Market Garden, Lot 1 (274) Pinjar Road, Mariginiup

Mr R M Delamare

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 657
November 1992

THE PURPOSE OF THIS REPORT

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister for the Environment on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's recommendations.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding environmental conditions which might apply to any approval.

APPEALS

If you disagree with any of the assessment report recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of $10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
West Perth WA 6000

CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on 27 November 1992

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1. Introduction and assessment procedure

This proposal was referred to the Environmental Protection Authority in July 1992 and it was decided to formally assess the proposal. It was proposed to use the following procedure;

1. Send copies of the planning application and a covering letter noting the key issues identified by the Authority to the following bodies;

   Market Gardeners Association of WA
   Coalition for Wanneroo's Environment
   Conservation Council of WA
   Australian Conservation Foundation (WA Branch)
   Library, Environment Centre of WA
   Water Authority of Western Australia
   Department of Planning and Urban Development
   Department of Agriculture
   City of Wanneroo

   It was anticipated that three weeks would be a sufficient time for the groups and agencies to respond to the proposal.

2. A summary of submissions would be prepared, and the proponent was to be allowed two weeks to respond to submissions.

3. Prepare this assessment report.

After the close of submissions, only one response had been received from a State government agency. The Authority telephoned the relevant State Government agencies seeking their response and wrote to the proponent asking if he wished to respond to the issues raised by State Government agencies. However, no response was received from the proponent. Submissions were received from Water Authority of Western Australia, Department of Planning and Urban Development, and the City of Wanneroo. The last submission in response to the proposal was received by the Authority on 9 October 1992. The comments made in submissions have been considered in the assessment of the proposal by the Authority.

2. The proposal

The proposal is to irrigate approximately 6 hectares of Lot 1 Pinjar Road as shown on Figure 1. The proponent has not determined the type of crops to be grown because the the proponent would seek a lessee to operate the proposed market garden if it gained approval.

