KNIGHTSBRIDGE
City Beach

PUBLIC
ENVIRONMENTAL
REPORT

BOND CORPORATION HOLDINGS LIMITED

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RESIDENTIAL SUBDIVISION OF LOT 1 STEPHENSON AVENUE, CITY BEACH

PUBLIC ENVIRONMENTAL REPORT

- Prepared by -

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RESIDENTIAL SUBDIVISION OF LOT 1 STEPHENSON AVENUE, CITY BEACH
PUBLIC ENVIRONMENTAL REPORT

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal.

The Public Environmental Report (PER) for the residential subdivision of Lot 1 Stephenson Avenue, City Beach, has been prepared by Bond Corporation Holdings Limited in accordance with Western Australian Government procedures. The report will be available for comment for eight weeks, beginning on 4 December 1987 and finishing on 29 January 1988.

Following receipt of comments from government agencies and the public, the EPA will prepare an assessment report with recommendations to government, taking into account issues raised in public submissions.

WHY WRITE A SUBMISSION?

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents, unless confidentiality is requested, and may be quoted either in full or in part in each report.

DEVELOPING A SUBMISSION

You may agree or disagree with, or comment on, the general issues discussed in the PER or the specific proposals. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal environmentally more acceptable.

When making comments on specific proposals in the PER:

- clearly state your point of view
- indicate the source of your information or argument if this is applicable
- suggest recommendations, safeguards or alternatives.

POINTS TO KEEP IN MIND

By keeping the following points in mind, you will make it easier for your submission to be analysed.

- Attempt to list points so that the issues raised are clear. A summary of your submission is helpful.
- Refer each point to the appropriate section, chapter or recommendation in the PER.
- If you discuss different sections of the PER, keep them distinct and separate, so there is no confusion as to which section you are considering.
- Attach any factual information you wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name
- address
- date.

The closing date for submission is 29 January 1988.

Submissions should be addressed to:

The Chairman
Environmental Protection Authority
1 Mount Street
Perth, WA 6000

Attention: Mr P. Skitmore

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SUMMARY

Lot 1 Stephenson Avenue, City Beach (the site), is a 19 ha area of uncleared land adjacent to, but not part of, Bold Park. The site is currently zoned 'Urban' by the State Planning Commission and 'Development Zone' by the Nedlands City Council. In accordance with this zoning, Bond Corporation Holdings Limited, through its subsidiary Harpford Pty Ltd, is the proponent for a 136 lot residential subdivision on the site. The development will be known as 'Knightsbridge', and lots, ranging from 800 m^2 to 1,550 m^2, will be fully serviced with internal access roads, water supply, deep sewerage, on-site drainage, electricity, telephones and gas. Only single dwellings will be permitted, plus 150 m^2 of retail floor space, with strict convenants controlling dwelling size, retention of on-site vegetation, visual amenity, and use of compatible construction materials. In addition, 2.08 ha (10.9% of site area) of landscaped and reticulated public open space will be provided and developed, mainly for passive recreation, at no cost to the Nedlands City Council. Facilities will include two ornamental lakes, pedestrian/bicycle paths, seating, a gazebo and two public tennis courts. The public open space will be linked to the abutting Stephenson Avenue west side road reserve and northern site boundary—Bold Park buffer zone. Four landscaped drainage basins will retain all stormwater runoff on site. All public lands will be landscaped and reticulated with groundwater.

The proponent purchased the site with the intention of developing a residential subdivision. However, in order to attain environmental approval, a number of alternative development options for the site were considered, including the 'no build' or conservation option and a land swap. The site was also offered for purchase or resumption to the State Government, Nedlands City Council and 'Friends of Bold Park Bushland', all of whom rejected the offer. The conservation and land swap options are not considered feasible or economic by the proponent. The selected option of residential development of the site was confirmed after considering the wide range of land uses permitted under the site's Development Zone. The preferred residential development option has been subject to detailed engineering, planning and landscape design. Other residential development alternatives were rejected on engineering and environmental grounds, as they involved extensive earthworks and clearing of site vegetation.

The existing environment consists of moderately sloping land with sandy, well-drained soils supporting areas of native flora and mainly introduced fauna. The site has some minor recreational use and landscape and visual amenity; however, the System 6 Study (Department of Conservation and Environment 1983) and sections of the public have wrongly assumed that the site is part of Bold Park and available for public use. The environmental value of the site is not considered high, as existing flora and fauna on site are neither rare nor significant in a regional or State context. Some of the opposition to the development, received as appeals against the level of assessment by the Environmental Protection Authority, cited perceived conflicts with the System 6 Study and the Wycherley Report (Ecology Working Party 1976). However, the residential development as proposed would be consistent with the recommendations of these reports.

The development's main impacts will be caused by earthworks and the clearing of some vegetation, plus the effects of urbanization, i.e. occupation of the site by an estimated 420 people and 220 motor vehicles. The infrastructure, social and economic impacts of the development can be readily accommodated on site. No additional headworks, community and recreation facilities or other services will need to be constructed off site as a result of the development. Existing utility and traffic systems can accommodate additional loadings and flows to and from the site.

The environmental impacts of the development will be minimized as much as practicable. The majority of conspicuous on-site vegetation will be retained, particularly in public open space areas, and earthworks minimized as far as possible within the constraints of supplying water, sewerage and road access to all lots. The proponent has made a number of environmental management commitments in order to minimize any impacts, particularly during the construction phase of the development.

Provision of underground services; landscaping and reticulation of all public lands within and abutting the site; controlled fencing around residential portions of the development; restrictive convenants on dwelling construction; and conservation of vegetation will ensure that the development blends in with the surrounding environment. Impacts on adjacent areas (including Bold Park and Camel Lake) and on other proposed land uses will be minimal and are considered insignificant.

Environmental management of the land will be the responsibility of the proponent during construction of site infrastructure and lot development and until the lots are sold. Management of public open space, drainage basins and road reserves will eventually revert to the Nedlands City Council. All public lands, including the Stephenson Avenue west side road reserve and the northern site boundary—Bold Park buffer zone, will be maintained and reticulated by the proponent for a maximum of two years or until all lots are sold. Environmental management of private lands will be the responsibility of individual land owners, and occupation of new dwellings by residents is expected to occur within two years of environmental and development approval.

The proponent undertakes to meet all legislative, planning, engineering, landscape and environmental requirements of the relevant authorities in order to ensure a technically feasible and environmentally sound development. The proponent considers that the benefits of residential development of the site outweigh the minor adverse environmental impacts.

1 INTRODUCTION

1.1 BACKGROUND

Lot 1 Stephenson Avenue, City Beach (the site), is a 19 ha area of uncleared land adjacent to Bold Park (Figure 1.1). The Certificate of Title (Volume 1619, Folio 880) shows the site is a portion of Swan Location 2103. The site is located within the City of Nedlands and bounded to the north and west by the City of Perth. Stephenson Avenue is the south-eastern boundary.

Prior to 1985, the land was zoned as 'Public Purposes - University of Western Australia (UWA)'. The Nedlands City Council (NCC) initiated zoning changes in 1985 with the publication of the City of Nedlands Town Planning Scheme No. 2 (1984). In accordance with the Metropolitan Region Scheme (State Planning Commission 1986), which has zoned the site 'Urban', the NCC's planning scheme zoned the site 'Development Zone'. This enables a wide range of land use and development options for the site, subject to NCC approval (see Section 3.2).

In April 1987, the UWA offered the site for sale by public tender. The successful tenderer was Harpford Pty Ltd, a subsidiary of Bond Corporation Holdings Limited (Bond Corporation).

In mid-1987, Bond Corporation submitted a proposal for residential development of the site to the Environmental Protection Authority (EPA), the State Planning Commission (SPC) and the NCC. The EPA decided that it was a referrable project, and that a Notice of Intent was an appropriate level of assessment. Some of the appeals against this level of assessment cited perceived conflicts with the recommendations of the System 6 Study (Department of Conservation and Environment 1983) and the Wycherley Report (Ecology Working Party 1976). The Minister for the Environment overruled the EPA's level of assessment decision and directed Bond Corporation to prepare a Public Environmental Report (PER). Subsequently, the EPA issued relevant guidelines to the proponent for the preparation of the report, a copy of which is included in Appendix A.

Kinhill Engineers Pty Ltd has been commissioned by Bond Corporation to prepare the documentation for the PER.

1.2 THE PROPONENT

The proponent is Bond Corporation, through its wholly owned subsidiary Harpford Pty Ltd.

Bond Corporation is a well-known, Australian company with a diverse range of activities throughout Australia and overseas. The Bond Corporation group and its associated companies directly employ about 7,000 people. Its administration base is Perth. The main trading areas include energy and mineral resources (petroleum, coal, gold), brewing, media (radio and television), property development and retailing.

1.3 OBJECTIVE OF THE PROPOSAL

The proposal's objective is the provision of highly appealing residential allotments within a prestigious locality.

1.4 SCOPE AND TIMING OF THE PROPOSAL

The proposal subdivides the site into 136 residential lots, varying in individual size between 800 m^2 and 1,550 m^2, with an average lot size of 934 m^2. The estate will be known as 'Knightsbridge', City Beach, and will be developed as one stage.

Lots will be fully serviced with paved roads and footpaths, and underground electricity, water, gas, sewerage, drainage and telephone services. Provision has been made for 2.08 ha (10.9% of the site) of landscaped public open space and some recreation facilities. A neighbourhood shop would also be provided.

When environmental and all other statutory approvals are granted, site preparation will commence as soon as practicable and will continue for about six months. It is anticipated that the developed land will be sold within a six-month marketing period. Housing construction will continue for twelve to eighteen months, depending on private land owners' plans. The first occupants of the development are expected in early 1990.

1.5 LEGISLATIVE AND OTHER REQUIREMENTS

1.5.1 Legislative requirements

The relevant legislation and its application to the development of land for residential subdivision in the metropolitan area is briefly outlined as follows:

- The Town Planning and Development Act, 1928 (as amended) empowers the NCC to control land development under the provisions of its Town Planning Scheme. Statement of Planning Policy No. 1 - Residential Planning Codes (City of Nedlands 1985) also has effect under the provisions of this Act.

- The Local Government Act, 1960 (as amended) provides authority to the NCC with respect to local planning and zoning regulations.

- The Metropolitan Region Town Planning Scheme Act, 1959 (as amended) grants the SPC regional planning powers to control development.

- The State Planning Commission Act, 1985 (as amended), which established a single body responsible for urban and regional planning and development, empowers the SPC to grant the necessary development approvals of applications for subdivision and to impose certain conditions for approved applications. This Act provides the SPC with the powers and duties previously held by the Town Planning Board and the Metropolitan Region Planning Authority.

- The Environmental Protection Act, 1986 requires that the proponent prepares documentation of the proposal, stating the environmental impacts, for evaluation by relevant authorities before environmental approval can be granted.

The development of the proposed subdivision will be consistent with the

Figure 1.1
Location plan of the proposed development

requirements of all relevant Acts and regulations.

1.5.2 Approvals and zonings

The development will comply with the requirements of public utility authorities, including the Water Authority of Western Australia (water supply, sewage disposal, main drainage), the Western Australian Fire Brigade, the State Energy Commission of Western Australia (electricity, gas), Telecom (telephones), and other authorities responsible for granting land development approvals, such as the EPA, NCC and SPC. The proposal basically meets the residential planning code requirements as defined by the NCC and SPC.

1.5.3 Environmental approval process

The environmental approval process is illustrated in Figure 1.2.

The PER will be submitted to the EPA and placed on public display for a period of eight weeks. Written submissions from the public and government departments will be sought by the EPA during this review period for incorporation into its assessment of the proposal. During the review, the EPA will liaise with the proponent if further information is required. The EPA will recommend to the Minister for the Environment that:

- the proposal is environmentally acceptable
- the proposal is acceptable subject to certain conditions, or
- the proposal is environmentally unacceptable.

Development approval lies with the NCC and the SPC, and their evaluation is normally made in concert with the environmental approval process.

1.5.4 Planning and development controls

The site is regulated by planning provisions and development controls of both the SPC and NCC. Figure 1.3 shows the regional setting of the site and the zoning of surrounding lands under the Metropolitan Region Scheme. The majority of the surrounding land is for urban use. The land to the north has been reserved for public purposes and parks and recreation.

The Residential Planning Codes Manual (Town Planning Board of Western Australia 1985) provides a guide for residential development, including density control and the setting of development standards. The codes (gazetted as Statement of Planning Policy No. 1) set out to, amongst other things, encourage a variety of housing types (through minimum and average lot sizes) to suit different groups, provide adequate environmental standards and ensure that new residential developments are compatible with their neighbours and with the local environment. The density codings are allocated by local authorities in Town Planning Schemes; however, the NCC has not yet determined an appropriate density code for the site, as a wide range of non-residential uses are permitted with Council's approval. For the low density, single house type of development proposed for the site, the minimum residential development requirements as amended by the NCC are shown in Table 1.1.

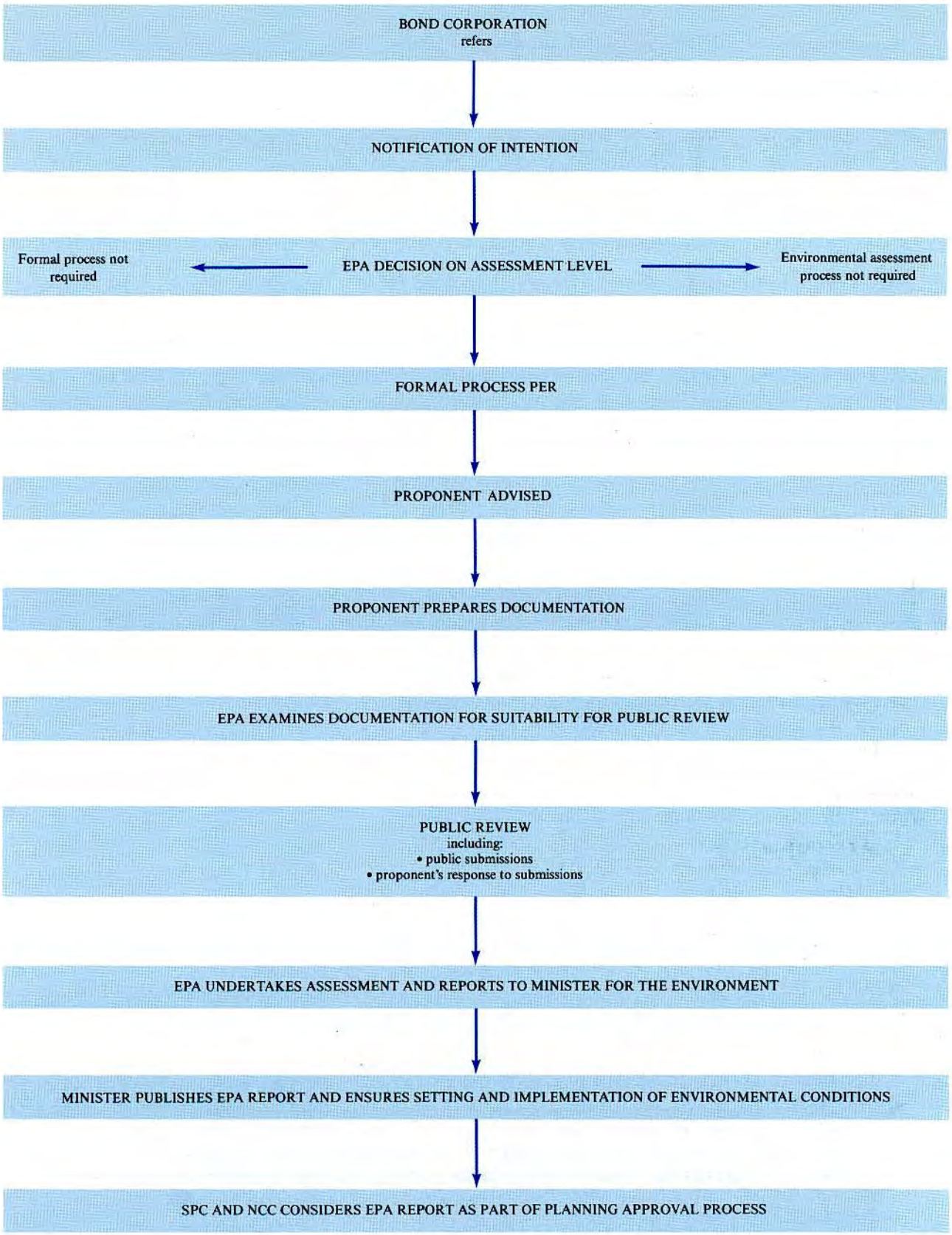
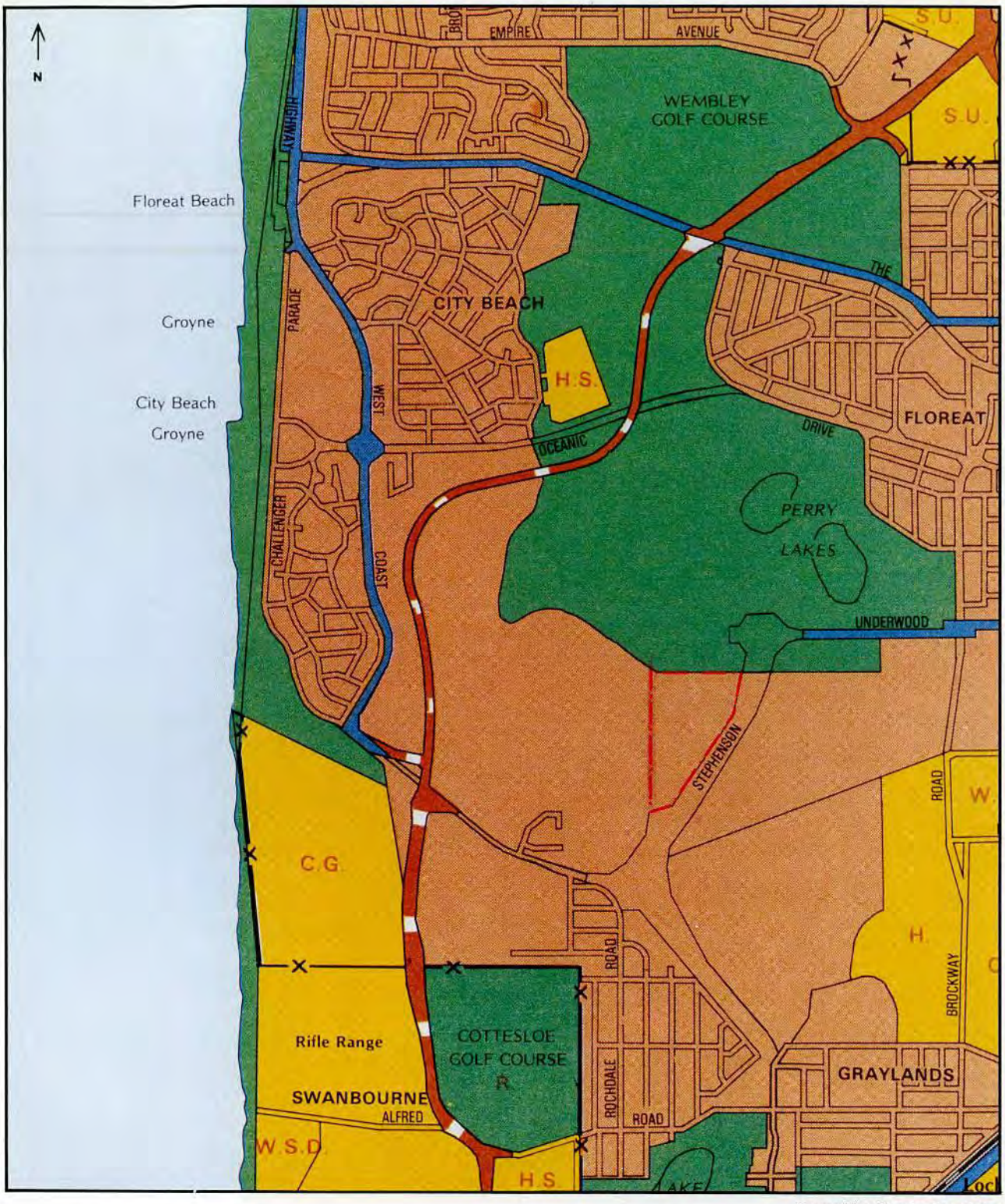


Figure 1.2
Approval procedures



Source: State Planning Commission

Legend

- Urban
- Parks and recreation
- Public purpose
- Important regional roads
- Controlled access highways
- Other major highways
- Restricted public access
- HS High schools
- SU Special uses
- WSD Metropolitan Water Authority
- CG Commonwealth Government
- H Hospital
- Knightsbridge, City Beach Proposed Subdivision Lot 1 Stephenson Avenue

Figure 1.3
Zoning plan

Table 1.1 Minimum development requirements for single house dwellings

Development requirement	R* dwellings/ha	
	R10	R12.5
Lot area (m^2)	1,000	700 (800 average)
Lot frontage (m)	20	17
Site open space (%)	60	55
Street boundary setback (m)	9	9
Rear boundary setback (m)	9	9
Side boundary setback (m)	1-3	1-3
Car spaces per dwelling	2	2

* Residential Planning Code.
Source: Town Planning Board of Western Australia 1985.

