW & MANAGEMENT PROGRAM

DECEMBER 1981

CONTENTS

1.	Introduction
2.	Background
3.	Concept Plan
4.	Floreat Waters Development
5.	Open Space Design
6.	Research and Monitoring
7.	Safeguards and Project Supervision
8.	Management of Herdsman Lake
9.	Conclusion
Appendix 1.	Urban Runoff Stormwater Discharge Policy
Appendix 2.	Proposed Development Agreement
Appendix 3.	Charter and Current Membership of Parks and Recreation Committee

1.0 Introduction

1.1 Environmental Consultants acting for the Cooper/Jennings Joint Venture approached the Town Planning Department in April 1981 for advice on the development and design criteria for the open space area adjacent to the Herdsman Lake Industrial area. Fruitful liaison has occurred continually during the year and the Environmental Review and Management Program substantially reflects those discussions.

1.2 In July 1981 the M.R.P.A. considered proposals from Cooper/Jennings to develop the Herdsman Park Industrial Estate (City of Stirling TPS 30) using dredge and fill methods and to landscape the open space area affected in accordance with the concept plan. The Authority resolved as follows:

"(a) To advise the developers that the Authority is in favour of the concept proposed, however, before a decision can be made on a specific proposal, further details of the proposal, its impact and management implications will be necessary. In addition, any approval for such a project will be subject to the following:

- (i) The applicant entering into a legal agreement with the Authority which includes a performance bond of \$300,000.
- (ii) The enlargement of the project area to encompass all the lands marked on Map 6.
- (iii) Completion of base course and one carriageway of the Important Regional Road between Pavis Street and Pearson Street without cost to the MRPA.
- (iv) Such monitoring and environmental studies as are required.

(b) To advise the Government of the implications of the proposals for the ongoing management of the whole Herdsman Lake area so that the Government's wishes may be understood.

(c) That when appropriate the developers lodge a Form 1 application to commence development for the works, at which time the agreement mentioned in (a)(i) above would be entered into.

1.3 Cooper/Jennings submitted a fresh development proposal detailing the benefits of the scheme to the public and the MRPA in support of a request for rezoning of the Metropolitan Region Scheme. This was agreed to and in November 1981 Amendment No 415/33A was effected.

1.4 The Authority is currently processing an Application to Commence Development relating to the proposal.

2.0 Background

2.1 Herdsman Lake is a major component in the extensive chain of wetlands running parallel to the coast. Because of its relatively close location to the city centre, its size and ease of access, and its natural attractiveness to wildlife, the lake has considerable importance.

2.2 The interest shown by the public in the future of the lake and the need to re-examine the road network in the area led to the formation of a Technical Advisory Committee in 1975 to advise the MRPA on the planning and development of the Lake area.

2.3 The Authority released in 1976 a report on Herdsman Lake showing a concept plan that had evolved from a preliminary concept plan and road network adopted by the Authority on April 23, 1975, after an extensive period of public participation.

2.4 The concept plan provides for a parks and recreation area which is made up of open water, wetlands and islands. Provision is also made for areas of passive and active recreation. The road system is considerably modified in this final plan to provide for a minimum disturbance of the natural environment. The major change is the deletion of the proposed extension of Hale Road across the Lake.

2.5 A number of amendments to the Metropolitan Region Scheme envisaged in the concept plan have been effected. Amendment No 415/33A relating to the industrial area is currently on public display.

2.6 The Metropolitan Region Planning Authority has a program of acquisition at Herdsman Lake which is a prerequisite to the development of the lake in accordance with the concept plan.

2.7 Under the provisions of its Act the M.R.P.A. has development control over the Lake and adjacent areas. Until the Government has appointed a body to undertake the ongoing management of the lake the Authority is acting as temporary custodian of the lake using its development control powers to ensure that any developments are in accord with the concept plan.

The Authority also has property management functions, the main ones being fire control on MRPA owned land, and maintenance of the Floreat Waters open space which was ceded to the Authority as a development condition.

2.8 Concern at the quickening pace of development at Herdsman has led the Authority to advise the Government of the implications for ongoing management of the Cooper/Jennings Venture, so that the Government's wishes may be understood. The Government has responded by appointing a Cabinet Sub-Committee to examine the Herdsman question as well as the status of the MRPA's estate at the same time.

3.0 Concept Plan

3.1 After a lengthy period of public participation and a major public meeting the Concept Plan for Herdsman Lake was adopted by the MRPA in October 1976.

3.2 The essential components of the concept are as follows:

3.2.1 Concept Statement

"The concept is to maintain a flood plain and at the same time create a parkland and provide for roads, with a minimum amount of upheaval to the natural environment so as to cater for the needs of drainage, conservation, education and community leisure."
(Herdsman Lake Concept Plan. M.R.P.A. 1976)

3.2.2 Wetlands, Channels and Islands

The main feature of the design is the retention of the existing wetland. It has four distinct features:

- (i) a permanent wetland area interwoven with a canal system is to be maintained as wading and grazing grounds for wildfowls,
- (ii) a peripheral channel system will act as a barrier to keep out intruders to the shallow waters and nesting islands,
- (iii) a series of deep open-waters will serve as diving, landing and taking-off areas for water fowl, and
- (iv) nesting islands are to be created for wildlife.