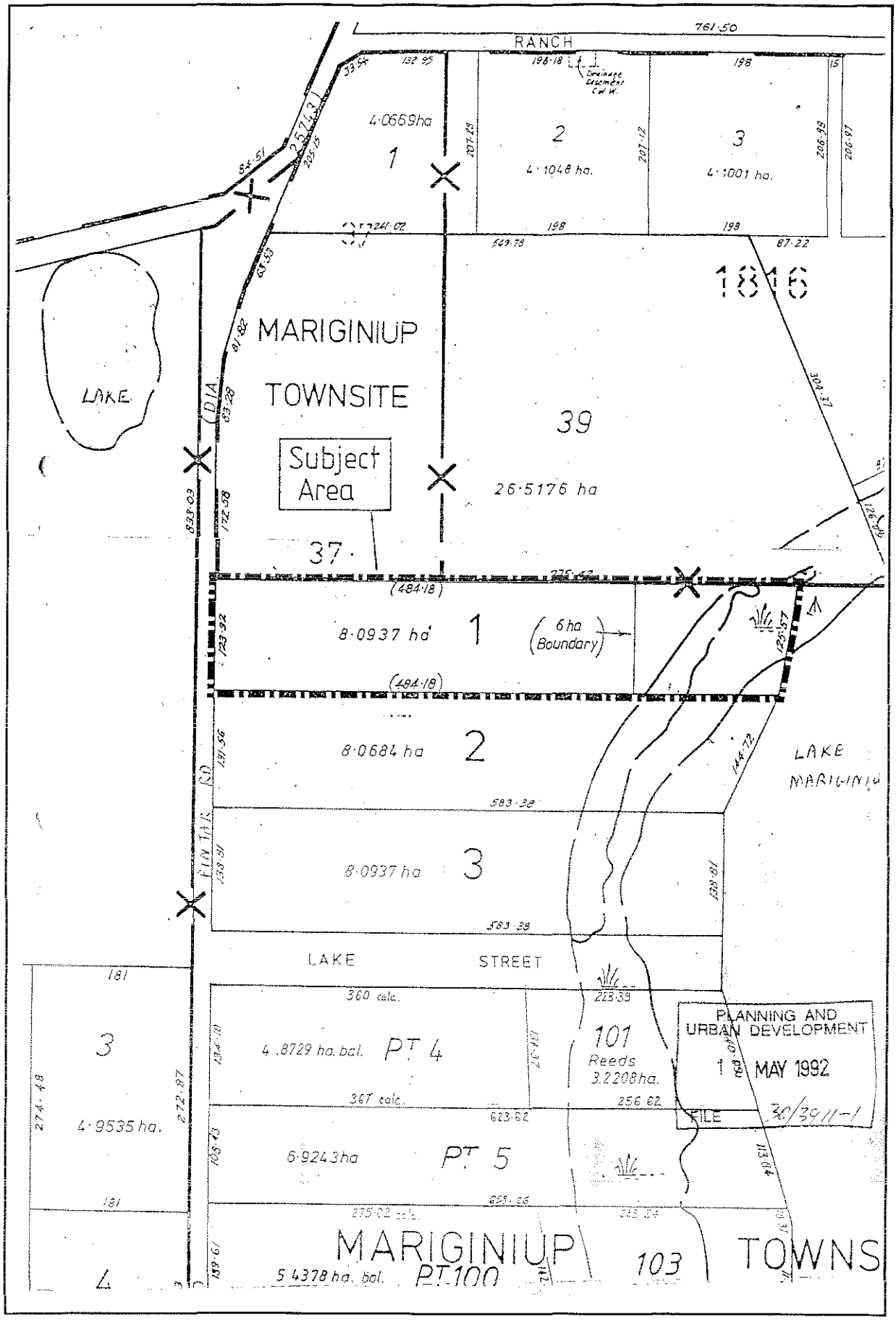


Figure 1. Location of lot 1 Pinjar Road showing boundary of 6ha proposed to be irrigated and the interim boundary of the area proposed for Parks and Recreation.

2.1 Typical nutrient use and loss rates from market gardens

The main nutrients applied to market gardens on the Swan Coastal Plain are nitrogen and phosphorus. They are applied either as manures or artificial fertilisers.

Appendix 1 shows typical levels of phosphorus and nitrogen applied, removed in crops and residual in kilograms per hectare of crop (kg/ha/crop) and the percentage of that applied which is residual for the major vegetable crops on the coastal sands of Western Australia.

It can be seen from Appendix 1 that the Western Australian Department of Agriculture currently recommends applications of 50 to 120kg of phosphorus per hectare per crop for horticultural crops commonly grown on the coastal plain. Multiple cropping is common, so the recommended application rate per year is 2 to 2.5 times that amount (around 200kg of phosphorus). At these rates, only 10-20% of the applied nitrogen and phosphorus is taken up by the crop and removed when the crop is harvested. The remaining nutrients are leached by rain and irrigation water into the ground and that not absorbed by the soil reaches the groundwater.

3. Existing environment

3.1 Wetlands, groundwater and soils

As shown on Figure 1, Lot 1 has Mariginiup Lake to the east and an un-named lake to the north-west.

A comparison between a map showing regional maximum groundwater levels and a map showing topographic contours mapped at 2m intervals indicates that little, if any of Lot 1 has a separation of 5m or more between the surface and the highest known groundwater level.

The regional groundwater flow is to the west, however recent studies on the interaction between lakes, wetlands and unconfined aquifers suggest that groundwater flows from Lot 1 may be drawn towards the unnamed lake to the north-west.

The Altas of Natural Resources (Darling System Western Australia) indicates that the boundary between the Bassendean and Karrakatta landform and soils occurs at or in the vicinity of Lot 1.

Neither the Karrakatta or Bassendean soils have a substantial capacity to retain or bind nutrients. The Western Australian Department of Agriculture has tested a number of types of Karrakatta soils and found Phosphate Retention Index (PRI) values of between 0.3 and 26, however most Karrakatta soil types had PRI values of below 4.1. Bassendean Sands typically have PRI values near zero. Whilst the fate of nitrogen applications to these soils is poorly understood, unacceptable levels of nitrogen contamination have occurred under market gardens in similar situations to this proposal.

No specific testing or analysis of the soil at Lot 1 has been carried out by the proponent.

The Draft Environmental Protection (Swan Coastal Plain Lakes) Policy and regulations associated with the policy apply to the unnamed lake.