Under the City of Nedlands Town Planning Scheme No. 2, the site is within a Development Zone and is subject to a number of provisions for those uses permitted in the zone and detailed in Table 3.1. The intention of the NCC is to ensure that development of land within a Development Zone takes place only after comprehensive planning ensures the maximum possible benefits of urban design and servicing. To this end, the NCC requires the proponent to submit an Outline Development Plan for approval, which shows:

- the topography of the area;
- the existing major road systems;
- the location and width of proposed roads;
- the approximate location and quantity of shopping, civic and public facilities proposed;
- the approximate location of the recreation and open space area proposed;
- the population and residential densities proposed, including the spatial location of appropriate residential planning code densities;
- the basic layout of a sewerage system;
- the layout of comprehensive drainage, both land and stormwater;
- land-holdings adjacent to, or in the vicinity of, the subject area;
- the development proposed, the method of implementation and the projected times of completion of each stage;
- such other information as required by Council.

Other NCC provisions for residential development of land include:

- maximum building height of two storeys or 10 m;
- building materials to be of brick, stone or concrete;
- unless otherwise approved by Council, retaining walls to be a maximum 0.5 m height;
- fence or screen walls on dividing boundaries to be a maximum 1.8 m height.

In consideration of applications for planning approval, the proponent must satisfy the NCC that the following conditions and standards have been met:

- The nature and intensity of the proposed use or development will not detrimentally affect the locality in terms of its environmental impact by any of its hours of operation, illumination, emission of any kind and the effect on any use or development within the locality.
- The plot ratio, site coverage, setbacks, height, landscaping and parking provisions are in keeping with the general character of the locality.
- The form, layout, appearance and material of any building are in keeping with the existing character of the locality.
- The vehicular and pedestrian access, including on-site circulation and provision for deliveries, will not create any danger.
- The vehicle flows to and from the subject land will not be disruptive to existing traffic movements or circulation patterns.
- Any traffic generated will be capable of being accommodated within existing streets.
- The development or use will not place excessive loads on existing or projected essential services.
- The proposed development or use is necessary to service the needs of the district's residential population and is otherwise generally in keeping with the NCC town planning intentions for the locality.
- Any other matter considered relevant by the NCC will be addressed.

1.6 SCOPE AND STRUCTURE OF THE PER

The aim of this PER is to provide the public and government with information on the development, including an examination of environmental impacts and description of a management plan and commitment to it. The PER enables the public and government agencies to make submissions, which will be reviewed by the EPA in its assessment of the proposal.

The scope of the PER is limited to areas that will be affected by site preparation, housing construction and activities associated with residential development. The environmental appraisal considers the physical, biological, social and economic environment of the site and its immediate environs.

The PER follows the EPA guidelines (Appendix A) and presents the following information:

- the need for the development, while outlining the benefits that the proposal will bring to the proponent, Perth and the local community (Section 2);
- an evaluation of alternative development options, including permitted land uses and the 'no build' or conservation option, indicating the rationale for selecting the preferred development option (Section 3);
- a description of the proposal, covering development concepts, subdivision layout, public open space, landscaping and provision of infrastructure and public utilities (Section 4);
- a description of the existing physical, biological and human environment, together with land use planning (Section 5);
- an evaluation of potential environmental impact upon the existing and surrounding environment during development, construction and habitation of the proposed subdivision (Section 6);
- a programme of environmental management that will be implemented to ensure impact is minimized (Section 7);
- conclusions and a summary of the commitments made by the proponent to ensure an environmentally acceptable, technically feasible and financially sound residential development (Section 8).

2 NEED FOR THE DEVELOPMENT

Both the SPC and the NCC have recognized, through their zoning of the site (Urban and Development Zone, respectively), that some form and scale of urban development is appropriate and a need for development exists.

Indeed, in designating particular zones, both the SPC and NCC consider factors such as:

- regional setting (location of site in relation to services, facilities, transport, physical features, areas of employment);
- existing and proposed character of the site (high or low density, range of proposed uses, etc.);
- optimization of resources and urban efficiency.

Both authorities consider the site is suitable for urban development and, as such, the proposal is in accordance with the zoning. Accordingly, the proponent has adopted the view that there is justification for the proposal to proceed based on the zoning of the site. The proponent also recognizes its responsibility to consider the influence of the development on adjacent Bold Park and its potential impact on the environment.

The proponent is experienced in real estate development and, prior to purchase, justified the development of the site commercially. The view that the site is commercially viable for residential development is supported by the fact that the UWA received six other tenders for the land from experienced property developers. There is an existing and potentially high demand for high-quality residential development that has easy access to the central business area, recreation facilities, parkland, beaches and shopping facilities. The site has excellent access to these facilities and has the added advantages of being located in close proximity to other high-quality residential developments and being favoured with elevated views across parkland to the city.

The existing demand for high-quality residential land close to essential facilities is reflected in the large number of inquiries the proponent has received to purchase lots in the development. Since mid-November 1987, the proponent has compiled a register of forty-eight persons willing to pay deposits to purchase a total of fifty-three lots following development approval.

The development will have a number of economic and social benefits. Some of the existing demand for high-quality residential development in the metropolitan area will be met. The NCC will benefit from a substantially expanded rating base, a broadened age/sex structure and an increase in population. The use of nearby existing infrastructure and facilities will be further optimized and the costs associated with expanding the urban area in the metropolitan region minimized. Increased patronage of the following existing local facilities is also expected to occur:

- Bold Park;
- Perry Lakes;
- regional shopping centres (Floreat Forum, Claremont);
- indoor sports centres (Perry Lakes stadium, Western Australian Sports Centre);
- surf life-saving clubs (Floreat Beach, City Beach);
- City Beach bowling club;
- golf courses (City of Perth, Cottesloe, Lake Claremont);
- swimming pools (Bold Park, Western Australian Sports Centre).

The development will also offer an increased choice in housing for the residents of Perth, through provision of new housing and the vacating of existing dwellings.

The proponent has purchased the site in good faith, planning to begin residential development as soon as possible, subject to development and environmental approvals. Some sections of the public have wrongly assumed the site is part of Bold Park, as it is indistinguishable in character from that area and open to public use.

3 EVALUATION OF ALTERNATIVES

3.1 CONSERVATION OR DEVELOPMENT

The public debate that has arisen since the proponent purchased the site has centred on whether the site should be conserved in its present form, as an addition to Bold Park, or whether the proponent should develop the site in accordance with the intent at the time of purchase and the present zoning for the site. This is a common conflict between the rights of individuals to express views about changes to the use of land with which they perceive some association and the rights of individuals (in this case a publicly listed company) to be able to change the use of land that they have acquired. Traditionally, conflicts of this nature are resolved through the formal planning process, administered locally by Local Councils (in this case the NCC) and on a regional scale by the SPC.

It is important to emphasize that the planning process and, in particular, the adoption of Town Planning Schemes and consideration of development applications by local Councils give the public adequate opportunity to make comment and for these comments to be considered in the development of land.

The zoning of the site was changed to its present status in 1985. Therefore, it can only be assumed that issues pertaining to the recreational use of the site, its relationship to Bold Park and its relationship to the surrounding region were all previously subjected to public review and subsequently assessed by the responsible authorities.

Some public debate has also been concerned with the conservation value of the site due to perceived environmental significance. The conservation value of the site has been examined in the course of preparing this PER. The findings show that the site is not distinctive, nor does it appear to have any significance in terms of conservation of flora and fauna. Therefore, there are no significant ecological arguments for not developing it in accordance with its present zoning. Bond Corporation purchased the site on the understanding that it is suitably zoned and appropriate for urban development. Bond Corporation is a public company and must endeavour to achieve a reasonable rate of return on assets and shareholders' funds. The Corporation is accountable to its shareholders and, consequently, the site is an asset that must be developed or utilized in order to show an acceptable return.

Bond Corporation is aware that sections of the community believe conservation of the site is desirable. Consequently, on 16 October 1987, Bond Corporation wrote to potential organizations with conservation interest, offering the site for purchase or resumption in order to address any feasible opportunities that avoid development of the land. The resale price requested by the Bond Corporation allowed for the cost of buying the land from the UWA, holding cost and reasonable profit anticipated from a residential subdivision. The three offers and responses were as follows:

> The Hon. Minister for Education and Planning was asked of his interest to purchase or resume the site on behalf of the government and rededicate it as an extension to Bold Park.

The Minister replied to this offer on 18 November 1987, declining to purchase or resume the site. Copies of both letters are included in Appendix B.

- The NCC was similarly asked to purchase the site for $12 million and rededicate it as an extension to Bold Park. Information was provided on the estimated rate increases that would be required for one, three and fifteen year periods, respectively, to fund the purchase.

  The Town Clerk replied to this offer on 29 October 1987, declining to purchase the site. Copies of both letters are included in Appendix B.

- A representative of the 'Friends of Bold Park Bushland' group was also offered the opportunity to purchase the site for approximately $12 million by public subscription. A requirement to provide underwriting or similar guarantee prior to completion of the PER was requested.

  The Friends of Bold Park Bushland declined the opportunity to purchase the site on 23 October 1987. Copies of these letters are included in Appendix B.

Land swaps have been suggested by opponents to the development. Bond Corporation does not consider a land swap is feasible. Various parcels of land have been indicated by particular groups as suitable for a land swap, but they have been rejected by Bond Corporation because:

- they have inappropriate zoning for residential development;
- they are smaller in size than the 19 ha site, which would result in a lower lot yield upon development;
- they are located in the City of Perth, which could result in complicated transfer procedures with the City of Nedlands;
- they do not offer the same premium or prestigious location.

Any land swap necessitates complex and time consuming negotiation between land owners for adequate compensation of Bond Corporation's holding cost, plus the extensive planning, PER preparation, engineering and landscape design work already undertaken for the site.

3.2 DEVELOPMENT OPTIONS

Bond Corporation purchased the site with the intention of developing it for residential use, as this will maximize the economic returns from the site. The various development options discussed in this section have been evaluated in order to assess their potential for environmental impact as compared with that of residential development.

A number of options and mix of land uses are permitted under the NCC's Development Zone for the site. Table 3.1 shows the uses permitted on the land with Council's approval. It also gives a qualitative ranking of the suitability of the site for each land use.

Table 3.1 Uses permitted in Development Zone with Council approval

Use	Suitability of site	Site coverage	Demand for use	Potential environmental impact
Boat sales yard	L	L	M	M
Boat servicing premises	L	L	M	M
Car sales yard	L	L	L	H
Car servicing premises	L	L	M	M
Caretaker's dwelling	H	L	L	L
Child-minding centre	H	L	H	L
Civic use	L	H	L	M
Consulting rooms - single	H	L	H	L
Consulting rooms - multiple	H	M	H	M
Convenience store	H	L	H	L
Dry-cleaning premises	M	L	M	M
Dual accommodation unit	H	H	M	L
Dwelling house	H	H	H	L
Educational establishment	H	H	H	H
Fast food outlet	H	L	H	L
Health centre	H	M	M	M
Health studio	H	L	M	M
Home occupation	H	M	L	M
Hospital	H	H	H	H
Hotel	H	M	H	H
Institutional home	H	M	M	M
Licensed premises	H	M	H	M
Light industry	L	M	M	H
Lodging houses	H	M	L	L
Motor repair station	L	L	M	M
Night club	L	L	M	M
Office	L	M	M	H
Public amusement	L	M	M	H
Public utility	M	H	M	H
Recreation	M	M	M	L
Religious purposes	H	L	M	L
Restaurant	H	L	H	M
Service industry	L	M	M	M
Service station	L	L	M	M
Shop	H	L	H	L
Showroom	M	M	M	L
Squash courts	H	L	M	M
Transport depot	L	H	M	H
Warehouse	L	M	M	M

L = low M = medium H = high

The ranking criteria included the suitability of the site (including access, topography, soils, existing nearby facilities, etc.) for the listed use, the proportion of the 19 ha site to be covered by the listed use, the anticipated demand for the listed use, and the likely environmental effect of the listed use

(e.g. traffic generation). These criteria have been reviewed to ensure a technically sound, economically viable and environmentally acceptable development option. Table 3.1 shows that residential use (dwelling house) is the only listed use that has a high suitability for the site, high site coverage and high demand to ensure an acceptable return, and low potential environmental impact. Uses normally associated with residential development, such as a child-minding centre, consulting rooms, convenience store, dual accommodation unit and home occupation, are also acceptable within the preferred development option. Other uses, such as boat or car sales yards, hospitals, service stations, transport depots and warehouses, are unsuitable for the site for one or more of the following reasons:

- insufficient commercial return;
- physical constraints such as access or topography;
- low demand due to the number of existing facilities in the metropolitan region;
- low site coverage, which would not make maximum use of the whole area;
- large potential environmental impacts.

3.3 PREFERRED RESIDENTIAL DEVELOPMENT OPTION

Bond Corporation tendered for the site without a preconceived layout for the residential subdivision.

After purchase, the following seven alternative residential development options were considered:

- One layout included the development of 161 residential blocks, averaging about 750 m^2, and the provision of 1.8 ha of public open space, the majority of which would have been located at the south-east end of the development.
- Another design proposed the development of 136 residential blocks with the complete levelling of the site and the provision of a retaining wall to the western boundary.
- A development option prepared by the UWA as a guide to potential purchasers included the provision for some group housing - in contrast with the single residential blocks proposed by Bond Corporation.
- Three residential development options involved extensive earthworks and removal of all vegetation on site in order to increase lot yield. These were rejected on environmental and engineering grounds, because they did not optimize the topographic features inherent in the land to best commercial and environmental advantage.
- The adopted residential development option will enable 136 single dwelling lots ranging in size from 800 m^2 to 1,550 m^2, together with retail floor space of 150 m^2 and extensive landscaping and development of public open space. This option incorporates the major environmental benefits of minimizing the amount of earthworks involved and conserving the majority of conspicuous trees and vegetation on site. Despite the lower lot yield compared with other residential development options, the preferred option has since been refined with detailed planning, engineering and landscape

design work. The preferred option is in accordance with the objective of the proposal and the requirements of the NCC, and is described in detail in Section 4.

4 DESCRIPTION OF PROPOSAL

4.1 GENERAL DEVELOPMENT CONCEPTS

As required by the NCC, an Outline Development Plan (Figure 4.1) has been prepared for the site. The Outline Development Plan was formulated in consultation with the Perth City Council (PCC), SPC and NCC, and shows existing and proposed major land uses in the area surrounding the site. The major land uses include parks and recreation, public purposes and residential uses, including the City of Perth's 53 ha endowment residential area west of the site and the 400 lot Landbank development zone south of the site. The main access points to these major land uses are also shown in the Outline Development Plan, together with internal site access. Liaison with the SPC, PCC and NCC has determined the most appropriate access point to the site, which will permit staggered intersections onto Stephenson Avenue to serve surrounding recreation and residential areas. The internal site access has been shown as a cul-de-sac arrangement, with a possible extension to the abutting City of Perth residential area west of the site.

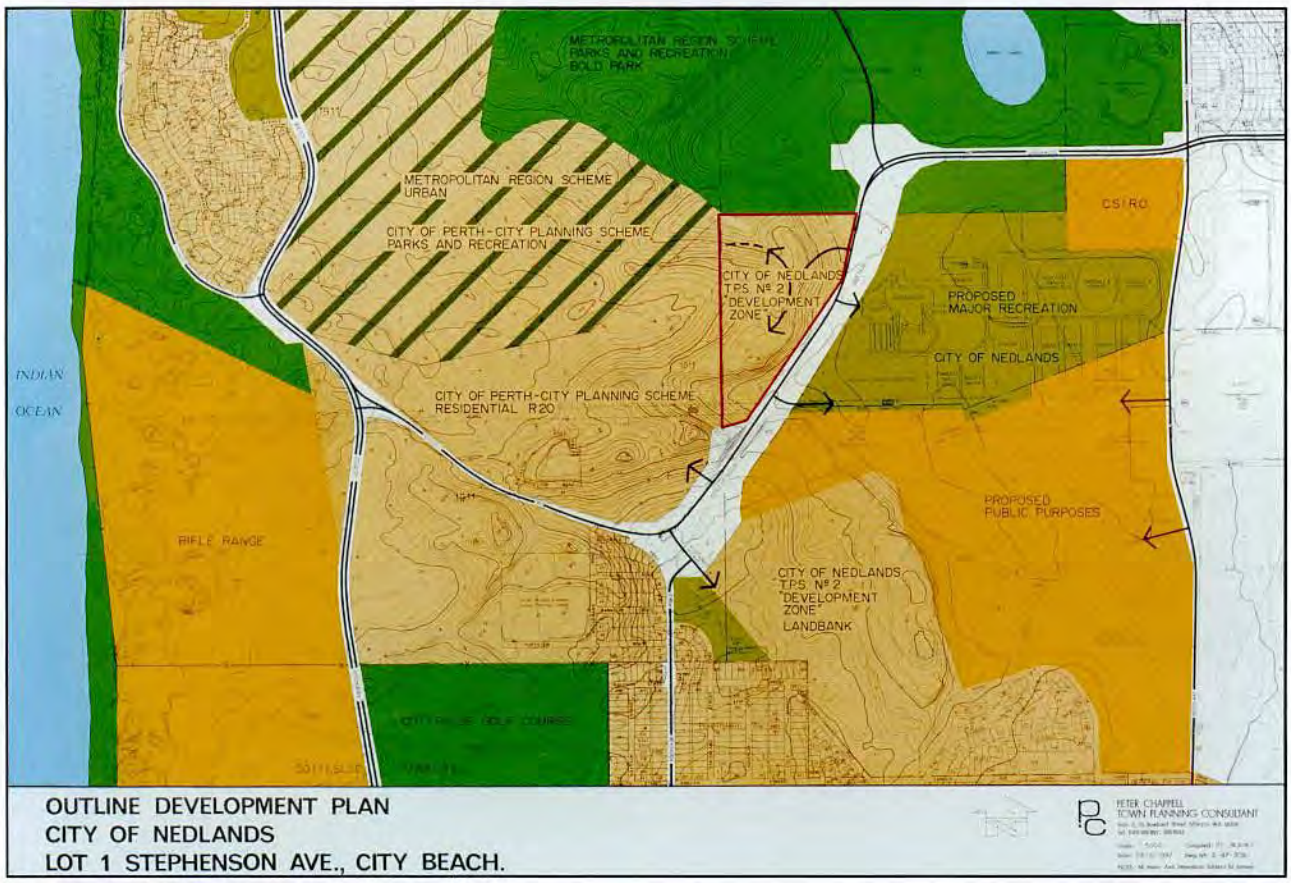


Figure 4.1
Outline Development Plan

The site has a high land capability for residential use, having moderate slopes and good site drainage and soils, and as there are no landslip, erosion or flood hazards on site and no outcropping rock. Consequently, the detailed planning, engineering and landscape design concentrated on carefully conserving the site's major environmental attributes of slope vegetation. Thus, the general development concepts for the site were to ensure a high-quality residential environment within the constraints of the SPC, NCC and other planning and development controls, while conserving as much as possible of the site's existing vegetation and the integrity of existing topography.

4.2 SUBDIVISION LAYOUT

Careful analysis of the site using the general development concepts discussed earlier, together with detailed planning, engineering and landscape design, has resulted in the subdivision layout shown in Figure 4.2, which provides more detail than the Outline Development Plan. The subdivision layout provides for an extensive internal road and footpath network, providing access to 136 residential lots and landscaped public open space. The lots average 934 m^2 in size, varying from 800 m^2 to 1,550 m^2, and form the main land use within the site. A benched lot layout has been used on the steeper portions of the site to enable housing development, while avoiding loss of existing vegetation and extensive earthworks. (Without this form of development, most of the site would have had to be cleared to obtain lot access or provide services.)

The road network layout was designed within the following constraints:

- topography and slope
- size and shape of the site
- a single access point to Stephenson Avenue
- conservation of vegetation
- road access required to all lots.

Some lots have a battleaxe shape and reduced road frontages with 3.5 m access carriageways. A series of cul-de-sacs off the two main spines (Kings Road and Kensington Gardens/Pavillion Terrace), as shown in Figure 4.2, provide a satisfactory road network solution. The road reserves will range from 15 m to 25 m in width, with paved carriageways 6-7.5 m wide. Paved pedestrian footpaths will be provided on the west side of Kings Road and Kensington Gardens, the north side of Sloane Rise and the south side of Pavillion Terrace abutting the limestone retaining wall.

Development of the lots, road network and infrastructure will involve some earthworks and construction of feature limestone retaining walls.

A schedule of all proposed land uses within the site is shown in Table 4.1.

