

HERDSMAN LAKE

Boundary Definition: protected area/conservation wetland boundary

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 281

Area (ha): bushland 22.6 (Site also includes open water.)

Map no. 40, 46

Map sheet series ref. no. 2034-II SW

Other Names: part of Herdsman Regional Park

Local Authorities (Suburb): City of Stirling (Herdsman, Churchlands, Glendalough)

Includes CALM Managed Land: Reserve 31906 (Environmental Education and Conservation of Flora and Fauna)

System 6 (1983): M43 part System area bushland, only bushland described

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qhw: Cps)

VEGETATION AND FLORA

Vegetation Complexes

Wetlands

Herdsman Complex

Floristic Community Types: not sampled, insufficient vegetation

WETLANDS

Wetland Types: lake, artificial channel

Natural Wetland Groups

Spearwood Dunes

Balcatta (S.2)

Wetland Management Objectives: Conservation (307.5ha)

Swan Coastal Plain Lakes EPP: 252.3ha

THREATENED ECOLOGICAL COMMUNITIES

Not determined

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: open water, vegetated wetland

Vegetation and Flora

Structural Units: mapping (EPA and WAWA 1990)

Wetlands: *Eucalyptus rudis* Woodland; *Melaleuca* sp. Low Woodland; *Melaleuca raphiophylla* Low Open Forest, *Baumea articulata* Sedgeland

Scattered Native Plants: *Eucalyptus rudis* Woodland and *Melaleuca* sp. Low Woodland — regionally significant vegetation recognised as being in the area of Site in need of protection

Vegetation Condition: <10% Good, >90% Degraded to Completely Degraded

Total Flora: not known

Significant Flora: none recorded

Fauna: multiple survey for birds (107 species) (RAOU 1996 D, 51 visits), limited survey for reptiles (7 species) (J. Dell pers. comm.). Good assemblage of ducks and other waterfowl including Hardhead, Australasian Shoveler, Blue-billed, Pink-eared and Musk Ducks, and Dusky Moorhen. Important feeding site for birds of prey, including Swamp Harrier, and aerial insectivores, including Tree Martin and Welcome Swallow (J. Dell pers. comm.). Significant bird species: category 1 (2), category 2 (6), category 3 (9), and category 4 (4). Significant reptile species: Mourning Skink (*Egernia luctuosa*). Important research and teaching site

Linkage: no adjacent bushland; part of Greenways 23, 30 (Tingay, Alan & Associates 1998a); part of a regionally significant potential bushland/wetland linkage (Part A, Map 7)

Other Special Attributes: to become the 'Herdsman Lake Regional Park' (State Government Cabinet Minute 5 May 1997)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; Location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation, Criteria not relevant to determination of regional significance, but which may be applied when evaluating areas having similar values

Recommendation: Site with Some Existing Protection; The care, control and management of this area for conservation purposes within Herdsman Lake Regional Park is endorsed (see Table 3, Volume 1).

HERDSMAN LAKE

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SECTION 1: CADASTRAL INFORMATION

(Lots, locations and derived information to be updated in the public submission period)

Bushplan Site no. 281 **Map no.** 49, 50 **Map sheet series ref. no.** 2034-II SW

System 6 (1983): M43 part System area bushland, only bushland described

Other Names: not known

Area (ha): total 311.3 (includes open water); bushland 22.6

Local Authorities (Suburb)

City of Stirling (Herdsman, Churchlands, Glendalough)

Zoning

MRS: Parks and Recreation

TPS: Landscape

Ownership Categories

Private (commercial organisation), Local Government, State Government, Not identified

Lot/Location/Reserve numbers (Purpose), Street name

1, 2, 3, 83, 84, 85, 86, 113, 115, 116, 117, 118, 119, 137, 138, 139, 452, 501 Lakeside Rd; 3, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405 421, 470, Selby St; 1, 29, 41, 82, 303, 460, 1003, 1005, 1007 Pearson St; 1, 2, 3, 12, 109, 304, 461, 468, 475, 477, 483, 484 Jon Sanders Dv; 0, 1, 2, 3, 4, 9, 12, 15, 50, 200, 430, 458, 462, 463, 493, 496, 604, 605, 607 Moondine Dr; 13, 8059 Herdsman Pde; 352 Bishop Riley Wy; 54, 393, 450, 480, 484, 1005 street not identified

CALM Managed Land

Crown Reserve

Reserve 31906 (Environmental Education and Conservation of Flora and Fauna)

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Linkage: no adjacent bushland; part of proposed Greenways 19, 23 (Tingay, Alan & Associates 1997a); part of a regionally significant potential bushland/wetland linkage (Volume 2A, Map 8)

Other Special Attributes: to become the Herdsman Lake Regional Park (State Government Cabinet Minute 5 May 1997)

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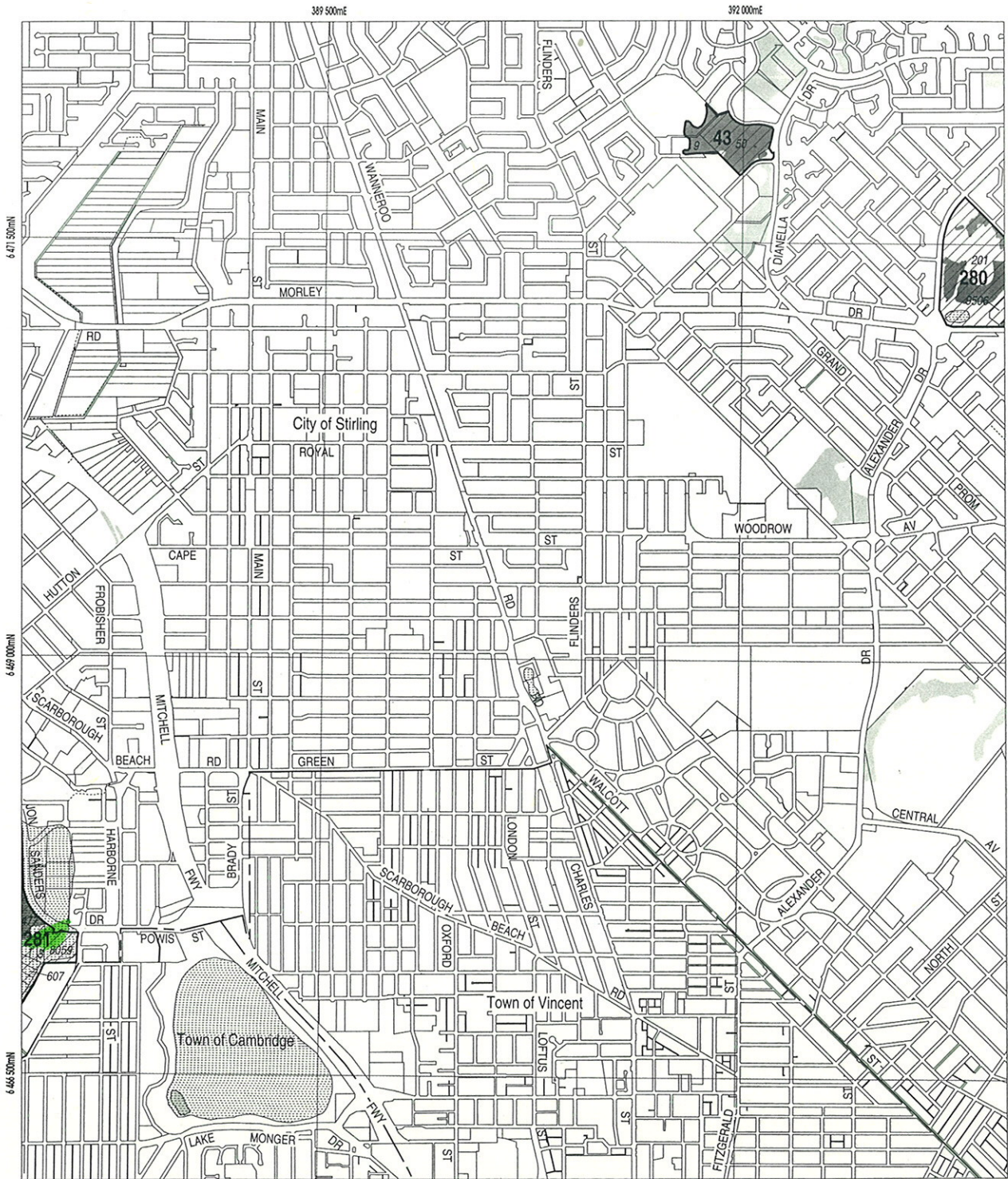
Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site subject to Swan Coastal Plain Lakes EPP; location of Scheduled Fauna, conservation category wetland; under MRS Parks and Recreation Reservation and TPS Landscape Zoning, Crown Reserve

Constraints: private land

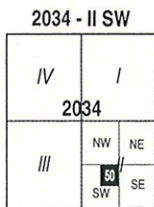
Recommendation: The care, control and management of this area for conservation purposes within Herdsman Lake Regional Park is endorsed.