4. System 6 Recommendations and planning context

4.1 Regional setting

Lot 1 lies in the North West Corridor which is experiencing a significant population increase and development pressures.

The area east of Wanneroo Road has traditionally been a rural area, with land use activities ranging from horticulture, equestrian related activities, hobby farms and special rural zones. While some urbanisation will occur east of Wanneroo Road, it is expected that, for the foreseeable future, the area will remain important for rural land uses.

However, in particular sensitive locations, rural land uses which may be have been acceptable in planning terms may no longer be acceptable in the light of new information. For example, in the Wanneroo Wetlands area, environmental concerns relating to water quality, nutrient management and wetland protection have been demonstrated and land capability is now considered to be the best basis for agricultural land use planning. This has created uncertainty where current town planning schemes permit uses which are now considered unacceptable by the community. Both the Department of Planning and Urban Development and City of Wanneroo are aware that to alleviate this problem, land capability studies need to be carried out in order to determine the acceptability or otherwise of proposals and that appropriate wetland areas need to be protected and reserved and as outlined in below are considering measures to ensure this occurs.

4.2 System 6 and the M8 wetlands

The 1983 System 6 report, or "Red Book", of the Environmental Protection Authority identified areas which are desirable for National Parks, Nature Reserves and major associated recreational areas. The System 6 region extends from Moore River to the north, to Blackwood River to the South, and east from the coast approximately 80 kilometres.

The Red Book identified many of the wetlands East of Wanneroo Road and between Lake Pinjar and Snake Swamp has having important environmental value. This includes the area east of Wanneroo Road which has a number of interdunal swales that intersect with the watertable forming a series of wetlands known as the "Circular wetlands", including Mariginiup Lake, Lake Jandabup, Lake Pinjar, Lake Gnangara, and many smaller seasonal lakes and damplands.

These wetlands were grouped together and called the M8 wetlands. The Authority's recommendation for M8 is as follows:

M8.1 That our general recommendations on planning and management of regional Parks be applied to the area (see Recommendations 15 and 16, Chapter 5).

M8.2 That the Metropolitan Region Planning Authority consider "reserving" those portions of the area not already "reserved" for Parks and recreation under the Metropolitan Region Scheme according to the following order of priorities: Jandabup lake, wetlands north of Jandabup lake, Mariginiup Lake... etc

M8.3 The Wanneroo Shire Council's Circular Lakes Landscape Enhancement Area Plan for the area is endorsed.

The key M8 Recommendation is that the M8 wetlands and some of the associated upland areas be made part of a Regional Park. The nature of these Parks is discussed in detail in Chapter 5 of the Red Book. In summary, they are meant to be areas of open space of regional importance that are managed for conservation, landscape protection and recreation.

Ownership of the land contained within a Regional Park can be either public or private provided that the management objectives are consistent with protection of the important natural and man-made elements of the landscape.

The System 6 recommendation for Mariginiup Lake is indicative only and the actual boundary of the area to be reserved for a Regional Park as Parks and Recreation will ultimately be determined by the planning system. Figure 2 shows the System 6 boundaries for the wetlands near Lot 1.