3.2.3 Recreation Areas

The peripheral area of the wetland is to be developed mainly for recreation, leisure and sport uses. Access, recreation trails and a number of specialised facilities including a nature study display centre and a refreshment centre are proposed in The Concept Plan.

3.3 The main feature of the 1976 Concept Plan for Herdsman Lake is the retention of the existing wetland, including the provision of a peripheral channel system, or "moat". The area surrounding the wetland is to be developed mainly for passive and informal recreation uses. Embodied in plans for the central wetland is the notion that it will eventually be improved, with channels and islands and actively managed for the husbandry of waterfowl. The key element in such management is the ability to influence breeding and other activity by manipulating water levels and transferring water from one part of the wetland to another. The Herdsman Concept Plan provides for the integration of urban drainage into the wetland system and the dual use of deep open water areas as compensating basins and water resource areas for wildlife.

3.4 Herdsman Lake has undergone great changes since European settlement. It is clearly a rich bird habitat at present, and the Metropolitan Region Planning Authority concept plan of 1976 when put into effect will increase its value by providing channels with permanent water, sheltered feeding and nesting areas and a greater diversity of wetland vegetation. It is recognised in the plan that it will be necessary to carry out dredge and fill operations to achieve the desired result.

The avoidance of controlled ecological change is not one of the objects of the concept plan. On the contrary, dredging to rejuvenate the existing weed choked wetland and to create filled areas for passive recreation separated from the wetland by a moat, is the essential concept of the plan. The plan recommends, however, that dredge and fill operations should be carried out in stages so that their effects on the wildlife could be assessed. This will also allow time for the ecosystem to adjust itself.

4. Floreat Waters Development

4.1 The Floreat Waters development can give some insight into the problems likely to be encountered by the Cooper/Jennings Joint Venture, however, it is still too early to claim that Floreat Waters is a "success" in any specific sense.

4.2 The ERMP cites for example, increased bird species and numbers, as evidence of success of the project. Increased bird use is a predictable response to environmental change, and care should be taken to ensure that development of bird habitat does not become the only criterion for the design of Herdsman. This is an aspect which can be developed at any time in the future, but preferably at a time when the availability of funds and a strong volunteer support group permit the management body to embark on an active bird husbandry program. In the meantime design should concentrate on the framework of the open space and wetland system, by the development of the moat, and the protection of the central wetland area with its extensive feeding grounds.

4.3 Water quality and lake depths are related aspects which draw comment in the E.R.M.P. in relation to Floreat Waters. Although no problems have been detected so far, the lakes are too youthful in the biological sense, to draw any conclusions, except perhaps that the wetland seems to have a great capacity to absorb impacts. Too little is known of the ionic exchange capacity of the peat to make any definite statements about the behaviour of water quality.

4.4 Comment is made in the E.R.M.P. on the cost of maintenance of Floreat Waters reticulated parkland, and whether or not such landscaping is appropriate. Irrigated turf was required firstly to carry the projected heavy uses adjacent to a residential area, and secondly, as a means of stabilising the peat which has a very low pH. Cooper/Jennings have been advised that the most appropriate landscaping technique adjacent to the industrial area is reafforestation with wetland tree species, with occasional dry grass clearings. Experience at Floreat Waters suggests that the establishment cost of tree plantings will be high and frequent watering may be needed. Once established, running costs will be low. The MRPA will not clear the development until plantings are sufficiently advanced to survive without watering.

4.5 The main benefits to flow from the Floreat Waters development have been that the contractors and consultants have gained experience in wetland management and have also gained a sympathy for the Herdsman environment. The same consultants and contractors will be involved in the Cooper/Jennings Joint Venture and the track records they have established in work performance, ability and readiness to comply with direction, give confidence in assessing the Joint Venture's capability to undertake the development in an environmentally acceptable manner.

4.6 Experience gained in the Floreat Waters development has confirmed that the blueprint approach to construction works in wetlands is impractical and insufficiently sensitive to environmental conditions, quantities and unforeseen problems. The method adopted there, of scientists and engineers working together with recourse to an arbiter is clearly the most suitable procedure. This method however, means that precise determinations of areas or locations, are inappropriate in the design and planning stages. Equally however, the lack of resource data has impeded site decision making and the risk of incorrect decisions was ever present. Evaluation of the project was made difficult by the absence of "before and during" data.