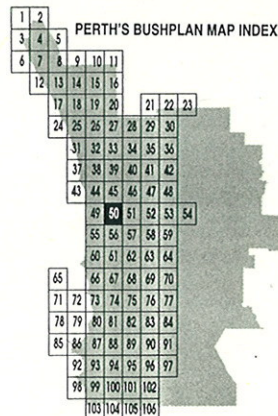


LEGEND

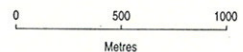
- 472 Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary



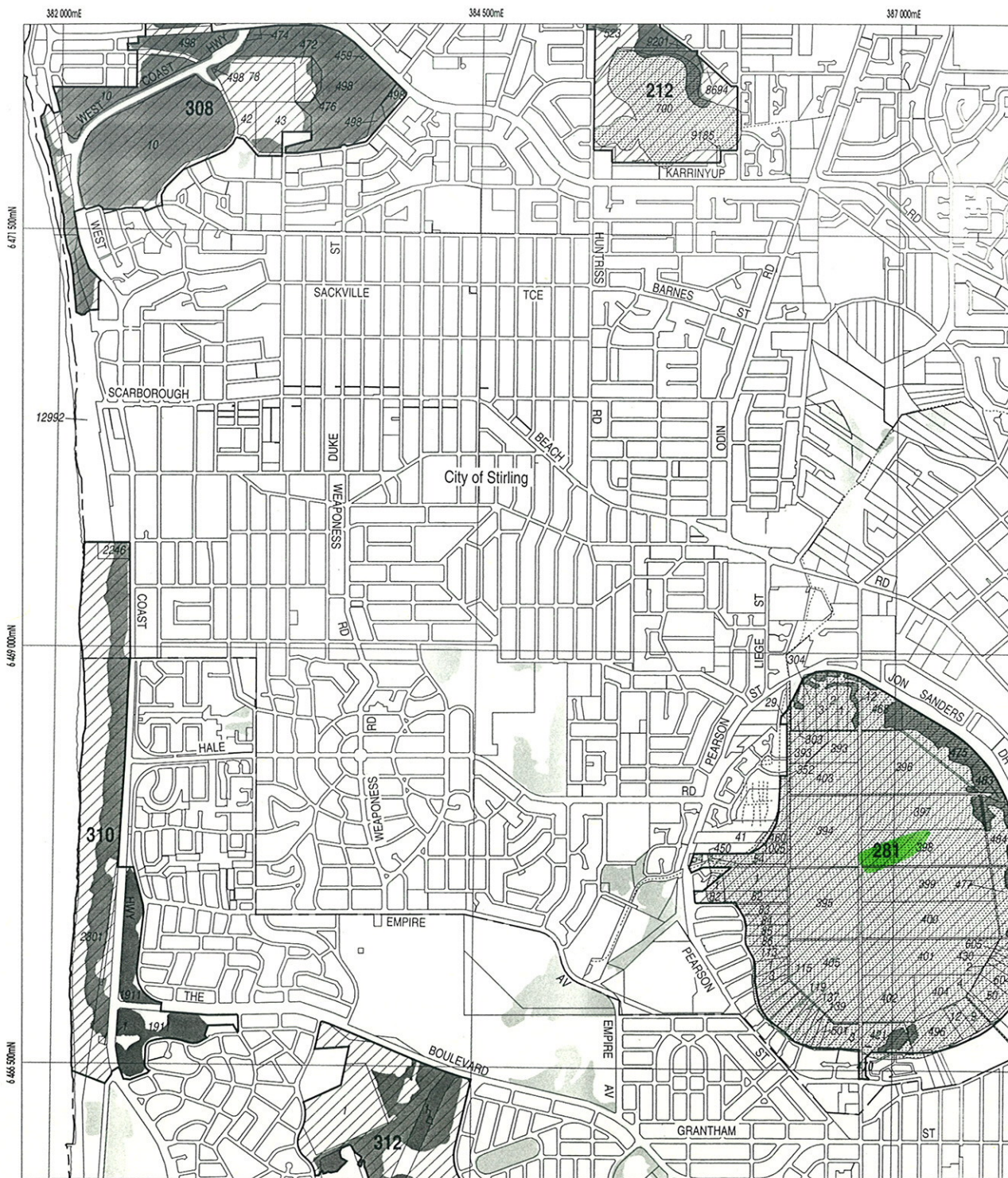
1 : 25 000 AMG Reference Grid showing Perth's Bushplan Map Sheet Breakdown



SCALE

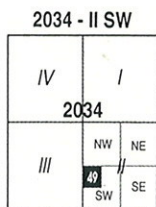


Produced by Project Mapping Section
 Land Information Branch, Ministry for
 Planning, Perth W.A. November 1998
 ntw-map18/environ/bushplan/bushv2_50.dgn
 Cadastral Data supplied by Department
 of Land Administration, W.A.
 Wetlands Data supplied by
 Water and Rivers Commission
 Native Vegetation Extent for Study Area
 supplied by Agriculture Western Australia



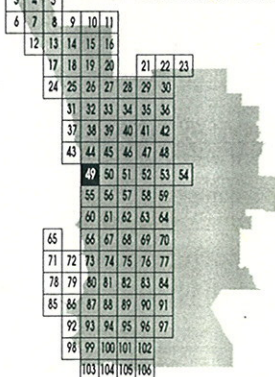
LEGEND

-  Bushplan Sites With Regionally Significant Bushland
-  Other Native Vegetation
-  Conservation Category Wetlands
-  Bushplan Sites With Some Existing Protection
-  Lot Number, Location Number
-  Channel Wetlands
-  Local Government Boundary



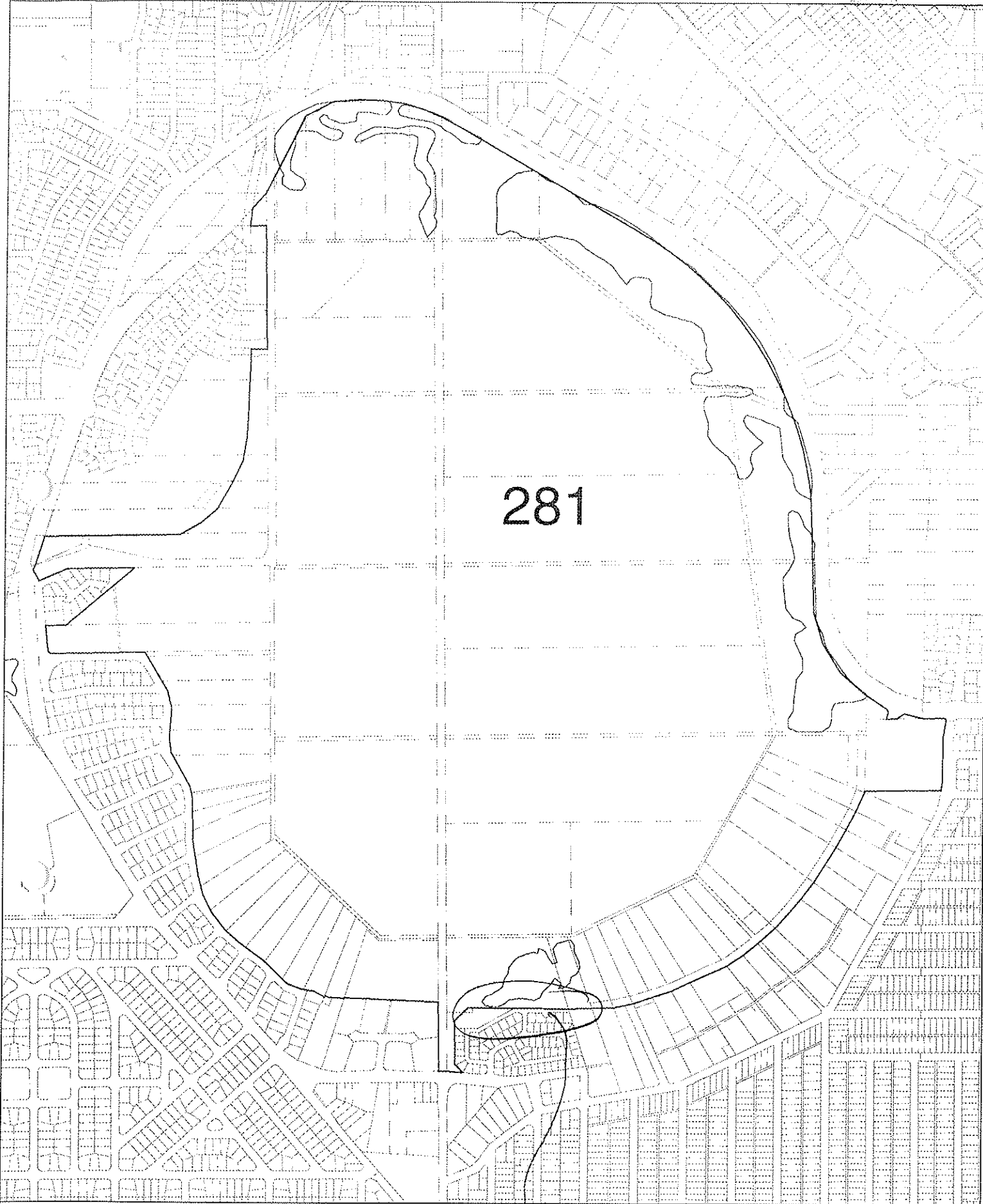
1 : 25 000 AMG Reference Grid showing Perth's Bushplan Map Sheet Breakdown

PERTH'S BUSHPLAN MAP INDEX



SCALE
0 500 1000
Metres

Produced by Project Mapping Section
Land Information Branch, Ministry for
Planning, Perth W.A. November 1998
ntw-map18/environ/bushplan/bushv2_49.dgn
Cadastral Data supplied by Department
of Land Administration, W.A.
Wetlands Data supplied by
Water and Rivers Commission
Native Vegetation Extent for Study Area
supplied by Agriculture Western Australia



