

ILUKA STRUCTURE PLAN

Structure Plan No. 26

**This Structure Plan is prepared under the provisions of Part 9 of the City of
Joondalup District Planning Scheme No. 2**

ENDORSEMENT PAGE

This structure plan is prepared under the provisions of the City of Joondalup
District Planning Scheme No. 2.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF
THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

13 AUGUST 2002

In accordance with Schedule 2, Part 4, Clause 28 (2) and refer to Part 1, 2. (b) of the
Planning and Development (Local Planning Schemes) Regulations 2015.

Date of Expiry:

19 OCTOBER 2028

**Table of Amendments
the Iluka Structure Plan**

Amendment No.	Summary of Amendment	Amendment Type	Date Approved by WAPC
1	<p>A. Changes to Figure 1 as follows:</p> <ol style="list-style-type: none"> 1. Modify the layout of the western side of the structure plan area south of O'Mara Boulevard by re-orientating commercial and public open space land and including laneways in the adjoining residential land with a small section being recoded to R30. 2. Remove the laneway in the north-west corner of the structure plan area along Burns Beach Road. In addition recode the portion fronting Burns Beach Road from R20 to R30. 3. Recode a stretch of land on the east side of Delgado Parade and land to the north of O'Mara Boulevard from R30 to R25. 4. Removal of a laneway to the north and south of a portion of land in the centre of O'Mara Boulevard. 5. Inclusion of a laneway for R30 lots north-west of Sir James McCusker Park. 6. Modify the road layout for all R30 lots located north of Sir James McCusker Park and O'Mara Boulevard to reflect the subdivision proposal dated 16 October (WAPC No.120494). 7. Delete reference to Detailed Area Plan (DAP). <p>B. Changes to Part 1 'Statutory Planning' as follows:</p> <ol style="list-style-type: none"> 1. Deleting section 5.2 and replacing with generic design guidelines for R20, R25 and R30 lots. <p>C. Delete reference to the 'Residential Planning Codes' and replace with 'Residential Design Codes'.</p>	Major	27 May 2003

Amendment No.	Summary of Amendment	Amendment Type	Date Approved by WAPC
2	<p>Changes to Figure 1 as follows:</p> <ol style="list-style-type: none"> 1. Modify the configuration of the small pocket park in the northernmost section of the structure plan area by providing road interfaces on all sides of the POS. 2. Modify the road network immediately surrounding the POS outlined in 1. above to facilitate the change in POS configuration. 3. Inclusion of Controlled Access Places along the north eastern section of Burns Beach Road and Delgado Parade. 	Major	27 May 2005
3	<p>Modify clause 5.2 Provisions – Parts 2, 3 and 4 to read: Land use permissibility and general provisions shall be the same as those within the Residential zone under the scheme unless otherwise specified in the Structure Plan.</p>	Minor	23 November 2009
4	<ol style="list-style-type: none"> 1. Removal of Centre Zone, replaced with Commercial R80 Zoning. <p>Requirement for Local Development Plans for Village Centre sites, rather than separate Structure Plan.</p>	Major	12 June 2018

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OVERVIEW

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O V E R V I E W

1. PARTS OF THE STRUCTURE PLAN

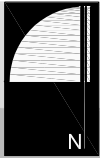
This Structure Plan comprises two parts:

Part 1 – Implementation Section

Part 2 – Explanatory Report



- LEGEND
- PARKS AND RECREATION RESERVE
 - COMMERCIAL ZONE
 - RESIDENTIAL ZONE
 - R30 DENSITY CODE
 - R25 DENSITY CODE
 - R20 DENSITY CODE
 - 'SPECIAL STREETS' - SUBJECT TO DETAILED DESIGN



STRUCTURE PLAN
ILUKA - CITY OF JOONDALUP
BEAUMARIS LAND SALES

robertsday

scale : 1:6000 @ A3
drawn: ES
checked: CE
approved: DC
date : 31.01.05
client: BEAUMARIS LAND SALES

2. SUMMARY

This Structure Plan refers to the land within Iluka bounded by Burns Beach Road to the west and north, Silver Sands Drive to the south and Naturaliste Boulevard and Delgado Parade to the east. The site is located within Swan Location 1370 and includes Pt Lot M1722, contained within Certificate of Title Volume 2098, Folio 1000 and Pt Lot M1722, contained within Certificate of Title Volume 1975, Folio 725. This Structure Plan shall determine the overall land use and form of development for this area.

The Structure Plan area is divided into the 'Commercial Zone', 'Residential Zone' and 'Parks and Recreation' reservation. Part 1 of the report outlines the objectives and provisions for each of these zones/reservations. The Explanatory Report contained within Part 2 provides further explanation about the site and the rationale for the proposed design.

The zones and reservations nominated for Iluka are shown on the Structure Plan (refer to Figure 1 - Iluka Structure Plan).

PART 1 – IMPLEMENTATION SECTION

1.0 SUBJECT AREA

The Structure Plan area comprises approximately 95ha of land bounded by Burns Beach Road to the west and north, Silver Sands Drive to the south and Naturaliste Boulevard and Delgado Parade to the east (refer to Figure 2 - Location Plan).



2.0 STRUCTURE PLAN ZONES / RESERVATION

The Structure Plan shows the road structure and divides the Structure Plan area into the following:

- Residential Zone
- Commercial Zone
- Parks and Recreation Reservation

3.0 DEFINITIONS

The terms used in this Part of the Structure Plan Report shall be interpreted in accordance with the City of Joondalup District Planning Scheme No. 2.

4.0 THE SCHEME

Unless provided for by specific requirements of this Structure Plan, all requirements shall be in accordance with the provisions of the City of Joondalup District Planning Scheme No. 2.

5.0 RESIDENTIAL ZONE

5.1 Objectives

The objectives for the Residential Zone are:

- To provide for a range of lot sizes to facilitate housing diversity and choice;
- To provide lots which are orientated and dimensioned to suit energy efficient housing;
- To provide lots which optimise coastal views, solar orientation and cooling coastal breezes;
- To arrange lots to front the Parks and Recreation reservations and to properly address street frontages to promote attractive streetscapes and passive surveillance of public spaces;
- To provide for smaller lots around the Centre Zone and the Parks and Recreation reservations;
- To guide building layout and access on laneway lots to enable efficient use of land and protection of neighbourhood amenity;
- To maintain a high level of pedestrian safety, amenity and accessibility.

5.2 Provisions

1. The residential density codes nominated on the Structure Plan (refer to Figure 1 – Iluka Structure Plan) shall apply to future development within the Residential Zone.

2. R20 Lots

Development of all Residential R20 lots shown on the structure plan shall be assessed in accordance with the Residential Design Codes, District Planning Scheme, Council's Policies (except in the case of Building Height in which the Residential Design Codes applies), relevant Local Laws and Building Codes of Australia.

3. R25 Lots

Development of all Residential R25 lots shown on the Structure Plan shall be assessed in accordance with the Residential Design Codes, District Planning

Scheme, Council's Policies (except in the case of Building Height in which the Residential Design Codes applies), relevant Local Laws and Building Codes of Australia, except where they have been varied in the following instances:

- a. A minimum 2.5 metre front setback and an average of 4.5 metres shall be met. An average front setback of 3.0 metres shall be permitted where 50% or more of the garage/carport is recessed into the design of the dwelling, however garage/carports shall be setback a minimum of 4.0 metres regardless.
- b. Rear setback shall be in accordance with the Residential Design Codes.
- c. Laneway access is not permitted.
- d. Development of Residential R25 lots shall have a maximum site coverage of 60% of the total lot.
- e. To encourage solar access and energy efficiency whilst preserving similar solar access to adjoining properties, a zero lot setback onto a side boundary other than a street boundary is encouraged (except where stated for corner lots with a secondary street frontage, refer to 3(i)). The use of a zero setback shall be limited to the western boundary for north/south-orientated lots and the southern boundary for east/west orientated lots. A zero setback to the side boundary is required to be in accordance with acceptable development provision A2 (iii) section 3.3.2 of the Residential Design Codes.
- f. Regardless of whether or not a zero setback has been sought to one of the side boundaries referred to in (e) above a minimum setback of 1.5 metres is required to the opposite side boundary for both ground and upper floors for walls without a major opening. This will be to the eastern boundary for north/south, orientated lots and the northern boundary for east/west, orientated lots. Where major openings are proposed, setbacks are to be in accordance with the Residential Design Codes.