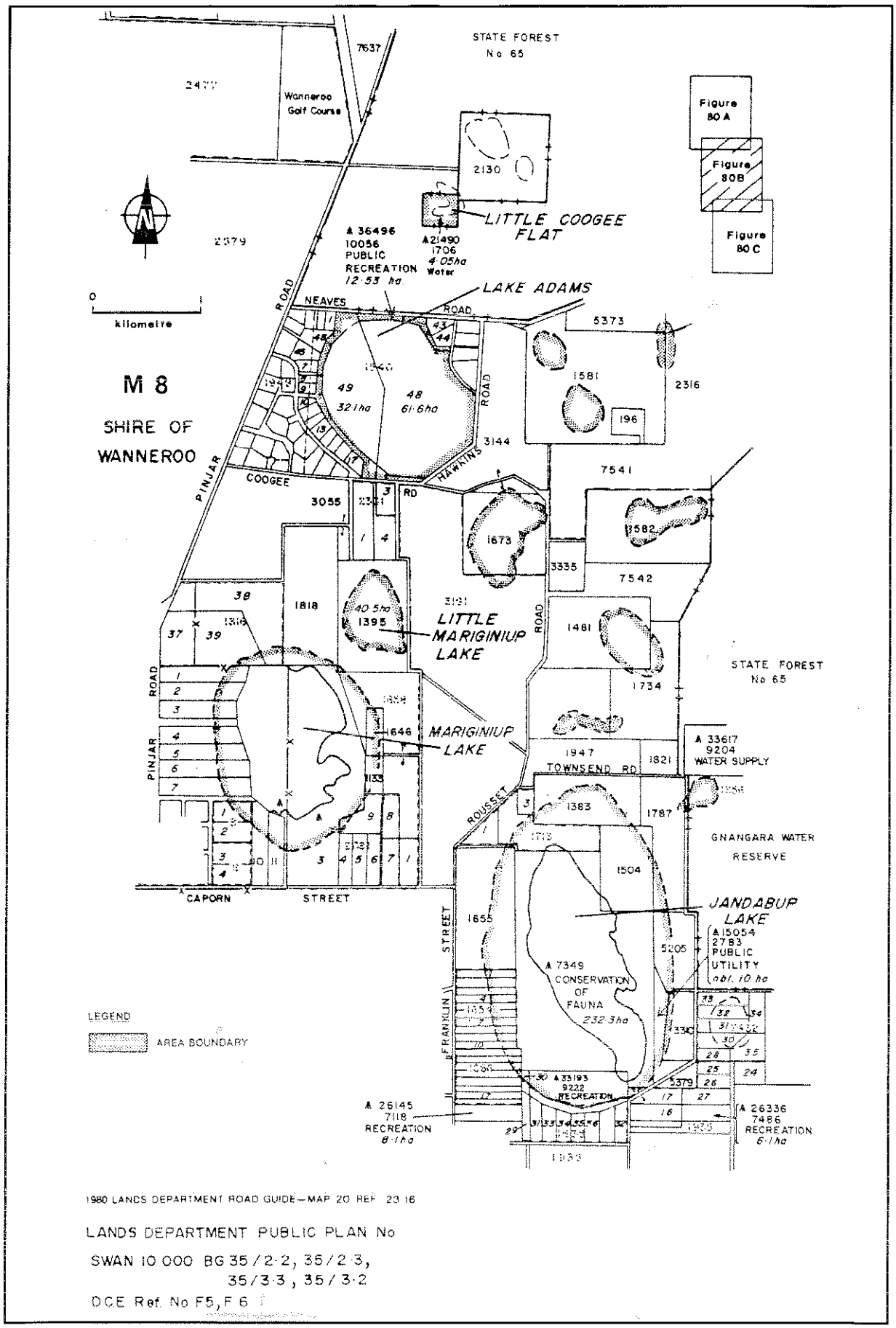
4.3 Planning control area 16

In response to the System 6 Recommendations the Department of Planning and Urban Development has recently completed a Study which defines open space boundaries around four important wetlands in the East Wanneroo region, namely Lakes Gnangara, Jandabup, Mariginiup and Little Mariginiup.

This Study was preceded by the declaration of Planning Control Area Number 16 on 22 June 1990 by the Department. The Planning Control Area included land within and immediately adjacent to these four important Wanneroo wetlands (See Figure 3). Lot 1 falls within the area affected by Planning Control Area 16 and is affected by the proposed open space boundaries.

Planning Control areas permit the Department of Planning and Urban Development to control land uses within those areas so as to protect the recognised values of the area whilst a detailed study is undertaken.

The Department of Planning and Urban Development is considering initiating an amendment to the Metropolitan Region Scheme in the near future. The recommended boundaries for acquisition as Parks and Recreation reserve are shown in Figure 4.



1980 LANDS DEPARTMENT ROAD GUIDE—MAP 20 REF 23 16

LANDS DEPARTMENT PUBLIC PLAN No

SWAN 10 000 BG 35/2-2, 35/2-3,
35/3-3, 35/3-2

DCE Ref. No F5, F 6

Figure 2. System 6 boundaries for the lakes near Lot 1.