Figure 4.2 also shows possible layout options for development of some lots, including housing, tennis courts and swimming pools. The home-store lot includes a residence, and the occupant will manage the 150 m^2 of retail floor space and the club house with toilets and washing facilities for the two adjacent public tennis courts.

Figure 4.2
Subdivision layout

Table 4.1 Schedule of proposed land uses

Land use	Area (ha)	% of total area
Residential*	12.70	66.8
Road reserves and pedestrian accessways	4.10	21.6
Stormwater drainage basins	0.12	0.7
Public open space	2.08	10.9
Total	19.00	100.0

* Includes 150 m^2 retail floor space.

4.3 PUBLIC OPEN SPACE

Public open space covering 2.08 ha or 10.9% of the site area will be included in the residential development. The public open space has been selected to cover all conspicuous stands of existing vegetation and will be mainly used for passive recreation. Two stormwater basins covering 430 m^2 will also be included in the public open space. As these areas will be landscaped, a 50% credit of 215 m^2 of open space will increase the total to 2.1 ha or 11.0% of the site area. The open space will cover four different areas so that all residents can enjoy ready access. All areas of open space will have access to Bold Park. The public open space areas are shown in Figure 4.2 and will include:

- Area 1, covering 0.65 ha, will include the stand of existing Eucalypt vegetation bordering Stephenson Avenue near the southern portion of the site. Access from Stephenson Avenue through the open space to Bold Park and Kensington Gardens will be possible via two pedestrian ways.

- Area 2, covering 0.86 ha, will include the conspicuous stand of large jarrah and marri trees located in the north-east portion of the site. This public open space will have both active and passive recreation components. Two ornamental lakes separated by a bridge/culvert and surrounded by trees will provide an attractive entrance way and passive recreation area. Two public tennis courts will enable active recreation.

- Area 3, covering 0.26 ha, will be located on the steeper portion of the site between Sloane Rise and north of Kings Road. This area will be for passive recreation.

- Area 4, covering 0.31 ha and located between Pavillion Terrace and Montpellier Square, will be for passive recreation and will provide pathed access to Bold Park.

The public open space will have a pathway system for both pedestrians and cyclists through all areas. Access will be provided to Bold Park at four points connected to these pathways. The pathways will also connect to road reserves via pedestrian accessways so that an interconnected system of walking trails links all open space areas, the Stephenson Avenue road reserve, road reserves, footpaths and Bold Park pathways.

Seating will be provided at appropriate locations throughout the public open space. A gazebo will be installed between the two public tennis courts.

4.4 LANDSCAPING

The development will incorporate landscaping designed to visually integrate the residential development with the surrounding land uses. In particular, the use of parkland clearing and the provision of the ornamental lakes will extend the concept adopted for Perry Lakes.

Public open space will be landscaped, as will all roadside verges and drainage basins on site, at no cost to the NCC. In addition, the Stephenson Avenue west side road reserve will be landscaped to enable its integration with the public open space located in areas 1 and 2. An area in Bold Park adjacent to the northern boundary of the site will also be landscaped to form a semi-natural transition or buffer zone and firebreak between the site and Bold Park. A schedule of landscaped areas is shown in Table 4.2.

Table 4.2 Schedule of landscaped areas

Landscape type	Area (ha)
Public open space	2.08
Roadside verges	2.20
Drainage basins	0.12
Stephenson Avenue west side road reserve	1.78
Northern site boundary—Bold Park buffer zone	2.08
Total	8.26

The majority of conspicuous vegetation on site will be retained, particularly in the public open space areas. Street trees will be planted along the road reserves, with species selection taking into account the existing vegetation and habitat requirements of regional birds. Planting beds will also be provided at the base of the limestone retaining walls on road reserves. Tree conservation techniques will be used where required (e.g. near earthworks) to enable the trunk to breathe and to maintain the integrity of root and drainage systems. Existing ground cover and tree canopies will be maintained where possible, but will be selectively trimmed and pruned for aesthetics. Dead limbs on existing vegetation will be removed for safety.

The majority of the public open space areas (area 4 of 0.31 ha being excluded) and all of the Stephenson Avenue west side road reserve, northern site boundary—Bold Park buffer zone and traffic roundabouts will be reticulated. All of Kings Road roadside verges, approximately 170 m of the northern section of Kensington Gardens, and the southern portion of Sloane Rise will be reticulated. Trickle irrigation will be provided for street trees along all remaining roadside verges.

The water supply for reticulation and the lakes will be obtained from a groundwater bore to be located near the northern lake. Groundwater abstraction will only be required for about thirty-two weeks each year, because sufficient rainfall normally occurs during the winter months. On this basis, the total amount of groundwater needed to reticulate the 8.26 ha of landscaped area is estimated to be 65 ML/a. Some of this water will be in excess of plant requirements and will, therefore, infiltrate back into the groundwater.

Private domestic bores will also extract groundwater from the site. Based on existing private domestic bore ownership in the metropolitan area, it is estimated that between thirty-five and forty houses out of the total 136 lots will establish private bores. The Perth Urban Water Balance Study indicates that the average groundwater abstraction rate per private domestic bore is 1 ML/a (Water Authority of Western Australia 1987). Based on these estimates, it is concluded that the total groundwater abstraction from private bores on the site will be 35-40 ML/a. Some of this water will be in excess of plant requirements and will, therefore, infiltrate back into the groundwater.

The lakes will be significant features within the main area of public open space. Both lakes will be plastic lined to prevent loss of water by infiltration, with the plastic lining subsequently screened to give a natural appearance. The northern lake will have a depth of approximately 2.5 m and the southern lake a depth of approximately 5 m. The lakes and public open space are shown in Figure 4.2.

The walkways throughout the public open space areas, Stephenson Avenue west side road reserve and northern site boundary—Bold Park buffer zone will be stabilized limestone. Footpaths in the road reserves will be concrete and clay brick paved. All intersections and turning heads within the road network will also have concrete and clay brick paved areas.

Steeper areas of the site, including public open space areas 3 and 4 and Kensington Gardens, will feature limestone retaining walls up to 5 m in height. Planting beds and street trees will be provided at the base of the limestone walls to soften the landscape.

The proponent will also provide controlled fencing along the northern site boundary abutting Bold Park, the Stephenson Avenue west side road reserve boundary and along lot boundaries where they border areas of public open space. The fencing will be a maximum 1.8 m in height and of uniform character in order to set a high-quality control standard throughout the development. The provision of controlled fencing will prevent different types of fencing being erected around the site and consequently breaking up the landscape character.

The public open space, drainage basins and road reserves will be managed and maintained by the NCC. The proponent will provide and maintain the reticulation system for a period of two years from NCC approval of the subdivision (unless all lots are sold within two years). All residential allotments will initially be maintained by the proponent until they are transferred to private landholders for private management and maintenance. A covenant will restrict any removal of existing vegetation on individual lots outside a specified building envelope.

4.5 UTILITIES AND INFRASTRUCTURE

All lots will be fully serviced with water supply, deep sewerage, electricity, gas, telephones, stormwater disposal and road access.

Water will be supplied to the site from the existing reticulation system established by the Water Authority of Western Australia. The Water Authority plans to service the site by extension of supply along Stephenson Avenue from the existing 460 mm diameter reinforced concrete main in West Coast Highway.

Installation of this main within Stephenson Avenue west side road reserve will require the approval of the Main Roads Department and the Department has indicated that such approval is likely. Any specific proposal will require formal application to ensure approval. An on-site reticulation system supplied from the West Coast Highway main could not normally service land above reduced level (RL) 41 m by gravity without careful planning. The highest point of the site will be cut to RL 43 m to enable gravity-fed water supply to eleven affected lots. A concept plan of water supply and reticulation systems on site is shown in Figure 4.3.

The site falls within four preliminary sewerage catchments and, by judicious planning, the concept sewerage design shown in Figure 4.3 will enable most of the developable land to be served by gravity sewer at present ground levels, with some filling needed. The gravity sewer will flow to the Subiaco no. 8 sewage pumping station, located adjacent to the eastern boundary of the Western Australian Sports Centre. The Water Authority has confirmed that, if the site was developed at a residential density of R12.5, effluent could be accepted at the existing Subiaco no. 8 pumping station. The land is presently encumbered by a 35 m wide sewerage easement located in the southern portion of the site and protecting the Subiaco effluent outfall and the Subiaco main drain. The sewerage concept plan takes this easement into account.

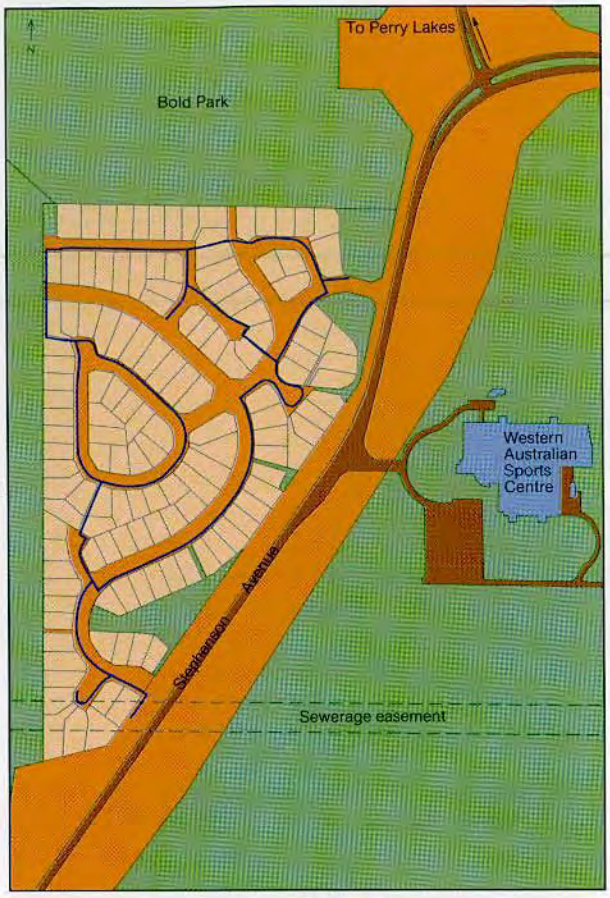
The deep calcareous sands on site will provide ready absorption of stormwater runoff from paved areas. All stormwater will be collected on site in four landscaped stormwater basins for absorption in limestone sumps. The total area of these basins (including the surrounding lot where appropriate) will be 1,250 m^2. Figure 4.3 shows the drainage concept plan for the site.

The area adjacent to the ornamental lakes will consist of a 300 m^2 landscaped stormwater drainage basin, plus an additional landscaped area of 1,000 m^2 to cater for overland flow from roads and overflow from the lakes when it rains. The base of the drainage basin will have sufficient capacity to empty the lakes, and will be surrounded by a 0.8 m high limestone retaining wall with sufficient capacity for runoff from the roads based on a ten-year storm frequency. Rainfall in excess of a ten-year storm frequency will travel overland to the basin and overflow onto the adjacent landscaped area. Overflow from the lakes will be via a concealed weir located in a manhole in the bank of the lower lake.

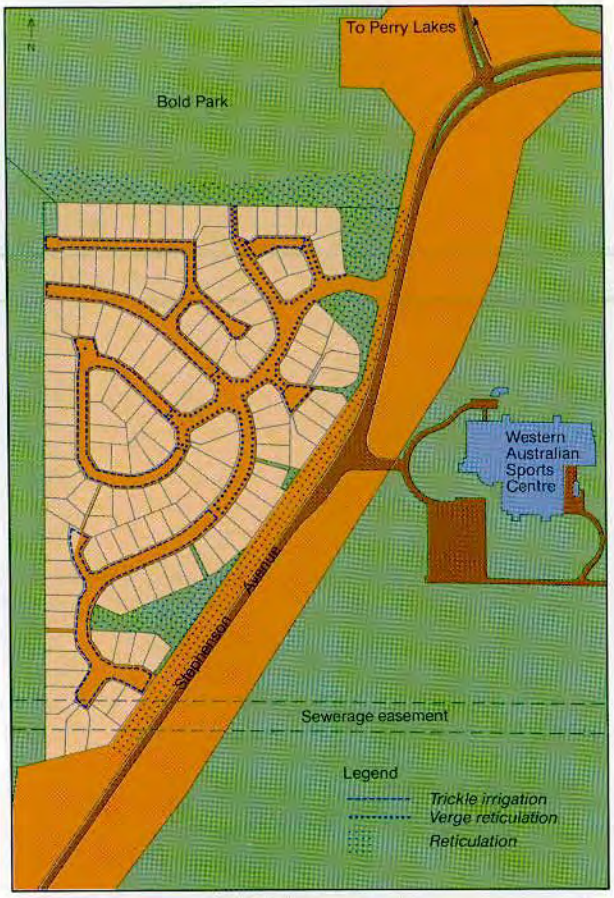
The site will be provided with underground electricity supply. At present, the State Energy Commission of Western Australia (SECWA) has supply lines in close proximity to the site and it advises that provision of the necessary supply is not considered to be a problem, subject to detailed examination of the proposal. For the size of the single residential development proposed, it is likely that two padmount transformer sites will be required within the development to facilitate an underground residential distribution scheme; one of these will be a switchgear padmount site. These sites will be situated on public lands and have not yet been located within the subdivision as they are subject to approval of SECWA.

No gas supply line exists in Stephenson Avenue; however, SECWA does have a supply in West Coast Highway for a development such as the proposal. SECWA advises that it will extend the line along Stephenson Avenue (subject to Main Roads Department approval) at no cost to the proponent.

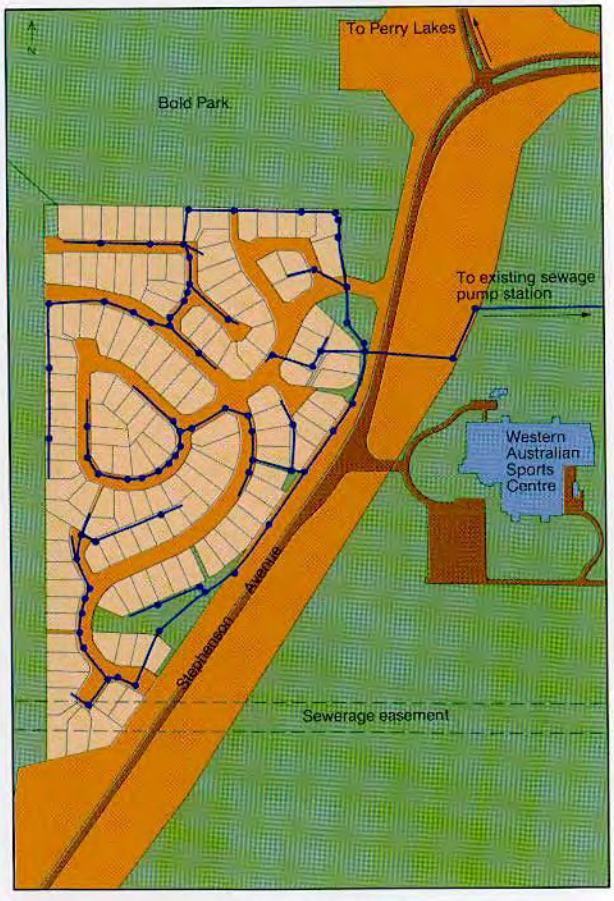
Telecom has recently installed an extension of the telephone line along Underwood Avenue and along the southern side of Stephenson Avenue, to service the new Western Australian Sports Centre. This extension will provide sufficient capacity for the development.



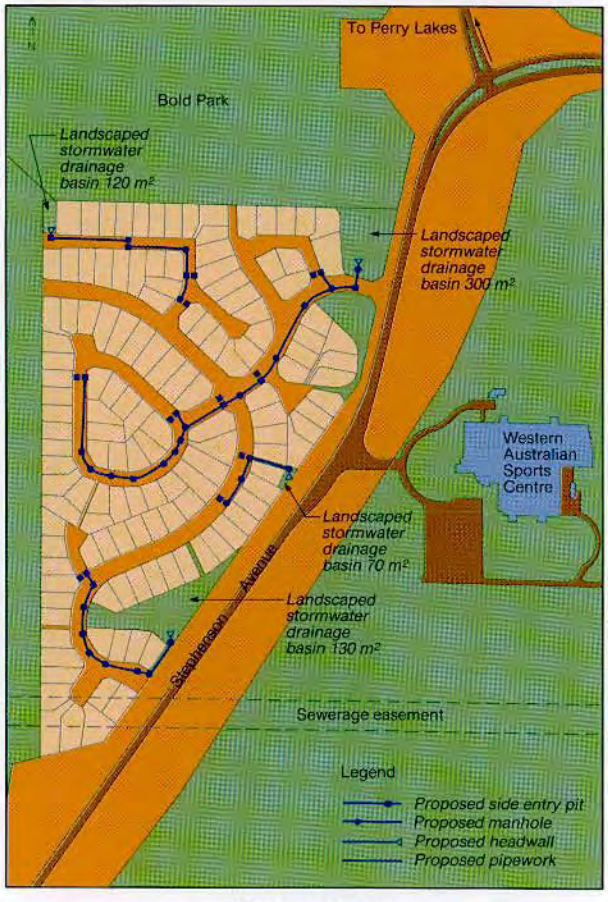
Water supply concept



Reticulation concept



Sewerage concept



Drainage concept

Figure 4.3
Concept plans of water supply, reticulation, sewerage and drainage

5 EXISTING ENVIRONMENT

This section provides a description of the environment as it pertains to the proposed development. Only the physical, ecological and social systems that have the potential to be affected in either a positive or negative manner have been appraised.

5.1 PHYSICAL ENVIRONMENT

5.1.1 Climate

The climate, as for the Perth metropolitan area, is characterized by mild wet winters and hot dry summers. Average annual rainfall is approximately 870 mm, of which 90% occurs within the period from April to October. Depending on rainfall distribution, metropolitan bushland is normally subject to the risk of fire outbreaks between November and March.

5.1.2 Site configuration

The Certificate of Title for the site shows the land to be approximately triangular in shape, with a northern boundary length of 433 m, a western boundary length of 675 m and a total south-eastern boundary length of 837 m, of which 760 m directly fronts onto Stephenson Avenue. The total area of land contained within these boundaries is 19.0043 ha.

5.1.3 Soils and geomorphology

The site is located near the eastern boundary of the Quindalup Dune System. This geomorphological unit is the closest dune system to the coast, and is characterized by parabolic and nested parabolic aeolian dune deposits. These aeolian dunes are generally composed of white, fine to medium grained, sub-rounded quartz fragments and shell debris.

The site generally has deep unconsolidated calcareous sands on the higher ridges, with grey siliceous and pale yellow sands in the interdunal swales. All of these sands have high permeability with low slope stability. The site also has easily excavated soils and low bearing capacity.

5.1.4 Topography

The site is moderately sloping, with slopes varying between 10° and 20°, generally characteristic of the topography on the eastern margin of the coastal dune system.

In general, the site is hilly, with its lowest point at 6 m Australian Height Datum (AHD) and its highest elevation at 48 m AHD.

A distinct valley near the southern boundary extends westward from Stephenson Avenue through the site into adjoining land. A pronounced depression adjoins the valley where it abuts Stephenson Avenue. From the valley, the landform rises towards a plateau, before sloping more gradually to a summit.

5.1.5 Hydrology and groundwater

No permanent or semi-permanent waterbodies or natural drainage channels, such as creeks, are evident on the site. The deep calcareous sands on the site are highly permeable, allowing rapid infiltration of rainfall through the soil. Groundwater levels in the region, as indicated by water-levels in Perry Lakes and Camel Lake, vary in elevation from about 5 m AHD to 10 m AHD. Regional groundwater flow, as indicated in the Perth Urban Water Balance Study (Water Authority of Western Australia 1987), is to the south-west at an average rate of 50-100 m/a.

The nearest lakes to the site are Camel Lake and Perry Lakes. Camel Lake is a small, shallow, possibly semi-permanent swamp located 200 m north of the site. The basin has been formed or altered by earthworks, which have created a 1 m bund to the east. Its water-level is about 7 m AHD.

The two Perry Lakes are located 600 m and 700 m north-east of the site. Water-levels in these lakes vary by about 0.8 m between summer and winter, and are generally about 2 m lower than Camel Lake. The area around Perry Lakes has been landscaped and managed to provide a focus for passive recreation for the public.

Due to the direction of the regional groundwater flow, it would normally be expected that the water-level in the vicinity of Camel Lake would be marginally lower than that in Perry Lakes. The reverse is the case, probably due to the water-table being in sympathy with the surface topography. About 78 ha of land contributes to this localized effect.

5.2 BIOLOGICAL ENVIRONMENT

5.2.1 Vegetation and flora

A reconnaissance survey was conducted to describe and map the vegetation systems and to identify the rare or otherwise significant flora within the site. The findings of this survey are presented in Appendix C and summarized as follows.

The site's vegetation and flora are basically similar to that in Bold Park, although less varied and poorer in species number. However, there are some aspects of the vegetation and flora on the site that may not be represented in Bold Park.