- g. Those lots with the zero lot line on one side boundary shall also have a mandatory 2.0 metre second storey setback when the wall contains no major openings to habitable rooms. This setback is to apply specifically on the south for east/west lots and the west for north/south lots. Where major openings to habitable rooms are proposed setbacks are to be in accordance with the Residential Design Codes.
- h. Maximum building height is to be in accordance with Table 3 'Category B' of the 'Residential Design Codes'. This provision supercedes any Local Planning Policy that relates to Building Height.
- i. For corner lots with two frontages to a street, the secondary street setback is to be in accordance with the Residential Design Codes. To encourage active frontage and surveillance to a secondary street a zero setback may be permitted to up to 50% of the secondary street boundary subject to the following conditions:
 - (a) The part of the building that is located at a zero setback must address the secondary street in a similar manner to that of the primary street;
 - (b) The remaining part of the building is to be setback in accordance with the Residential Design Codes for secondary street;
 - (c) Any fencing proposed to the secondary street boundary is required to be a maximum height of 1.8 metres with the solid component being permitted to a maximum height of 750mm with the remainder being 'permeable fencing' (See City of Joondalup Policy 3.2.6 'Subdivision and Development Adjoining Areas of Public Space' for an example of 'permeable fencing') and
 - (d) The secondary street boundary does not include the corner truncation.
- j. Elements 8 and 9 of the Residential Design Codes, do not apply.

- k. Each Single house is required to provide an enclosed, lockable storage area, constructed in a design and material matching the dwelling, accessible from outside the dwelling, with a minimum internal dimension of 1.5m with an internal area of at least 4m². Storerooms are permitted in garages provided the minimum dimensions and area are achieved.
- l. Where no fence is proposed along the front boundary, side fencing must not exceed a height of 1 metre within the front setback area. Where front fencing is proposed the side fencing within the front setback area is required to be of the same height (not to exceed 1.0m), same style and same materials as the front boundary fence.
- m. Fencing forward of the front building line is not encouraged, however where it is proposed permeable fencing or solid fencing or a combination of the two will be permitted to a maximum height of 1.0 metre.
- n. Should an application not be in accordance with the development provisions provided in this section, consultation with adjoining or other landowners and the submission of a development application is required.

4. R30 Lots

Land use permissibility and general provisions shall be the same as those within the Residential zone under the Scheme unless otherwise specified in this Structure Plan.

Development of all Residential R30 lots shown on the Structure Plan shall be assessed in accordance with the Residential Design Codes, District Planning Scheme, Council's Policies (except in the case of Building Height in which the Residential Design Codes applies), relevant Local Laws and Building Codes of Australia, except where they have been varied in the following instances:

- a. The development of all residential lots with rear laneway access shall satisfy a minimum 1.5-metre front setback and an average of 3.0 metres.

- b. The development of lots without laneway access shall satisfy a minimum 2.5-metre front setback and an average of 4.5 metres. An average front setback of 3m shall be permitted where 50% or more of the garage is recessed into the design of the dwelling. A minimum 4m setback shall apply to all garages/carports.
- c. Rear setback (excluding garages/carports for lots with rear laneways) shall be in accordance with the Residential Design Codes.
- d. Garages and carports on laneway lots shall provide a 1.5 metre minimum rear setback. A 1.5 metre side offset is required for garage/carport openings to the boundary for site truncation to enable improved vehicle access.
- e. To encourage solar access and energy efficiency whilst preserving similar solar access to adjoining properties, a zero lot setback onto a side boundary other than a street boundary is encouraged (except where stated for corner lots with a secondary street frontage, refer to 4(k)). The use of a zero setback shall be limited to the western boundary for north/south-orientated lots and the southern boundary for east/west orientated lots. A zero setback to the side boundary is required to be in accordance with acceptable development provision A2 (iii) section 3.3.2 of the Residential Design Codes.
- f. Those lots with the zero lot line on one side boundary shall also have a mandatory 2.0 metre second storey setback when the wall contains no major openings to habitable rooms. This setback is to apply specifically on the south for east/west lots and west for north/south lots. Where major openings to habitable rooms are proposed setbacks are to be in accordance with the Residential Design Codes.
- g. Regardless of whether or not a zero setback has been sought to one of the side boundaries referred to in (e) above a minimum

setback of 1.5 metres is required to the opposite side boundary for both ground and upper floors for walls without major openings to habitable rooms. This will be to the eastern boundary for north/south, orientated lots and the northern boundary for east/west, orientated lots. Where major openings are proposed setbacks are to be in accordance with the Residential Design Codes.

- h. Development of Residential R30 lots shall have maximum site coverage of 60% of the total lot.
- i. Rear garages/carports are mandatory for all laneway allotments.
- j. Maximum building height is to be in accordance with Table 3 'Category B' of the 'Residential Design Codes'. This provision supercedes any Local Planning Policy that relates to Building Height.
- k. For corner lots with two frontages to a street, the secondary street setback is to be in accordance with the Residential Design Codes. To encourage active frontage and surveillance to a secondary street a zero setback may be permitted to up to 50% of the secondary street boundary subject to the following conditions:
 - (a) The part of the building that is located at a zero setback must address the secondary street in a similar manner to that of the primary street;
 - (b) The remaining part of the building is to be setback in accordance with the Residential Design Codes for secondary street;
 - (c) Any fencing proposed to the secondary street boundary is required to be a maximum height of 1.8 meters with the solid component being permitted to a maximum height of 750mm with the remainder being 'permeable fencing' (see City of Joondalup Policy 3.2.6 'Subdivision and Development Adjoining Areas of Public Space' for an example of 'permeable fencing') and
 - (d) The secondary street boundary does not include the corner

truncation.

- l. Elements 8 and 9 of the Residential Design Codes, do not apply.
- m. All developments are required to provide an enclosed, lockable storage area, constructed in a design and material matching the dwelling, accessible from outside the dwelling, with a minimum internal dimension of 1.5m with an internal area of at least 4m² per dwelling. Storerooms are permitted in garages provided the minimum dimensions and area are achieved.
- n. Where no fence is proposed along the front boundary, side fencing must not exceed a height of 1 metre within the front setback area. Where front fencing is proposed the side fencing within the front setback area is required to be of the same height (not to exceed 1.0m), same style and same materials as the front boundary fence.
- o. Fencing forward of the front building line is not encouraged, however where it is proposed permeable fencing or solid fencing or a combination of the two will be permitted to a maximum height of 1.0 metre.
- p. Should an application not be in accordance with the development provisions provided in this section, consultation with adjoining or other landowners and the submission of a development application is required.

6.0 COMMERCIAL ZONE

6.1 Objectives

The objectives for the Commercial zoning classification/Local centre are those contained in the City of Joondalup District Planning Scheme No.2 for the Commercial Zone, together with the following objectives:

- To provide efficient and safe access arrangements with pedestrian/cycle priority;
- To promote buildings with active street frontages, which properly address the street and public spaces;
- To encourage high standards of built form and streetscape;
- To ensure that development is not detrimental to the amenity of adjoining owners or residential properties in the locality; and,
- To ensure any commercial uses are reflective of the local scale of the centre, primarily serving the needs of the local community.

6.2 Development Provisions

- 6.2.1. No subdivision or other development shall commence or be carried out on land within the Commercial Zone until a Local Development Plan has been prepared and adopted on that land in accordance with the requirements of the City of Joondalup District Planning Scheme No. 2 for this area.
- 6.2.2. The approved Local Development Plan shall address the following:
- i. Measures to ensure the built form adjacent to O'Mara Boulevard provides an activated street frontage, passive/active surveillance and encourages pedestrian movement;
 - ii. Measures to ensure the ground floor of building/s fronting O'Mara Boulevard include non-residential land uses;
 - iii. Distribution of non-residential floor space (size-location) over each land parcel fronting O'Mara Boulevard;
 - iv. Consolidated vehicle access points to ensure minimum disturbance with surrounding uses and availability of on-street parking, and
 - v. maximum building height (3 storeys).
- 6.2.3. A Minimum allowance for 1,500sqm of non-residential floorspace generally fronting O'Mara Boulevard shall be provided on land within the Commercial Zone, with non-residential uses to frame both sides of the road reserve to create a 'main-street' pedestrian environment.
- 6.2.4. A maximum building height restriction of three storeys shall apply for all development within the Commercial Zone.