5. Open Space Design

5.1 As mentioned above, the open space design proposal submitted by Cooper/Jennings was developed initially by the Joint Venture's consultant and officers of the Town Planning Department. The proposal was then reviewed by the M.R.P.A. and Plan No 877bc (figure 1.1) is now satisfactory to the M.R.P.A. This plan was prepared in colour format at the Authority's request to show how the proposed development related to the remainder of the lake, and how the whole relates to the M.R.P.A.'s Concept Plan.

5.2 The overall design has regard for several aspects including:

- The sand budget of the Lake.
- Sufficient deep open water to provide for drainage compensation, quality and quantity buffering.
- A balance between deep and shallow lake to avoid over-population of certain species within the moat.
- Retention of a maximum area of Typha wetland to provide for migratory species protected under Treaty, and local bird species.
- The rights of Mallina Mining and Biala Pty Ltd which have registered mining claims over much of the central area.
- Drainage design and management.

It is considered that these points are adequately covered in the E.R.M.P., however the questions of drainage design, landscaping, and lake depths need a great deal of further work. It is considered that the environmental consultant to the joint ventures should undertake the necessary consultations to resolve these questions to the satisfaction of the bodies involved as a matter of priority.

- 5.3 Drainage design must take account of both local drainage and the main drainage network. The latter must be seen as part of the basic water resource for wildlife management and should be designed so as to maximise water management options. For example, whilst the main drains should enter the moat, options should exist to divert the water:

- (1) directly through the wetland
- (2) into wetland sediment settling areas (eg. near Selsted Street)
- (3) around the moat and other channels.

This can be achieved by the provision of stop logs, and at a later stage, by pumping. Local drainage should be discharged to the tree protection areas, in accordance with the M.R.P.A.'s policy on drainage (Appendix 1). If local drainage is to be discharged into the main drains, it should comply with M.W.S.S. & D.B. requirements.

- 5.4 The approach to landscaping outlined in the E.R.M.P. is satisfactory, however it is envisaged that difficulties will arise in establishing the tree plantations because of watering, pH and compaction problems. The Authority will not give clearance of the landscape work until it is satisfied that the plantations will survive without supplementary watering. This may involve the developer in unforeseen maintenance costs. The developer's environmental consultant will be responsible for the convening of any technical meetings or consultations on these matters in accordance with the development agreement.
- 5.5 It should be noted that the M.R.P.A. requires that the play areas near Selsted Street be reticulated, or, in the event that they can be kept sufficiently low lying to sustain kikuyu from the groundwater, that an equivalent amount be spent on landscaping elsewhere.
- 5.6 The extent of filling of the area for sports development near Pearson and Selby Streets will be determined by the amount of fill available. The Authority requested that this area, plus Reserve 28366 on Herdsman Parade, be included in the developers planning so that any unforeseen surplus of peat could be disposed of to the community's benefit without the need for further approvals. It is considered likely that variations in quantities of sand and peat will be encountered by the developer, notwithstanding the extensive quantity surveys that have been made. These areas should be compacted, sown down with grass (non-irrigated) until required for development. The developer will be required to plant some trees for aesthetic reasons.
- 5.7 To a large extent the proposed development is experimental. In view of the requirement to minimise ecological disruption it would not be prudent to embark on any further excavations or mining in the central wetland area during the currency of the proposed development, or within a reasonable period after completion. Interference with the central wetland area should not occur until an ongoing manager has been appointed. Evaluation of the effects of the project should continue after project completion.
- 5.8 As part of the requirement to protect the central wetland, every effort should be made to complete the construction of the moat, particularly in the south east sector. A schematic layout for this sector was provided by Town Planning Department and is shown in figure 1.1 (Plan 8776c) of the E.R.M.P.

6. Research and Monitoring

- 6.1 The M.R.P.A. has advised the Joint Venturers that a monitoring program will be required as a condition of development approval. The developer has agreed, in discussion, to undertake a four year program of monitoring with a program cost of about \$100,000. The program submitted in the E.R.M.P. has been examined and is considered to be satisfactory and in line with the understanding reached with the developers.
- 6.2 In Chapter 8 of the E.R.M.P., page 80, a new proposal is put forward which has not been discussed with the M.R.P.A. The proposal is that after the first year, the program would be jointly funded by the E.P.A. and the developer. The M.R.P.A. may not object to this if the developer's contribution remained at the level discussed in paragraph 6.1 above.
- 6.3 It was the developer's own suggestion that its monitoring cover the whole lake area, however a retreat from that position would be reasonable provided a more intensive program was undertaken in the immediate surrounds of the development. However monitoring of the Floreat Waters area would have to continue, as would monitoring of inputs from the main drain system. At this stage the M.R.P.A. has no plans to continue its monitoring program beyond December 1982. The position with monitoring of drains by M.W.S.S. & D.B. is not known.
- 6.4 If the suggestion contained in the E.R.M.P. is to be taken seriously, the E.P.A. may find a role in co-ordinating and eventually publishing a larger monitoring exercise over the whole lake involving the Joint Venturers, M.R.P.A., M.W.S.S. & D.B. and academic institutions or workers.