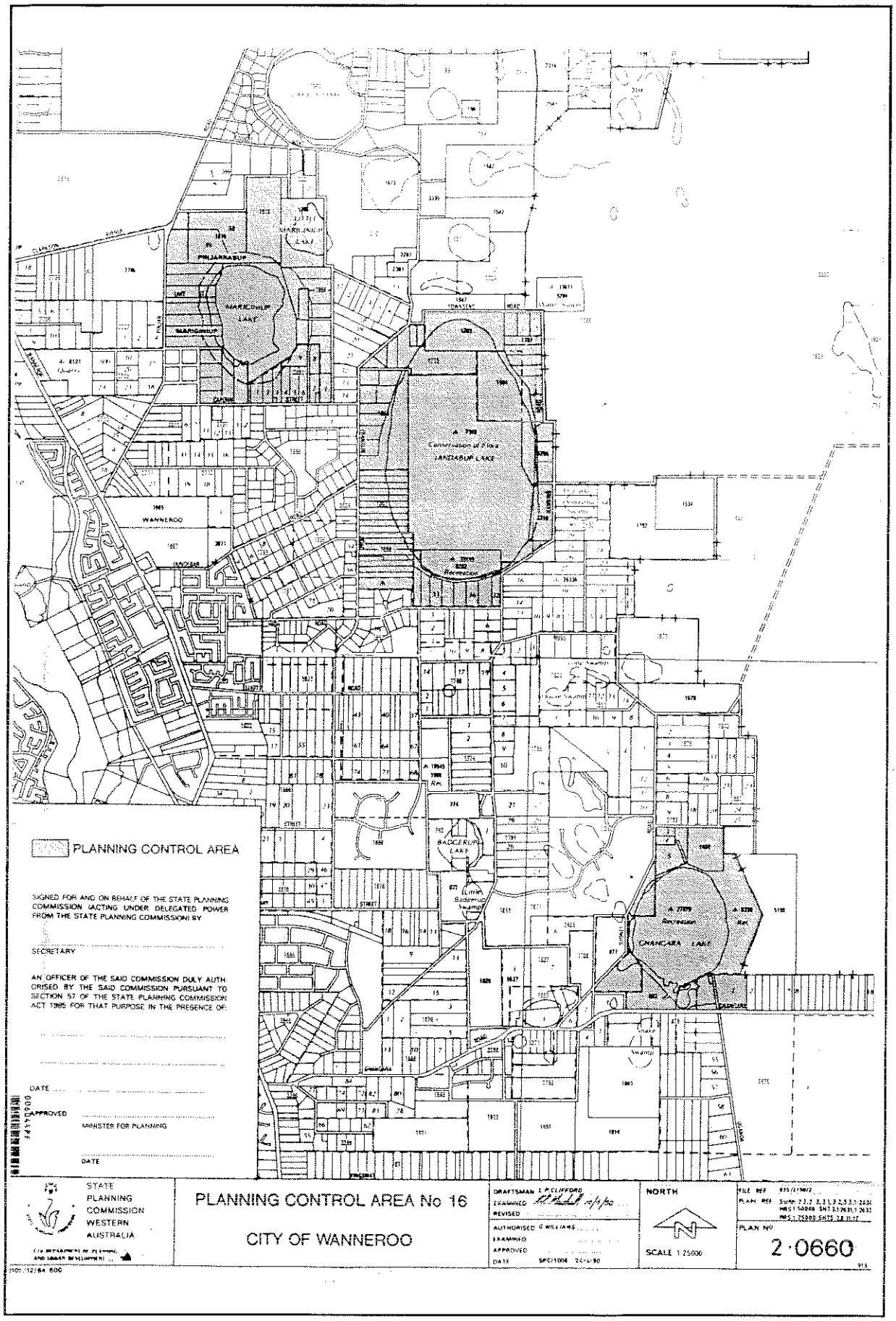


Figure 3: Planning Control Area Number 16.