The vegetation of the site is principally Tuart Woodland, Banksia Low Woodland and scrub or heath dominated by Melaleuca acerosa, Grevillea crithmifolia, Calothamnus quadrifidus and Acacia pulchella. These three basic vegetation types intermingle and, to varying extents, have ground layers comprising Pelargonium capitatum, Ehrharta calycina and other weedy alien species.

Descriptions of each vegetation zone are presented in more detail in Appendix C, together with a map of the site's vegetation.

The commissioned survey compared species identified on the site with a species list from a survey of Bold Park by The Tree Society, which is provided as an Attachment to Appendix C. The comparison indicates that many species identified in Bold Park are not evident within the surveyed site. This could be explained by the difference in the sizes and complexities of the two areas - Bold Park is larger and its vegetation more complex. In addition, twenty-three native species that occur on the site are not on the Tree Society's list for Bold Park. These species are listed in Appendix C.

Gyrostemon ramulosus was the only rare or otherwise significant species observed during five visits to the site between April and October 1987. The presence of G. ramulosus is somewhat significant due to the fact that the area of the site represents the approximate southern limit to its known distribution; however, the species itself is not considered rare. Approximately twenty shrubs and small trees of G. ramulosus were identified in the general region of the south-western corner of the site and on adjoining land to the west, but only two were observed within the Tuart Woodland on the site. Most occur on slopes outside the development area.

In November 1987, Jacksonia sericea was found on the northern edge of a heath near the western boundary of the site. The presence of J. sericea within the site represents the approximate northern limit of its known distribution on the sandy and calcareous soils between Perth and Pinjarra. However, investigations have indicated that it is adequately conserved, as it is common in a range of vegetation types in Kings Park. It is most likely that J. sericea also occurs in similar habitats within Bold Park.

Another native plant of interest is a yellow-flowered form of Banksia menziesii; three trees of this colour form were observed on the site. It has been reported that up to twenty yellow-flowered B. menziesii plants have been sighted within Bold Park. Although not common within the metropolitan area, during the Banksia Atlas Project, the yellow-flowered form of B. menziesii was found to be widely distributed (although not common) in areas between the Murchison River and the southern Swan Coastal Plain (Taylor and Hopper, n.d.).

The existing vegetation near Camel Lake, north of the site, includes bulrushes (Typha ? orientalis), marsh club-rushes (Bolboschoenus caldwellii) and various alien weedy grasses and sedges. Banksias and other native species have been planted among the grasses bordering the swamp. An Acacia saligna thicket exists to the east, while a stand of Melaleuca incana and Regelia ciliata is located north of the swamp. Flooded gum trees (Eucalyptus rudis) occur on the west side of the swamp.

5.2.2 Fauna

The Western Australian Museum conducted a faunal survey of the northern Swan Coastal Plain during 1977-78 (Western Australian Museum 1978). This survey studied the mammals, birds, amphibians and reptiles, freshwater fish and aquatic invertebrate fauna within the defined study area between Moore River and Swan River. The survey provided useful data on habitat types and species present. The following lists of mammals and reptiles are based on the data provided from this survey.

The mammals that may occur on the site include Macropus irma (brush wallaby), (Tarsipes rostratus (honey possum), Mus musculus (house mouse), Pseudomys albocinereus (ashey-grey mouse), Felis catus (domestic cat) and Oryctolagus cuniculus (European rabbit). None of these are considered rare or significant, and many are introduced.

The 1977-78 reptile survey used various data sources, including specimen collections of the Western Australian Museum, review of ecological literature and observations in the field. The locations of specimens found were reported to the Museum; this information was used to determine whether the reptiles would be likely to occur on the site. Areas such as Reabold Hill, City Beach and Floreat were used as indicators. In addition, preferred habitat descriptions of reptile species were related to the known habitats on the site.

The reptiles that may occur on the site include two species of gecko (Diplodactylus spinigerus and Phyllodactylus marmoratus); four species of lizards (Aprasia repens, Liasis burtonis, Amphibolurus adelaidensis adelaidensis, A. minor minor); five species of skinks (Hemiergis peronii quadrilineata, Lerista elegans, L. lineopunctulata, L. praepedita, Menetia greyii); and six species of snakes (Typhlina australis, Brachyaspis curta, Pseudonaja affinis affinis, Vermicella bertholdi, V. bimaculata, V. calonotos).

As the site has been isolated by urban development for some time, this species list is probably an overestimate of the total number of reptile species that actually exists on the site. None of these are considered rare or significant, and all are common in the northern Swan Coastal Plain. Although one rare species of burrowing snake is reported to be present in the Bold Park region, areas of the snake's preferred habitat exist within the Bold Park reserve.

The System 6 Study stated that 'Bold Park supports close to a hundred varieties of birds, including a number of rare species such as the Splendid Wren (now lost from Kings Park) and the Black-capped Sittella' (Department of Conservation and Environment 1983). However, an avifauna survey conducted during five visits over twelve months in 1985-86 for the Metropolitan Bird Project identified a total of only forty species present in Bold Park (Royal Australian Ornithological Union 1987). The species list from this survey, together with the occurrence of each species, is presented in Appendix D.

The majority of birds recorded in this survey were either common or very common. Only one bird, the Painted Button Quail, was considered to have a very rare occurrence in the Perth metropolitan area and a rare occurrence in Western Australia. Three species - the Peregrine Falcon, White-winged Fairy Wren and the Variegated Fairy Wren - were considered rare in Perth. However, of these, both wrens were considered common in Western Australia. It is highly unlikely that any bird species would be confined to the site and not be present in the rest of Bold Park. Therefore, as the habitats in Bold Park and the site are essentially similar and as the 19 ha site represents only 7% of the total area of Bold Park, most birds observed would be expected to occur in Bold Park rather than exclusively within the site.

Several visits to Bold Park and the site in November 1987 indicated that another eight species were present and should be included in the Metropolitan Bird Project list. These include the Little Eagle, Shining Bronze Cuckoo, Rufous Whistler, Yellow-rumped Thornbill, Western Gerygone, New Holland and White-cheeked Honeyeaters, and Grey Butcher-bird. All are common or very common in the Perth area, except the Shining Bronze Cuckoo, Rufous Whistler and White-cheeked Honeyeater which are considered uncommon.

5.2.3 Conservation status

Based on the evidence available, the site contains no plants or animals that are considered to be so rare or endangered that the proposed development would endanger any species or alter the site's conservation status. It is recognized that the site represents the southern extremity of Gyrostemon ramulosus shrubs and trees; however, the majority occur on adjacent land to the west. Jacksonia sericea, although located near the northern limit of its known distribution, is considered common and is well conserved in Kings Park. The yellow-flowered form of Banksia menziesii is found on the site, but it is also widely distributed between Murchison River and the southern Swan Coastal Plain.

All habitats occurring within the site are considered to be sufficiently well represented in the Bold Park reserve and in other reserved areas in the metropolitan region, such as Kings Park. Therefore, from a biological perspective, the site is considered to have no significant conservation status or value.

Camel Lake, adjacent to the site, is considered highly degraded due to the poor quality of the native vegetation, with numerous alien weedy grasses, and due to the extent of alterations made to the natural surrounding topography. The condition of the swamp does not warrant a high conservation status.

5.3 HUMAN ENVIRONMENT

5.3.1 Landscape

An oblique view of the site, looking south-west, is shown in Figure 5.1.

The elevated nature of the site allows good viewscapes from a considerable portion of the site. These views incorporate the area northward towards Reabold Hill, Perry Lakes, Bold Park valley and Camel Lake; eastward towards Kings Park, the city skyline and the Darling Scarp; and southward over the Western Australian Sports Centre, John XXIII College, Graylands Hospital and the McGillivray playing fields. Views to the west towards the Indian Ocean are limited due to topography.

The site is equally visible from most directions. Views southward from the well-known Reabold Hill look-out encompass the natural bushland of Bold Park. However, the perspective of the site from Reabold Hill is dominated by the Western Australian Sports Centre, John XXIII College, Graylands Hospital, and an extensive area of sand used as a quarry and rubbish tip.

5.3.2 Adjacent land uses

Land use near the site is shown in Figure 5.2.

Adjacent to the site in a westerly direction is 53 ha of City of Perth endowment land zoned for residential use. As yet, no plans to develop this area are known. The existing land uses west of the site include Wollaston Theological College and a pine plantation, with the remainder being semi-natural bushland.

The Bold Park bushland reserve extends to the northern boundary of the site. The SPC had land reserved for an extension to Underwood Avenue immediately north of the site; however, in October 1987, these plans were withdrawn. Further land has been reserved for the proposed Western Suburbs Highway, which would bisect Bold Park (Figure 5.2).

The Western Australian Sports Centre, a major indoor sporting complex development, is located opposite the site. North of the sports centre is land fronting Underwood Avenue, which is currently uncleared and reserved for parks and recreation by the PCC. South of the sports centre and adjacent to Stephenson Avenue is a large sand quarry. The probable long-term land use for this area is an extension of the McGillivray playing fields. A 400 lot subdivision is proposed by Landbank to be developed south of the site and west of Graylands Hospital.

Additional land uses in the area include stables, CSIRO research laboratories, McGillivray playing fields, Brockway rubbish tip, SECWA terminal, Graylands Hospital, John XXIII College and housing.

5.3.3 Aboriginal and European heritage

The Museum of Western Australia has been contacted with regard to existing registrations of Aboriginal sites of significance or archaeological artefacts recorded within the site or within the immediate adjacent area. No such registrations have been recorded.

Should any archaeological site or artefacts be located during land development, the proponent would immediately notify the Museum in accordance with the requirements of the Aboriginal Heritage Act, 1972 (as amended). Such sites or artefacts would not be disturbed until written approval to do so was granted by the Museum.

As the site has not been developed, it has no known European heritage.

5.3.4 Existing social climate

The surrounding suburbs such as City Beach, Floreat, Mt Claremont and Wembley Downs include some of the more prestigious areas within the metropolitan region, and most of their residents enjoy a relatively high standard of living.

5.4 LAND USE PLANNING

5.4.1 Wycherley Report

Bold Park belongs to the City of Perth and is regulated by the City of Perth Endowment Lands Act, 1920 (as amended). The site is located within the City of Nedlands. In the early 1970s, the PCC reviewed the capability of its land in the City Beach area and considered its future use in appropriate detail. The PCC had already dedicated 150 ha of its endowment land in the area for parkland to be known as Bold Park in recognition of a long-serving Town Clerk.

The PCC recognized a need to supplement the existing Bold Park area in the long term to ensure its continued function. An Ecology Working Party was convened to conduct a detailed analysis of the vegetation, soils and land use and to make recommendations on the most appropriate future land use of the area. The Working Party was chaired by the Director of the Kings Park Board, Dr. P.R. Wycherley. Other members of the Working Party included senior representatives from the Forests Department, CSIRO, Department of Agriculture, Department of Fisheries and Wildlife, the Parks and Recreation Divison of the City of Perth, and the PCC, plus a biology consultant.

The findings of the Working Party were presented to the PCC in March 1976 in a report known as the Wycherley Report. The primary recommendation of the Wycherley Report was for 'the retention of the greater part of the bushland in the area adjacent to Bold Park, excising ... the area south of the proposed important regional road (referring to the extension of Underwood Avenue) ... The area excised would be available for residential and community development.' (Ecology Working Party 1976).

In addition, the Wycherley Report recommended an extension of the existing Bold Park to the west to encompass a further 99 ha. The retention of this area as bushland was considered to contribute to the 'landscape and environment of Perth, its recreational and education facilities'. However, land south of the existing reserve (which incorporates the site), bordered by West Coast Highway (now Rochdale Road) and Stephenson Avenue, was found to be substantially disturbed as a result of repeated bushfires, erosion by vehicles and pedestrians, the development of Wollaston Theological College, the establishment of a couch

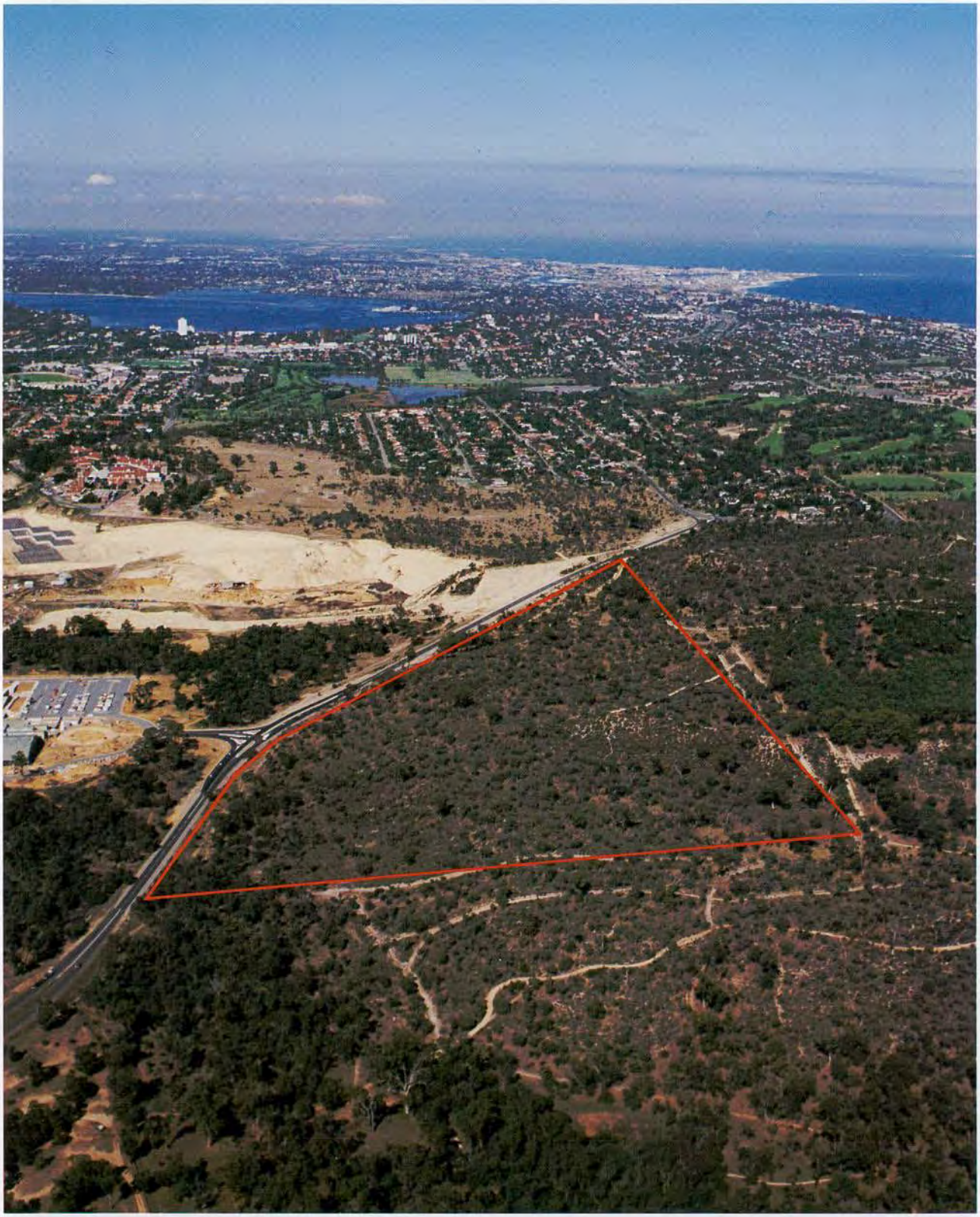


Figure 5.1
View of site

Figure 5.2
Land use near the site

grass plantation by the PCC and the existence of a pine plantation. For these reasons, the Wycherley Report recommended that this area be set aside and developed for residential purposes. The Ecology Working Party was convened by the PCC and, in preparing its recommendations, considered the residential development of the site, even though the site lies within the City of Nedlands.

The findings of the Wycherley Report were endorsed at a special meeting of the PCC on 5 May 1976. The PCC resolved at this meeting to advise the UWA and the NCC that a small portion of UWA land could be incorporated into the proposed extended bushland of Bold Park, while the remainder would be available for residential development if so desired. The ramifications of the PCC meeting, including the recommendation that residential and community development be permitted on 53 ha near the southern extremity of Bold Park, were well reported on the front page of the West Australian on 6 May 1976 (Figure 5.3). This article and the associated plan clearly show that residential development was assumed for the site when the decision was made to extend Bold Park. The article also shows that the PCC believed that the possible extension of Underwood Avenue might never be built; therefore, this was not a requirement considered necessary for recommending the extension of Bold Park or the residential development south of Bold Park. The proposals for Bold Park were also commended by the editorial of the day. The public reaction to the proposals was negligible.

Since 1976, the PCC has had no commercial need, and therefore no immediate plans, for the residential development of its residual land following the excision of Bold Park. Similarly, the UWA did not have immediate plans for the residential development of its land. As a result, the whole area has remained undeveloped like other undeveloped residential sections of the endowment lands at City Beach. Consequently, the public has been under the misconception that all existing undeveloped land in the area constitutes Bold Park. This misconception has been compounded by the City of Perth's own sign boards and maps in the area, which indicate to the public that all bushland in the area is part of Bold Park.

5.4.2 System 6 Study

The EPA appointed the Conservation Through Reserves Committee to study the provision of reserves representing the major communities of natural wildlife and flora types in Western Australia. To facilitate this review, the State was divided into twelve regions or systems, with the Perth metropolitan area being encompassed in the Darling System or System 6. The relevant section of the System 6 Study (Department of Conservation and Environment 1983) is included in Appendix E.

Assessment of the Bold Park area was described and referred to as metropolitan locality M47, the boundaries of which are shown in Figure 5.2. The adoption of these boundaries in the System 6 Study incorporated several important anomalies, including:

> The Study did not take into account the recommendations of the Wycherley Report and the subsequent endorsement of those recommendations by the PCC in 1976. Instead, the Study adopted the pre-1976 park boundaries as defining Bold Park, i.e. the Study used the Metropolitan Region Scheme 'Parks and Recreation Reserve' boundaries.

- The definition of the 'Area Boundary' of M47 was inconsistent. For some locations, the boundary was quite intricate, but it also omitted locations that should have been incorporated. For example, the Study went into some detail to exclude a portion of undeveloped bushland that had already been incorporated into the PCC extension to Bold Park through a land swap with the Catholic Church. The area that was incorrectly excluded was to be bounded by Dunloe Road and St. Brendan Drive; these roads were never made. However, the Study correctly excluded the Wollaston Theological College site from consideration.

- The Study also correctly excluded City Beach High School, but did not exclude a number of other alienated sites, notably:

  - Water Authority of Western Australia reservoir;
  - Skyline drive-in theatre;
  - City Beach bowling club;
  - Boy Scout Association Hall;
  - Bold Park swimming pool and car-park;
  - UWA land;
  - PCC component excluded by the Wycherley Report and zoned for urban development.

The System 6 Study (Department of Conservation and Environment 1983) recommendations pertaining to Bold Park were as follows:

- M47.1 That our general recommendations on planning and management of Regional Parks be applied to this area.

- M47.2 That the PCC's proposal to maintain and extend Bold Park is endorsed.

Taking into account the PCC had already extended Bold Park by 99 ha beyond that recognized by the System 6 Study, the recommendation M47.1 can only logically apply to the original 150 ha of the Bold Park reserve. The M47.2 recommendation is considered to have been achieved through the previous implementation by the PCC of the recommendations of the Wycherley Report.

The proponent believes that, like Wollaston Theological College, the UWA land should never have been considered a component of Bold Park, because it was a private land-holding and previously recommended for residential purposes by the PCC. Regardless of this, the proposed plans for residential development on the site are consistent with the recommendations of both the Wycherley Report and the System 6 Study.

Since the completion of the 1983 System 6 Study, a residential Retirement Village has been approved and constructed within the original area of Bold Park as defined prior to 1976 (by the Metropolitan Region Scheme). This development is situated near The Boulevarde and Kalinda Road intersection. It represents an obvious precedent, as the area was Bold Park bushland and the village development is not consistent with the recommendations of the System 6 Study. In addition, this development did not meet with objection nor was it subjected to formal EPA assessment.

Huge bush park for City Beach

By DES TRAVERS

A huge national bushland park to be created at City Beach will rival Kings Park.

The Perth City Council decided last night to establish a 249-hectare (615-acre) natural bushland park at Bold Park. It will include the existing Reabold Hill site.

The existing area known as Bold Park is to be extended to take in 99 hectares (245 acres) that was originally intended for housing development.

The whole of the Bold Park area—which includes the Perry Lakes stadium, the Wembley Downs golf course and Reabold Hill—covers about 526 hectares.

Kings Park covers about 404 hectares.

Last night's decision means that the council has forgone an opportunity to raise as much as $15 million in revenue from the development of the 99-hectare area for medium density housing.

Some informants say that this figure is a conservative estimate.