7. Safeguards and Project Supervision

- 7.1 As a condition of development approval the M.R.P.A. will require the Joint Venturers to sign a Development Agreement which will provide for a performance bond of \$300,000 in the form of a Bankers Guarantee. The agreement will provide for the appointment of an environmental consultant, who is satisfactory to the M.R.P.A. to design and supervise the whole development project including the wetland, open space, and subdivisional area. This environmental consultant will be the principal consultant for the project and will be a party to the Development Agreement. A copy of the draft agreement is at Appendix 2.
- 7.2 As the major safeguard for the project, the Development Agreement has been the subject of lengthy discussions between officers of Crown Law Department, who developed the agreement and officers of I.L.D.A. and the M.R.P.A. Crown law is also involved in the project through the preparation of agreements relating to the purchase of the land from I.L.D.A. Thus there are further safeguards in that the legal documents complement each other.
- 7.3 The draft Development Agreement, which is currently being considered by the Joint Venturers, contains several features of note:
1. The environmental consultant is a signatory to the agreement.
 2. There is provision for replacement of consultants, but consultants must be acceptable to the M.R.P.A.
 3. The environmental consultant has the burden of design and supervision of the project but his rights to professional expression in design are protected.
 4. The performance bond of \$300,000 is administered by the M.R.P.A. and in the event of default or dispute the Hon Minister for Urban Development and Town Planning will arbitrate.
 5. The bond will be reducible by \$100,000 as each of the three project stages is completed to the satisfaction of the M.R.P.A., however the final stage will not be cleared until all plantings are established. Additional safeguards in regard to clearance of conditions result from the arrangements and conditions of the Town Planning Board and the Industrial Land development Authority. Thus the transfer of land from I.L.D.A. to the developer, clearance of subdivision conditions and clearance of development conditions will be linked.

8. Management of Herdsman Lake

- 8.1 Several Government and private agencies own or control land reserved for Parks and Recreation at Herdsman. These include:

Under Secretary for Lands	Crown Reserves and vacant crown land
City of Stirling	Crown Reserves, unmade roads, council owned land, drainage reserves
Metropolitan Water Supply Sewerage & Drainage Board	Drainage reserves
Metropolitan Region Planning Authority	Land acquired for Parks and Recreation
Private individuals	Freehold Land
Mining Companies	Mining claims.

8.8 If a Joint Management Committee for Herdsman Lake is convened by the Authority its function would be to co-ordinate policies and management operations. It would not directly involve itself with the Cooper/Jennings development as this would be supervised and controlled under the provisions of the legal agreement. Any such Committee established by the Authority would have the services of the Technical Consultative Committee.

9. Conclusion

9.1 The Metropolitan Region Planning Authority believes that the E.R.M.P. is a satisfactory document which takes into account detailed discussions which have been held with the Cooper/Jennings Joint Venture. The proposals are in accordance with the 1976 Concept Plan for Herdsman Lake and with agreements which have been reached between the developer and the Authority. The Joint Venturers have indicated their willingness to enter into a Development Agreement with the M.R.P.A. which is an innovative and powerful safeguard against environmental damage. A great deal of detailed design remains to be done but the agreement provides for an environmental scientist to develop and submit detailed designs for approval of the M.R.P.A.

9.2 The Authority believes that the development of the Herdsman Park Estate should proceed as set out in the Environmental Review and Management Program under the conditions previously applied by the Authority.

8.2 At present there is no co-ordination of management activities among the Government and semi-government bodies other than that provided by the planning and development control powers of the M.R.P.A. Several management problems result from this lack of co-ordination, particularly the annual wildfire at Herdsman, which has been shown to be ecologically damaging. The E.R.M.P. highlights this problem and suggests that a considerable amount of public money is being spent by the various Government agencies in an uncoordinated way. Coordination of management and funding may result in economics, and would certainly result in improved environmental management.

8.3 The Parks and Recreation Committee of the M.R.P.A., formerly known as the Region Open Space Management Committee, was established to deal specifically with the co-ordination of management of the major region open space areas, and manages a budget to this end. Herdsman Lake is one of the areas delegated to this Committee by the Authority in accordance with the Committee's Charter. A copy of the Charter and current membership of the Committee is at Appendix 3. This Committee is supported by a Technical Consultative Committee which is comprised of representatives of most relevant departments and local authorities in the Region.

8.4 The work of the Parks and Recreation Committee has been limited to development control and planning, and maintenance of M.R.P.A. properties at Herdsman. Recently the Committee approved a budget of \$40,000 for the Floreat Waters parklands. This included an amount of \$8,000 for monitoring.

8.5 The major question of which body is to be responsible for the ongoing management of Herdsman has been referred to Government as a result of the work of this Committee. The Government has responded by appointing a Cabinet Sub-Committee to examine the Herdsman question and the status of the M.R.P.A.'s Estate at the same time.