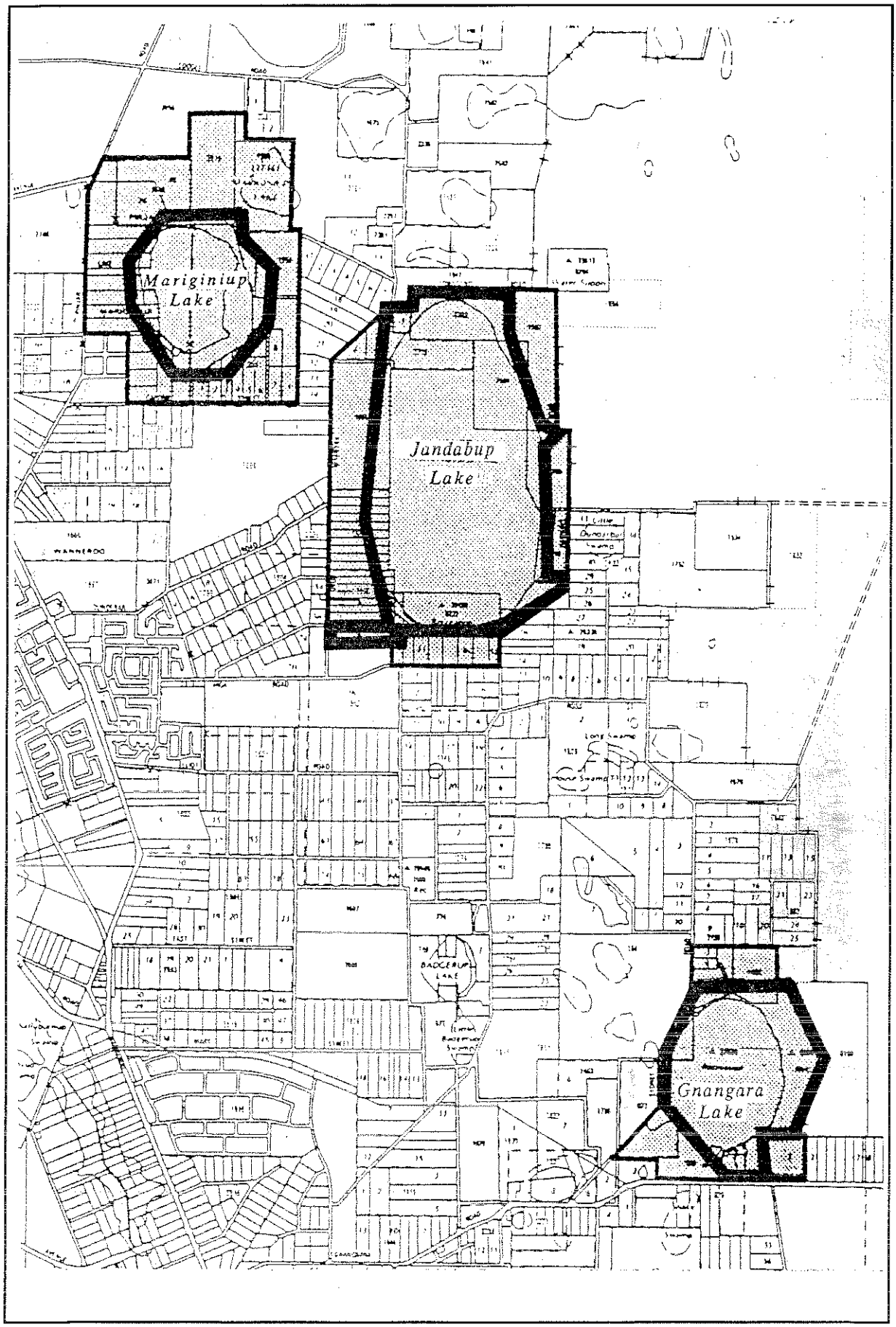


Figure 4. The Department of Planning and Urban Development's proposals for open space around and including Lakes Mariginiup (which includes Lot 1), Jandabup, Little Mariginiup and Gnangara.

4.4 The Gnangara Regional Park and City of Wanneroo's Rural Strategy

In order to identify acceptable land uses and protect wetland areas the Department of Planning and Urban Development has proposed two planning mechanisms, namely;

1. Preparation of a Local Rural Strategy. Such a Rural Strategy will be able to manage land use change and ensure decision making takes place in a coordinated and consistent manner in the context of both planning and environmental concerns. In September 1992, the City of Wanneroo resolved to prepare a Local Conservation Strategy which will examine issues such as agricultural land use and its impact on wetland areas. The outcomes of the Local Conservation Strategy are proposed to be integrated into a Local Rural Strategy.