- 6.2.5. An R80 density coding shall apply to residential development within the Commercial zone.
Development to be consistent with the controls specified by 'SPP 7.3 Residential Design Codes Guidance for multiple dwelling and mixed use developments (Apartment Design)' with respect to the R80 coding, with nil side setbacks applying;
- 6.2.6. Residential Development within the Commercial Zone shall comply with the relevant provisions of the Residential Design Codes and Building Code of Australia.
- 6.2.7. For all non-residential land uses, parking shall be provided on-site at a ratio of 1 bay per 20 sqm of net lettable floor area.
- 6.2.8. Notwithstanding the land use permissibility for the Commercial zone under the City's District Planning Scheme No.2, the following uses are considered incompatible with the local centre and the amenity of the surrounding locality as they are unlikely to meet the relevant objectives of clause 6.1 and therefore are not contemplated within the local centre:
- i. Liquor Store – Large;
 - ii. Night Club;
 - iii. Restricted Premises;
 - iv. Tavern;
 - v. Vehicle Sales/Hire Premises; and
 - vi. Veterinary Hospital.

7.0 PARKS AND RECREATION RESERVES

The areas depicted on the Structure Plan as local “Parks and Recreation” reserves shall be ceded free of cost to the Crown by the developer of the Structure Plan area and vested in the City of Joondalup in accordance with the WAPC’s Urban Development Policy 2.3. Use and development of this land shall comply with the provisions applicable to “Parks and Recreation” reserved land under the City of Joondalup District Planning Scheme no. 2.

PART 2 – EXPLANATORY REPORT

1.0 INTRODUCTION

1.1 Background

Development of Iluka is managed by Beaumaris Land Sales on behalf of The Roman Catholic Archbishop of Perth and Davidson Pty Ltd. Iluka forms part of the Beaumaris Estate and is located approximately 28 kilometres north west of the Perth Central Business District (CBD) and 3.5 kilometres west of the Joondalup City Centre (refer to Figure 2 - Location Plan). The site comprises an area of approximately 95ha and is projected to yield approximately 900 allotments, catering for an estimated population of 2300 persons.

An earlier Structure Plan was prepared for Iluka by Feilman Planning Consultant Pty Ltd in 1992. This Structure Plan formed the basis for a submission to the then City of Wanneroo seeking approval to rezone the site from 'Rural' to 'Residential', 'Commercial', 'Civic' and 'Service Station' (Amendment No. 641). Scheme Amendment No. 641 and the former Structure Plan were not formally endorsed by the City of Wanneroo due to a number of outstanding issues associated with a legal agreement. Accordingly, the site remained zoned 'Rural' under the preceding City of Joondalup Town Planning Scheme No. 1 (TPS No. 1).

TPS No. 1 was superseded by Town Planning Scheme No. 2 (TPS No. 2) in November 2000. Under TPS No. 2 the subject land is zoned 'Urban Development'. A provision is included within this Scheme requiring a Structure Plan to be prepared for land zoned 'Urban Development' before subdivision or development can commence.

In order to progress the required Structure Plan, a project team was commissioned comprising the following members:

Roberts Day Group	Town Planners
Sharni Howe Architects	Architect
Cossill and Webley	Civil Engineers
Riley Consulting	Traffic Engineers
ATA Environmental	Environmental Consultants
McMullen Nolan & Partners	Licensed Surveyors
McNally Newton Landscape Architects	Landscape Architects

In preparing the Structure Plan a number of investigations were carried out by the project team including environmental, engineering and traffic assessments.

Collation of information from these investigations has enabled clear identification of the opportunities and constraints presented by the site and provided a logical framework for the delineation of future land uses and the structure of the proposed design. The Structure Plan also responds to the Western Australian Planning Commission's (WAPC) Liveable Neighbourhoods and is lodged for assessment under this code.

This report provides complete details of results from the investigative process and the rationale behind the land use mix and design proposed by the Structure Plan. It also responds to the Liveable Neighbourhoods and the City of Joondalup District Planning Scheme requirements for the preparation of local structure plans. Aspects of the Structure Plan relative to the subdivision design may be changed at the subdivision application and/or detailed design stages.

1.2 Project Objectives

The overriding vision for Iluka is to create a quality residential estate, incorporating the most recent design and environmental initiatives, while recognising the unique opportunities presented by the site in the building of a future community. With this vision in mind, the following project objectives were developed to guide the development of the Iluka Structure Plan:

- Promote the development of a premier coastal community with its own clear identity and sense of place, using the coastal location and natural undulating topography of the site as key foundations;
- Design a neighbourhood which promotes the building of a 'real' local community, including a strong emphasis on a mixed-use local centre;
- Provide opportunities for a mix of uses to promote vibrant and dynamic spaces and to generate local employment activity;
- Provide efficient, safe, convenient and fully integrated transport networks for pedestrians, cyclists, public transport and motorists;
- Provide public open spaces (POS) that are well distributed, designed and managed to provide choice of recreational opportunities for all members of the community;
- Promote residential development which optimises coastal views, solar orientation and cooling coastal breezes;
- Provide a diversity of lots for a wide range of quality housing and a diverse community; and
- Incorporate the main elements of traditional planning principles into the Structure Plan to promote a place for quality living, recreating and working.

2.0 SITE CHARACTERISTICS

2.1 Location

Iluka is situated near the coast within the City of Joondalup, approximately 28 kilometres north-west of the Perth CBD. The site is bounded by Burns Beach Road to the west and north, Silver Sands Drive to the south and Naturaliste Boulevard and Delgado Parade to the east (refer to Figure 2 - Location Plan).

The site is located within Swan Location 1370 and includes Pt Lot M1722, contained within Certificate of Title Volume 2098, Folio 1000 and Pt Lot M1722, contained within Certificate of Title Volume 1975, Folio 725.

2.2 Land Use

The site is vacant and partially cleared of natural vegetation as a result of the overall earthworks program for the site. Uncleared portions are mostly covered with coastal heath.

2.3 Landform & Soils

The site is located within the Spearwood Dune System, which is characterised by low hilly to undulating terrain. The Quindalup Dune System, which usually occupies the near coastal zone within the coastal strip of the Perth metropolitan region, is absent within this location. This Quindalup system does however occur adjacent to the beach, north of the Burns Beach Caravan Park and to the south of the site.

The coastal area east of the beach consists of bare limestone and shallow brown sandy soils over limestone (McArthur & Bartle, 1980). Inland of this, particularly within the southern section, the site comprises Karrakatta sand characterised by grey-brown sand over yellow sand, generally with limestone within two metres. Further east and interspersed with the Karrakatta sand in places, limestone is again exposed or covered with a shallow layer of sand.

The site has varied relief with a central ridge which dissects the site from north to south and which slopes down towards the coast and Marmion Avenue (refer to Figure 3 – Site Analysis Plan). The land falls towards the coast to a low point of 5 AHD in the south western sector, near the coastal reserve.

The natural relief contributes important landscape character to the site, which underpins the design proposed by the Structure Plan. To preserve this landscape character and optimise the advantages it affords, boulevards will be aligned to offer long distance views to the ocean from the lots developed on the more elevated land.

Based on topographical information for the site, the minimum separation from groundwater is about 4 metres at the lowest point. There are no wetlands or surface expressions of the groundwater within the site or within immediately neighbouring areas.

2.4 Vegetation and Flora

ATA Environmental has coordinated a flora and vegetation survey and fauna habitat assessment of the site. Full details of the findings from this research are provided under Appendix G – Flora and Vegetation Survey and Fauna Habitat Assessment.

The flora and vegetation survey was undertaken by qualified botanists during October and December 2000. Six principle native vegetation associations were recorded from the study area all broadly mapped as the Cottesloe Complex – Central and South. The vegetation comprises areas of heath, which predominantly occur in locations where limestone is at or close to the surface and woodlands consisting primarily of Banksia species over a dense low under storey on deeper sands. All associations with the possible exception of Eucalyptus foecunda Mallee are represented within the conservation and reservation estates (including the nearby Neerabup National Park) and as a consequence are not considered to be of high conservation value.