281

BUSHPLAN SITES CORRECTED



WESTERN
AUSTRALIAN
PLANNING
COMMISSION

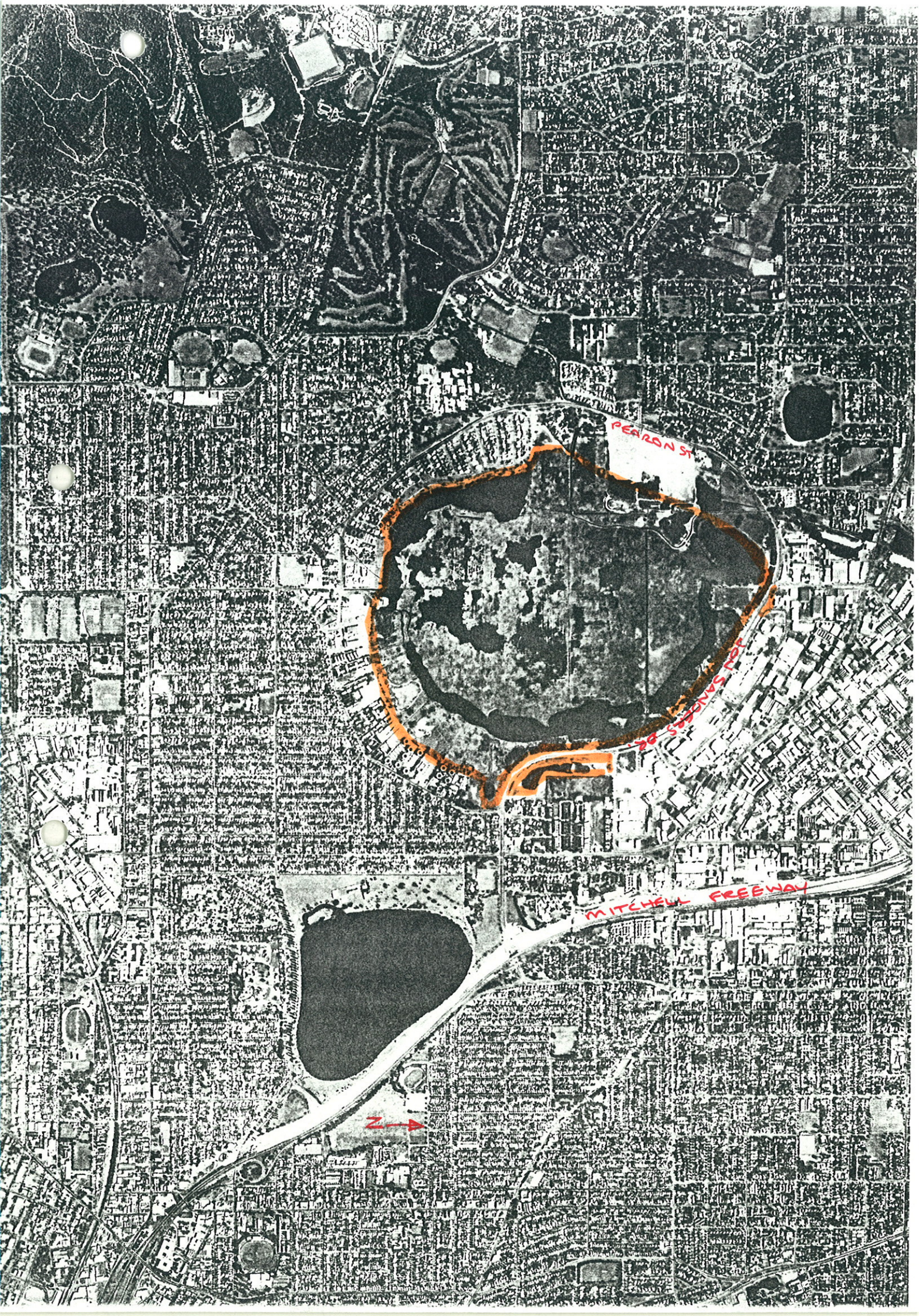


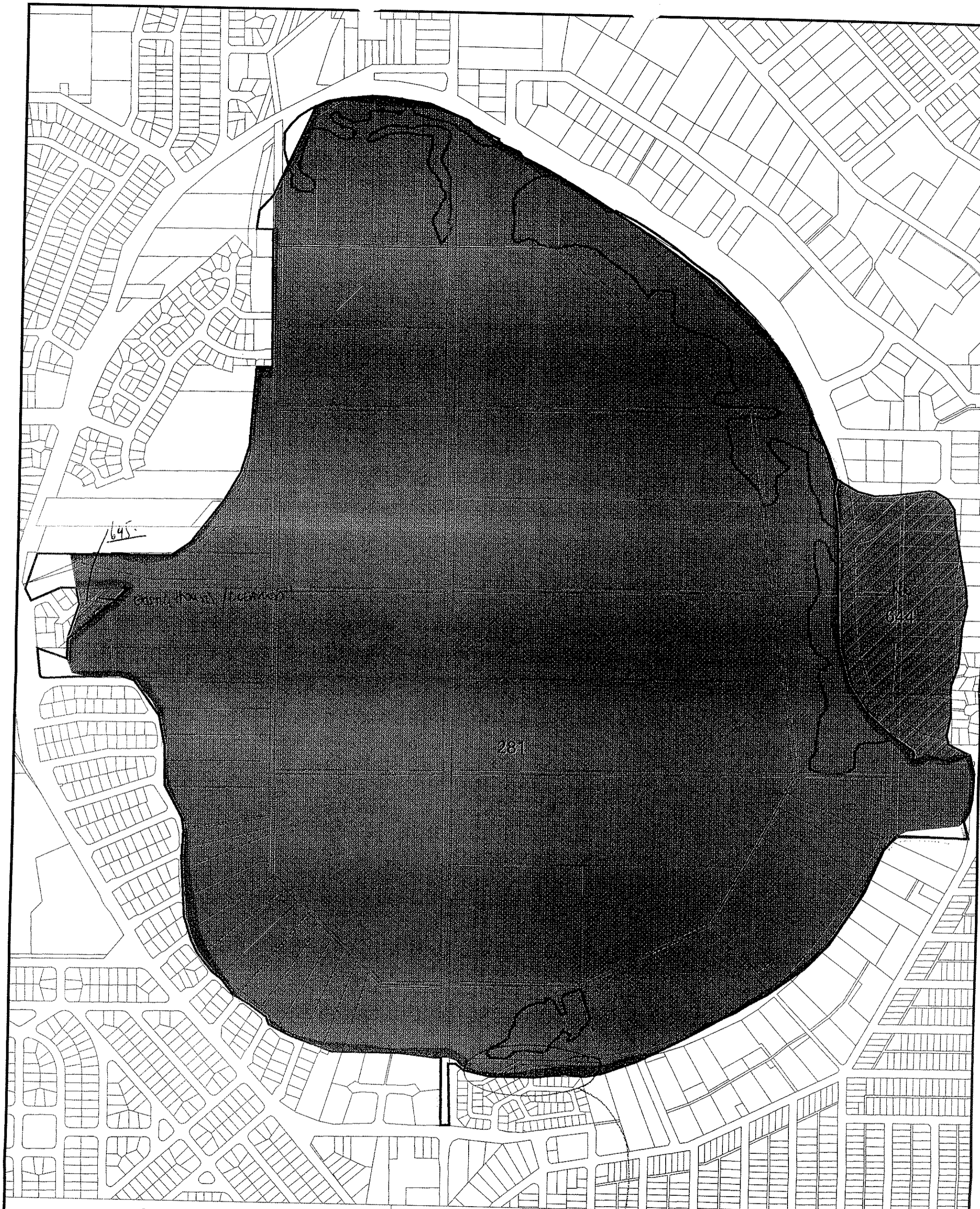
*Change not indicated on
attached map.*



*see
comments*






B BK/76 22/10/98





bp site 281

PHR

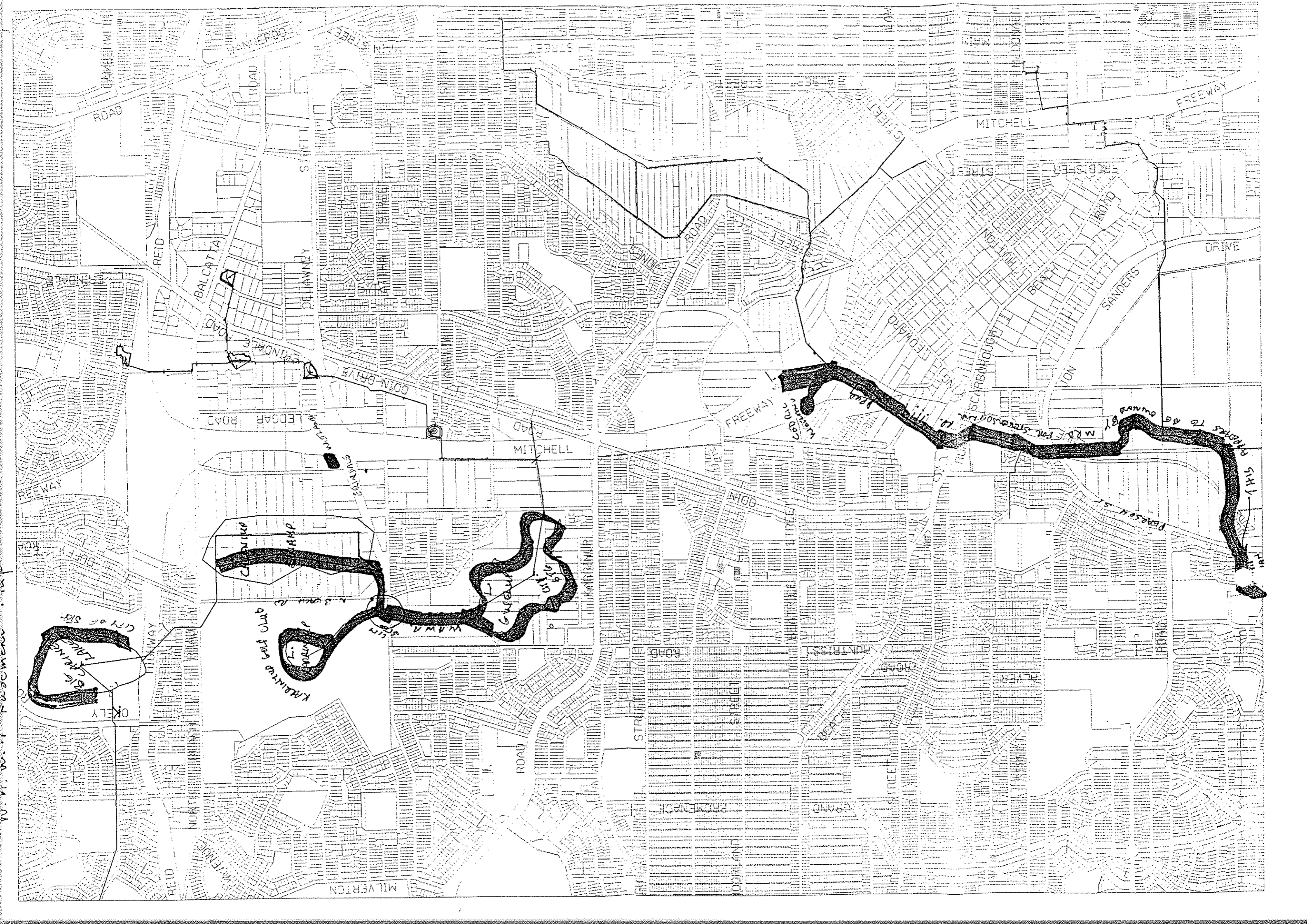
-  AG VEG 1998 BOUNDARY THEME
-  Cadastre
-  Bushplan sites refno 1-500 SCP BOUNDARY THEME
-  cons category wetlands
-  Verified CCWs

645 no
 644 (no)
 - EXISTING ROAD SEPARATED } Agreed
 - NOT MAPPED AS BUSHLAND } GJK
 - NOT MAPPED AS VEG VCH. } 8/98

Map Ident: plot980527_1	DATE: 27 May 98
Prepared By: Andrea Zappacosta	Prepared For:
Scale 1:AUTO	MFP INTERNAL USE ONLY



check proposed boundary
 This is cleared PANAMA 1998



Big Creek Lake
KMA...
M...