2. Establishment of the Gnangara Regional Park to recognise the conservation values of wetlands in the Gnangara groundwater area, which includes the M8 wetlands. The Department of Planning and Urban Development expects to commence a study to establish exact boundaries of the Regional Park during the 1992/93 financial year. Areas will then be reserved under the Metropolitan Region Scheme and acquired.

An agreed and adopted Rural Strategy involves lengthy investigation and discussion as does the imposition of a Parks and Recreation reservation. Planning Control Area 16 is a necessary interim measure to protect assets which may ultimately be acquired for community benefit.

Pending completion of the mechanisms described above, developments in sensitive areas need to be regulated and landowners whose livelihoods may be affected need to be given some guidance on the acceptability or otherwise of various proposals. To achieve this the Department of Planning and Urban Development is considering two approaches, namely;

1. Bring forward the Metropolitan Region Scheme amendment relating to the establishment of the proposed Gnangara Regional Park just within the area covered by Planning Control Area 16. As recommended boundaries of areas to be rezoned to Parks and Recreation have been identified, and only slight amendments to the recommended boundaries are envisaged, this may be feasible.

2. Development of an interim policy statement agreed by all relevant parties as to what land uses are and are not acceptable adjacent to land affected by Planning Control Area 16. This would aid decision making, protect the value of the wetlands in the short term and provide greater certainty for landholders pending production of a Local Rural Strategy.

The Environmental Protection Authority endorses the mechanisms and approaches outlined above and urges that they be given a high priority.

5. Environmental assessment

5.1 Potential for groundwater/wetland nutrient pollution

Based on the likely nutrient export rates from the proposed horticultural activity (See Section 2.1 of this report), the low phosphate retention capabilities of the soil and minimal separation between the groundwater and land surface (See Section 3.1 of this report) the Environmental Protection Authority considers that this proposal for conventional market gardening could not be sustained on Lot 1 without unacceptable contamination of the groundwater by nutrients (particularly phosphorus and nitrogen) below Lot 1. This pollution would then most likely be transported to the nearby unnamed lake to the north west and could cause an unacceptable decrease in water quality of the lake which could cause algae blooms, midge plagues and foul odours.

5.2 Acceptable land uses

The Environmental Protection Authority considers that fertiliser application rates and stocking rates recommended by the Western Australian Department of Agriculture for grazing of pastures could be sustained without unacceptable groundwater contamination provided fertiliser was not applied in the area proposed by Planning Control Area 16 for Parks and Recreation.

As indicated in Section 4.4 of this report, the Environmental Protection Authority endorses the proposal by the Department of Planning and Urban Development to develop an interim policy statement agreed by all relevant parties as to what land uses are and are not acceptable adjacent to Planning Control Area 16.

6. Recommendation

Recommendation

The Environmental Protection Authority considers that the proposal for a market garden, at Lot 1 (274) Pinjar Road, Mariginiup could not be sustained without unacceptable contamination of the groundwater by nutrients and unacceptable impacts on System 6 area M8. The Authority therefore recommends that this proposal not be implemented.

Appendix 1

Typical levels of phosphorus and nitrogen fertilizer applied, removed and residual in kg/ha/crop and the percentage of that applied which is residual for the major vegetable crops on the coastal sands of Western Australia

Phosphorus

Crop	Yield (T/Ha)	Status	Phosphorus applied (kg/ha/crop)			P removed (kg/ha/crop)	Residual P (kg/ha/crop)	Residual P as % of applied
			Total	Organic	Inorganic			
Cabbage	50	Established	100	40	60	24	76	76
		New	260	200	60	24	236	91
Carrots	44	Established	50	0	50	15	35	70
		New	74	24	50	15	59	80
Cauliflowers	50	Established	120	40	80	25	95	79
		New	280	200	80	25	255	91
Celery	100	Established	134	20	114	40	94	70
		New	214	100	114	40	174	81
Lettuce	50	Established	90	40	50	20	70	78
		New	250	200	50	20	230	92
Onions	50	Established	120	40	80	26	94	78
		New	280	200	80	26	254	91
Potatoes	40	Established	120	40	80	15	105	88
		New	280	200	80	15	265	95
Pumpkins	25	Established	100	40	60	10	90	90
		New	180	120	60	10	170	94
Rockmelons	25	Established	76	16	60	10	66	87
		New	140	80	60	10	130	93
Tomatoes	60	Established	160	40	120	33	127	79
		New	320	200	120	33	287	90