A total of 111 flora species from 42 families were recorded during the field surveys. This included 17 introduced, non-endemic or invasive species, which were largely restricted to disturbed areas. The native species total comprised one cycad, 29 monocotyledons and 81 dicotyledons. None of the species recorded are listed as a Declared Rare Flora species or on CALM's Priority flora list. Two of the species from the list *Sarcozona bircarinata* and *Hibbertia spicata* have been previously recorded from the vicinity of the study area. Although neither was recorded during this study the timing of the survey was appropriate for identification of both species.

2.5 Fauna

A search of the Department of Conservation and Land Management's (CALM's) database in November 2000 indicated three species that are Specially Protected under provisions of the Wildlife Conservation Act 1950 and one species of Priority taxa are known to occur in the area (Appendix 2). These are:

- Schedule 1 - Rare or likely to become extinct
Short-billed (or Carnaby's) Black-Cockatoo, *Calyptorhynchus latirostris*
- Schedule 4 - Otherwise in need of special protection
Peregrine Falcon, *Falco peregrinus*
Carpet Python, *Morelia spilota imbricata*
- Priority 4 - Taxa in need of monitoring

Southern Brown Bandicoot (or Quenda), *Isoodon obesulus fusciventer*

A fauna habitat assessment involving a one day site inspection occurred in November 2000. All of the fauna species recorded are typical of the location and available habitats. One species of significant fauna, Short-billed (or Carnaby's) Black Cockatoo, *Calyptorhynchus latirostris* (Schedule 1) is known to occur at the site. This species would occur as a seasonal visitor to the area during the non-breeding period. Possible signs of the Southern Brown Bandicoot (Priority 4) were recorded in one location on the site, however the presence of this species has not been confirmed.

Suitable habitats for fauna occurring or expected to occur on the site, including the bandicoot, are protected within existing and proposed reserves to the north and north-east of the site such as Neerabup National Park and the coastal Foreshore Reserve. Continued clearing of bushland for the expansion of the Iluka residential development will result in the removal of habitat. Wherever possible, retention of good quality vegetation should be considered as part of the allocation of Public Open Space (POS) for the subdivision development. In particular, retention of the area of *Eucalyptus foecunda* Mallee near Burns Beach Road should be considered.

3.0 STATUTORY PLANNING FRAMEWORK

3.1 Strategic Planning

The subject site has been identified as a future urban development node in a number of strategic planning studies produced by the WAPC. These studies include, Urban Expansion Policy Statement (November 1990), Metroplan (December 1990) and North West Corridor Structure Plan (March 1992).

3.2 Metropolitan Region Scheme

The Iluka Structure Plan area is zoned 'Urban' under the Metropolitan Region Scheme (MRS). Land to the west of the subject site is reserved 'Parks and Recreation' under the MRS, land to the north is zoned 'Rural' and land east and south is zoned 'Urban'.

3.3 Local Town Planning Scheme

The subject site is zoned Urban Development under the existing City of Joondalup Town Planning Scheme No. 2. The purpose of the Urban Development Zone is to provide for the orderly planning and redevelopment of larger areas of land in an integrated manner within a regional context whilst retaining flexibility to review planning with changing circumstances.

To achieve this outcome, the Scheme requires that an Agreed Structure Plan be prepared and endorsed before subdivision and/or development proceeds and for subdivision and development to be carried out in conformity with the Agreed Structure Plan.

4.0 CONTEXT ANALYSIS

A Context Analysis Plan has been prepared to locate Iluka within its broader metropolitan context and to demonstrate the site's relationship with surrounding developed and natural areas, including planned and committed development for adjacent sites.

Iluka is situated approximately 28 kilometres north west of the Perth CBD and 3.5 kilometres west of the Joondalup City Centre. Iluka is a coastal site, abutting a MRS 'Parks and Recreation' coastal reserve on its western boundary.

The Context Analysis Plan shows that, with the exception of the Burns area to the north, the Iluka Structure Plan area is encircled by developed residential estates based on conventional residential subdivision design. Kinross is located to the north east, Currambine to the east and Ocean Reef to the south. Areas within the southern and eastern sectors of Iluka are also developed and a small residential settlement exists at Burns Beach to the north-west.

The Burns area to the north of Iluka is the subject of a MRS Amendment to zone the land 'Urban'. The Amendment is yet to be finalised due to a number of environmental issues. To support the initiation of the proposed MRS Amendment, a Structure Plan was prepared for the Burns area (refer to Figure 4 - Context Analysis Plan). This Structure Plan, having no formal status other than that it supported the initiation of the MRS Amendment, is expected to be subjected to further revisions and refinements.

The most direct connecting roads to Joondalup from Iluka are Shenton Avenue and to a lesser extent Moore Drive and the most direct route to the Perth CBD is via Marmion Avenue and the Mitchell Freeway. Vehicular access from Iluka to the coast is via Ocean Parade and a series of trails within the coastal reserve provide for controlled pedestrian access. The existing bike paths and bus route locations available to Iluka are depicted on the Context Analysis plan. The nearest train station is at Currambine, approximately two kilometres east of Iluka.

Originally, the Iluka Structure Plan predicted that a market would exist for up to 3,300sqm of retail floorspace within the Village Centre, with the exact amount of floor space to be determined at a later date. Following a prolonged and detailed market investigation, including several attempts at tenant procurement, in addition to urban design considerations for potential scenarios, it has been established that a figure of 1,500sqm of non-residential floorspace is both desirable and achievable. Key considerations pertinent to the non-residential floorspace include:

- The urban design outcome necessary to accommodate the originally planned 3,300sqm of retail floorspace, would likely result in a traditional 'big box' internalized shopping centre with a large at-grade car park surrounding.
- This urban design outcome would represent a poor result for residents within the Iluka community, particularly considering vistas toward the lower lying Village Centre sites.

- Since original planning of the Village Centre was conducted, the nearby Currambine Central Centre has expanded to include a range of civic services and retail/commercial floorspace. This has impacted on the ability for the Iluka Village Centre to attract a commercial operator for a major retail tenant.
- Demand for retail and local entertainment experiences has evolved since the inception of original planning for the estate, with options now desired to be accessible and welcoming to local pedestrians and cyclists, not just motorists that have the ability to park nearest the entry.
- Equally, local residents have expressed a desire for the centre to be a 'local' destination, rather than attract large amounts of regional traffic.
- The market has matured since original planning for the Village Centre was conducted, with an identified demand for apartment living in the area that was not always anticipated.
- This identified market segment represents an opportunity to:
 - Improve the possible urban design outcomes for the Village Centre, by substantially increasing the likelihood of non-residential land uses being delivered below appropriately scaled apartment development – creating a true form of 'mixed-use' development.
 - Increase the likelihood for basement level car parking to be provided, and/or built form framing the street to screen unsightly large expanses of at-grade parking areas.
 - Provide dwelling stock that responds to the City's Housing Strategy, and provides a diverse form of housing that appeals to a broad range of demographics.

The intent is to create a mixed use Coastal Village located within comfortable walking distance of all residents. This Village will function as a local centre for local residents and is expected to comprise a minimum of 1,500 sqm of street activating non-residential floor space fronting O'Mara Boulevard and 1,000m² for community use located on the northern side of O'Mara Boulevard (or otherwise provided as a contribution to benefit local residents). The exact amount of floor space dedicated to retail and community use will be determined, as part of the more detailed local development plan that will be required for this area before development can proceed.

Joondalup is the nearest Strategic Regional Centre to Iluka, providing a full range of shopping, office, administrative, social, entertainment, recreation and community services. Joondalup will continue to grow and will provide an important service and employment centre for Iluka residents. Other centres such as Currambine Central already serve the Iluka community.

The nearest primary schools to Iluka are Beaumaris Primary School and St Simon Peter Catholic Primary School to the south, Currambine Catholic Primary School to the east and Kinross Primary School to the north-east. The Education Department of Western Australia has advised that Iluka is within the public school catchment for Beaumaris Primary School. The school catchment areas for

Iluka Structure Plan

the Joondalup Education District could however change should a new primary school be developed within the Burns area to the north of Iluka as is currently proposed in the Structure Plan proposed for this area.