KMA...
M...
G...
M...

M.R.D. FOR ST...
ROADS TO BE OWNED BY

Map labels: REID, BALCANTIA, DE LAUNAY, COIN DRIVE, LEDCAP ROAD, MITCHELL, FREEWAY, EDWARD, SCHABOUGH, BENTON, SANDERS, DRIVE, 5TH ST, P... ST, GRAND, HUNTERS, ROAD, STREETS, GRAND, STR...

System 6 Update - Floristic Community Type Mapping Information **DRAFT ONLY**

AREA INFORMATION

System 6 Area (C or M) or Update Area (Update)

M43 Bushplan # 281

Conservation Area	Herdsmen Lake
Nature Reserve	
Reserve No	
National Park	
Reserve No	
Local Government	
Reserve No	
Other	
Proposed Conservation Areas	
Local Government	
Reserve No	
Other	

Conservation Area

Nature Reserve	
Reserve No	
National Park	
Reserve No	
Local Government	
Reserve No	
Other	

AREA

Total Area	hectares
Completely Degraded	hectares
comments:	

AREA MAPPED FLORISTIC UNITS

Boundaries: System6 CALM

Units	Site (Condition)	Code	Bound	Area (ha)	Area(ha)

Boundaries determined by use of

aerial photograph
orthophoto
vegetation map
soil map



M43 Herdsman Lake

Bulletins 263 (devel), 360 (Floreat Lakes devel), 405 (Glendalough Open Space)

Friends Advocate Management

Other Names:

Specific Study/studies Miscellaneous studies

? Flora

Vegetation Map	1	2	3	
Flora list	1	2	3	4
Significant Taxa			done / suitable / doubtful	

? Fauna

Mammals	1	2	
Birds	1	2	RAOU
Reptiles and Amphibia	1	2	
Invertebrates	1	2	

Vegetation Condition Map Sites Comment

Disturbance Factors Comment Management

Swan Coastal Plain Floristic Survey

AHC: National Estate- Listed / Interim / Nominated / Notified NT (WA): Heritage Classification

Notes
<i>Herdsman Lake Environment Advisory Committee</i>
<i>Could be a league</i>

M43 Herdsman Lake Bulletins 263 (devel), 360 (Floreat Lakes devel), 405 (Glendalough Open Space)		
M43.1 Regional park recommendations be applied to this area.	Implementation Progressing	In 1987 Cabinet decided that Herdsman Lake be managed as a single A Class reserve for the purpose of conservation and recreation. The Regional Parks Task Force Report proposes that it be a regional park. CALM's 1992 draft Forests Strategy recommends the regional park be a nature reserve.
M43.2 DPUD's concept plan is endorsed.	Implemented	Endorsement. Gould League has an interest in this area.

LM • Draft Management Plan
 Herdsman Lake Environment Advisory Com
 • Seminar to pull together information

"A FORUM ON HERDSMAN LAKE"

Herdsmen Lake Wildlife Centre - 830 February 8, 1993

The aim of the forum was to exchange information about the lake and find out where that information is stored. Speakers from a variety of government agencies, community and conservation groups, and private business who have had dealings with Herdsmen outlined in the data their organisations had available.

Introduction - Dr Stephen Davies, Chairman of the Herdsmen Lake Management Advisory Committee.

Dr Davies welcomed the participants to the seminar and outlined the functions of the Herdsmen Lake Management Advisory Committee. The committees' role is to assist CALM in preparing a management plan for the proposed Herdsmen Lake Regional Park.

Mr Alan Briggs - Manager, Perth District, CALM.

Alan outlined the progress of the draft management plan for Herdsmen Lake. A draft plan has been prepared for the lake. The plan will be retained in its draft form until the transfer and funding arrangements for the Regional Park have been finalised. Once this has occurred and a Regional Parks planner has been appointed, the draft plan will be finalised and released for public comment.

Linda Moore - Water Authority of W.A. - Environmental Section.

Linda advised that the State Water Resources information system has a record of water levels for Herdsmen Lake, but does not have water quality data.

Andrew Vadja - Design Engineer, Water Authority of W.A., Northern Region.

1. Water Authority maintenance of drains.

The Water Authorities maintenance works on the drains were more intensive in the past. The maintenance involved cutting the grass and removing blockages three to four times a year.

2. Design Information.

In the past levels were able to be controlled by the use of control structures at the Pearson Street outlet and Osborne main drain inlet (still there). A control structure has recently been constructed on the Balgay drain. A map showing the drainage system was presented. The Herdsmen inner ring drain has largely disappeared due to the construction of moats. The Water Authority has cadastral plans and design plans showing design features of all these drains.

The whole of Herdsmen Lake is considered to be a compensating basin from a design point of view.

3. Future Design Information

The Water Authority need to update drainage data as changes in catchment affect the pattern/volumes of drainage.

Questions and Answers

Mr Eric McCrum - What do you plan to do with the Selby/Flynn Street drain with regards to minimising the risk of pollution spills?

Andrew Vadja - No current plans. The Water Authority has not been geared to be involved in pollution spills in the past. This issue is seen as an important one for the management plan to address.

Eric McCrum - Have suggested that at very least a load of sand be available to block drains if necessary. Can you see any solutions to carpet cleaners dumping waste into drains?

Andrew Vadja - Control structures may be helpful in larger drains, however, control in smaller drains without diversion drain is much more difficult. How do you control illegal dumping without catching them in the act. Discharges are easy to control where the discharges are from premises, but not when they are opportunistic.

Halina Kobryn - Have you done any flow measurements to calculate a water balance?

Andrew Vadja - No. Have a grid of spot levels across the lake.

Leon Griffiths - Do the Water Authority have any plans to budget for pollution control.

Andrew Vadja - Urban drainage system has minor inbuilt safety valve - water passes through trap manholes before entering the system. However liquids which float on the top are difficult to control. There are no plans to my knowledge to undertake pollution control.

Don Viol - Director, Environmental Protection Authority.

Don Viol sent his apologies and advised that the EPA have files of information on Environmental Impact Assessments around Herdsman which can be reviewed in the EPA.

Dr Stuart Halse - Research Scientist, CALM.

We have fairly sketchy information about the lake apart from waterbirds. CALM has investigated pesticides with Murdoch University. CALM looked at pesticides in birds, Jenny Davis looked at pesticides in invertebrates following heptachlor spraying for argentine ants for an eighteen month period. Levels found in birds were below levels considered to cause problems elsewhere. Sue Gordon undertook another study investigating the effect of pesticides on the breeding success of reed warblers.

CALM and the RAOU have a lot of information on bird usage. There has been little change in usage since the early 1980's.

In conjunction with the Swan Coastal Plain waterbird study, water quality was measured in Floreat Waters, providing another sample.

Believe the Water Authority does have some water quality data collected twice yearly. Jenny Arnold from the EPA put together a very comprehensive bulletin on the Floreat Waters development.

John Blyth and myself put an article in Landscape several years ago which summed up the information available at the time.

Jenny Davies and myself assembled a set of water quality management criteria to cover wetlands, including Herdsman, several years ago.

Dr Jenny Davis - Murdoch University

The first study I became involved in was the Herdsman Lake Pesticide Study, primarily to look at treatment of argentine ants in March/April 1986. This study broadened out into looking at the effects on waterbirds. This has become dated and it would be worth while doing some follow up.

Herdsman Lake Water Quality Study was undertaken to put together all relevant water quality information collected by the State Planning Commission for a data set for the management plan.

The need for water management criteria is very important. Stuart Halses and my criteria for the lake was the first attempt at setting criteria. Also a water and nutrient balance is very important.

The dredged moats are the deepest wetlands on the Swan Coastal Plain. Stratification occurs in areas greater than 5 metres and is a significant feature at Herdsman Lake.

Herdsman was sampled in 1989/90 for the project "Wetland Classification on the Basis of Water Quality and Invertebrate Community Data".

Eric McCrum - Executive Officer, W.A. Gould League.

Attached paper on the Bulrush prepared by Eric McCrum refers.

Questions/Answers and Others Comments:-

Jenny Davis - Typha would be taking up a lot of nutrients. If taken out it is likely to revert to an algal dominated system with associated midge, bird death and poor water quality problems. Once typha is in a system, need to be careful about it's removal. Keily George - Murdoch Honours student compared invertebrate community of Baumea and Typha. Typha came out better, however some species only occurred in Baumea, including the Ross River Virus carrying species of mosquito - which hasn't been found to use typha.

Leon Griffiths - with regards to cutting typha in the wet season. When is the best time to minimise disturbance on birds.

Eric McCrum - As the water rises is the best time. From experience cutting with a whipper snipper, it takes four years for the typha to come back.

David Everall - Department of Planning and Urban Development

DPUD have records regarding decision making and rationale for these decisions at Herdsman. It has been a fifteen year project. The problems that it tried to address in 1975 are very different from today, as are community attitudes to the environment.

DPUD have had a fairly consistent approach to have habit and species protected for the enjoyment of the public, and use the drainage water as an opportunity to achieve management goals.

Rationale is important as things were done for a purpose, related to scientific or community opinion, or in some cases litigation.

Mining was seen as a way of implementing an already agreed project at no expense to the public purse. The mining records may be of significance. Mallina Holdings drilled the whole of the lake looking at the substrate. Development companies have similar records. There is a great deal of information on the substrate, depth of the peat etc!

DPUD has a record of all development control meetings with each company involved in dredging or development. Each company was responsible to design and to take into account environmental considerations. Government to have overall concept then companies to do the fine details and implement.

A drainage management plan done by Wood and Grieve for the N.W. sector development as a condition of development is in draft form.