8.6 Until the question of ongoing management is resolved, there will remain a need for co-ordination of policies and day to day operations at Herdsman, particularly when the Cooper/Jennings development commences. Whilst the Parks and Recreation Committee of the M.R.P.A. is constituted to do such work, it is lacking in representation from the City of Stirling and the Western Australian Wildlife Authority, which is concerned with the operation of the Nature Study Centre.

8.7 At its meeting of March 22, 1978 the M.R.P.A. resolved to advise the Under Secretary for Mines that it was prepared to withdraw the objection to the mineral claims in the Herdsman Lake area, provided that:

The extraction of silica sand and diatomaceous earth being considered as a three stage operation as follows:

- (a) Drilling and exploration to determine the economic value of the material.
- (b) If excavation is proved viable, the companies concerned shall submit an application to commence development to the M.R.P.A. via the local authority, together with an environmental review and management programme and no development shall commence until approval of the application and then too, only in compliance with the terms and conditions of that approval.
- (c) when a viable mining operation is proposed, a co-ordinating and management group will be formed and convened by the M.R.P.A.

The Environmental Protection Authority has advised the M.R.P.A. that the proposed development is akin to mining. Thus at the appropriate time the Authority intends to convene under the provisions of its Act, a co-ordinating and management group to include all bodies with statutory responsibilities at Herdsman.

APPENDIX 3: SUMMARY OF SUBMISSIONS FROM OTHER GOVERNMENT INSTITUTIONS

Herdsmen Park Estate ERMP Summary of Formal Government Submissions

INDUSTRIAL LANDS DEVELOPMENT AUTHORITY

ILDA has maintained a policy encouraging the development of the industrial land on Herdsmen Lake since 1966, subject to the adoption of acceptable environmental standards and proper urban design.

ILDA has been closely involved in the extended negotiations which have led to the present proposals.

There is currently an unsatisfied demand for industrial land north of the Swan River.

Construction of the Important Regional Road will assist in alleviating present heavy traffic congestion in the area.

There will be provision of a large area of Regional Open Space at little cost to the public which appears to fit well with MRPA's development concept for the area.

ILDA Proposes to enter into a formal Agreement with Herdsmen Nominees Pty Ltd for the company to acquire the major land holding which the Authority has assembled in the area and develop it in accordance with TPS No. 30. ILDA will also be obtaining joint and several guarantees from the parent Cooper & Jennings organisations.

The present proposal is the best opportunity yet to achieve the development in a manner which is broadly acceptable on the major considerations involved. If the present attempt fails it is likely to be a very long time before a satisfactory development proposal can be evolved.

The Authority strongly supports the proposed development as being in the overwhelming general interest of the community.

MAIN ROADS DEPARTMENT

MRD does not wish to offer formal comment.

DEPARTMENT OF TOURISM

The transformation of an ephemeral swamp to a permanent wetland system is supported providing stringent measures are taken to protect the indigenous flora and fauna and the quality of their environment. The moat type of development is particularly suitable.

Adequate provision must be made for the ongoing management and maintenance of the resource.

DEPARTMENT OF FISHERIES AND WILDLIFE

Concern is expressed that a large proportion of the total open water area to be established will be 4-8 m in depth. Curry's report (Bulletin 105) shows that the deep water sector of the Floreat Waters Lagoon is unsuitable for almost all species of water birds which inhabit Herdsmen Lake.

- It is urged that every effort is made to maximise the shallow water/deep water ratio.
- Open, peaty margins with gradients no greater than 1 in 100, should be established around the margins of the water bodies (Curry, Bulletin 105).

DEPARTMENT OF HEALTH AND MEDICAL SERVICES

(Occupational Health, Clean Air, Noise Abatement).

The main concern is that a dust nuisance would arise during the construction phase from two main sources.

- i) Heavy haulage vehicles on unsealed roads.
- ii) Large areas of exposed dry sandfill and peat.

The preventative measures outlined in the document would appear to be adequate to prevent a dust source from (i). The Clean Air Section would interest itself to the extent of making several site inspections.

It may be necessary to employ some method of soil stabilisation to avoid dust from (ii) above.

Attention is drawn to recent amendments of the Clean Air Act where construction sites are now under the Act as Controlled Operations (Section 39(b)).

The sites are subject to a Permit/Consent system for which draft regulations are being assessed by the industry.

In addition, a draft amendment requires the construction company to lodge a bond with the Local Authority to ensure rehabilitation of construction sites to a state in which air pollution will be minimised or prevented.

Before construction work is commenced it would be advantageous for the Joint Venture to discuss their responsibilities with officers of the Clean Air Section.

METROPOLITAN WATER SUPPLY, SEWERAGE AND DRAINAGE BOARD

The MWB requires that adequate arrangements be made for the proper functioning and maintenance of constituted main drains both during construction and on completion of the development. There is special concern here that proper measures be implemented during the various earthworks states described for the formation of industrial land, recreation areas and the important regional road.