The nearest high schools to Iluka are both to the south within Ocean Reef, being Ocean Reef Senior High School and Prendiville Catholic College. A new school accommodating years 6 – 10 is proposed for Kinross, which may service the northern sector of Iluka.

The Edith Cowan University and TAFE Joondalup campuses provide the nearest tertiary education facilities for future Iluka residents.

Notable recreational resources available to Iluka include extensive coastal reserve, the Joondalup Golf Course to the south-west, Ocean Reef Boat Harbour to the south, the Joondalup Arena to the east and Neerabup National Park to the north-east.

The existing lakes parkland area, which is contained within the south-eastern sector of the Iluka Structure Plan area, is developed with a system of pathways and attractive lakes within a landscaped setting. This area is suited mostly to passive forms of recreation. The other two main parklands proposed for Iluka are of sufficient size and are of regular shape to be developed to meet the needs of the initial community and to be modified as community needs change over time.

5.0 DESIGN PHILOSOPHY

5.1 Traditional Planning Principles

Neighbourhoods designed and developed in accordance with traditional town planning principles provide the framework for the creation of integrated and sustainable communities. The design proposed for Iluka incorporates traditional planning principles which promote community development and diversity (refer to Figure 1 - Structure Plan). The principles adopted are:

- An accessible, vibrant and identifiable local village centre, providing a select amount of street activating non-residential mixed uses and alternative housing options for local residents;
- A built environment which can accommodate a compatible mix of land uses – housing, shops, work places, parks and civic facilities;
- Land use mix, development densities and interconnecting street patterns which make walking, cycling and public transit viable alternatives to driving;
- Priority given to public spaces and the location of public buildings;
- Housing choices for diverse residential communities – i.e. different age groups, economic levels, cultural backgrounds etc;
- A sense of community and place;
- Strong links with other neighbourhoods, district/regional centres and outside attractions; and
- Ability to accommodate modern society – i.e. advances in telecommunications / technology and changing living / working patterns and transport needs.

The key principles espoused by the proposed design are discussed in further detail below.

5.2 Coastal Village

A mixed use community and commercial Coastal Village is proposed adjacent to the coastal reserve, within comfortable walking distance of all residents. This village will be delivered in the form of a mixed use, beach-side, main-street node, complementary but smaller in size to nearby developments such as Sorento, Hillarys and Mindarie. The Village intends to provide a diverse range of alternative housing options and a mix of street activating non-residential land uses; providing convenient facilities, services and employment opportunities for local residents and attractions for visitors. It is expected that the day-to-day commercial viability for the street activating non-residential land uses fronting O'Mara Boulevard will be primarily from local customers, both within the Village Centre itself and the Iluka community.

Located at the western end of O'Mara Boulevard, the main east-west route into the Estate, the Coastal Village will have a strong visual presence for visitors and local residents and will become a significant landmark for the Estate. The Village will comprise multi-storey buildings of up to three storeys with landmark qualities. These buildings would mark the termination of the vista for O'Mara Boulevard and provide a key interest along Burns Beach Road. POS will be developed immediately south of the Village, providing a complementary Village Green and an important recreation and meeting space for the local community and visitors.

The Village design will be based upon 'Main Street' principles, with buildings having active street frontages along O'Mara Boulevard. The Village will also be designed to provide a strong sense of place which is closely linked with its coastal setting.

It is proposed for a residential density of R80 and a building height restriction of three storeys to apply to development within the Coastal Village. A strong residential presence within this area will promote the vitality of the centre and viability of businesses.

As noted in Part 1 of this structure plan, a Local Development Plan/s for the Coastal Village (Commercial Zone) will need to be approved by Council before development within this area can proceed. The Local Development Plan will be required to address, activation of O'Mara Boulevard, built form controls, height limits, and car parking and vehicular access requirements. This requirement will give Council the control needed to ensure future development within the Village is of a high standard and compatible with development within the Estate and its coastal location. The Village will function as a Local Centre and is expected to comprise approximately 1,500m² of street activating non-residential floor space fronting O'Mara Boulevard, and 1,000m² for community use to be located to the northern side of O'Mara Boulevard (or otherwise provided as a contribution to benefit local residents).

5.3 Residential Neighbourhood

5.3.1 Lot Orientation

Residential lots will be oriented to maximise the benefits of solar orientation, cooling coastal breezes and where applicable, views of the ocean and surveillance of POS areas (refer to Figure 3 - Site Analysis).

The street block layout will accommodate north-south and east-west oriented lots. The dwellings designed for these lots will be able to benefit from solar access, incorporating north and east facing habitable room windows and outdoor living areas. Section 5.2 sets out provisions for all residential laneway lots. This includes the smaller residential lots that will be developed within the Estate for which the opportunities for capturing solar access are more limited. The provisions will, among other matters, be required to address solar orientation and solar setbacks.

The interconnected road pattern proposed for the Estate will afford strong physical and visual links between the residential areas and the Coastal Village, the foreshore reserve and local parks.

5.3.2 Residential Densities and Design

A range of residential densities are proposed to facilitate a diversity of housing types and to meet the requirements of people with different housing needs.

In terms of yield, it is projected that the Structure Plan area will produce approximately 900 lots. It is proposed for approximately 80 per cent of this yield to be coded R20 and the remaining 20 per cent to be coded R30. Residential land within the R20 coded areas will include some lots with areas above the average lot size permissible under the R20 coding. These larger lots will enable a proportion of larger homes to be developed within the Estate.

Applying the metropolitan average housing hold size of 2.6 persons (ABS 1996), the Structure Plan area is expected to cater for an estimated population of 2300 persons.

The higher density, R30 residential precincts will generally frame parkland areas, the Coastal Village and O'Mara Boulevard leading into the Village. Within these locations, the limited private areas available to the smaller lot sizes can be offset by proximity to open space or the public areas associated with the Coastal Village.

Rear laneways are proposed for lots fronting POS areas to provide vehicular access to garages at the rear of lots and reduce vehicular traffic on the frontage streets. Coupled with reduced setbacks, the laneway lots will encourage greater community interaction on frontage streets and dwelling designs which effectively address the street.

Along the ridgeline, lower density development is proposed to accommodate the larger homes built to optimise premium coastal views. These lots will all have east-west orientations to maximize coastal views and will be serviced by rear laneways to ensure the houses properly address the street frontage. The laneways will also enable direct access to the upper level of the dwellings.

The design and standard of residential development will generally be controlled by the Residential Planning Codes and Covenants. Site specific building provisions, as set out in section 5.2, will be prepared for the smaller lot precincts where additional development controls are required to ensure buildings function effectively for prospective owners and contribute to attractive and unified streetscapes. These provisions will also be used for the larger lots with rear laneways to guide building layout, design and access and ensure dwellings are oriented to have surveillance over the street frontage and rear laneways.

5.4 Public Open Space and Community Facilities

Two well defined neighbourhood parks and one district park are proposed. As shown in Figure 5 – Public Open Space Plan, most dwellings will be within 400 metres of a neighbourhood or district park as required by Liveable Neighbourhoods. The interconnected street pattern will ensure convenient pedestrian and cycle access to these parks. Residential lots will be oriented to overlook each of the spaces; promoting good opportunities for passive surveillance and an attractive outlook for residents. Streets leading to the parkland areas will also benefit from the attractive vistas afforded by these spaces.

The largest park will be the existing district lakes parkland area, comprising an area of approximately 6.13ha (includes lakes) within the south-eastern sector of the Estate. This POS area will be used primarily for passive recreation and will serve an important drainage function. The two neighbourhood parks will be located in the lower lying areas to the south and north of the Coastal Village, where coastal views are unavailable. Being of a substantial size and of regular shape, these open spaces will have the flexibility to be adaptable to changing community needs. The neighbourhood park to the south will have a drainage function.

In addition to these neighbourhood parks, boardwalks and pavilions will provide controlled community access to the adjacent coastal reservation. Well defined east – west links within the Estate will provide direct access to this important community space and resource.

POS will be provided in accordance with the WAPC's Liveable Neighbourhoods wherein there is provision for a 2 per cent discount on the normal 10 per cent POS requirement. This provision is subject to compliance with the following:

- Element 1- Community Design Objectives of Liveable Neighbourhoods having been satisfied to achieve the desired urban structure, lot layout and parkland distribution.
- Any local parks having the support of the local government and both neighbourhood and local parks being constructed in accordance with an approved landscaping and management plan to the satisfaction of the local government.
- Any regional open space or foreshore reserve being provided in accordance with Clauses 3.2 and 3.3 of the WAPC's policy DC 2.3.