Some of the commitments for drainage structures are in place, additional are proposed. The objective is to provide a structure for the management of water for wildlife enhancement.

Originally moats and islands were proposed in the centre of the lake. There was a change of view in 1980's to leave the centre intact.

DPUD's files are available to CALM and people preparing the management plan, including financial records of every cent spent on the place over 15 year period.

Jim Chesterman - Department of Planning and Urban Development.

Improvement Plan 21 - working on completion of the concept plan. Glendalough almost completed, outstanding development of the Gava Cottage area. South-east area - exact development to be finalised. Mixture of habitat and recreation modes. DPUD are reaching completion of IP 21 works. N.W. sector - estimate completion and handover of 12 - 18 months (developer will manage for first 12 months) developer.

David Harrington - Wood and Grieve.

Wood and Grieve involved for 12 years on behalf of DPUD. Most of our work has been done for them and is owned by them. Data available includes; bathymetry water depths - comprehensive study of S.E. sector, elsewhere information on depths and latter slopes (not so detailed).

Development history of programs, materials moved , all development and construction plans , details of drainage that has been constructed in the lake, and flow control structures.

The draft management plan for drainage documents and quantify's drainage catchment. This is a nuts and bolts approach to what you might be able to achieve in any management approach. This is now owned by DPUD.

Peat depth records over many projects.

Details on sewerage - pump station flows etc - for developments.

These files are available provided DPUD or the owners agree. Contacts are Keith Ayres, David Harrington, Bruce Keay and Rob Mercer form Wood and Grieve.

Dr Paul Van Der Moezel - Tingay and Associates (Environmental Representatives for Sherwood Overseas).

One of the conditions on Sherwood is to undertake monitoring during development of the NW sector to ensure it does not impact on other moats. Sampling done by Halpern, Glick and Maunsell. There is a lot of raw data on their files. Reports are submitted to the EPA.

The Herdsman Water Quality and Dredging preliminary report - July 1991 is available.

For the first two years samples were taken from 14 locations every month. Based on these results, subsequent samples since August 1991 have been done on a quarterly basis from seven sites. These results are still being collected and are not in an available form as they will not be reported to the EPA until later this year.

Catchment Management - compilation of all Wood and Grieves and other data is being done. This is required by the time the development is finished as condition of development.

Questions and Answers

Otto Mueller - Who pays for the existing sampling and how long does it continue?

Dr Paul Van Der Moezl - Sherwood Overseas pays for the program. The results will be reported to the EPA in July and further monitoring requirements will be determined at this stage.

Dr Stephen Davies - What pesticides are sampled?

Dr Paul Van Der Moezl - PCB's, Lindane, BHC, Heptachlor, DDT and Dieldrin.

Diieldrin and Heptachlor are the most common ones coming up in samples. Dredging has resuspended some pesticides, but they have not been detected outside the dredge pond and they are expected to settle out.

Rosemary Rosario - Heritage Consultant.

Approached by DPUD in April 1992 to look at Gava Cottage, prepare study of history and findings and look at possibility of the rotation interp facility in content of the lake. Prepare statement of significance then work out how to retain significant values and use building.

Two reports - Conservation study on site and building
- Conservation plan - how to practically implement findings.

Both reports - very thoroughly sourced - based on archival research.
These reports are held by DPUD.

Early ownership - found in catholic church archives - owned by them up to the end of first world war. History of drainage - public works 1920's departments reports - Battye Library.
History of subdivision - Lands and Surveys files 1920's - early 1930's.
These files focus on the issues of the subdivision and soil surveys - construction of cottages and administration of settlement. The cottage is a benchmark of cottages used throughout the State in the 1920's and 30's.

Aerial photos - 1942.

Various maps/drawings - available at archives in Battye Library.

Interviews with people who lived in the area in the early days.

Copies of the plan available from DPUD.

Daniel Rajah - City of Stirling.

Only in recent times have local authorities become involved in managing natural areas. Stirling is in the process of formulating various strategies and plans to manage areas with conservation value. Management plans and policies are being developed and adopted. Looking at impacts of land uses in catchments. Star Swamp management plan is used as a model for development of other plans in Stirling. City of Stirling Green Plan addressed the establishment of ecological links. Herdsman is featured very strongly in this plan which looks at linking wetlands by planting native species on other parkland between wetlands to increase the movement of birds and genetics.

Other polices and programs being developed

- management of dogs on wetland reserves
- restrictions under Dog Act Introduction of by-laws.

- establishment of management advisory committees - with management plans
- Jackadder Lake has similar problems to Herdsman. Approaches taken and sources of data may be of interest and relevance to Herdsman
- midge monitoring study of key wetlands trying to correlate midge populations with environmental factors - nutrients, temp etc
- gathering data on the establishment of native reed and rushes - fringing vegetation.

Have undertaken rehabilitation trials. These techniques and this data maybe of some relevance to the Herdsman situation.

- Accumulate a lot of info through Stirlings nursery with regards to the propegation of native and indigenous species.
- Data re maintenance costs for landscaped - reticulated and unreticulated areas.
- Problem of horses, Local Authority is also required to provide recreation opportunities in balance. Development of bridal trails that takes them away from wetlands.
- declaration of pampas as a pest.
- experience of Local Authority in parkland area management will be useful.

In the planning area, the City has a GIS system with a variety of information, including

- demographics (gives an idea of demands and impacts).
- no of registered dogs in area.
- business/industries located in catchment (from which may be able to extrapolate pollutants).
- surface drainage plans.
- anticipated and design flow.
- various town planning zones eg future impacts.
- recreational concepts being developed for city.

Halina Kolbryn- Murdoch University.

Since mid 1992 have been sampling major drains and water flow on monthly basis and during peak events.

Other data available includes some measurements of water flow during one storm event in September 1991 which identified the key drains where water flows into the lake, and a satellite map which identifies areas of irrigated grass in the catchment.

Mike Tooby - Landscape Architect.

Prepared a landscape plan proposal for use in development of the management plan by CALM. Looked at recreation from the perspective of a recreational user. Estimated by comparison to other areas that you might expect up to 1000 people at the lake at one time (apart from local people) in the future. Saw potential for regional resource being developed on eastern side with access close to the freeway which doesn't have to penetrate local areas.

This document is held by CALM. Another document prepared by Halpern, Glick and Maunsell to assist preparation of the management plan is also held by CALM.

Otto Mueller - Habitat Herdsman.

Refer to notes attached.

Dr Stephen Davies thanked all the participants for their contributions and closed the seminar.

4 5

Aerial photo 5135
is also required to show
Northern edge of Big Game Lake e.

SYSTEM 6 BUSHLAND SUBMISSION FORM FOR CONSIDERATION IN THE UPDATE PROGRAMME

If you wish to submit more than one area for consideration in the System 6 update, please use a separate form for each area.

Please fill in each section giving as much information as possible.

LOCATION, OWNERSHIP AND ZONING OF THE AREA

1. Location

Please give as accurate and detailed a description as possible of the site location

Please include either a hand drawn or copied map showing the area of the area

a) Bordering Roads: *Attached map self-explanatory*

b) Nearest Corner:

c) Lot Number: Street Number:

d) Town/Suburb/Location:

e) Local Council: *S.A.I.P. 106*

f) Site Name (if any):

g) Approximate size of the area (ha):

h) Please locate the area on a map and give us map references if possible:
.....

i) Map: Streetsmart /UBD/Other:

j) Map no.:

k) Grid Ref:

l) Please give any other information that may help us to find the location:
.....

m) Are you aware of any development proposals that are likely to affect the area?
.....
.....

NOTE: Areas that have already been given development APPROVAL should not be nominated

Please fill out those questions that you can answer

2. Who owns the area? (If owned by the person/s making the nomination please indicate)

3. If you own the area, and may be interested in participating in conservation on private land initiatives please indicate (and leave your name and address at the end of this submission form)

4. What is the area zoned? (please indicate whether zoning is Town Planning Scheme or Metropolitan Region Scheme)

CAN YOU TELL US A LITTLE ABOUT THE PHYSICAL CHARACTERISTICS OF THE AREA

5. Why do you consider this area important? (Refer to Guiding Issues paper)

The area is important as part of vast wetlands area with original

6. What is/are the soil type/s and colours? F. rudis habitat / corridor link

Type: Sand/Clay/Gravel/Loam/Silt

Colour: White/Grey/Brown/Orange/Yellow/Red/Black

7. Does the area have any special features such as unusual landforms / landscapes that still retain their natural vegetation? Yes/No

If yes, what are they? Melaleuca raphaeophylla plus F. rudis
corridor link

8. Is the area a wetland or does it include a wetland? Yes

If yes, what kind of a wetlands is it?

a) lake

b) river

c) stream

d) swamp

e) estuary

f) seasonally wet

g) other permanently wet.

9. What percentage of the wetland is open water in summer?

CAN YOU TELL US A LITTLE ABOUT THE VEGETATION /FAUNA ON THE NOMINATED AREA.

10. What percentage of the area is indigenous vegetation?

11. If the area includes regions cleared of native bushland please indicate reasons for the inclusion.

..... *Salinity / corridor connecting wetlands*

12. Has any previous flora or fauna survey work been done on the area?

If yes, please give details of the work

.....
.....

13. How would you rate the condition of the native bushland? (see attached table)

- a) pristine
- b) excellent
- c) very good
- d) good
- e) degraded
- f) completely degraded
- g) don't know

14. Please indicate the disturbances affecting the area and where appropriate the percentage of the area disturbed.

- a) Partial clearing
- b) fragmentation
- c) Selective removal of species: timber cutting, wildflower picking, mowing dieback and other plant diseases
- d) Fire regime, including intensity, season and frequency
- Carine* e) 'Enrichment plantings' that is plantings of species not found in that community
- f) Weed invasion
- g) Animal impact: horses, foxes, rabbits, cats, dogs, camels, goats etc
- h) Soil movement, both removal and dumping
- i) Changes in water regimes; flooding, drainage and watering
- j) Salinity
- k) Fertiliser drift and along waterways nutrient influx
- l) Mining, including that for road works

- m) Grazing: stock, overgrazing by feral or native mammals
- n) Proliferation of tracks, fire breaks and walk trails
- o) Off-road vehicle use
- p) Use as service corridors by the SEC, Main Roads, Water Authority.