The MWB is responsible, under its Act, for the maintenance and operation of the metropolitan main drainage channels and for the operation of the lake as a compensating basin. This must be taken into consideration in further study of Herdsman Lake management options.

The MWB will also be interested in the proposed environmental data collection programme. Certain hydrological information which has been collected by the MWB over past years could be made available to assist the study.

DEPARTMENT OF LANDS AND SURVEYS

The Department finds the ERMP acceptable so far as its interests are concerned.

Right of entry has been granted to Cooper/Jennings as the nominee of Industrial Land Development Authority, to areas of Crown land to be affected by the work described in the ERMP, subject to approval of the development scheme by appropriate authorities.

DEPARTMENT OF MINES

The ERMP provides a lucid and competent description of the proposed industrial development and examines environmental aspects in some detail. However it fails to address the fact that other organisations are seeking to exploit the lake materials.

The large quantities of material to be dredged and used as fill may leave little for companies holding mineral claims. Department of Mines has the responsibility of seeing the rights of mineral claim applicants are maintained.

It is not possible to assess the nature and extent of mineral products that may be viably extractable until details of investigations have been received.

APPENDIX 4: SUMMARY OF SUBMISSION FROM THE CITY OF STIRLING

Herdsmen Park Estate ERMP Summary of Submission from the City of Stirling

OPEN SPACE

More detailed consideration will be required to establish a workable active recreation area.

Not enough detail is given in the proposal for construction of open space areas. In particular suitability of peat as a horticultural material and its treatment to develop a stable surface.

No mention is made of reticulation to the open space areas. The area will need to be reticulated. An approved reticulation system should be supplied by the developer.

Peat is an unstable material and therefore safeguards are required to ensure the continued stability of the lakes and islands once the development is completed.

Council does not have the required resources for organising and managing the monitoring process.

No provision is made for constructing facilities, e.g. toilets, parking areas, in the recreation areas. There would be problems constructing such facilities on peat. There is no provision for connection to sewers.

The validity of excluding the private land at the rear of lots facing Harbourne Street is questioned.

Council is unable to accept the management responsibilities for the maintenance of lands and areas for recreation and leisure activities.

ROAD CONSTRUCTION

The report does not indicate a time limit for the pre-loading of peat. Discussions with the Main Roads Department indicate that pre-loading must occur for at least 300 days. The City must have a clarification of the 36 month period and whether or not the pre-loading period has been considered. The method of establishing a pre-loading height of 3.0 m is questioned.

ADHERENCE TO REGULATIONS

Road Construction

All road construction and associated works must be carried out to the satisfaction of the Local Authority: there is no reason to lower the normal standards. In the case of the Important Regional Road the standards shall be to the satisfaction of the Local Authority and the MRPA.

Noise Abatement

If provisions of the Noise Abatement Act are violated the City's officers are bound by this Act to protect its ratepayers.

Dust Control and Sand Drift

The City is to ensure that dust control and sand drift are kept to a minimum.

Health

The City's normal health requirements for Industrial Development will apply.

DRAINAGE

The City does not accept the proposal of drainage sumps within the industrial subdivision.

Consolidation of the peat will disrupt the existing flow of water towards the lake. The regional road's damming effect would necessitate ongoing management costs of sumps to be incurred by the City.

The strict control of the MRPA on outlet structures should be implemented in the overall drainage system used.

One section of the report indicates a lesser role for monitoring and managing the lake for the Metropolitan Water Board.

The City Engineer hopes that this management is not expected to fall on the City of Stirling. Because City of Perth contributes to the drainage inflow and management of the Herdsman Tunnel is under control of the MWB, it would be difficult for anyone but the MWB to control or manage the water levels in the lake.

PERFORMANCE BOND AND ARBITRATION IN CASE OF DISPUTES

Performance Bond

The performance bond of \$300,000 is not understood. The project is worth more than \$300,000. If it is meant to be a bond which is forfeited while the incomplete project will be accepted by Authorities excluding the City, then the amount is acceptable.

Arbitration in Case of Disputes

The jurisdiction of the Minister for Urban Development and Town Planning as a arbitrator is questioned in matters of design and construction of the engineering aspects of the project. The City's legal advisers have indicated that this is outside the Minister's jurisdiction.

APPENDIX 5: SUMMARY OF SUBMISSIONS FROM GROUPS AND INDIVIDUALS

Herdsman Park Estate ERMP Public Submissions

HARRY FROCHTER

The writer is against any proposals by the Cooper/Jennings Joint Venture for construction of the regional roadway and against any further encroachment onto this wetland area for industrial purposes or for residential purposes.

The writer supports the planning approach that development should achieve a balance between conservation, education and needs of community recreation.

The proposed regional road should be realigned to avoid dissecting any recreational reserve. It should follow the industrial access roads as required by the City of Stirling (relates to plan of subdivision of the industrial estate). It should preserve in the short term a substantial stand of flooded gums.