The Lord Mayor, Mr E. H. Lee-Steere, said after the meeting that it was an extremely unselfish decision, made without thought for gain and in the interests of future generations.

Planting

The council will start a major tree planting programme for the park in the next financial year. It will fence the area and provide paths, hiking tracks and horse trails.

An area of 14.5 hectares (36 acres) at the extremity of the new park will be used for a car park, lavatories, playgrounds and barbecues.

Trail bikes and beach buggies will be barred from the new park.

The council expects next year's initial development to cost about $182,000. The money will come from the proceeds of a council land sale at City Beach last Saturday.

The city planner, Mr E. Sabin, said that, with Kings Park, the new bushland park would provide Perth with more bushland than most cities in the world.

Last night's decision was taken at a special council meeting. The meeting was delayed for 15 minutes till enough councillors arrived to form a quorum.

Mr Lee-Steere said he had called the meeting to mark the significance of the vote that was about to be taken.

The minutes of the meeting are to be bound in a special volume and will be presented to the State Library for safe keeping.

Cr John Dallimore told the meeting that Mr Lee-Steere was to be congratulated for his direction and interest in the project. It was in line with a decision taken by Sir John Forrest when Kings Park was set aside for future generations.

The council has decided to keep an area of 53 hectares on the southern extremity of the park for residential and community development.

Money from the sale of this land will be invested and the interest used for park maintenance.

Amendment

It will be necessary for State Parliament to amend the Endowment Lands Act to allow the council to use the money for maintenance. At present money from the sale of endowment land has to be spent on capital works in the area.

Last night's decision is the result of more than two years of planning and investigation by a study group comprising conservationists, ecologists and councillors.

In March last year the study group recommended that the Bold Park land west of Reabold Hill be set aside for bushland.

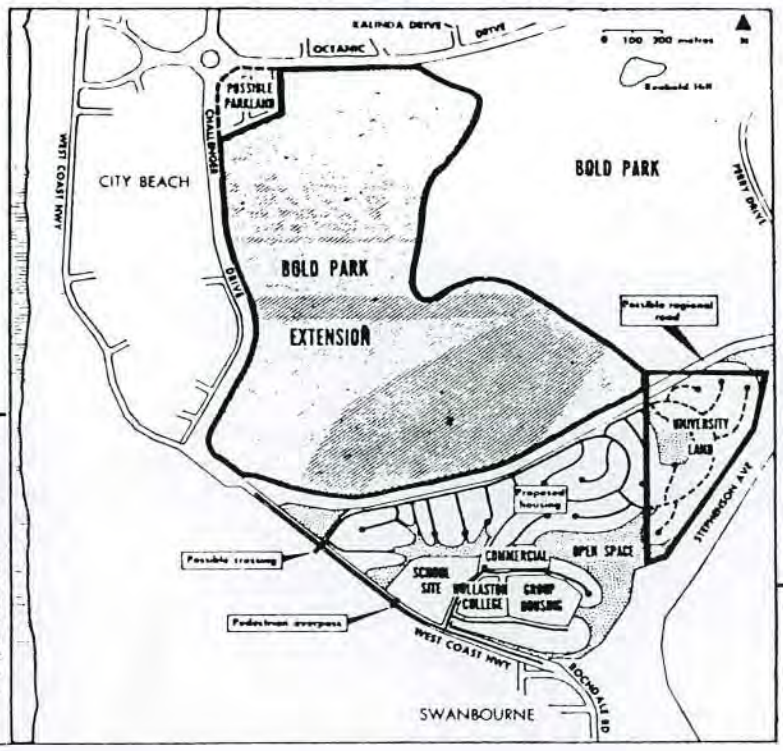
The council will retain an ecology working party as an advisory body to assist it with the development and management of the park.

The council also decided to ask the Metropolitan Region Planning Authority to investigate the need for an important regional road in the area.

A proposed road in the Metropolitan Region Scheme is shown running through the park. The council believes the road, which would be an extension of Underwood Avenue, may never be built.

If the MRPA decides to go ahead with the road, the council wants it realigned to form the southern boundary of the park.

• Map; page 10



PARK PLAN

This map shows how Bold Park will be extended. The area will be fenced and will include walk paths, hiking tracks and horse trails. The planned residential area is south of the natural bushland park.

Figure 5.3
West Australian article 6 May 1976

5.4.3 Town planning zoning

The site was rezoned from Public Purposes - UWA to Development Zone by the NCC in 1985. A Development zoning permits a wide range of land uses and development options, providing Council approval is obtained. The provisions for rezoning were drafted in the City of Nedlands Town Planning Scheme No. 2, which was subject to government consideration and public comment between 1978 and 1984. The planning scheme was in accordance with the Metropolitan Region Scheme that had zoned the site Urban.

5.4.4 Value of existing land use

Conservation

The site is not considered to be of high conservation value, particularly when compared with the Bold Park reserve. The Bold Park bushland is rated a superior area in terms of value for conservation. Much of the conservation value of the site has been reduced by fire outbreaks, rabbits, invasion by alien weeds, timber removal, bushwalkers, trail bikes and dieback. The vegetation structures and habitats present within the site are considered to be better replicated in the Bold Park reserve and in other reserves on the Swan Coastal Plain.

Recreation

In Australia, parks are visited by approximately only 10% of the total population (Department of Sport, Recreation and Tourism 1986a, 1986b). Notwithstanding this fact, it is evident from statements issued by the Friends of Bold Park Bushland that Bold Park is used by some people for walking along the nature trails, in addition to the more frequently used look-out facilities provided at Reabold Hill.

Only 200 m of established nature trail exists on the site and this represents less than 1% of the nature walks and bridle paths in the adjacent Bold Park. Therefore, it is reasonable to assume that recreational usage of the site, albeit without the consent of the present owner, would not be significant.

Education

Bushland in close proximity to educational institutions in metropolitan areas can be of some educational value. The bushland of Bold Park is generally a valuable asset in terms of providing a representative natural ecological area. However, the same cannot be said of the site. The botanical degradation resulting from fire outbreaks, dieback, rabbits, bushwalkers, trail bikes and invasion by alien weeds has contributed to reducing the value of the site for educational purposes.

Landscape

The site exhibits some landscape value for bushwalkers in Bold Park, sightseers at Reabold Hill, recreationalists at Perry Lakes and motorists on Stephenson Avenue. Because the site lies adjacent to Bold Park and has remained uncleared, it has generally been viewed and used as an extension of the Bold Park reserve. As such, the site has contributed to landscape appreciation and visual quality.

6 ENVIRONMENTAL IMPACTS

This section describes the potential impacts on the human and biophysical environment, demonstrating that, with appropriate management, possible impacts will be minimized and restricted to generally acceptable levels, consistent with other residential subdivision developments in the metropolitan area.

The assessment has been confined to areas where the potential for impact is perceived.

6.1 CONSTRUCTION

Development of the site will involve some clearing of vegetation and earthworks to enable roads, infrastructure and dwellings to be constructed. However, site clearance and earthworks will be minimized wherever possible.

A tree survey undertaken for landscape purposes has shown that there are 230 conspicuous trees on site, particularly in areas 1 and 2 of the open space (Figure 6.1). Fifty-five (or 24%) of these trees will be lost during site development works for roads, infrastructure and lots. Other vegetation and undergrowth will be selectively pruned and trimmed for aesthetic and safety reasons.

The site will require some earthworks in order to adjust levels for roadworks, water supply and sewerage. Sensible subdivision planning has resulted in a maximum of 36.8% of land within the lots needing recontouring. This is considerably less than other subdivisions where 60-70% is normal and 100% is not uncommon.

The construction period for earthworks, road and infrastructure development and landscaping works will extend over six months. This phase will entail temporary erection of small site buildings (including toilets); raw material inputs (e.g. concrete, bitumen, limestone, piping); some stockpiling of soil before transport off site; demands for water, energy and labour; dust and noise emissions from the construction equipment; and traffic generation due to the transport of materials and labour. These impacts are normally associated with construction activity and will be subject to the requirements of the NCC.

6.2 INFRASTRUCTURE AND COMMUNITY FACILITIES

Table 6.1 shows the requirements or loadings on public utilities based on 136 dwellings and average consumption rates in metropolitan Perth. Additional energy will also be expended during construction of the development and maintenance and reticulation of public open space and road reserves.

Table 6.1 Estimated use of public utilities and energy

Utility/energy source	Annual consumption/loading
Water	50 ML/a
Electricity	3,000 GJ/a
Natural gas	4,400 GJ/a
Telephone	140 + services

In addition, based on NCC rubbish collection data, approximately 300 t/a of solid wastes will be collected from the development by Council.

As discussed in Section 4.5, the authorities responsible for the supply of infrastructure and services have indicated that there is spare capacity in all systems and that no additional headworks will be required as a result of the development. Internal roads and stormwater drainage will be provided by the proponent.

Provision of deep sewers for all lots will ensure that there is no contamination of groundwater by effluent. The sewerage easement located in the southern portion of the site affects the development potential of six lots and a portion of Brompton Place.

As all the proposed infrastructure will be underground, the visual impact will be minor. Two electricity substations will be located within the development with minor visual intrusion. The earthworks required for the stormwater basins will landscaped to minimize visual impact and integrated with surrounding open space.

The nearest fire station is located within about 2.5 km from the site, while the nearest police station and State Emergency Service depot are in Subiaco, within 4 km. The Queen Elizabeth II Medical Centre incorporates the nearest ambulance depot and hospital facilities, which are located within 3 km of the site. The nearest private doctor and dentist consulting rooms are located within 2 km at Floreat Park.

The Floreat Park Primary School is the closest primary school, while the nearest secondary school is John XXIII College (which also offers primary school education) and the Wollaston Theological College, both within 1 km of the site. The most accessible tertiary institution is the Churchlands College of Advanced Education, situated within 3 km, while the UWA is located within 5 km of the site.

The closest shopping area is at Mt Claremont, while the nearest major shopping centre is Floreat Forum, within 2 km. The nearest post office and community centre are also located at Floreat.

The proximity of these existing community facilities and services to the site, together with the small increase in demand from the future residents, means that no new community facilities or services will be required as a result of the development.

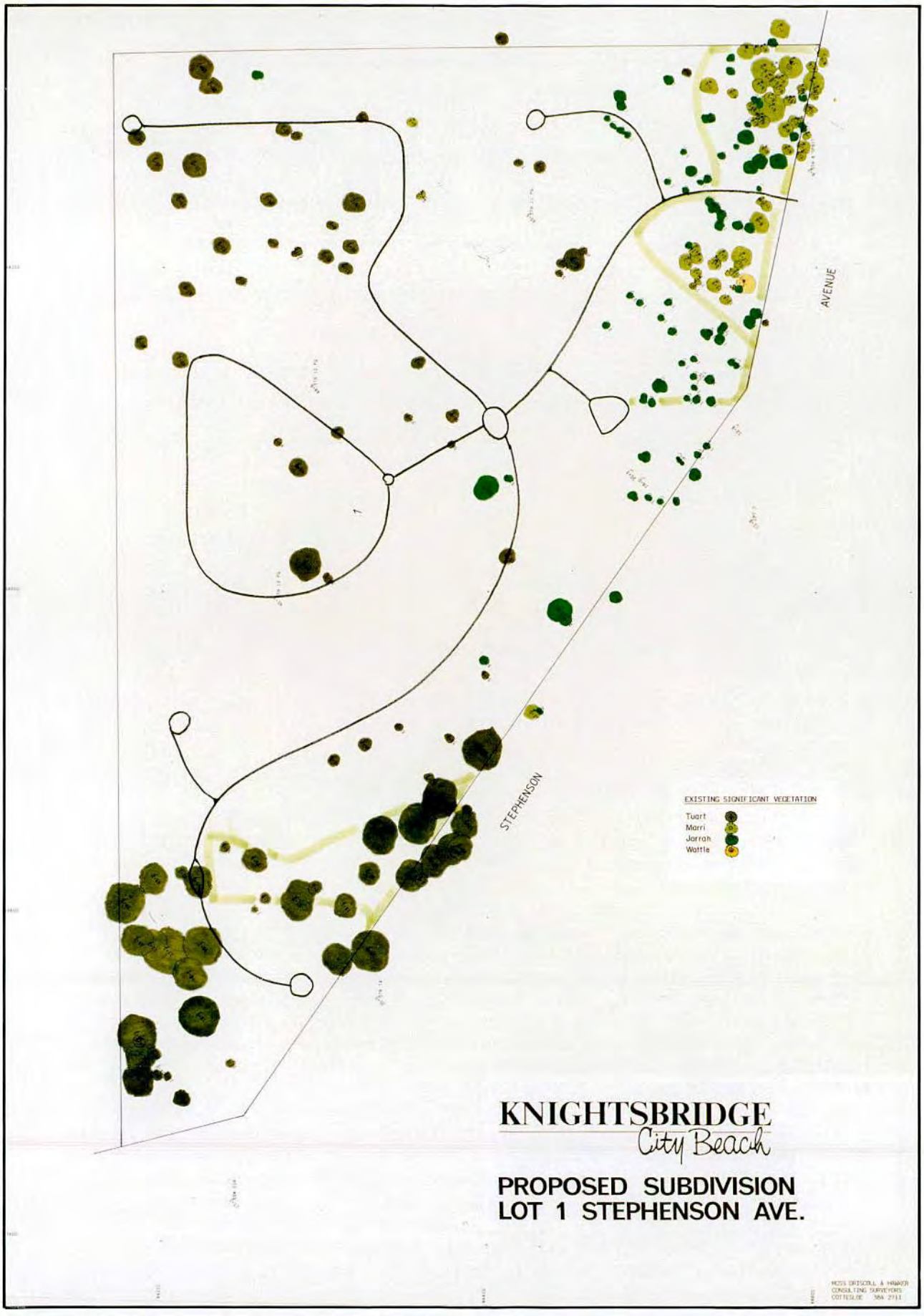


Figure 6.1
Survey of conspicuous trees

6.3 HOUSING AND POPULATION

At full development of the site, 136 private dwellings will be constructed and occupied. Based on the occupancy rate for separate houses in the Perth Statistical Division (3.07 persons/dwelling in 1986), approximately 420 people will occupy the site. As it will be a high-quality residential area, probably attracting successful mature families, the estimated population may be slightly lower.

Using the Australian Bureau of Statistics 1986 Census average figures for the Perth Statistical Division, the following characteristics for a population of 420 persons can be derived:

- 38 children aged five years and under
- 38 children at primary school
- 27 children at secondary school
- 21 children at tertiary educational establishments
- 58 persons aged sixty years and over
- 180 persons in the workforce
- 220 motor vehicles owned by the resident population.

The City of Nedlands had gross densities of 6.44 persons/ha and 2.45 dwellings/ha in 1986. The site will have higher gross densities of 22.1 persons/ha and 7.15 dwellings/ha. Net site densities will be 33 persons/ha and 10.7 dwellings/ha. These gross and net population and dwelling densities are classified as low density residential development. This is reflected in the R10 to R12.5 low density code classification for the site. The proposed low density residential development will be similar to existing residential densitities in the City of Nedlands, and therefore the residential amenity in the surrounding areas will not be affected.

6.4 TRANSPORT AND TRAFFIC

The establishment of 136 dwellings in the residential development will result in an estimated 420 residents owning 220 motor vehicles. This will, in turn, cause a small increase in traffic density and transport demand in the area.

Assuming an average eight vehicle trips per day per dwelling, the total number of vehicle movements per day from the residential development is estimated to be approximately 1,100. These trips will extend throughout the day, with normal peak periods expected between 7.00 a.m. and 9.00 a.m. and between 3.30 p.m. and 6.00 p.m. caused by the resident workforce. The majority of residents will undertake the journey to work by private motor vehicle, in most cases using Stephenson Avenue and Underwood Avenue towards the central business district in Perth.

Stephenson Avenue has an existing design capacity to accommodate a maximum of 2,000 vehicles per hour. This capacity could further increase with the construction of a median strip or with road widening. Underwood Avenue can accommodate even higher vehicle volumes due to the dual carriageway road design.

Vehicle counts on Stephenson Avenue indicate that the existing level of traffic is significantly below its design capacity. During August 1987, Department of Main Roads vehicle counts on Stephenson Avenue east of Rochdale Road recorded an average weekday count of 4,473 vehicles, while 5,745 vehicles were recorded on Stephenson Avenue west of Brookdale Street–Brockway Road during the same

period. These counts included vehicles travelling in both directions over a twenty-four–hour period. Assuming all vehicles from the development use Stephenson Avenue and Underwood Avenue, the development will represent a 25% increase in traffic along Stephenson Avenue and a 19% increase along Underwood Avenue, with the combined total being much less than the road design capacities.

Based on the design capacity and on existing levels of vehicle use of Stephenson Avenue, the increased traffic generated by the residential development (including the construction phase) could easily be accommodated on Stephenson Avenue, Underwood Avenue and the surrounding road network.

Surrounding land uses, including the Western Australian Sports Centre, will not adversely affect traffic safety for the residents of the development. The majority of traffic generated by the sports centre will be in the early/late evenings when most sporting events are held. Peak traffic periods of the residential development and the sports centre will not coincide.

Apart from children attending school, the demand for public transport by residents will most likely be low. Transperth would be capable of accommodating some of the demand for public transport through the provision of services along Stephenson Avenue.

The construction phase of the residential development will require the use of 20 t trucks to transport spoil from the site and deliver materials required for construction. Over the two-year construction phase, including both site preparation and dwelling construction, about 4,000 truck movements will be required, representing an average of forty trucks per week. This number of truck movements will have a negligible to low impact on traffic in the area; however, appropriate safety measures will be adopted to ensure that the risk of traffic accidents is minimized.

6.5 NOISE

The proponent will be responsible for noise emanating from the site until lots are sold; then private landholders will be responsible for compliance with the Noise Abatement (Neighbourhood Annoyance) Regulations, 1979 (as amended) of the Environmental Protection Act, 1986. The greatest potential for noise emissions will exist during the construction phase of the site development.

Noise impacts during construction will be managed by the proponent to ensure compliance with the regulations. Management measures will include the requirement for all contractors to use heavy equipment fitted with effective noise-reducing devices and restricting construction periods to normal working hours. These measures will minimize the impacts of noise on weekend users of Bold Park and reduce to insignificant levels any noise impacts on the nearest residences located behind hills 1 km from the site.

6.6 BIOPHYSICAL IMPACTS

6.6.1 Flora and fauna

Preparation of the site for residential development will involve the removal of some understorey vegetation located beyond areas to be reserved for public open space and lots in order to provide visual integration with the surrounding land

use. The total area affected, however, is small compared with the amount of adjacent bushland with similar vegetation. Most conspicuous trees and shrubs located in areas set aside for housing and open space will be retained.

Site preparations will cause the removal of the Banksia menziesii and the Jacksonia sericea shrubs. The yellow-flowered B. menziesii tree located immediately west of the site will not be affected by the development. The retention of Banksia trees within residential areas, and in particular within domestic gardens, frequently results in their death due to excessive applications of phosphate fertilizers.

Appropriate measures will be taken to ensure that vegetation marked for preservation is not damaged during site preparation.

The removal of, or damage to, existing habitats will affect fauna within the site; these impacts are unavoidable. The mobile fauna, particularly the mammals, birds and reptiles, will be capable of moving into adjacent bushland where similar habitats are located. It is quite common for wildlife to colonize adjacent bushland following preparations for new residential developments.

Once established, public and private landscaped areas provide valuable habitats for some bird species. Honeyeaters, parrots, owls, tawny frogmouths and other species have become well established in domestic gardens in properties along the coastal area of City Beach where they were previously not known to inhabit. It seems that, once trees and shrubs become established and trapped water and seeds become available, many birds adopt landscaped and vegetated residential areas as new habitats. This will be likely within the developed site due to its proximity to natural bushland in Bold Park.

6.6.2 Groundwater

The clearing of vegetation and the establishment of urban areas with their associated impervious surfaces (roads, roofs, etc.) and reticulated gardens alter the local hydrological cycle, resulting in alteration to recharge to groundwater. Experience with the study area used for the Perth Urban Water Balance Study (Water Authority of Western Australia 1987) shows that, on average, urban areas infiltrate 2% more rainfall than the total study area, which contains bushland, forests, urban development and agricultural land use. The following discussion assumes an increased rainfall infiltration rate of 4% for the site following development.

A localized increase (or decrease) in groundwater level is only of significance to nearby Camel Lake. However, the potential for impact of the development on the water-level in Camel Lake is minimal, because the site only contributes about 11% towards the Camel Lake catchment. Therefore, a variation of 4% in the recharge from the site translates to a variation of less than 0.5% of the water source, which is insignificant in comparison with normal meteorological fluctuations.

Minor contamination of groundwater will occur due to loadings of oil, grease, pesticides and fertilizers in stormwater runoff. This contamination will be unavoidable due to the retention of stormwater on site. Similar practice elsewhere in the Perth area has not resulted in unacceptable levels of contamination of groundwater.