(Source: B Keighery. Bushland Plant Survey, September 1994)

15. Does the area contain any plant species of special interest that you know of? (eg. declared rare flora, priority taxa, outlier populations)

Do you know what they are?

16. Do you know of any native animals that use the area?

Can you list those you know of? (birds, mammals, reptiles, amphibians etc)

Big Carina = long-necked tortoise + 60+ birds

17. Is the area used by any native animals of special interest? (eg. endangered species, large/important populations).....

If yes, please name them and indicate source of information

.....

CAN YOU TELL US A LITTLE ABOUT THE SURROUNDING AREA

18. Are there any bushland areas (including wetlands) near to this area?

.....

If yes, how close are they?

.....

.....

Are they already conservation reserves?

What is their approximate size?

19. Does the submitted area link other bushland areas?

.....

.....

Please attach any additional information about the area which may be of use when assessing it.

BS 281

PB100

164

Habitat Herdsman

c/o 7 Hamer Ave.
Wembley Downs 6019
21-3-1999



To the Ministry of Planning
BUSH PLAN SUBMISSION
Albert Facey House
Wellington Street Perth

To whom it may concern

After long delays we were able to obtain and view a draft version of the PERTH BUSHPLAN at the end of 1998.

We congratulate the agencies responsible for this compilation of the draft. If those three agencies are genuinely interested in the Conservation of Biodiversity they are expected to do their utmost to have this project accepted and endorsed by the Cabinet of the day.

Implementation should not be delayed since the *development front* (a term used in previous SPC Publications) moves at an ever accelerating pace. It must also be borne in mind that sites may have to be purchased despite the repeated claims of financial constraints. Also more emphasis could be placed on the increasing use of covenanting schemes as initiated by the National Trust. If none of these ideas is feasible it could then well be that many of the sites, so painstakingly described or at least listed, will be History before even the final document is printed. The cemeteries of Guildford Rd and Talbot Road should be relocated into CLEARED land rather than into adjacent bush.

Below we shall outline some more detailed examples of how the concerned Community is being run out of time.

In recent years much has been made of GREEN CORRIDORS, LINKAGES, GREENWAYS or BELTS in the City of Perth. Every single one of such features has to be fought for by the Public.

* Inevitably, due to those much cherished market forces, the land on which such foci are standing or growing becomes too expensive to support such "non-performing" assets!

* E.g. Vol. 2 Part A Page 64 4.5.5 The sentiments expressed here are generally supported BUT the commendable effort by a Commonwealth Department to ensure the creation of more strategies (here a draft Strategy for Perth's Greenways) is certainly laudable, but highly unrealistic. We therefore consider the map 6 Vol. 1 Page 81 a waste of money and time. **NOBODY WILL KNOW IF EVER THERE WILL BE A FINAL PLAN OUT**, when it happens and how it will be IMPLEMENTED! Perhaps sometime in the next millenium, by then there will be no colour green left.

This map 6 shows Greenways which are coloured brown (!). We certainly disagree that there is or will be a greenway from the Perth CBD and Lake Monger and beyond past Herdsman Lake Regional Park along a freeway (?) to the north. There are also no numbers. At least three local government authorities would be involved to bring that to fruition. All of them profess to be green. Yet there is no room on the ground or commitment in their multitude of offices to bring such public open spaces about. Note our comments above.

Map 8 Vol. 2 Part A Page 66 shows in dotted blue lines so-called CONTIGUOUS CORRIDORS and ECOLOGICAL LINKAGES (whatever that means). Another mouthful are "potentially, regionally significant Bushland/Wetland Linkages". Again in the area of our own NGO we notice dotted lines only from Bold Park across somehow to Herdsman Lake Regional Park and on to the north along Osborne Park drain and somehow along the Freeway to link up with Karrynup Lake (?).

SUBMISSION NO. 251

MINISTRY FOR
PLANNING

25 MAR 1999

805-2-1-32pt/2
FILE

163

We see an urgent need to update your draft on those "Potentials" because soon they will belong to the past as indicated above.

- 1) Churchland Bushland has been thrown open for development and the remnant, original bushland has been bulldozed during the last four weeks! The location is between Tuscany Way and Pearson Street.
- 2) To the north of Herdsman Lake one can follow Osborne Park drain past the Nookanburra Hotel across Scarborough Beach Road. On the other side is Oswald Street; there the same drain is being rerouted at great expense to make way for a controversial, realigned Oswald Street. Ignorant as we are, one may be excused to believe that the new alignment looks like a freeway. In the context of which we loose numerous mature Euc.rudis and lots of wetland. The Public is being fobbed off with a 1.3 ha replacement wasteland on the other side of the freeway!
- 3) To call the coastal strip south of Fremantle towards Woodman's Point with its wastelands, degraded dunes, factory ruins and Caravan Parks a "potential regionally significant bushland linkage" shows the lack of reality amongst the Authors of such plans.

Now some final remarks on the paucity of data supposedly available on ~~SECRET~~

The latter is described on page 290, Vol. 2 Part B. Section 3 : Your specific site details are very poor, to say the least. This NGO has accumulated site details for over 20 years on Flora, Fauna and Birdbanding Activities. E.g., we identified 120 plantspecies. We disagree with your "Vegetation Condition" and also with the Landmanagers (CALM) continuation of market gardening! We would challenge the Authors in which Bushland Site so far 120 species of birds have been identified including Wandering Whistleduck and Freckled Duck? Site 281 has recorded 9 species which are supposedly to be protected under the international agreements of JAMBA and CHAMBA which would come under your Section 4. All three australian Ibis and Grebe sp. can be seen there. Ten Insect orders with 46 taxa have been identified as well. Maybe, in your final report you will be able to identify a local bushland/wetland site where more than 3393 birds were banded under the ABBS.

O.Mueller for Convenor HABITAT HERDSMAN



R. A. O. U. TRACKING DATABASE

23/06/96

PARK SIGHTINGS REPORT

Page No.

1

Herdsman Lake (M43)

ORDER:	REF:	BIRD NAME		NO. SIGHTINGS
0018	0216	Blue-billed Duck	3	44
0019	0217	Musk Duck	3	54
0022	0203	Black Swan		51
0025	0207	Australian Shelduck		50
0028	0202	Australian Wood Duck		11
0031	0948	Mallard		22
0032	0208	Pacific Black Duck		55
0033	0212	Australasian Shoveler	3	34
0035	0211	Grey Teal		51
0036	0210	Chestnut Teal		2
0039	0213	Pink-eared Duck	3	24
0040	0215	Hardhead	3	47
0041	0061	Australasian Grebe		54
0042	0062	Hoary-headed Grebe		23
0043	0060	Great Crested Grebe		53
0126	0103	Red-footed Booby		1
0128	0101	Darter		28
0129	0100	Little Pied Cormorant		55
0131	0099	Pied Cormorant		1
0132	0097	Little Black Cormorant		42
0133	0096	Great Cormorant		50
0135	0106	Australian Pelican		50
0139	0188	White-faced Heron		37
0140	0185	Little Egret		6
0142	0189	White-necked Heron		2
0145	0187	Great Egret		48
0150	0192	Nankeen Night Heron		26
0156	0178	Glossy Ibis		17
0157	0179	Australian White Ibis		46
0158	0180	Straw-necked Ibis		9
0159	0181	Royal Spoonbill		1
0160	0182	Yellow-billed Spoonbill		47
0163	0241	Osprey		1
0165	0232	Black-shouldered Kite		23
0170	0228	Whistling Kite	4	13
0174	0219	Swamp Harrier		42
0175	0221	Brown Goshawk	4	10
0181	0225	Little Eagle	4	6
0182	0239	Brown Falcon	4	1
0183	0235	Australian Hobby		12
0186	0237	Peregrine Falcon	1	1
0187	0240	Nankeen Kestrel		9
0192	0046	Buff-banded Rail		5

0198	0049	Australian Spotted Crake		2
0200	0051	Spotless Crake		7
0204	0058	Purple Swamphen		55
0205	0056	Dusky Moorhen	3	52
0206	0055	Black-tailed Native-hen		7
0208	0059	Eurasian Coot		55
0231	0158	Common Greenshank	2	11
0233	0154	Wood Sandpiper	2	6
0235	0157	Common Sandpiper	2	10
0249	0163	Sharp-tailed Sandpiper	2	2
0251	0161	Curlew Sandpiper	2	1
0267	0146	Black-winged Stilt		33
0268	0147	Banded Stilt		1
0269	0148	Red-necked Avocet		8
0275	0143	Red-capped Plover		12
0282	0144	Black-fronted Dotterel		38
0284	0132	Red-kneed Dotterel	2	4
0297	0125	Silver Gull		48
0303	0112	Caspian Tern		2
0324	0957	Rock Dove		16
0326	0988	Laughing Turtle-Dove		52
0327	0989	Spotted Turtle-Dove		29
0356	0794	Short-billed Black-Cockatoo	1	1
0356A	1266	White-tailed Black-Cockatoo		2
0359	0273	Galah		19
0362	0271	Little Corella		13
0365	0274	Cockatiel		1
0366	0254	Rainbow Lorikeet		32
0386	0294	Australian Ringneck		37
0405	0337	Pallid Cuckoo		3
0408	0338	Fan-tailed Cuckoo		2
0410	0342	Horsfield's Bronze-Cuckoo		3
0421	0242	Southern Boobook		1
0427	0249	Barn Owl		2
0446	0322	Laughing Kookaburra		2
0450	0325	Red-backed Kingfisher		1
0451	0326	Sacred Kingfisher		7
0453	0329	Rainbow Bee-eater		15
0492	0976	Striated Pardalote		17
0517	0463	Western Gerygone	3	29
0524	0476	Inland Thornbill		2
0531	0486	Yellow-rumped Thornbill	3	6
0537	0638	Red Wattlebird		44
0561	0608	Singing Honeyeater		53
0583	0597	Brown Honeyeater		38
0587	0631	New Holland Honeyeater	4	3
0607	0448	White-fronted Chat		12
0650	0398	Golden Whistler	3	1
0653	0401	Rufous Whistler		22
0671	0415	Magpie-Lark		48
0673	0361	Grey Fantail		26

0676	0364	Willie Wagtail	53
0678	0424	Black-faced Cuckoo-shrike	23
0693	0702	Grey Butcherbird	2
0698	0705	Australian Magpie	46
0706	0930	Australian Raven	37
0725	0647	Richard's Pigeon	9
0749	0657	Chestnut-breasted Mannikin	8
0761	0358	White-backed Swallow	3
0763	0357	Welcome Swallow	34
0765	0359	Tree Martin	53
0768	0524	Clamorous Reed-Warbler	37
0772	0522	Little Grassbird	28
0791	0574	Silvereye	39

Page No.