With respect to the first of the above points, the Structure Plan and this accompanying report effectively demonstrate compliance with the Community Design objectives outlined under Element 1 of Liveable Neighbourhoods. With regard to the second point, a Parkland Agreement is provided under Appendix A which provides an undertaking to the City of Joondalup that development of the POS areas within the Structure Plan area will be carried out in accordance with an approved landscaping and management plan to the satisfaction of the City. These plans are currently being progressed and will be lodged with the City prior to subdivision. With regard the last point of the above points, the regional coastal reserve complies with the WAPC's Policy DC 2.3.

During March 1999, the City of Joondalup considered and confirmed the accuracy of the POS Schedule that was prepared for the whole of the Beaumaris Estate (refer to Appendix B - Letter from City of Joondalup dated 8 March 1999 and Beaumaris Estate POS Schedule). This Schedule had shown a 5,000m² surplus of POS for the Beaumaris Estate.

Iluka Structure Plan

Since this Schedule was prepared, the Structure Plan for the undeveloped area of Iluka has been modified. The implications of these changes for POS provision are as follows:

- i) The 'Commercial' (1.61ha) and 'Service Station' (0.15ha) sites, which equate to a POS deduction of 1.76ha for the 'Iluka Village Precinct', do not apply under the revised Structure Plan. These commercial components have been replaced by the Centre Zone which equates to a 2.18ha POS deduction;
- ii) The lakes POS area within the 'Iluka Village Precinct' of the former Structure Plan comprised a total area of 5.43ha (drainage deducted). Under the revised Structure Plan this POS area is proposed to comprise 4.13ha (drainage deducted);
- iii) The former Structure Plan proposed a single POS area within the 'Balance Residential Area' comprising 1.77ha. The revised Structure Plan replaces this area with a POS area within the north western sector and a second area within the south western sector. Together these areas will provide 1.57ha of POS (drainage deducted).

The revised POS schedule for Iluka, which allows for the above variations, is provided, together with the original figures, in the table below:

Description	Former POS Calculations for Iluka	Revised POS Calculation for Iluka
Gross Area	207.19ha	207.19ha
Total Deductions	7.64ha (incl. drainage)	5.17ha (excl. drainage)
Net Subdivisible Area	199.55ha	202.02ha (92.82 ha = Structure Plan Area 109.20 ha = remainder of Iluka)
POS Required	19.95ha (10% requirement)	8% of 92.82ha = 7.4256ha 10% of 109.02ha = 10.902ha Total = 18.3276
Drainage Areas		2.89ha
Drainage Credit	N/A	1.44ha (50% credit)
POS Provided	20.86ha	20.80ha (incl. drainage credit)
Surplus POS	0.91ha	2.47ha

It is evident from the above table that allowing for deductions for non-residential land uses (eg. Coastal Village, road widening, drainage) the revised Structure Plan for Iluka results in a POS surplus of 2.47ha above the 8% and 10% contribution requirement applicable to Iluka.

5.5 Interconnected Street Pattern

The Structure Plan proposes a highly interconnected street pattern which will offer choice so as to reduce excessive flows on any individual route and will provide good connectivity between Iluka and adjoining neighbourhoods.

The street layout has been deliberately configured to preserve long distance views of the ocean and foreshore conservation reserve and to provide direct pedestrian/cycle access between the residential areas and the Coastal Village, coastal reserve and POS areas. Fundamental to the road structure is the central, main east-west O'Mara Boulevard between Naturaliste Boulevard and the coast.

It will provide a strategic link between the two primary Estate attractions; the existing lakes parkland area and the Coastal Village. Traversing the central saddle, O'Mara Boulevard will also afford motorists, pedestrians and cyclists extensive coastal views and enables the Coastal Village to be centrally located to the Estate (refer to Figure 3 - Site Analysis).

O'Mara Boulevard will be designed and landscaped to contrast strongly with local streets so as to effectively distinguish 'civic' from 'neighbourhood' streets and provide legible and convenient access to the Coastal Village for residents of nearby Estates and other visitors. Street blocks with a north-south orientation will lead into the Boulevard, ensuring convenient pedestrian/cycle access to the Coastal Village for local residents and enabling dwellings to be oriented to capture optimal coastal views.

In addition to the central boulevard, an east-west link will be provided within the northern sector of the Estate. This link will provide direct access to the northern neighbourhood park, to the coastal reserve and to the Burns Beach coastal village. Importantly, this link will also provide the Burns Beach community with convenient access to the Iluka Estate and its associated facilities. Motorists will be denied uninterrupted vehicle access along this route to ensure priority is given to pedestrian/cycle movement.

Traffic management measures will be incorporated into the street system to maintain a high level of safety and amenity within the residential precincts and the Coastal Village.

5.6 Pedestrian / Cycle Network / Public Transport

The Iluka development has been planned to provide for convenient east-west connections between residential development, the village centre, the beach and foreshore reserve and the existing Iluka community.

The modified grid street pattern, incorporating frequent junctures and direct linkages to key attractions and facilities, will encourage local pedestrian and cycle movement throughout Iluka. To promote safe and efficient movement, dual use paths will be provided on the main connecting routes. The proposed road reserve widths will be of sufficient width to accommodate footpaths in accordance with the requirements of Liveable Neighbourhoods.

The Department of Transport (DOT) has been consulted about future bus services to Iluka. The DOT has advised that two routes will service Iluka; feeding residents and visitors between Iluka and the Joondalup railway station. From the Joondalup railway station, passengers will have direct access to the Perth CBD and other metropolitan centres.

The proposed bus routes are submitted in the Traffic Assessment Report included under Appendix C. Details of the pedestrian/cycle routes that are proposed to service the Structure Plan area are shown on the Traffic Management and Pedestrian/Cycle Network Plan submitted under Appendix D.

5.7 Landscape Works and Streetscape Treatments

Details of the landscape works and streetscape enhancement projects that are proposed to be implemented as part of the development of the Structure Plan area are submitted in the landscaping and streetscape enhancement report prepared by McNally Newton Landscape Architects under Appendix E.

6.0 ENVIRONMENTAL CONSIDERATIONS

Development of the site in accordance with the Structure Plan will involve the removal of existing vegetation and habitats. The area is not identified in the draft Perth's Bushplan (1998) as supporting regionally significant bushland.

The vegetation complex occurring on the site is represented within the nearby areas that are presently afforded protection or recommended for retention in Perth's Bushplan. A total of 36% of the complex remains within the Perth Metropolitan Region with over 15% currently protected (WAPC, 1998). Implementation of the draft Perth's Bushplan would result in a total of 19% of the original extent of this vegetation complex being retained in the Perth Metropolitan Region, which is well above the target applied in Perth's Bushplan of 10% being protected.

The Iluka Structure Plan area lies adjacent to large areas supporting regionally significant vegetation that are presently protected or proposed for protection in Perth's Bushplan. This includes the wide coastal foreshore reserve fronting the development area, Burns Beach bushland immediately to the north, Neerabup National Park to the north-east and the link between Burns Beach and Neerabup National Park. These areas will preserve representative areas of vegetation, flora and habitat for fauna in the local area.

The bushland at Iluka is therefore considered of local significance only. Pockets of vegetation will be retained within areas of POS, and where feasible, linkage will be maintained between the POS areas and the neighbouring foreshore area.

There are no natural drainage features or wetlands within the Structure Plan area. The drainage design will incorporate features to facilitate removal of pollutants to minimise potential impacts on groundwater quality.

The Structure Plan has been designed to take account of the natural landscape of the site and retain the character of the site as much as feasible in the context of residential development.

A Foreshore Management Plan (FMP) for the Foreshore Reserve was prepared in 1991 and updated in 1993. Provision of controlled access from the development will be essential to ensure the long term protection of the adjoining coastal foreshore area. Opportunities for access points from the residential areas to the coast are shown on the Structure Plan. Details of proposed access points from the Structure Plan area to the coastal reserve, facilities within the foreshore reserve, and any proposed modification to the previous FMP will be provided at a later date as planning proceeds, and will be subject to approval from relevant agencies. No development is to intrude into the foreshore reserve.