Community involvement in beautification of the area is desired. Recommended species could be eucalypts and melaleucas. Voluntary conservation groups would gladly help with initial plantings.

No industrial wastes should be allowed to drain directly into the lake. Strict controls should be placed on disposal of toxic and hydrocarbon wastes. The types of industry proposed to operate from the new industrial area should be carefully examined.

Any proposed carparks should be confined to the perimeters of the lake on industrial land.

Management responsibility for the whole lake should be by a Board of Management under the Parks and Reserves Act with representatives from several interested groups.

The Powers of the MRPA to manage the area are not clear and the City of Stirling could not afford the full responsibility, though it could maintain the treed areas which require little attention.

Research should be continually encouraged for ecological data on Herdsman Lake.

Herdsman Lake has potential to become a tourist attraction of world class but only if the bird habitat is protected.

CONSERVATION COUNCIL OF WESTERN AUSTRALIA INC.

The Conservation Council stated that it would make no submission on the ERMP in its present form as it is not of sufficient standard to warrant detailed consideration.

A number of other issues were raised including:

- The period of four weeks for public review was inadequate.
- The price of \$20.00 per copy of the ERMP is excessive.
- The document is inadequate because it neither reviews the existing environment nor proposes a management programme.
- Preliminary acceptance of what the Council sees as a low standard ERMP can only bring into disrepute public participation in environmental assessment.
- The Council believes the project conflicts with certain written statements of DCE and the EPA.

It is asserted that the Joint Venture accepted the Council's offer to assist in preparation of the ERMP but then failed to involve them.

The Conservation Council endorses the Habitat Herdsman *New View of Herdsman Lake* as allowing approved developments to proceed and protecting the valuable bird habitat. The Council is also concerned about amendment of the Metropolitan Region Scheme to rezone recreation reserves to industrial land (Amendment No. 415/33A) before the EPA recommendations have been made.

HABITAT HERDSMAN

The submission was highly critical of the proposed project and expressed concern on a number of matters:

Relationship between the Proponents and Herdsman Nominees. Development to take place on land held by other bodies under pending or conditional mining claims.

Floreat Waters Lagoon has not been long enough established to provide evidence of its success.

Not clear that there is need for more industrial land.

Proposals for end management are inconclusive.

The MRPA Concept Plan called for minimal interference of the central wetland; the proposal does not follow this proposal.

If urban drainage or run-off supplies the proposed lakes, studies are required to determine water quality. *Typha* may be acting as a filter.

The peripheral channel system of the Concept Plan is to be replaced by large lakes. The area of deep, open water is larger than that proposed in the Concept Plan. Construction as proposed may lead to nutrient release.

Hydrological data are inadequate.

Description of the flora and fauna is poor.

The proposal that algal blooms could be counteracted with dyes or algicides was deprecated.

The studies cited were too short to be meaningful.

The \$300,000 development bond is not considered to be an adequate safeguard against environmental problems.

Does the EPA agree to funding monitoring and research in years two and three?

The Group is against carrying out research while development is proceeding.

THE TREE SOCIETY

Concern was expressed about a number of issues including:

- The short period available for public comment.
- The cost of the ERMP document.
- Lack of terms of reference included in the ERMP.
- Lack of presentation of all options and lack of cost-benefit analysis of options.
- Shortcomings in the document including contradictory and unjustifiable statements, lack of understanding of wetland ecology, failure to review the existing environment adequately, failure to provide a management programme and misleading information in Fig. 1.1 (unexplained).
- A discrepancy in areas of development (apparently accounted for by interpreting the area involved as including industrial land rather than just that reserved for Parks and Recreation).

The Tree Society is not making a submission on the ERMP as presented but would be prepared to review its position should circumstances seem to warrant it.

IAN LANTZKE: Claremont College

Frame of reference:

- A teacher with particular concern for training of primary school teachers.
- A rate-payer of the City of Stirling concerned at the size of the City's large parks and gardens maintenance bill.
- Has studied the coastal wetlands for almost 10 years, including Herdsman Lake, and has taught students in or at the lake.

- Believes that large tracts of natural areas are necessary to provide people with contact with their environment.
- Wetlands of the coastal plain are essential and all must be conserved.

Personal Preferences

- Leave the lake alone or obtain adequate baseline data prior to changes (sampling all year long for seven to ten years).
- If the industrial area must be filled, use fill from an alternative source, e.g. sand slurry pumped from Mongers Lake.

Criticisms of the Document

- The document is repetitious
- Use of emotive but inappropriate terms
- Errors

Errors of Commission

- Concept plans do not call for large areas of open water
- No effort is made to remedy the lack of baseline data prior to the proposed development.

Errors of Omission: (Request that the ERMP be amended to include the information).

- Use has not been made on existing information on the fauna apart from the birds (ref. Work of Lantzke; Students of Claremont College; Environment 2000).
- The arguments for birds are incomplete; no consideration of other water bodies.
- There is a lack of quantitative data.
- Blue-green algae have been detected in Floreat Waters lagoon.