*** END OF REPORT ***

① 2
 ② 6
 ③ 9
 ④ 4

SUMMARY REPORT

TOTAL BIRDS SIGHTED	:	107
TOTAL NUMBER OF CARDS	:	51

*** END OF SUMMARY ***

HERDSMAN LAKE

M
43

① Library

551.481(941) WES - A Plan for Herdsman L.

711.4-112 (941) HER -

Accessn. 960258

② MFP

③ Draft Mgt Plan - Herdsman Lake EAC

~~④ Check Melaleuca SP in low woodland~~

⑤ ?? referencing of Jenny Arndt's 'Felin wetlands
Resource Bookl.

Vim. Junea

Mr

Pr. Euc radis OW



Western Suburbs Weekly

31/07/2007

Page: 17

General News

Region: Perth Circulation: 48960

Type: Suburban

Size: 37.21 sq.cms

-T-----

Herdsman proposal

PEOPLE have until the end of August to comment on a draft management plan for Herdsman Lake.

The integrated catchment management plan provides a summary of Herdsman Lake's health and threats.

Herdsman Lake is the biggest remaining inner metropolitan wetland and has regionally-significant environmental, social and cultural values.

The catchment has a conservation category status, is a Bush Forever site and is part of a regional park.

Submissions close on August 31. For information visit www.stirling.wa.gov.au or call 9345 8555.

Department of Environmental Protection

Date: Wednesday, 16 July 1997

Library Bibliography

Time: 2:45 PM

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ISSN: 1030-0120 ISBN: 0 7309 1998 6
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ISBN: 0 7309 18874
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Published: 1979
P551.481.1(941) HER Accession no.: 903564
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Published: 1977
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13. Herdsman lake - south east section feasibility report on proposed development plan.

Published: 1986

711.4-112(941) HER

Accession no.: 908415

14. Herdsman lake southeast sector proposals : notice of intent.

Published: 1986

711.4-112(941) HER

Accession no.: 908417

FLOREAT LAKES RESIDENTIAL DEVELOPMENT NORTH WEST SECTOR HERDSMAN LAKE

Sherwood Overseas Co Pty Ltd

Report and Recommendations
of the
Environmental Protection Authority

**Full document
available
on request**

Herdsman Lake-Glendalough Open Space

State Planning Commission

Report and Recommendations
of the
Environmental Protection Authority

**Full document
available
on request**

Environmental Protection Authority
Perth, Western Australia
Bulletin 405 July 1989

711.559

WES

COPY C

HERDSMAN LAKE - SOUTH EAST SECTION
FEASIBILITY REPORT ON
PROPOSED DEVELOPMENT PLAN

HERDSMAN
BS 281
SPEAR N

**Full document
available
on request**

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711.4-
112(941)
Her

8.8.9 MANAGEMENT ISSUES

As well as its significant drainage function Jackadder has social values. A visit to the lake will usually find many people making use of the lake's surroundings. For this reason, maintenance of reasonable water quality and of water levels which provide for the amenity of the locality should be the management priorities.

The achievement of good water quality and water throughout the summer would also enable the lake to provide a refuge for common waterbirds. Enhancement of the fringing vegetation could have the dual effects of improving water quality and increasing the range of habitats offered by the lake.

Maximum water levels do not appear to be a matter of concern. Control of minimum water levels by managing local authority use of bore water, and by alerting surrounding residents of drawdown effects of heavy private pumping might be feasible ways of protecting the wetland.

It is understood that people who live near the lake have dense vegetation obscures water views, provide litter. Nevertheless, establishment of a reserve along the lake foreshore would be beneficial in improving bird habitat.

Full document available on request

8.9 HERDSMAN LAKE B5281

8.9.1 GENERAL INFORMATION

LOCAL AUTHORITY: City of Stirling

MRS ZONE: Parks and Recreation

RESERVE NUMBERS: Land owned by State Planning Commission, private and various other government agencies; various drainage and reserves including 31096 for Environmental Education and Conservation of Flora and Fauna.

MANAGEMENT: State Planning Commission under Improvement Plan 21; management role to be assumed by Department of Conservation and Land Management in late 1988

SYSTEM 6 RECOMMENDATION: M43

WAC CLASSIFICATION: LE.f.l.p.sc (modified)

DRAINAGE: Main drainage for a substantial area of suburbs to the north-east of the lake; compensating basin; local drainage.

MINING CLAIMS: Extraction of sand for landfill and disposal of peat as a means of lake bed modification.

8.9.2 PHYSIOGRAPHY AND GEOLOGICAL SETTING

Herdsman is the largest lake in the region. Its basin is within an area bounded by the 15 m AHD contour which includes the wetlands of Osborne Park, Balcatta and Stirling, as well as Jackadder Lake, and extending to the south-west to include Perry Lakes. Herdsman Lake is separated from Mongers Lake by a ridge above 15 m AHD.

The lake basin contains substantial lake deposits within the Karrakatta soil association of the Spearwood Dunes. Teakle and Southern (1937) described the peat of the lake; it varies in nature indicating that it may have been laid down under varying conditions.

HERDSMAN LAKE - SOUTH EAST SECTOR PROPOSALS

STATE PLANNING COMMISSION

**Report and Recommendations
by the
Environmental Protection Authority**



**Department of Conservation and Environment
Western Australia**

Bulletin 263 June 1986

1/10/86
Copy A



HERDSMAN LAKE - SOUTH EAST SECTOR PROPOSALS

STATE PLANNING COMMISSION

List of
Figure
Figure

REPORT AND RECOMMENDATIONS
by the
ENVIRONMENTAL PROTECTION AUTHORITY

Department of Conservation and Environment
Western Australia

Bulletin No 263
June 1986

ISSN 0156-2983
ISBN 0 7309 0595 0

CONTENTS

1. INTRODUCTION
2. PROPOSAL
3. ASSESSMENT
4. CONCLUSIONS AND RECOMMENDATIONS

List of Figures

Figure 1. Herdsman Lake Improvement Plan No 21

Figure 2. Proposed Works

1. INTRODUCTION

Following the 1976 Concept Plan for Herdsman Lake, various plans and proposals for development have been put forward and undertaken. In order to coordinate planning for the lake, the State Planning Commission adopted Improvement Plan No 21 for the lake area and its surrounds. (see Figure 1)

A major component of the original concept plan and the Improvement Plan was for the creation of a protective moat around the central core of the lake area. This moat was designed to protect the conservation value of the central area and to provide open water areas for wildlife.

Developments in the south western section of the lake (Floreat Waters) and the north eastern section (Herdsman Industrial Park) have created a major portion of the protective moat. The only remaining sections to be completed are in the north west and south east corners of the lake.

In 1985, the State Planning Commission proposed works in the south east sector, to complete the moat in this area and to create some passive recreation areas between the existing urban zone and the moat. The Environmental Protection Authority approved Stage 1 of the moat, being a southern extension of the existing water area near Jon Sanders Drive, but in respect of the remaining section called for a Notice of Intent.

2. PROPOSAL

2.1

The State Planning Commission has prepared and submitted a Notice of Intent for the extension of the moat in the south eastern sector of the lake and for the creation of a filled passive recreation areas adjacent to the moat.

2.2

The moat would be created by removing reed material from the area by bulldozer and subsequently employing a dredge to deepen the moat to R L 5.4 metres. The material from this dredging would be used to form the filled passive recreation area and backfill other sections of the moat to design specifications. Two narrow connecting channels would be constructed between the moat and the World Wildlife Fund Headquarters. Figure 2 shows the extent of the proposed works.

3. ASSESSMENT

3.1

In examining the Notice of Intent, the Authority considered that the advice of certain conservation groups would be essential before making its report on the proposals. Accordingly, a meeting was held between representatives of the following:

- . Conservation Council of WA;
- . Herdsman Habitat;
- . Department of Conservation and Land Management;
- . Royal Australia Ornithological Union;
- . State Planning Commission; and
- . Department of Conservation and Environment.

As a result of these discussions, the assessment of the Notice of Intent has included the range of issues raised by the group.

3.2

The Authority was impressed by the quality of the assessment document and the comprehensive manner by which all pertinent issues of environmental concern were addressed. Such an approach has made the Authority's task of reviewing the proposal easier.

3.3

Physical impacts of the proposal in terms of noise, dust, smoke and general disturbance to the residential area adjacent to the works area are considered to be acceptable and adequate management controls have been incorporated into the works contract.

3.4

Biological impacts of the proposal do not appear to be a cause for concern, however, the Authority believes that aspects of design should be modified slightly during the construction phase in order to provide a more diverse range of habitats.

In particular, attempts should be made to increase the amount of shallow mudflats adjacent to the core area and adjacent to reed areas on the outside of the moat.

3.5

The Authority believes that the proposed moat should be made as shallow as possible, and in line with its prior advice on stage 1 of the moat in this area, the bed of the moat should not be lower than R L 5.4 metres. The Authority believes that this depth will be adequate to achieve the objectives of a protective moat, whilst providing a desirable additional habitat to the total lake system.

3.6

The Authority noted that the moat is to have a peat bottom. This objective is strongly supported and the proponent should ensure that a substantial depth of peat exists on the bottom of the finished moat.

3.7

The width of the moat has been questioned, however, as a result of accommodating suggestions from the Department of Conservation and Land Management and including the additional mudflat areas referred to in 3.4, the moat will be narrower than originally proposed.

3.8

The use of the material from the proposed moat to backfill other sections of the moat to design levels is supported by the Authority. The dredging operation being carried out in a closed system will ensure that disturbance to adjacent water bodies is minimised.

The proposals to include the newly created section of moat within the overall water quality monitoring programme for the whole lake is supported.