6.6.3 People and pets

The proximity of Bold Park will allow easy access to the adjacent bushland for residents. This accessibility will encourage residents to undertake more bushwalking forays than they normally would, thereby increasing the level of use of walking trails through Bold Park. It is evident from the signs and provision of nature trails in Bold Park that increased usage has been encouraged in the past. As long as bushwalking is restricted to the walking trails, the impacts on the environment will be low.

Residential development situated in close proximity to bushland areas has the potential to result in certain 'edge effects'. These effects include incidents of illegal rubbish dumping and increased risk of fire outbreak.

In the case of the proposed development, illegal rubbish dumping will be minimal due to the nature of the residential subdivision and the provision of boundary fencing and controlled access to Bold Park. Normal weekly rubbish collection and proximity to the Brockway rubbish tip will help alleviate the need for residents to illegally dump rubbish in the adjacent bushland. In addition, receptacles will be provided near the entrances to Bold Park from the residential area for the disposal of rubbish by bushwalkers.

Fires deliberately and accidentally started in bushland could pose a potential hazard to both Bold Park and the safety of residents. The reticulated public open space on the northern site boundary will act as an effective buffer zone to limit the advance of fires and reduce the potential for accidental fires arising from residential activities. Similarly, the nature trails and bridle paths within Bold Park have generally been duplicated in order to act as a series of firebreaks. Signs will be erected at strategic locations near entrances to Bold Park from the site, advising the public of the risks of fire and the need for precautions.

Based on the known number of dog licences per dwelling in the City of Nedlands (one dog per 4.9 dwellings) and an estimate of cat ownership (one cat per four dwellings), it is expected that the residents will have a total of about thirty dogs and thirty-five cats.

Household pets, such as dogs and cats, if allowed to roam, could pose a potential risk to wildlife, particularly birds, in Bold Park. However, under current requirements, no dogs are permitted within Bold Park. This will be indicated to each resident within the development by signs at appropriate locations. The controlled fence line along the northern boundary will also act to deter pets from intruding into Bold Park.

6.7 SOCIO-ECONOMIC ENVIRONMENT

Compared with the Perth metropolitan region population, the City of Nedlands has an older age structure. If the residents of the development have similar population characteristics to the Perth region, then the City of Nedlands' existing age/sex structure will be broadened. If the residents of the development are mature families compared with the Perth region, then the existing population characteristics of the City of Nedlands will be reinforced. The high quality of the development will also be in keeping with the existing residential amenity in the City of Nedlands.

The resident population will also have some effect on the local economy. The rating base of the City of Nedlands will be increased by approximately $60,000 per year. The construction phase of the development will provide direct employment for construction workers and tradesmen and enhance the trading activities of building and material suppliers. The population will also increase the demand for local goods and services.

6.8 LANDSCAPE AND VISUAL QUALITY

The development will have both adverse and beneficial impacts on the existing landscape. During the initial part of the construction phase, removal of some vegetation and earthworks will have an adverse effect on landscape, as the amount of vegetation cover will be reduced and the area of bare earthworks will be at a maximum. This phase will occupy a three to four month period.

The later stage of the construction phase will involve extensive landscaping works, planting of new vegetation and development of open space, resulting in an enhanced landscape. At this stage, the area of vegetation cover will increase and the area of bare earthworks decrease. Upon full development of the site, approximately 40% of the total area will have impervious surfaces, including dwellings, roads and recreation facilities. The remaining 60% of the site will be landscaped public areas and private gardens. Private landholders will be expected to increase the vegetation cover of their lots. In addition, all dwellings will be required to be constructed of materials that blend in with the environment. Over time, the proponent's and private landholders' gardens will mature and enhance the landscape and visual quality. The provision of underground services on site will also contribute to this effect. Compared to conventional subdivisions, the landscape and visual quality of the site will be superior, due to the retention of the majority of existing conspicuous vegetation, the landscaping of 4.4 ha of public lands within the site and 3.86 ha of public lands abutting the site, and the landscaping of private lands.

The visual quality of the development viewed from outside will be related to the landscape quality and degree of urbanization of the site. Initially, the visual quality of the site will decrease during the construction phase and then increase with full site development and maturing of the landscape. However, full development of the site will entail some loss in visual quality when viewed by passing motorists along Stephenson Avenue or users of Bold Park. Decreased visual amenity is inevitable when developed areas are compared to the existing semi-natural bushland. However, the proposed landscaping along the Stephenson Avenue and Bold Park frontages and compatible building materials will minimize this impact.

The Reabold Hill look-out, located 1 km away, encourages views over the site. Approximately three-quarters of the Reabold Hill 360° view includes urban development. Dominant landscape features from the look-out over the site include the blue roofs and facade of the Western Australian Sports Centre, the orange roofs of John XXIII College and the large extent of yellow sands covering a quarry and rubbish tip. When viewed from Reabold Hill, part of the site is not visible due to intervening ridges. Development of the site will involve some minor visual intrusion of housing and roads, but this will be minimal given the small area of site visible, compatible construction materials for dwellings, retention of existing vegetation, proposed gardens and distance from the site. Following site development, the existing dominant landscape features will still remain the most visible from Reabold Hill.

6.9 SYSTEM 6 RECOMMENDATIONS

As the System 6 Study (Department of Conservation and Environment 1983) incorrectly included the area of the site, together with the adjacent City of Perth land intended for residential use, when assessing the importance of Bold Park for conservation and reservation, the recommendations made are not directly applicable to the site. The proponent, however, does recognize the regional and local importance of Bold Park and will, therefore, ensure that the impacts of the residential development on the adjacent bushland are minimized. Measures that will be adopted to ensure this are described in Section 7.

6.10 ADJACENT LAND USES

The residential development will have negligible to low impact on adjacent land uses.

The impact on land uses on the other side of Stephenson Avenue will be negligible. The landscaping of the 1.78 ha Stephenson Avenue west side road reserve will effectively screen from view many lower level houses.

Residential development on the site will have negligible impact on future residential development of the adjacent City of Perth land. Development of both sites for residential use will prove highly compatible. Provision for the extension of Pavillion Terrace into this land has been made on the subdivision layout shown in Figure 4.2.

Similarly, residential development on the site will have negligible direct impact on the proposed 400 lot Landbank residential development. In the long term, however, the combined demand from both these residential developments could necessitate the provision of additional community facilities and services.

The proposed land uses on the other side of Stephenson Avenue for extensions of existing playing fields and general recreation area will not be adversely affected by residential development on the site.

7 ENVIRONMENTAL MANAGEMENT

7.1 CONSTRUCTION

All site preparation and construction activities will be conducted with the approval of appropriate authorities and in accordance with relevant legislation pertaining to such activities. All construction materials and practices will be in accordance with the relevant Australian codes.

In order to protect the trees and shrubs intended for conservation, each will be clearly marked prior to the commencement of site preparation. This will ensure that operators of earthmoving machinery can easily identify the trees and shrubs that are not to be disturbed. Some trees located near earthworks areas will require tree conservation measures to protect their trunks and root and drainage systems.

Fauna disturbed during site preparation will be moved into adjacent bushland in Bold Park. Workers will be instructed not to harm any fauna during site preparation and construction of the development.

The western and northern boundaries of the site will be clearly delineated with markers. Machinery operators will be instructed not to transgress over these defined boundaries to ensure that adjacent bushland is not disturbed.

Regular watering of cleared areas on the site will be conducted to suppress dust during summer. Water used for dust suppression will be obtained from groundwater supplies, and water trucks will supplement the distribution of water around the site. Heavy earthmoving machinery will not operate on windy days to ensure excessive dust levels do not occur in downwind areas.

Truck movements into and out of the site will be conducted in such a manner as to cause minimum hazard to traffic on Stephenson Avenue. If required, spoil material transported from the site in trucks will be covered with tarpaulins to ensure that spoil does not blow off in transit.

Waste vegetation material will be piled at a safe distance from any boundary to Bold Park and burnt in a controlled manner. Burning will be conducted at times advised to be safe by the Western Australian Fire Brigade and other relevant authorities. Appropriate fire fighting equipment will be available during periods of burning.

When all necessary site works are completed, cleared areas will be hydro-mulched to ensure rapid establishment of ground cover. This will help minimize dust generation during the period between completion of site works and commencement of dwelling construction.

Workforce amenities during site preparation will include site toilets. All refuse and construction material wastes will be transported from the site and disposed of in an approved manner.

To alleviate potential noise problems, site preparation work will be restricted to the hours between 7.00 a.m. and 6.00 p.m. each weekday. Heavy earthmoving machinery and other vehicles used during site preparation will be fitted with appropriate noise-reducing devices.

On-site facilities will include basic medical supplies to provide the necessary first aid attention in the event of an accident.

Some of these provisions will also apply during construction of dwellings on individual lots subject to NCC conditions. In particular, a building envelope will be outlined by the proponent, and all vegetation to be retained on the lot will be marked. Wastes will be burnt on site in a controlled manner or disposed of at a rubbish tip.

The proponent will maintain all vegetation on individual lots before they pass into private ownership. When all dwellings have been constructed, the environmental management of the site can be conveniently divided into public and private lands.

7.2 PRIVATE LANDS

All purchasers of lots will assume environmental management of their land upon settlement. The lots will be sold subject to certain covenants designed to protect and enhance the amenity of individual lots and the site as a whole. The covenants will be legally binding as they will be included on the transfer of land to be executed between the proponent and the purchaser. The covenants will include:

- No building (including dwellings, garages, outbuildings, clothes hoists, fences, walls, hot water systems and television, radio or other antennae) to be constructed without the proponent's consent within three years of the transfer. Plans and drawings of proposed buildings will need to show the location and building materials.

- All signs or hoardings on the lot to be approved by the proponent if erected within twelve months of purchase.

- Purchasers to acknowledge and agree to the following development guidelines for approval of any development on their lot subject to any legislation and regulations:

  - The minimum floor area of dwellings (excluding carports, garages, store rooms, verandahs, balconies and pergolas) shall be at least 180 m^2.

  - The design, appearance, external colours and materials of all outbuildings, carports and garages must be architecturally integrated with the main dwelling and preferably located under the main roof. No second-hand materials may be used.

  - Solar hot water heaters must be architecturally integrated with the dwelling and should be located so that they cannot be seen from any public street, thoroughfare or open space.

  - When designing dwellings, garages and carports, consideration should be given to the parking of boats, commercial vehicles and caravans so that they do not detract from the overall appearance of the property.

Where the building design calls for a metal deck roof, the material used shall not be of the reflection type. It shall be of painted Zincalume or Colorbond material and shall generally blend in with the natural surroundings.

- Clothes hoists should not be visible from any street or thoroughfare.

- Air-conditioners must be located below the eaves line where possible and architecturally integrated with the design of the dwelling.

- No fences or walls shall be constructed along either boundary of the lot from a point level with the front building line (or any residence) down to the boundary with the roadway, and no fence or wall shall be erected along the front boundary.

. Any buildings or improvements carried out on the lot shall be contained in a designated building envelope subject to NCC permission to construct a building on land outside the building envelope.

. All areas outside the approved building envelope to be tree preservation areas where no vegetation can be removed or destroyed without NCC approval.

. Any difference relating to restrictive covenants may be referred to arbitration.

7.3 PUBLIC LANDS

Public lands within the site will include 2.08 ha of public open space, 4.1 ha of road reserves (including 2.2 ha of roadside verges) and 0.12 ha of drainage basins. These areas will be developed, landscaped and maintained by the proponent for a maximum of two years or until all lots have been sold. Thereafter, the NCC will have responsibility for management and maintenance, supported by the annual rate income from lot owners.

Additional public lands abutting the site and to be landscaped by the proponent include the 2.08 ha northern site boundary—Bold Park buffer zone and the 1.78 ha Stephenson Avenue west side road reserve. These areas will be managed by the PCC (subject to approval) and the Main Roads Department, respectively.

As an interim measure, the proponent will supply a high-quality reticulation system throughout all public lands within the site and within the abutting landscaped areas of Bold Park and Stephenson Avenue road reserve. The reticulation system will operate automatically and will provide sufficient groundwater to sustain all vegetation. The proponent will maintain and operate this system for two years from approval of the development by the NCC, unless all lots are sold within two years. All reticulation equipment and operating procedures will be subject to NCC approval.

8 CONCLUSIONS AND SUMMARY OF COMMITMENTS

The main environmental impacts from the proposal will be caused by site clearance and earthworks and, subsequently, by construction of 136 dwellings and occupation by the estimated 420 residents. Sympathetic design of the subdivision, through retention of conspicuous vegetation where possible and careful consideration of earthworks within engineering and servicing constraints, will minimize these impacts. Site development works and construction of dwellings will be subject to all the environmental management criteria detailed in Section 7. Extensive landscaping of public lands and restrictive covenants for private lands will ensure a residential development in harmony with the surrounding area.

The residents of the development will generate minimal and acceptable environmental impacts off site. Infrastructure and utility loadings and traffic generation will be within the capacity of existing systems. Demands on community facilities, services and the socio-economic environment will not necessitate additional development. Development of the site will cause some insignificant adverse impacts, such as increased noise levels and loss of landscape and visual quality near the site. The site has no environmental significance in terms of flora, fauna, or conservation, recreation and education use. It is considered that development of the site can be accommodated within the existing and surrounding natural and human environments without adverse environmental impacts. Appropriate ameliorative measures, detailed in previous sections, will minimize adverse environmental impacts and, to this end, the proponent makes the following commitments:

- Construction and development of the site as one stage to proceed as soon as possible after approval.

- Construction commitments to include all those matters detailed in Section 7.1 and particularly:

  - construction materials and practices to be in accordance with the relevant Australian codes;

  - site development and infrastructure to be completed within six months of approval;

  - dust and noise control measures to be enacted subject to conditions of the NCC;

  - boundary of the site to be marked to protect adjacent lands;

  - construction workers to be instructed to be careful of vegetation and fauna;

  - trucks removing spoil to be covered, if required;

  - all trees for retention to be marked;

  - refuse and construction material wastes to be disposed of in a controlled manner;

- chemical toilets to be used on site;
- following completion of all site works, cleared areas to be hydro-mulched;
- any other conditions as required by the NCC.

. Development of the subdivision in accordance with Figure 4.2.

. Development of all infrastructure and provision of all services underground.

. Development of all public open space and recreation facilities and provision of tennis courts, gazebo, park seating, toilet and washing facilities in the home-store for public use.

. Covenants as outlined in Section 7.2 to be included on all transfers of land.

. Meeting of all SPC, EPA and NCC planning and engineering requirements.

. Meeting of all other public authorities requirements.

. Landscape commitments to include:

- provision of a uniform wall around the residential portions of the site;
- retention of all conspicuous trees, wherever possible;
- application of tree conservation measures where appropriate;
- provision of a pedestrian/cycle path network;
- provision of paths in public lands as stabilized limestone;
- provision of reticulation for all public open space, roadside verges, Bold Park and Stephenson Avenue frontages;
- provision of planting beds in roadside verges;
- maintenance of all public open space and roadside verges and provision and operation of a reticulation system for two years unless all lots are sold;
- retention of all stormwater on site;
- provision of reticulation equipment of high quality and subject to NCC approval;
- hydro-mulching of all public open space and roadside verges where appropriate;
- selective trimming of understorey and dead limbs from existing vegetation for safety and aesthetics;
- planting of ground cover and grasses in public open space and road verges;

- **provision of signs on the northern and western boundaries of public lands indicating that pets are prohibited in Bold Park;**

- **provision of signs near entrances to Bold Park from the site warning about the risks of fire outbreak and the need for precautions;**

- **provision of rubbish bins near the entrances to Bold Park from the site.**

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GLOSSARY

aeolian	wind-borne
benched	cut in steps to prevent sliding
bund	embankment
calcareous	of, or containing, calcium carbonate
geomorphology	study of the physical features of the earth's surface and their relation to its geological structures
landslip	a sliding down of the soil on a slope because of an increase of load
padmount transformer	transformer mounted on a concrete pad
parabolic	of, or like, a parabola (open plane curve formed by intersection of cone with plane parallel to its side)
siliceous	of, or containing, silicon dioxide
spoil	excavation waste
stand	standing growth of vegetation
swale	a local depression in the floor of a dune area

GENERAL ABBREVIATIONS AND ACRONYMS

AHD	Australian Height Datum
Bond Corporation	Bond Corporation Holdings Limited
EPA	Environmental Protection Authority
NCC	Nedlands City Council
PER	Public Environmental Report
PCC	Perth City Council
R	Residential Planning Code
RL	reduced level
SECWA	State Energy Commission of Western Australia
SPC	State Planning Commission
UWA	University of Western Australia

TECHNICAL ABBREVIATIONS

ha	hectare
GJ/a	gigajoules per annum
m	metre
m^2	square metre
m^3	cubic metre
m/a	metres per annum
ML/a	megalitres per annum
mm	millimetre
t/a	tonnes per annum

STUDY TEAM

Study Manager	G.R. Puglisi
Technical review	D.J. Alach
Planner	B.R. Adcock
Ecologist	P.M. Royce
Editor	W. Tobin
Graphics	U. Shaw
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Planning design	P. Chappell & Associates Pty Ltd
Engineering design	Barwood Parker Pty Ltd
Landscape design	Landscape Architectural Services

APPENDIX A
PER GUIDELINES ISSUED BY THE EPA

APPENDIX A
PER GUIDELINES ISSUED BY THE EPA

PROPOSED RESIDENTIAL SUBDIVISION OF LOT 1 STEPHENSON AVENUE, CITY BEACH

1 SUMMARY

This section should contain a brief summary of:

- salient features of the proposal;
- alternatives considered;
- description of receiving environment and analysis of potential impacts and their significance;
- environmental management and commitments thereto;
- conclusions.

2 INTRODUCTION

The introduction should include:

- identification of proponent and responsible authorities
- background and objectives of the proposal, including development concepts
- brief details and timing of the proposal
- relevant statutory requirements and approvals, zonings, etc.
- purpose and structure of the PER.

3 NEED FOR THE DEVELOPMENT

This section is to enable the proponent to provide the justification for the project.

4 EVALUATION OF ALTERNATIVES

A discussion of alternative development or other land use options should be given. A comparison of these in the context of the stated objectives should be included. In this way, the rationale for not choosing certain alternatives should be clear, as will the basis for choosing the preferred option.

The following provide examples of alternatives and their potential impacts for consideration in this section:

- various development options
- various special arrangements of uses based on environmental consequences
- any feasible opportunities which avoid the development of Lot 1.

5 DESCRIPTION OF PROPOSAL

This should include:

- general development concepts;
- subdivision layout;
- public open space:
  - location
  - proposed uses
  - purpose
  - development
  - management;
- landscaping of Stephenson Avenue road reserve;
- associated works:
  - water supply, including use of groundwater
  - access
  - deep sewerage
  - electricity
  - gas
  - stormwater disposal
  - fencing on boundaries
  - other works.

6 EXISTING ENVIRONMENT

This section should provide an overall description of the environment and of physical and ecological systems likely to be affected.

It should then concentrate on the significant aspects of the environment likely to be impacted by the development. Only the habitats, resources and potential resources which could be influenced should be defined.

This section should include:

6.1 Lot 1

- Physical.
- Biological:
  - emphasis on flora and floral systems (including quantity and quality) of the property which are important, rare or uncommon (or becoming so);
  - fauna with emphasis on rare or uncommon species.
- Biological issues to be set in both a local and regional context relative to their conservation status.
- Human environment:
  - landscape value in a local and regional context, from several viewing points, e.g. Reabold Hill and the existing walking trails;

- relationship with adjacent land uses;
- archaeological and ethnographic sites;
- existing social climate, uses and value.

6.2 System 6 Report and recommendation M47 area

A brief overview in a regional and local context of:

. conservation values
. recreation values
. education values
. landscape values.

7 ENVIRONMENTAL IMPACTS

This section of the PER should show the overall effect on the total ecosystem and social surroundings of the proposal.

The objective of this section is to synthesize all information and predict potential impacts (both adverse and beneficial) upon the environment in the short and long term, including the impacts of alternatives. This should include an assessment of the resilience of the systems to natural and man-induced pressures associated with the proposal.

Impacts should be quantified where possible. Criteria for making assessments of their significance should be outlined.

It will be necessary to determine impacts on individual components of the environment before a final overall synthesis of potential impacts is made.

This section should include, but not be limited by, consideration of the following:

7.1 Impact on System 6 and the recommendation M47 area

Impacts on those environmental values identified in Section 6.2 should be discussed, including:

. edge effects;

. access to and from the project area (pedestrian and vehicles);

. people pressure;

. pets, e.g. dogs and cats;

. fire;

. noise;

. landscape values - area generally and from within the System 6 M47 area specifically;

. groundwater response with emphasis on potential impact on Camel Swamp wetland and vegetation generally.

7.2 Impact on environmental values identified within the project area

7.3 Impact on adjacent lands

8 ENVIRONMENTAL MANAGEMENT

Environmental management should be described on the basis of (and cross-referenced to) the potential environmental impacts described in Section 7.