Nitrogen

Crop	Yield (T/Ha)	Status	Nitrogen applied (kg/ha/crop)			N removed (kg/ha/crop)	Residual N (kg/ha/crop)	Residual N as % of applied
			Total	Organic	Inorganic			
Cabbage	50	Established	495	120	375	147	348	70
		New	975	600	375	147	828	85
Carrots	44	Established	300	0	300	100	200	67
		New	372	72	300	100	272	73
Cauliflowers	50	Established	570	120	450	119	451	79
		New	1050	600	450	119	931	89
Celery	100	Established	400	60	340	154	246	62
		New	640	300	340	154	486	76
Lettuce	50	Established	370	120	250	100	270	73
		New	850	600	250	100	750	88
Onions	50	Established	320	120	200	90	230	72
		New	800	600	200	90	710	89
Potatoes	40	Established	260	120	140	132	128	49
		New	740	600	140	132	608	82
Pumpkins	25	Established	320	120	200	75	245	77
		New	560	360	200	75	485	87
Rockmelons	25	Established	198	48	150	75	123	62
		New	390	240	150	75	315	81
Tomatoes	60	Established	890	120	770	80	810	91
		New	1370	600	770	80	1290	94

Phosphorus and Nitrogen fertilization (applied, removed and residual in kg/ha/crop) and the percentage of that applied which is residual for the major vegetable crops on the coastal sands of Western Australia (adapted from information provided by

the Western Australian Department of Agriculture). Parts of these tables have been published previously by McPharlin and Luke (1989).

Assumptions for calculations made in tables

1. Major crops on sands ranked on area basis.
2. Yield estimated as good commercial average rather than Australian Bureau of Statistics average.
3. Assumed fertilizer applied as either organic (eg poultry manure) or inorganic (eg superphosphate, urea) according to Western Australian Department of Agriculture recommendations for new or established properties in kg/ha/crop elemental N or P.
4. Nutrient removal figures based on empirical data of Huett, D O (1985) (New South Wales Department of Agriculture), Knotts Handbook for Vegetable Growers (1988) and calculations made by officers of Western Australian Department of Agriculture for nutrients removed in harvested product.
5. Where most of the crop is harvested (eg cabbage, lettuce), very little N or P remains in the organic fraction of the soil. Where only part of the crop is removed as harvested product (eg tomato, carrot root etc) large quantities of N and P may remain in the unharvested material (leaves, stems etc). This is treated as one source as it is difficult to estimate the two sources.
6. It is assumed that organic fertilizers applied preplanting (eg poultry manure) have mineralised to elemental N and P by the end of the crop life so this appears as the inorganic form of N or P remaining.
7. Poultry manure: N = 3%, P = 1% average on a dry weight basis assuming a moisture content of 50%. N and P content of poultry manure vary considerably (N = 2 - 4.5%, P = 0.4 - 1.7% dry weight basis).
8. The N and P remaining is available for leaching. It should not be assumed that all N and P remaining will leach as this will depend on soil type, irrigation refines etc. It would be reasonable to assume that almost all P not used by the crop could leach from Bassendean sands since they have an extremely low P retention ability (PRI). Spearwood sands have a high PRI relative to other coastal sands but may still only hold a few percent of P remaining. Nitrate retention would be low in both Spearwood and Bassendean sands.

References

Huett, D O (1985). Plant Nutrition. In 'Vegetable Growing Handbook' ed. by J. Salvestrin, pp 44-49.

Lorenz, O A and Maynard, H W (1988). Knotts Handbook for Vegetable Growers. 3rd ed. John Wiley and Sons, New York.

McPharlin, I and Luke, G (1989). Irrigation and fertilizer management for horticultural crops on the Swan Coastal Plain. Journal of Agriculture, Western Australia, 30, 91-95.