Reference is made in the Notice to Argentine Air control. Before any major spraying programme in the works area is undertaken, the approval of the Department of Conservation and Land Management should be obtained.

4. CONCLUSIONS

The works proposed in the Notice of Intent have been assessed by the Authority as being desirable in terms of achieving the objectives of the original Concept Plan for the lake and the Improvement Plan No 21. The means of constructing the moat and adjacent filled area have been formulated in an environmentally sensitive manner and should not result in an unacceptable impact on the environment.

Subject to the following recommendations being met, the Authority does not object to the proposed works proceeding in accordance with the Notice of Intent:

1. The finished lake bed should be no lower than R L 5.4 metres.
2. A substantial depth of peat should exist on the bottom of the completed moat.
3. State Planning Commission should provide a report to the Authority on completion of the project, detailing any unexpected impacts, problems encountered and the means used to resolve them. In addition, a survey of the newly created moat (and the stage 1 moat) should be provided to show the finished depth does not exceed the depth as per recommendation 1.
4. The Commission should provide additional information as to the timing of the dredging operation and if there are any environmental implications if a delay occurs between the stripping of the reeds and the dredging. The means of overcoming any adverse implications should be addressed.
5. During construction, shallow mudflat areas on the edge of the moat should be provided (except adjacent to the filled recreation areas) to create a wider diversity of habitats.
6. The Commission should adhere to the commitments made in the Notice of Intent. Any alterations to the proposal or methods of construction, should be referred to the Authority for further consideration prior to those changes being made.

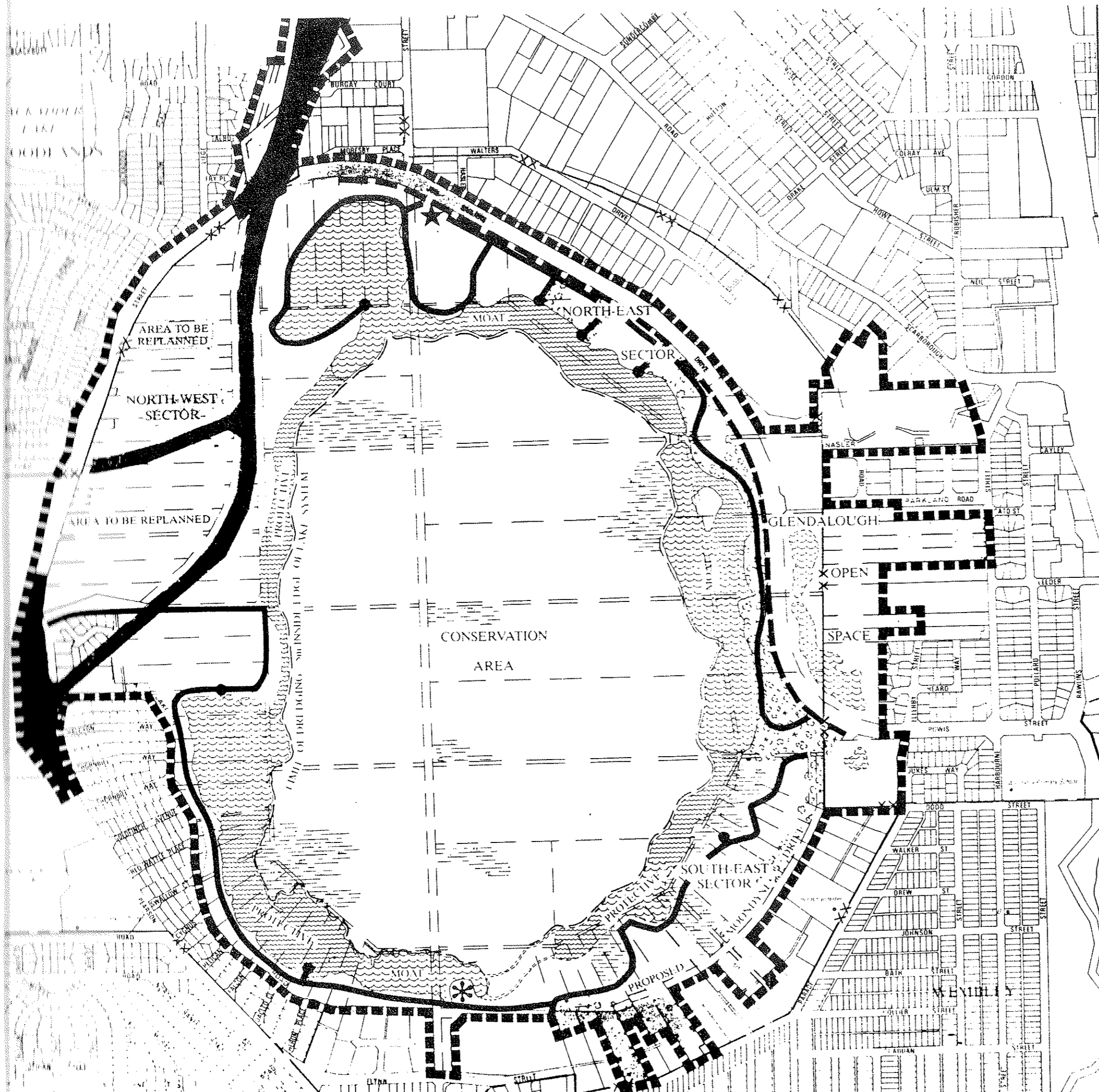
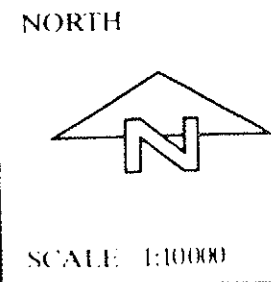


FIGURE 1

IMPROVEMENT PLAN No. 21 HERDSMAN LAKE

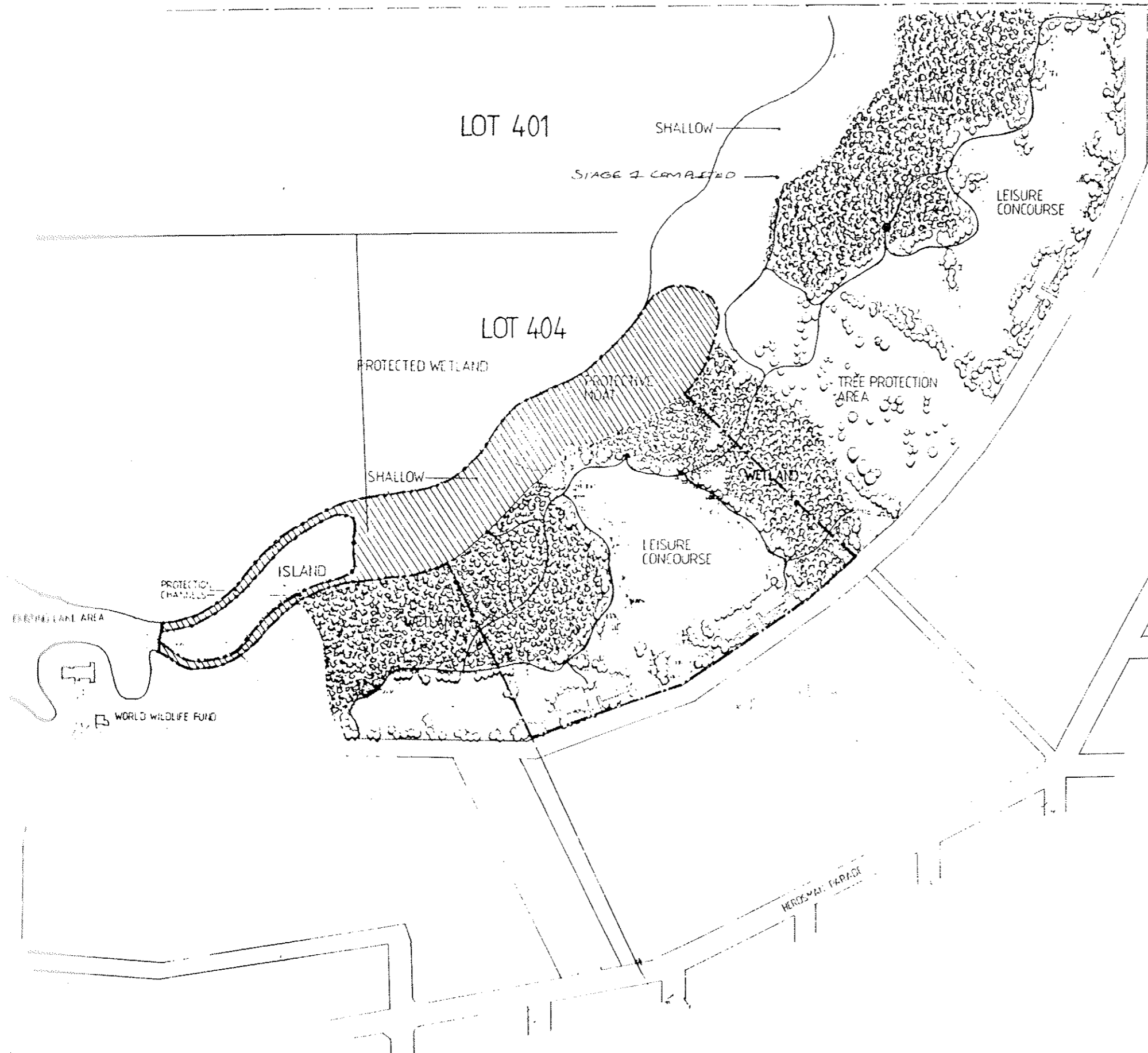
DRAFTSMAN LA SERVAAS
 AUTHORIZED D BROWN
 EXAMINED *Johnston 16/8/85*
 DATE 8/85
 REVISED

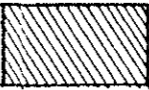



FILE REF SP 2013
 PLAN REF

PLAN No.
2.0516

FIGURE 2



 AREA TO BE DREDGED
 BOUNDARY OF STAGE 2 DEVELOPMENT

WILD 1574 UAGA
Nr 13037 152.72

100057



- 5 0 2 2 - 1 2 6 7 - 5 7 1 0 0 0 2 0 0 0 2 8 0 5 6 -

0 0 0 0 0 0 0 3 1 4 1 2 0 0 1 2 5 6 0 1 9 3 5