The purpose of management is to demonstrate the manner in which potential environmental impacts can be ameliorated either through design or specific ongoing management. The issue of management of the adverse impacts of the proposal should be specifically addressed in detail, including who will be responsible.

9 SUMMARY OF COMMITMENTS BY PROPONENT

10 CONCLUSION

An assessment of the environmental acceptability of the project in terms of its overall environmental impact and in the context of proposed management should be given.

REFERENCES

PER GUIDELINES

CONSULTATIONS

Details of consultations with government bodies and public interest groups.

APPENDICES

APPENDIX B
CONSULTATIONS

APPENDIX B
CONSULTATIONS

During the documentation of this PER, the following people, organizations and government departments were contacted to supply relevant information:

- Western Australian Museum
- Department of Conservation and Land Management
- Nedlands City Council
- Perth City Council
- Main Roads Department
- Australian Bureau of Statistics
- Arthur Weston - Consultant Botanist
- State Energy Commission of Western Australia
- Canine Association of Western Australia (Inc.)
- Water Authority of Western Australia
- State Planning Commission
- Department of Land Administration
- Environmental Protection Authority
- Friends of Bold Park Bushland
- Royal Australian Ornithological Union
- Peter Chappell & Associates Pty Ltd - Town Planning Consultants
- Landscape Architectural Services
- Barwood Parker Pty Ltd

16th October, 1987.

Hon. Minister for Education and Planning,
The Hon. R.J. Pearce, BA, JP, MLA,
151 Royal Street,
EAST PERTH. W.A. 6000

Dear Minister,

RE: LOT 1 STEPHENSON AVENUE, CITY BEACH

This Company, through its nominee, Harpford Pty. Ltd., purchased Lot 1 Stephenson Ave., City Beach by public tender from the University of Western Australia on the 7th May 1987.

The land is located in the City of Nedlands, comprises 19 hectares and is adjacent, but not in, Bold Park. The land is appropriately zoned for our intended residential subdivision.

We have been directed by the Minister for Conservation to prepare a Public Environmental Report on the proposal consistent with Section 40 (2) of the Environmental Protection Act 1986. The EPA have subsequently issued us with guidelines for the PER. One component, specifically causes us to address:

"Any feasible opportunities which
avoid development of Lot 1".

Purchase or resumption by your Government and re-dedication as an extension to Bold Park is one such avenue.

We respectfully point out that should this option be a consideration, a precedent may well be set for the acquisition by your Government of the 53 hectares of endowment land held by the Perth City Council and adjoining the 19 hectares of land currently owned by Bond Corporation.

The Perth City Council endowment land similar to the 19 hectares of Bond Land is also zoned for residential development.

We would therefore be grateful to have your advice in regard to this option so that we can complete the work required of us.

Yours faithfully,
BOND CORPORATION HOLDINGS LIMITED

BRUCE A BUCKLEY
W.A. STATE PROPERTY MANAGER.

WESTERN AUSTRALIA

MINISTER FOR PLANNING

Mr B A Buckley
WA State Property Manager
Bond Corporation Holdings Limited
9 Havelock Street
WEST PERTH WA 6005

18 NOV 1987

Dear Bruce

LOT 1 STEPHENSON AVENUE, CITY BEACH

Thank you for your letter of October 16, 1987 about the purchase of the above lot for public open space.

The land in question is zoned urban in the Metropolitan Region Scheme and the State Planning Commission is of the view that this is an appropriate use for the site.

In view of this I can advise that purchase of resumption for re-direction as an extension of Bold Park is not under consideration.

Yours sincerely

BOB PEARCE MLA
MINISTER FOR EDUCATION
AND PLANNING

151 ROYAL STREET, EAST PERTH 6000
TELEPHONE (09) 420 4444 TELEX 93153 EDUWA

16th October, 1987.

Mr. N.G. Leach,
Town Clerk,
City of Nedlands,
60-64 Stirling Highway,
NEDLANDS. W.A. 6009.

Dear Sir,

RE: LOT 1 STEPHENSON AVENUE, CITY BEACH.

The Minister for Conservation has required us to prepare a PER on our proposal to residentially develop Lot 1 Stephenson Avenue.

The EPA have in turn issued us with formal guidelines for a PER under Section 40 (2) of the Environmental Protection Act 1986.

One component of these guidelines specifically causes us to address:

> "Any feasible opportunities which avoid development of Lot 1".

The possibility of your Council purchasing the land and re-dedicating it as an extension to Bold Park, has been raised on a number of occasions, and as such we now are obliged to consider those in some detail.

We appreciate that some of your Councillors have individually considered this matter.

As we understand it, the monies involved would be approximately as follows:

Purchase Price plus interest and costs accrued until say December 1987	$ 9.0
Foregone Commercial opportunity through Subdivision and Sale, say	2.5 million
Stamp Duty etc.	0.5 million
TOTAL of say	$12.0 million

We assume for this exercise that funds to be raised for the purchase of this property are being derived from an increase of rates. Our calculation based on a one year, three year and fifteen year programme are therefore as follows:

.....2

S C H E D U L E

ONE YEAR

Purchase:	$12,000,000
Interest:	1,620,000
TOTAL:	$13,620,000
No. of Ratepayers:	8,600
Average Rates:	$425 p.a.
Annual Inc:	13%
Levy - 1 year: ($1,584) =	373% p.a.
TOTAL RATE INCREASE	386% p.a. for 1 year

OR $2,009 p.a. for one year.

THREE YEARS

Purchase:	$12,000,000
Interest:	3,240,000
TOTAL:	15,240,000
No. of Ratepayers	8,600
Average Rates:	$425 p.a.
Annual Inc:	13%
Levy - 3 years ($591) =	39% p.a.
TOTAL RATE INCREASE	152% p.a. for 3 years

OR $1,016 p.a. for three years.

FIFTEEN YEARS

Purchase:	$12,000,000
Interest:	12,960,000
TOTAL:	24,960,000
No. of Ratepayers:	8,600
Average Rates:	$425 p.a.
Annual Inc:	13%
Levy - 15 years: ($194) =	46% p.a.
TOTAL RATE INCREASE	59% p.a. for 15 years

OR $619 p.a. for 15 years.

The latter, the fifteen year proposal is very similar to the proposal suggested by Councillor Robert Binks on the eve of the public meeting on the issue.

We would be appreciative of your Council's formal attitude to any of these proposals, so that we can fulfil the requirements of our PER direction.

Yours faithfully,
BOND CORPORATION HOLDINGS LIMITED

LOU G. SCHOUTEN
PROPERTY CONSULTANT.

71 Stirling Highway, Nedlands, Western Australia. 6009. Telephone (09) 386 2414.
Office hours: Monday to Friday, 9 a.m. to 4 p.m.
All correspondence to be addressed to Town Clerk, P.O. Box 9, Nedlands, 6009.

Enquiries Mr McClure

Our Reference CM:LL:

Your Reference

The Manager
Bond Corporation
26 St. George's Terrace
PERTH WA 6000

ATTENTION: Mr Lou Schouten

Dear Sir

RE: LOT 1 STEPHENSON AVENUE, CITY BEACH.

I refer to your correspondence of 16 October 1987 concerning Lot 1 Stephenson Avenue, City Beach.

The Council of the City of Nedlands has formally resolved not to place itself in a position where it would be liable for compensation or purchase of the subject land.

The Council has resolved not to rezone the land for recreation in Town Planning Scheme No. 2 as it does not have the resources to compensate the owners for loss of development rights.

Yours faithfully

C.G. ELLIS
ACTING TOWN CLERK

29 October 1987

16th October, 1987.

Mrs. J.A. Drayson,
"Friends of Bold Park",
19 Hornsey Street,
FLOREAT. W.A. 6014.

Dear Mrs. Drayson,

We are aware of your concern in relation to the residential development of our land at Lot 1 Stephenson Avenue, City Beach.

Your Group has suggested purchase by public subscription and re-donation to the adjoining Perth City Council parkland.

The situation is, that the land was purchased by public tender, and was appropriately zoned for the purpose. Any sale of the property must therefore incorporate our purchase price, holding cost and foregone commercial opportunity. A realistic payout figure is therefore in the order of $12 million.

Bond Corporation is a public company with shareholders, and as such the land cannot simply be gifted or discounted as you have suggested. The property is not the personal property of Mr. Alan Bond.

We are prepared to consider your offer of purchase by public subscription, however, this would require underwriting or some similar guarantee. We will need this assurance prior to the completion of our Public Environment Review, if it is to be considered further.

We would therefore be glad to have your advice in this matter within the week if we are to proceed.

Yours faithfully,
BOND CORPORATION HOLDINGS LIMITED

LOU G. SCHOUTEN
PROPERTY CONSULTANT.

FRIENDS OF BOLD PARK BUSHLAND
Care of 19 Hornsey Road,
FLOREAT. W.A. 6014

23 October 1987

Mr Lou G. Schouten
Property Consultant
Bond Corporation Holdings Limited
Property Division
9 Havelock Street
WEST PERTH W.A. 6005

Dear Mr Schouten,

Thank you for your letter dated 16 October 1987 which was considered at a meeting of Friends of Bold Park Bushland.

Friends of Bold Park Bushland note that your Company is considering other alternatives for the land, and assume that this is on account of the substantial public pressure to keep intact one of the only remaining natural coastal bushland areas in the Perth metropolitan area.

We believe that the appropriate course would be for your Company to list in its Public Environmental Report all the alternatives to development of Lot 1 Stephenson Avenue, City Beach, including a land swap.

Yours faithfully,

Norma Calcutt on behalf
of Friends of Bold Park Bushland

copy sent to : Mr P. Beckwith, 26 St George's Terrace, Perth. 6000

APPENDIX C
VEGETATION AND FLORA SURVEY

APPENDIX C
VEGETATION AND FLORA SURVEY

Prepared by Arthur S. Weston, Ph.D. (Botany)

Lot 1 Stephenson Avenue (the site), lying south-east of Bold Park and contiguous with it, has vegetation and a flora that are basically the same, although less varied and poorer in species, as Bold Park's. Some aspects of the site's vegetation and flora do not, however, appear to be represented in Bold Park.

Vegetation

The vegetation of the site is principally Tuart Woodland, Banksia Low Woodland and scrub or heath dominated by Melaleuca acerosa, Grevillea crithmifolia, Calothamnus quadrifidus, Acacia pulchella and other species. These three basic vegetation types intergrade and, to varying extents, have ground layers comprising Pelargonium capitatum, Ehrharta calycina and other weedy alien species.

A map showing the site's vegetation is included in this Appendix and a description is given in Table C1.

Table C1 Vegetation of the site

Area	Vegetation
1	Tuart Woodland on lower slope with predominantly grassy understorey and Pelargonium capitatum and a few plants of Macrozamia riedlei, Olearia axillaris and Gyrostemon ramulosus (Figure C1).
2	Low-lying area with lines of disturbance through it, oats, veldt-grass and other weedy species, and a variety of native shrubs, including Acacia cyclops, Grevillea crithmifolia, Rhagodia baccata and Dryandra sessilis (Figure C2, foregound). There are a few Gyrostemon ramulosus shrubs and small trees on slopes in the southern part of this area; however, I understand that they are outside the area to be developed.
3	Heath dominated by Melaleuca acerosa, Acacia pulchella, Calothamnus quadrifidus and Acanthocarpus preissii, and with relatively few weeds (Figure C2, background).
4	Tuart Woodland between Area 2 and Area 3, similar to Area 1 but with more native plants in its understorey and without the Gyrostemon (Figure C2, midground).
5	Banksia Low Woodland, with scattered jarrah and tuart trees, the vegetation that covers most of the site - variable in density and nature of understorey, which is mostly heavily infested with veldt-grass and other alien weeds (Figure C3, background).
6	Banksia Low Woodland with predominantly native shrub understorey, including Conospermum triplinervium and a few other species which are not common on the site.

Area	Vegetation
7	Marri Woodland to open forest on low-lying, western fringe of the site, with blackboys, Acacia saligna, Macrozamia riedlei, occasional tuart trees and predominantly weedy, grassy understorey (Figure C4).
8	Heath dominated by the smokey blue-green shrub Olearia axillaris, Calothamnus quadrifidus and Melaleuca acerosa, on the upper northern slope (Figures C3 and C5, foregrounds). The impression gained from a view from the highest point on the site is that Olearia axillaris heath is uncommon in the area.
9	Heath similar to Area 8, but with taller shrubs, including Allocasuarina humilis (Figure C6). Also with Jacksonia sericea (Figure C7).
10	Banksia Low Woodland similar to Area 5, but with no jarrah or tuart, with at least two plants of Banksia menziesii which produce yellow-flowered cones (Figure C8, with Banksia attenuata in flower and pines in background).
11	Tuart Woodland in the north-west corner of the site (Figure C5, background).

Flora

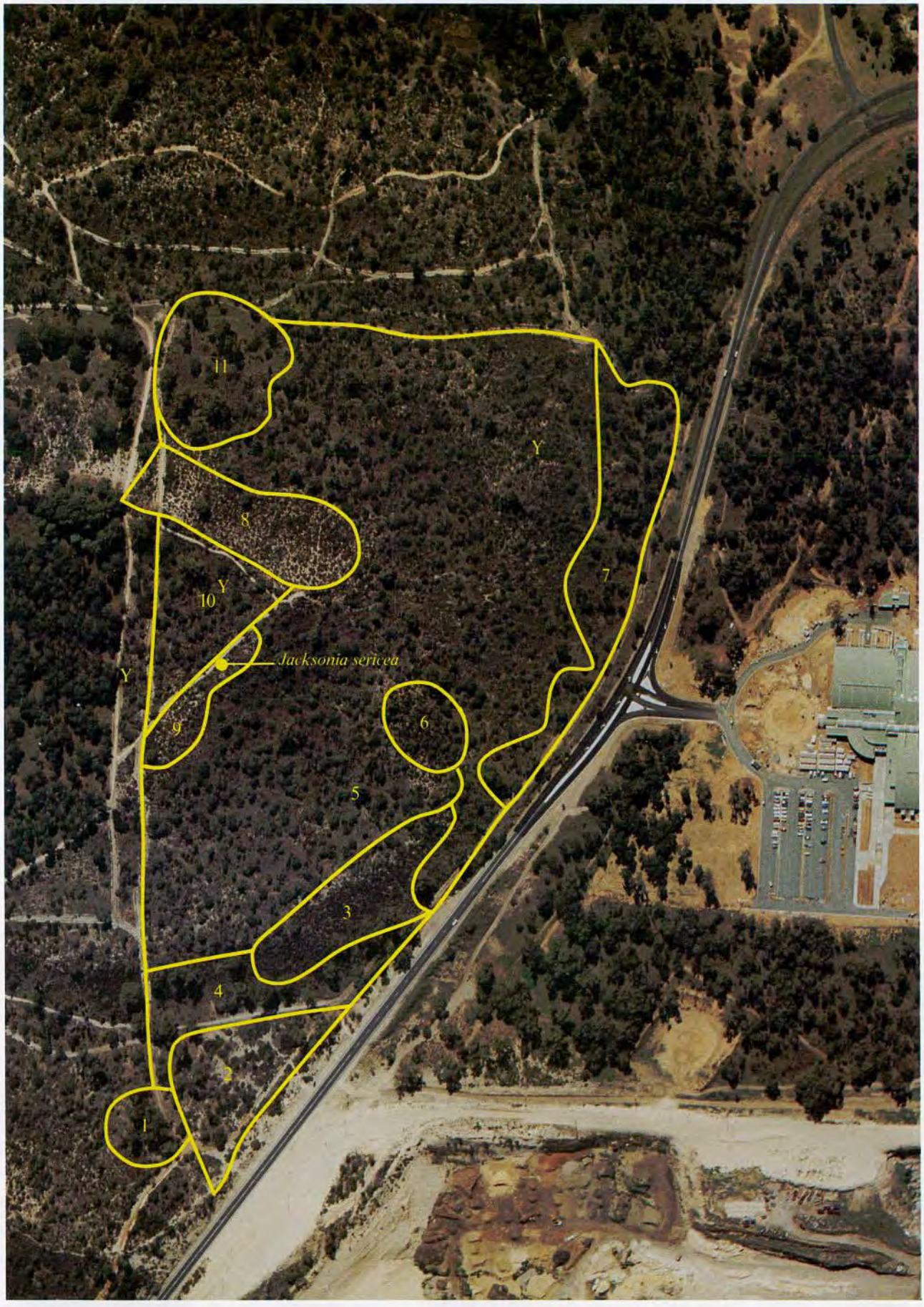
On five occasions in 1987 (April, May, August, October and November), I walked through the site compiling a list of the species seen. This list contains the dominant species of the site's vegetation, but it is neither definitive nor comprehensive.

For purposes of comparison, I have indicated the species that I saw on the accompanying list of species of Bold Park compiled by The Tree Society (Attachment C1). The list is not a recent one, nor is it especially comprehensive. There are a number of species on the list which are now known by different names. For instance, the species of Casuarina are now species of Allocasuarina. In addition, Grevillea crithmifolia, a heath dominant, is not on the list. A more comprehensive list of Bold Park plants is being prepared on the basis of recent field work by other botanists (Brown, pers. comm., 1987).

There are many species on the Bold Park list not found on the site. There are also some species on the site that are not on The Tree Society's Bold Park list, including the native species listed in Table C2.

Table C2 Native species of the site

Species	Family
Stipa compressa	GRAMINEAE
Loxocarya? flexuosa	RESTIONACEAE
Dianella divaricata	LILIACEAE
Thysanotus arenarius	LILIACEAE
Conostylis? aculeata	HAEMODORACEAE
Haemodorum spicatum	HAEMODORACEAE



Vegetation map of Lot 1 Stephenson Avenue, City Beach

Refer to Table C1 for descriptions of vegetation areas.

Figure C.1
Area 1 — Tuart Woodland on lower slopes of site with predominantly grassy understorey.

Figure C.2
Foreground: Area 2 — Low-lying area with trails dissecting the vegetation.
Background: Area 3 — Heath dominated by *Melaleuca acerosa, Acacia pulchella, Calothamnus quadrifidus* and *Acanthocarpus preissii*, with relatively few weeds.
Midground: Area 4 — Tuart Woodland similar to Area 1, but with more native plants in the understorey.

Figure C.3
Foreground: Area 8 — Heath on the upper northern slope dominated by the smokey blue-green shrub *Olearia axillaris, Calothamnus quadrifidus* and *Melaleuca acerosa.* Background: Area 5 — Banksia Low Woodland, with scattered jarrah and tuart trees. This vegetation covers much of the site and is generally heavily infested with veldt-grass and other alien weeds.

Figure C.4
Area 7 — Marri Woodland to open forest on low-lying western fringe of the site.

Figure C.5
Foreground: Area 8 — Heath on the upper northern slope dominated by the smokey blue-green shrub *Olearia axillaris, Calothamnus quadrifidus* and *Melaleuca acerosa.*
Background: Area 11 — Tuart Woodland in the north-west corner of the site.

Figure C.6
Area 9 — Heath similar to Area 8, but with taller shrubs, including *Allocasuarina humilis.*

Figure C.7
Area 9 — Close view of *Jacksonia sericea*.

Figure C.8
Area 10 — Banksia Low Woodland with *Banksia attenuata*. This area is similar to Area 5, but without jarrah and tuart, and contains at least two plants of the yellow-flowered form of *Banksia menziesii*.

Species	Family
Lomandra maritima	XANTHORRHOEACEAE
Banksia prionotes	PROTEACEAE
Grevillea crithmifolia	PROTEACEAE
Petrophile linearis	PROTEACEAE
? Petrophile macrostachya	PROTEACEAE
Gyrostemon ramulosus	GYROSTEMONACEAE (PHYTOLACCACEAE)
Acacia cochlearis	MIMOSACEAE
Acacia cyclops	MIMOSACEAE
Acacia? rostellifera	MIMOSACEAE
Gompholobium? tomentosum	PAPILIONACEAE
Jacksonia floribunda	PAPILIONACEAE
Jacksonia sericea	PAPILIONACEAE
Hibbertia? subvaginata	DILLENIACEAE
? Calytrix sp.	MYRTACEAE
Leucopogon? parviflorus	EPACRIDACEAE
Leucopogon? propinquus	EPACRIDACEAE
Scaevola? canescens	GOODENIACEAE

Prominent volunteer non-native species on the site that are not on the The Tree Society's list of Bold Park species are Trachyandra divaricata (Liliaceae), Lupinus cosentinii (Papilionaceae), Olea europaea (Oleaceae), Lycium ferocissimum (Solanaceae) and Solanum sodomaeum (Solanaceae).

Rare or otherwise significant flora

Department of Conservation and Environment (DCE) Reports 8 (1975) and 13 (1983) recommending specific localities for conservation reserves give brief descriptions of the vegetation of Bold Park, descriptions which also apply in part to the site, and refer to several plant species which occur in the park. Three of the species are rare or otherwise significant: Acacia xanthina, Fremantle Mallee (Eucalyptus foecunda) and Limestone Marlock (Eucalyptus decipiens).