7.0 ENGINEERING SERVICES AND INFRASTRUCTURE

An Engineering Services Report and Drainage Management Plan Report have been prepared by Cossill and Webley. These reports appear in Appendix F and provide details of the following engineering servicing and infrastructure requirements for servicing future urban development of the Structure Plan area:

- the provision of reticulated water supply and sewerage disposal;
- the provision of public utility services i.e.: underground electricity supply, telephone and natural gas supplies;
- drainage management strategy; and
- earth working strategy.

8.0 TRAFFIC

A detailed traffic assessment was prepared by Riley Consulting. Full details of the findings from the assessment and recommendations for traffic management are detailed in the Traffic Assessment Report provided under Appendix C.

Details of proposed treatments for intersections are shown in the Traffic Management and Pedestrian/Cycle Network Plan submitted under Appendix D.

In relation to the local centre, it is expected there will be high levels of walking and cycling to local facilities. For any non-residential land uses fronting O'Mara Boulevard, parking shall generally be provided at a ratio of 1 bay per 20 sqm of net lettable area. This parking ratio is typical of major shopping centres with significantly higher traffic demands and thus is considered reasonable. blanket A consistent parking ratio will assist the centre in maintaining tenants by allowing change of uses to occur easily without being constrained by parking, ensuring longevity of the centre for the benefit of local residents. The provision of on-street parking surrounding the local village sites will also assist in enhancing the viability of tenants, and may be viewed as contributing toward the site's overall parking requirements (for visitors of both residential and non-residential land uses). Reciprocal parking is to be encouraged for non-conflicting land uses in the village centre, to reduce the burden of parking and associated access on the efficient use of land.

9.0 STAGING

It is proposed for the development to be staged generally adopting a frontal approach to development, with releases developed and timed to respond to market demand and other identified objectives.

The Village Centre will be among the last land to be developed, once the surrounding catchment is mature.

10.0 CONCLUSION

The future urban development of Iluka forms a natural extension of the residential development that has occurred in recent years to the south, east and north-west and which is proposed for the land to the north. This pressure for urban development within this locality and the appropriateness of this form of development for the subject site is acknowledged by the 'Urban' zoning applicable to the site under the MRS.

The proposed Structure Plan provides a comprehensive planning framework for the future development of the site. A design approach has been adopted which incorporates traditional planning principles and which is consistent with the WAPC's Liveable Neighbourhoods, including diversity of lot sizes, an interconnected street pattern, mixed land uses and development focused around an accessible neighbourhood centre and prominent neighbourhood parks. The design also responds to local site conditions, particularly in terms of optimising coastal views, and maintaining a strong relationship with the coastal reservation and surrounding existing residential estates.

The subject site is zoned Urban Development in the City of Joondalup TPS No. 2. Under the Scheme, a Structure Plan is required to be approved for this zone before development or subdivision can proceed. To progress development of the site in accordance with the proposed Structure Plan, the City of Joondalup and WAPC's early consideration and adoption of the proposed Iluka Structure Plan is therefore sought.

R E F E R E N C E S

Alan Tingay & Associates (1991). **Beaumaris Foreshore Management Plan**. Prepared for Satterley Real Estate/Beaumaris Land Sales.

Alan Tingay & Associates (1999a). **Pt Lot 2 Burns Beach Flora and Vegetation Survey**. Prepared for Burns Management Pty Ltd.

Alan Tingay & Associates (1999b). **Pt Lot 2 Burns Beach Vertebrate Fauna**. Prepared for Burns Management Pty Ltd.

McArthur W.M. & Bartle G.A. (1980) **Landforms and Soils as an Aid to Urban Planning in the Perth Metropolitan Northwest Corridor, Western Australia**; Land Resources Management Series No. 5. CSIRO, Australia.

Water & Rivers Commission (1997). **Perth Groundwater Atlas**. Perth, Western Australia.

Western Australian Planning Commission (1998). **Perth's Bushplan (Draft)**. Western Australian Planning Commission, Perth, Western Australia.

Western Australian Planning Commission (2000). **Liveable Neighbourhoods**. Western Australian Planning Commission, Perth, Western Australia.

ILUKA PARKLAND MANAGEMENT PLAN

1. The Management Plan includes the two neighbourhood parks (public open space areas) included within the endorsed Iluka Structure Plan.
2. Prior to development of these parks, Beaumaris Land Sales shall submit to the City of Joondalup a detailed landscaping and reticulation plan for approval.
3. Beaumaris Land Sales undertake to develop the parks in accordance with the landscaping and reticulation plan approved by the City of Joondalup.
4. Beaumaris Land Sales shall maintain and be responsible for the parks for two consecutive summers commencing from the practical completion of the works.
5. An inspection shall occur just prior to the date for the handover of maintenance responsibilities to the City of Joondalup to enable City of Joondalup Officers the opportunity to assess the condition of the respective parks and for any outstanding matters to be addressed prior to handover to the City.

BEAUMARIS LAND SALES

.....

Signature

.....

Date

CITY OF JOONDALUP

.....

Signature

.....

Date

APPENDIX B
LETTER – CITY OF JOONDALUP 8 MARCH 1999
BEAUMARIS ESTATE POS SCHEDULE

City of
Joondalup

ADMINISTRATION CENTRE
60AS AVENUE
JOONDALUP
WESTERN AUSTRALIA 6007

TELEPHONE: (08) 9400 4000
FACSIMILE: (08) 9300 1393

DATE: 8 March 1999

YOUR REF:

ENQUIRIES: T F Dawson
Development Management Services

OUR REF: 01498J

Mrs Silja Dry
Development Planning Strategies
PO Box 8088
SUBIACO WA 6008

Dear Mrs Dry

PUBLIC OPEN SPACE SCHEDULE - BEAUMARIS ESTATE

I refer to the above and your facsimile memorandum of 15 January 1999 and advise as follows.

I confirm that the Public Open Space (POS) schedule provided by you for Beaumaris Estate consisting of localities Iluka, Currambine, Connolly and Ocean Reef is correct and that there is an overprovision of 5000m². However, the City does not support reducing the 2.0 hectare POS within the District Centre at Currambine by this amount in view of the agreement between the City and Roman Catholic Archbishop of Perth and Davidson Pty Ltd dated 14 July 1995 which requires a provision of 2.0 hectare POS within the District Centre. It is suggested that any POS offset be examined as part of more detailed considerations for future subdivisions at Iluka.

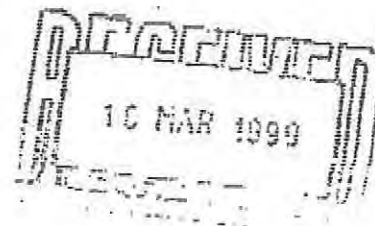
Yours sincerely


R. ZAGWOCKI

Manager, Development Management Services

TD:jc

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All Communications to be addressed to the Chief Executive Officer POST OFFICE BOX 71 JOONDALUP WESTERN AUSTRALIA 6007

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BEAUMARIS

ILUKA / CURRAMBINE / OCEAN REEF / CONNOLLY

PUBLIC OPEN SPACE SCHEDULE

January 1999

ILUKA

PRECINCT/ STAGE	GROSS SUBDIVISIBLE AREA (HA)	DEDUCTION (HA)	PLAN REF ID	NET SUBDIVISIBLE AREA (HA)	POS PROVIDED (HA)	PLAN REF ID
1A	11.3820	Pump Station 0.0809 Padmount/Bore 0.0035 Road Widening 0.0874	11 12 13	11.2102	0.3169	118
1B	7.3884			7.3884	0.6774	119
2	9.9738	Padmount 0.0025	14	9.9713	0.7070	120
3A	5.0203	Padmount 0.0015	15	5.0188	0	
3B	7.4842	Padmount 0.0029	16	7.4813	0	
4A	5.1421			5.1421	0	
4B	5.7474			5.7474	0	
4C	3.247			3.247	0	
5A	14.8927	Padmount 0.0034	17, 18	14.8893	2.6346	121
5B	1.5378			1.5378	0	
6	8.2449	Road Widening 0.6737	19	7.5712	0.9179	122
7	11.2704	Road Widening 0.5801	110	10.6903	0	
10	11.5335			11.5335	0	
12	4.2055	Padmount 0.0024	1	4.2031	0	
Iluka Village	13.5227	Retail 1.6108 Service Station 0.1535 Drainage Lakes 1.1262	111 112 113	10.6322	5.4325	123
Burns Beach Road	2.1651	0.6055	114	1.5596	0	
District Open Space	8.406	0		8.406	8.406	124
Drainage Sump	0.4326	0.4326	115	0	0	
Balance Residential Area	71.5972	Drainage (Central Lake) 0.87 Drainage (Lake-Dress Circle) 0.89 Burns Beach Road Widening 0.5194	116 117 126	69.3178	1.77	125
Roman Catholic Site	4.0	0		4.0	0	
TOTAL	207.1936	7.6463		199.5473	20.8623	
GROSS AREA:						207.1936 HA
TOTAL DEDUCTIONS:						7.6463 HA
NET SUBDIVISIBLE AREA:						199.5473 HA
POS REQUIRED (10% OF NET SUBDIVISIBLE AREA):						19.95473 HA
POS SUPPLIED:						20.8623 HA
SURPLUS OF POS:						0.9076 HA