Comments on the Proposal

The problem is seen as being to balance the financial gain of the proposers plus three years employment, and financial savings to the community of producing a range of leisure opportunities against the long-term costs of maintenance, loss of present habitat and likely degradation of the part of the lake that is left.

Too much emphasis is placed on the bird fauna and insufficient on other components of the fauna of educational interest.

The necessity to provide a range of habitats on Herdsman Lake is not seen. It is suggested that Mongers Lake provides sufficient open water; Herdsman should be retained as quality reed swamp.

A number of stances are queried, e.g.:

- that the 'natural fenland' must be improved
- that birds are the only important species
- that the Joint Venturers alone know what is needed
- that there is a need for more industrial land in the northern suburbs.

Monitoring

- Frequency of monitoring is inadequate.
- Samples should be analysed for heavy metals and hydrocarbons.
- What will happen to results of the monitoring programme? Data should be made available to the public and the DCE.
- Proposed computer treatment will not necessarily provide any benefit.

Conclusions

The writer appreciates the engineering nicety of the proposal and notes some good planning intentions for the disposal of waste water and monitoring change.

Sand fill should come from Mongers Lake after adequate environmental monitoring; water flow within the lake should be ascertained.

ADRIANNE KINNEAR: Department of Science Education, Churchlands College.

The submission is prefaced by a statement on the approach to the use of local natural ecosystems for education adopted by the Department in training pre-primary and primary science teachers. It contends that:

- Access to natural communities and their resource of biological materials is essential for effective education for and about the environment;
- An environment which offers a diversity of areas for investigation maximises its education potential;
- Herdsman Lake represents an opportunity to develop and conserve a wetland system and its fringe vegetation and, at the same time, cater for access for education.

The submission then examines the ERMP in some detail and makes a series of recommendations for changes in the plan to achieve better provision for education.

Recommendations

- That a much greater area of the peripheral edge be set aside for the development of fringe communities (trees, shrubs, understorey), to supplement the areas designated as "tree protection".
- That a greater area of wetlands be retained around the periphery.
- Associated with the extensive peripheral plant communities and adjacent reed beds, that there be controlled access pathways through and to such communities.
- That the area and volume of open and shallow water be reduced. Consideration should be given to reducing the amount of fill taken from Herdsman Lake.
- That alternative means be implemented for the discharge of stormwater from adjacent industrial areas.
- Comments are also made on Section 8 of the ERMP – Environmental Management, Research and Monitoring. There is seen to be vagueness about sampling procedures, particularly as they relate to the invertebrate fauna. A great deal more attention should be given to monitoring of the invertebrate fauna.

The submission supports its recommendations by reference to relevant sections of the report.

ROYAL AUSTRALASIAN ORNITHOLOGISTS UNION

The ERMP does not recognise that the MRPA Concept Plan is a concept, not a development plan. Recent information has suggested that the concepts may be better fulfilled by different designs than those shown by the maps in the Concept Plan.

Typha is a productive vegetation type for birds. Many rare species for which Herdsman is an oasis, favour *Typha*. It is desirable to maintain the present balance between stands of *Typha* and other species.

The design of islands shown in the ERMP should be modified to a saucer-shaped construction.

'Shallow' water should be defined as less than 0.3 m rather than 1 m.

The Concept Plan does not explicitly recommend "improvement" of the central wetland area. Minimum disturbance of the central area will be the best management. The RAOU regrets the great area included as 'limit of operations'. There is adequate deep water in the metropolitan area, but little and decreasing amounts of shallow swamp.

The value of Herdsman Lake to birds is its provision of places where rare species which do not breed or occur in many places in W.A. can live and breed. The presence of rare species at Herdsman is a measure of its success.

Management for wilderness which is cheap should be distinguished from the expensive exercise of wildlife management to produce large numbers of game birds or discourage predation.

Care should be taken that facilities to manage storm water do not become lethal to wildlife.

The EPA should control the monitoring programme. The MRPA should be regarded as a developer as it has a vested interest in the results of the development.

Fires on Herdsman frequently appear to start along the drains and to be purposely lit, rather than starting at the margins as suggested in the ERMP.

PETER CURRY

Comments in this submission are directly related to specific sections of the ERMP.

Areas of concern identified:

- Possible water quality problems arising from deoxygenation of waters in the deep lakes and input from the drainage system.
- Mechanisms for reporting on monitoring and special events, e.g. spillages.
- How is the area to be managed? A decision on management of the whole lake should be reached before the development proceeds.
- The list of plant species could have been extended.
- What penalties can be imposed if an industrial plant can be shown to have been negligent in its waste disposal?
- Who pays to clean up messes which cannot be traced to a particular origin?
- Control of bulrush on islands may not be necessary; Purple Gallinules and other roosting birds will probably achieve effective control.