These three species, plus three others not mentioned in the DCE reports, are of particular interest for the following reasons:

- Acacia xanthina — southern limit of distribution, or near it
- Agonis flexuosa — northern limit, or near it
- Chamelaucium uncinatum (the local, indigenous, wild form; not the garden escape) — southern limit, or near it
- Eucalyptus decipiens — sporadic in the Perth region and local area
- Eucalyptus foecunda sens. strict. — restricted, at least in the Perth region
- Gyrostemon ramulosus — southern limit, or near it.

The names of these six species and the information about them agree with the recently published Flora of the Perth region (March 1987) and have been checked with Dr. S.D. Hopper and other Department of Conservation and Land Management staff. All of the six species are large shrubs and trees, with heights up to 3 m or more, and are easy to spot from a distance. I searched virtually the whole of the site, on foot and with high-powered binoculars, for the six species and found only one of them - Gyrostemon ramulosus. A second species, Acacia xanthina, has, however, been reported to occur close to the site and possibly within it. (J. Brown, pers. comm., 1987).

Gyrostemon ramulosus (Figure C9) can be distinguished by its pale, grey-brown corky bark and long, narrow or cylindrical, upright, pale green leaves.

I found approximately twenty shrubs and small trees of Gyrostemon ramulosus in the south-western corner of the site and on adjoining land to the west. The majority of the plants are in what is shown in the DCE System 6 Report (1983) as the southern corner of the site. They are on slopes south of Area 2 and, I understand, south of the area to be developed. One or two plants, in the Area 1 Tuart Woodland, might be removed for the development.

Another native plant of particular interest that would be affected by the development of the site is a yellow-flowered form of Banksia menziesii (Figure C10). I saw three trees of this colour form on the site, the first I have ever seen. Their approximate locations are indicated by the symbol Y on the vegetation map.

In The banksia book, botanist Alex George, the world authority on banksias, describes the colours of Banksia menziesii flowers as 'pale to deep pink or red with silvery indumentum, sometimes cream, chocolate or rusty-brown'. Alex has told me that he has seen a few B. menziesii trees with cream or very pale yellow flowers (none of them in reserves), but not with bright yellow flowers.

As pointed out in a letter to the Subiaco Post (p.6, May 12 1987), there is a photograph of a yellow-flowered Banksia menziesii in Erickson, George, Marchant and Marcombe's book Flowers and plants of Western Australia (1979). The colour may fall within the range of what Alex George considers to be cream to pale yellow.

D.D. Letham, in the same letter, notes that he and his wife 'have sighted up to a dozen (yellow-flowered Banksia menziesii plants in Bold Park), easily visible from the paths'. Plants they have seen since mid-May bring the number up to twenty (Letham. pers. comm., 1987).

During the Banksia Atlas Project, co-ordinated at the Western Australian Wildlife Research Centre, about thirty sightings of the yellow-flowered form of Banksia menziesii were reported in areas between the Murchison River, in the north, and the southern Swan Coastal Plain (Taylor and Hopper, n.d.). There were probably other unreported sightings as well. Whether or not the thirty or more sightings are enough to infer that the yellow-flowered form of Banksia menziesii is not rare is arguable. The form appears at least to be uncommon.

Jacksonia sericea (Figure C7) is a more or less prostrate, orange-flowered pea plant which occurs on sandy and calcareous soils between Perth and Pinjarra. It is a restricted species that is, on the site, near the northern limit of its distribution. It occurs on the northern edge of the Area 9 heath. It also occurs in Kings Park where it is common in a range of vegetation types.

Camel Lake

North of the site, there is a small, apparently non-natural, degraded bulrush swamp with bulrushes (Typha? orientalis), marsh club-rushes (Bolboschoenus caldwellii) and various alien weedy grasses and sedges (Figure C11). The swamp is well north of the site and outside of it. Banksias and other native species have been planted among the grasses bordering the swamp and intruding into it. An Acacia saligna thicket is east of it (Figure C12), there are flooded gum trees (Eucalyptus rudis) west and south of it, and a stand of Melaleuca incana and Regelia ciliata is north of it (Figure C11, background).

Figure C.9
View of *Gyrostemon ramulosus,* which occurs in the south-west corner of the site, but mostly on adjoining land south and west of the area proposed for development.

Figure C.10
Close view of the yellow-flowered form of *Banksia menziesii.*

Figure C.11
Camel Lake with bulrushes, marsh club-rushes and various alien weedy grasses and sedges.

Figure C.12
Acacia saligna thicket located east of Camel Lake.

Attachment C1

Families of plants - genera and species - at Bold Park

(according to The Tree Society's list, i.e. the names have not been updated)

Family name			Botanical name	Common name
CYCADACEAE	B		Macrozamia riedlei	Zamia palm
CUPRESSACEAE			Callitris robusta	Rottnest cypress
GRAMINEAE	B	*	Ehrnarta longiflora	Veldt-grass (annual)
	B	*	E. calycina	Veldt-grass (perennial)
	B	*	Avena fatua	Wild oat
	B	*	Briza maxima	Large quaking grass
	B	*	Briza minor	Shivery grass
CYPERACEAE	B		Schoenus grandiflorus	
	B		Lepidosperma gladiatum	
	B		L. angustatum	
LILIACEAE		*	Asphodelus fistulosus	
	B		Acanthocarpus preissii	
	B		Sowerbaea laxiflora	Vanilla lily
	B		Burchardia umbellata	Milkmaids
	B	*	Freesia refracta	
	B		Tricoryne elatior	Yellow autumn lily
	B		Thysanotus patersonii	
	B	*	Gladiolus caryophyllaceus	Pink gladiola
XANTHORRHOEACEAE			Lomandra purpurea	Purple mat-rush
			L. preissii	
	B		Xanthorrhoea preissii	Blackboy
HAEMODORACEAE			Anigozanthos humilis	Cats paw
	B		A. manglesii	Kangaroo paw
	B		Conostylis candicans	White conostylis
	B		Patersonia occidentalis	Western patersonia
ORCHIDACEAE			Caladenia patersonii var. longicauda	Spider orchid
			C. latifolia	Pink faries
			C. flava	Cowslip orchid
			Diuris longifolia	Donkey orchid
CASUARINACEAE	B		Casuarina fraseriana	
	B		C. humilis	
			C. v. sp.	
PROTEACEAE			Grevillea vestita	
	B		G. thelemanniana	
	B		Hakea prostrata	Harsh hakea
			Dryandra floribunda	

Family name			Botanical name	Common name
	B		D. sessilis	Parrot bush
			Petrophile striata	
			P. serruriae	
	B		Banksia attenuata	
	B		B. grandis	
	B		B. menziesii	
			B. littoralis	
	B		Stirlingia latifolia	
	B		Conospermum triplinervium	Smoke bush
SANTALACEAE			Santalum sp.	Quandong
OLACACEAE			Olax benthamiana	
CHENOPODIACEAE	B		Rhagodia radiata	
AMARANTHACEAE			Ptilotus polystachyus	Green mulla-mulla
PHYTOLACCACEAE	B		Tersonia brevipes	Button creeper
CARYOPHYLLACEAE	B	*	Silene gallica	French catchfly
RANUNCULACEAE		*	Ranunculus colonorum	
			Clematis microphylla	
LAURACEAE	B		Cassytha sp.	
PAPAVERACEAE	B	*	Fumaria capreolata	
CRUCIFERAE		*	Cakile maritima	Sea rocket
		*	Heliophila pusilla	
DROSERACEAE			Drosera pallida	
			D. menziesii	
MIMOSACEAE	B		Acacia saligna	
			A. cuneata	
	B		A. lasiocarpa	
	B		A. pulchella	Prickly moses
PAPILIONACEAE	B		Kennedia prostrata	Running postman
	B		Hardenbergia comptoniana	Native wisteria
	B		Daviesia divaricata	
	B		D. juncea	
	B		Jacksonia sternbergiana	Stinkwood
	B		J. furcellata	
			Hovea pungens	
			Oxylobium capitatum	
	B	*	Vicia sativa	
	B		Templetonia retusa	Cockie's tongues
			Isotropis cuneifolia	Granny's bonnet

Family name			Botanical name	Common name
GERANIACEAE	B	*	Pelargonium capitatum	
EUPHORBIACEAE			Phyllanthus calycinus	
MYRTACEAE			Chamaelaucium uncinatum	'Wembly' wax: Geraldton wax
			Hypocalymma robustum	Swan River myrtle
			H. angustifolium	
			Agonis flexuosa	Peppermint
			Leptospermum laevigatum	Coast tea-tree
			Melaleuca huegelii	Chenille honey-myrtle
	B		M. acerosa	
	B		Calothamnus quadrifidus	One-sided bottlebrush
			Eucalyptus decipiens	Limestone mallet
	B		E. marginata	Jarrah
	B		E. calophylla	Marri
			E. foecunda	Narrowleaf mallet
			E. rudis	Flooded gum
	B		E. gomphocephala	Tuart
SAPINDACEAE	B		Diplopeltis huegelii	
RHAMNACEAE			Trymalium ledifolium	
DILLENIACEAE			Hibbertia hypericoides	
	B		H. racemosa	
THYMELAEACEAE			Pimelea sylvestris	
GOODENIACEAE	B		Scaevola thesioides	
	B		S. holosericea	
			S. crassifolia	
	B		Lechenaultia linarioides	
APIACEAE			Trachymene coerulea	
EPACRIDACEAE	B		Conostephium pendulum	
			Leucopogon australis	
PRIMULACEAE	B	*	Anagallis arvensis	Pimpernel
LOGANIACEAE			Logania vaginalis	
ASCLEPIADACEAE		*	Gomphocarpus fruticosus	Cotton bush
LAMIACEAE	B		Hemiandra pungens	Snake bush
SOLANACEAE		*	Solanum simile	
	B		Anthocercis littorea	Yellow-tail flower
MYOPORACEAE			Myoporum insulare	

Family name			Botanical name	Common name
RUBIACEAE	B		Opercularia vaginata	
DIPSACACEAE		*	Scabiosa maritima	
CAMPANULACEAE	B	*	Wahlenbergia capensis	Bluebell
LOBELIACEAE			Hybanthus calycinus	
COMPOSITAE			Senecio lautus	
			Helipterum cotula	
	B		Helichrysum cordatum	
	B	*	Ursinia anthemoides	
			Lagenifera huegelii	
	B		Olearia axillaris	Beach rosemary
			O. rudis	

B at the site
* introduced

APPENDIX D
AVIFAUNA SURVEY OF BOLD PARK

APPENDIX D
AVIFAUNA SURVEY OF BOLD PARK

Bird	Frequency observed * (%)	Occurrence **	
		Perth	WA
Painted Button Quail	20	Very rare	Rare
Collared Sparrow Sparrowhawk	40	Uncommon	Common
Black-shouldered Kite	40	Uncommon	Common
Peregrine Falcon	40	Rare	Uncommon
Brown Falcon	20	Uncommon	Common
Australian Kestrel	80	Common	Common
Southern Boobook Owl	80	Uncommon	Common
Rainbow Lorikeet	40	Uncommon	Very rare
White-tailed Black Cockatoo	80	Uncommon	Common
Little Corella	20	Common	Common
Galah	80	Uncommon	Very common
Western Rosella	40	Uncommon	Common
Port Lincoln Parrot	100	Common	Very common
Tawny Frogmouth	80	Common	Common
Laughing Kookaburra	80	Common	Common
Rainbow Bee-eater	20	Common	Common
Pallid Cuckoo	40	Common	Common
Welcome Swallow	80	Very common	Very common
White-backed Swallow	60	Uncommon	Common
Grey Fantail	80	Common	Common
Golden Whistler	20	Uncommon	Uncommon
Australian Magpie-lark	20	Very common	Very common
Black-faced Cuckoo Shrike	60	Common	Common
Weebill	80	Common	Common
Western Thornbill	20	Common	Common
White-winged Fairy Wren	20	Rare	Common
Variegated Fairy Wren	20	Rare	Common
Spotted Pardalote	60	Common	Very common
Striated Pardalote	80	Very common	Very common
Silvereye	80	Very common	Very common
Western Spinebill	20	Common	Common
Brown Honeyeater	40	Very common	Very common
Singing Honeyeater	100	Very common	Very common
Little Wattlebird	40	Uncommon	Common
Red Wattlebird	100	Very common	Very Common
Australian Magpie	100	Very common	Very common
Australian Raven	100	Very common	Very common
Feral Pigeon	80	Very comon	Very common
Laughing Turtle Dove	80	Very common	Very common
Spotted Turtle Dove	20	Common	Common

* During five visits over twelve months 1985-86.
** Very common > common > uncommon > rare > very rare.
Source: Royal Australian Ornithological Union. 1987.

APPENDIX E
EXTRACT FROM SYSTEM 6 STUDY

APPENDIX E
EXTRACT FROM SYSTEM 6 STUDY

M47 BOLD PARK, CITY BEACH

The recommended area comprises part of Endowment Land, owned by the City of Perth, subject to the City of Perth Endowment Lands Act, including part of Locations 571, 585, 617, 1911, 2103 and part of Perthshire Locations AI and Ak (Figure 116). Part of the area is "reserved" for Parks and Recreation under the Metropolitan Region Scheme.

Private groundwater extraction may affect vegetation in the area, which contains sewerage works and SEC lines, and may be affected by proposed road works. The proposed Western Suburbs Highway is routed to pass through the area.

The area of natural bushland and pine plantations to the south-west of Bold Park has been proposed by the Perth City Council for inclusion in the Park. The pine plantations include a quarry and a paddock which will be used for parking and picnic facilities. The Council is seeking an amendment to the Endowment Lands Act, to enable money gained from the sale of Endowment Land to be used to maintain and extend Bold Park, for which the Council has a development and management policy.

The area has deep, calcareous sands on the high sharp ridges, pale yellow and grey siliceous sands in the interdunal valleys, and dark-brown sands east of Reabold Hill.

Most of the section west and south-west of Reabold Hill is covered by woodland or open-woodland of tuart. The deeper moister soils of the valleys and depressions carry dense stands of banksia with a scattering of tuart and sheoak, and just north of the pine plantation, a few isolated jarrah. The understorey is dominated by blueboy and *Pelargonium capitatum*.

On the limestone ridges and the upper part of Reabold Hill the tree cover is sparse or absent. There are a few tuarts, but the vegetation is mainly a very rich closed-scrub or closed-heath, which includes snakebush, rats' tails and yellow lily, and where limestone is present, parrot bush, yellow leschenaultia and spider-net grevillea.

The vegetation on the northern slope of Reabold Hill, just below and east of the old quarry, is distinctive and comprises closed-scrub dominated by *Acacia xanthina* with a few emergent tuarts associated with such species as *Scaevola nitida* and chenille honeymyrtle.

The vegetation of the dry slopes and ridges comprises woodland or open-woodland of tuart, with an understorey of banksia, and a groundstorey which includes blueboy, one-sided bottlebrush and prickly moses. In the extreme south-west the vegetation includes *Olearia axillaris, Conostylis* and *Melaleuca acerosa*.

Along the western side of Perry Lakes Drive there is open-forest of tuart, jarrah, marri and flooded gum. Flooded gum is dominant around the small seasonal swamp near the corner of Perry Lakes Drive and Underwood Avenue, with some swamp banksia in the understorey. North of the swamp is a thicket of Fremantle mallee, which is uncommon in System 6 and rare in the metropolitan area.

Although much of the section of Bold Park between Oceanic Drive and The Boulevard is developed, there are still areas of bush. Especially significant is another smaller stand of Fremantle mallee north of Oceanic Drive, and the area south-west of the Skyline Drive-In, which supports low open-forest and low woodland of limestone marlock, which is uncommon in the metropolitan area. The grassed area around Perry Lakes contains a large number of native trees, including flooded gum, tuart and marri, with a second storey of wattle and banksia.

Bold Park supports close to a hundred varieties of birds, including a number of rare species such as the splendid wren (now lost from Kings Park) and the black-capped sitella. Species from Perry Lakes include black duck, grey teal and grebe. The reptiles in Bold Park include the bob-tailed lizard, sandhill dragon and bearded dragon, four species of skink and three of gecko. There is also a wide variety of insects, including the large colourful iridescent jewel beetle.

Reabold Hill is one of the highest parts of the Coastal Plain near Perth and is used for sightseeing. The remainder of the area is popular for bushwalking, for which gravel paths have been provided, and for recreation in general.

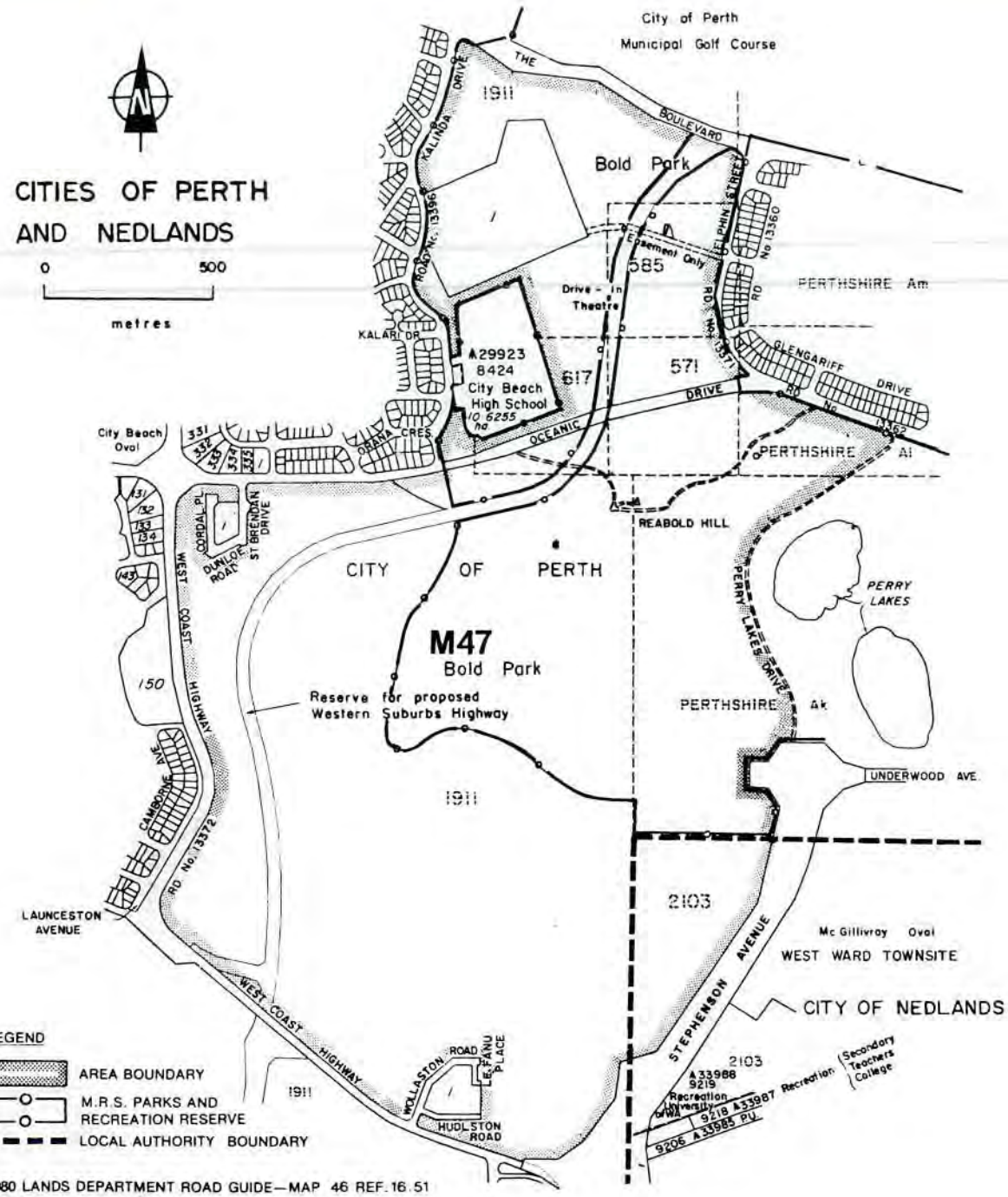


Figure 116

The area constitutes open space of regional significance (see Figure 1, Chapter 4) because of its high conservation, recreation and education value, and its proximity to Perth residential areas. Coordinated management of the area is likely to be required, particularly in view of the proposals for road and service corridors to pass through it. Important management considerations for the area include: encouraging the growth and regeneration of local indigenous flora (especially the Fremantle mallee and limestone marlock); restricting planting to local indigenous flora; and fire control.

Recommendations:

M47.1 That our general recommendations on planning and management of Regional Parks be applied to this area (see Recommendations 15 and 16, Chapter 5).

M47.2 That the Perth City Council's proposal to maintain and extend Bold Park is endorsed.