CONNOLLY

PRECINCT/ STAGE	GROSS SUBDIVISIBLE AREA (HA)	DEDUCTION (HA)	PLAN REF ID	NET SUBDIVISIBLE AREA (HA)	POS PROVIDED (HA)	PLAN REF ID
Stage 3	7.8230	Drainage 0.3310	C01	7.4920	0.4893	C02
Stage 4	6.3215			6.3215	0	
Stage 5	20.1816			20.1816	2.9612	C03
TOTAL	34.3261	0.3310		33.9951	3.4505	
GROSS AREA						34.3261
TOTAL DEDUCTIONS						0.331
NET SUBDIVISIBLE AREA						33.9951
10% POS REQUIRED:						3.3995 HA
POS PROVIDED:						3.4505 HA
POS SURPLUS:						0.051 HA

SUMMARY

ILUKA	
GROSS AREA	207.1936 HA
TOTAL DEDUCTIONS	7.6463 HA
NET SUBDIVISIBLE AREA	199.5473 HA
POS REQUIRED:	19.95473 HA
POS SUPPLIED:	20.8623 HA
SURPLUS OF POS:	0.9076 HA
CURRAMBINE	
GROSS AREA:	147.8599 HA
TOTAL DEDUCTIONS:	25.4466 HA
NET SUBDIVISIBLE AREA:	122.4133 HA
10% POS REQUIRED:	12.2413 HA
POS PROVIDED:	10.6545 HA
SHORTFALL:	1.5868 HA
OCEAN REEF	
GROSS AREA:	161.4549 HA
TOTAL DEDUCTIONS:	28.2149 HA
NET SUBDIVISIBLE AREA:	133.24 HA
10% POS REQUIRED:	13.324 HA
POS PROVIDED:	14.4573 HA
SURPLUS:	1.1333 HA
CONNOLLY	
GROSS AREA:	34.3261 HA
TOTAL DEDUCTIONS:	0.331 HA
NET SUBDIVISIBLE AREA:	33.9951 HA
10% POS REQUIRED:	3.3995 HA
POS PROVIDED:	3.4505 HA
POS SURPLUS:	0.051 HA
OVERALL ESTATE POS PROVISION	
GROSS AREA:	550.8345 HA
TOTAL DEDUCTIONS:	61.6388 HA
NET SUBDIVISIBLE AREA	489.1957 HA
10% POS REQUIRED:	48.9196 HA
POS PROVIDED:	49.4246 HA
TOTAL POS SURPLUS:	0.505 HA

BEAUMARIS LAND SALES

ILUKA STRUCTURE PLAN

TRAFFIC REPORT

February 2001
(amended January 2002)



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6. PEDESTRIANS, CYCLISTS AND BUSES

1.0 EXECUTIVE SUMMARY

Beaumaris Land Sales has commissioned Riley Consulting to review the traffic and transportation aspects of the structure plan application for Iluka.

This report considers:

- Future traffic flows within the site generated by the proposed land uses
- Access to the regional highway network
- Suggested road hierarchy
- Pedestrian and cyclist movement
- Bus movement to and through the site

Sinclair Knight Buchanan prepared a structure plan report for Beaumaris Estates in November 1992. The traffic distribution data used in this report has been based on the 1992 report. The City of Joondalup and Ministry for Planning concur with the changes made to the previous assumptions.

The development is indicated to consist of:

- 932 residential lots
- 3,500m² commercial land use
- Community Centre

The analysis undertaken in this report indicates the following:

Predicted traffic volumes on the majority of streets are less than 1,000 vehicles per day. The majority of streets will be designated as Access Streets.

Neighbourhood Connectors are the suggested classification of the following streets:

- Delgado Parade
- O'Mara Boulevard
- Naturaliste Boulevard

Daily traffic volumes on Burns Beach Road may reach 10,550 vehicles if land to the north of Iluka (Burns Beach) is developed. The traffic forecasts also include for 9% of future traffic on Marmion Avenue, north of Burns Beach Road, to use the coastal route to access destinations to the south.

It is suggested that Burns Beach Road, although indicated as a district distributor type B, will operate as a neighbourhood connector. A wide 2 lane or 4-lane carriageway may encourage higher speeds, which would be inappropriate through a residential area. Burns Beach Road adjacent to the foreshore has been approved to be constructed as a meandering boulevard. It is recommended therefore, that the remainder of Burns Beach Road be constructed as a boulevard, with localised widening on the approach to Marmion Avenue to achieve adequate capacity at the traffic signals. This road cross-section would compliment the existing cross-section of Shenton Avenue through Iluka.

2.0 TRAFFIC GENERATION

The Iluka development at Iluka proposes a mixture of residential and local commercial uses. The residential will comprise R20 and R30 density and would commonly have slightly different trip generation rates.

Discussions with the City of Joondalup have indicated that a single residential trip rate of 9 trips per dwelling per day should be used. It is considered that this rate will result in a higher overall trip generation for the development.

A plan provided by Roberts Day planning consultants (BEA SUB) indicates the following land uses:

- 932 residential lots
- 3,500m² local centre
- Community Centre

Residential Traffic Generation

The residential trip generation has been discussed with the City of Joondalup and the Ministry for Planning. It was agreed with both authorities that a trip rate of 9 trips per lot would reflect the potential traffic movements expected from Iluka.

Reference to the Director General of Transport South Australia, *Land Use Traffic Generation Guidelines* indicates that the trip rate of residential dwellings changes with their density. Higher density dwellings generally have slightly lower generation rates, typically in the order of 6 to 7 trips per dwelling per day. The Iluka site will contain an element of higher density units, predominantly based around the local centre and public open space. These dwellings will reduce the overall trip generation rate of the development site.

To provide a robust assessment and to satisfy the requirements of the City of Joondalup, a trip generation rate of 9 trips per lot per day has been applied. This will result in a slightly higher level of traffic than may result from the development site.

The development plan indicates in the order of 932 residential units within the application site. On the basis of 9 trips per day the following trips could be expected:

$$932 \text{ lots} \times 9 \text{ trips per lot} = 8,388 \text{ trips per day}$$

Based on the 1986 Travel Survey, Perth Metropolitan Area, Table 2.1 indicates the composition of the generated trips.

Table 2.1 Composition of Residential Trips

Purpose of trips*	% of Total
Home Based Work	27%
Home Based Education	5%
Home Based Other	34%
Home Based Evening	20%
Non-Home Based	14%

*refer page 6 for explanation of trips.

For ease of distribution the above figures have been combined to provide:

- Home Based Trips 81%
- Education Trips 5%
- Non-Home Based Trips 14%

Local Centre Traffic Generation

Iluka is currently well served by retail facilities at the Currambine district centre, to the east of Marmion Avenue. The main attraction to the proposed coastal village centre would be drawn from the existing residential land uses in Iluka and the proposed residential development (ie the proposed structure plan area).

Reference to the New South Wales Road Traffic Agency *Guide to Traffic Generating Developments* suggests that the trip generation of commercial centres less than 10,000m² is in the order of 120 trips per 100m². On the basis of 3,500m² of commercial use in the local centre the following trips would be expected:

Commercial land use 3,500m² / 100 x 120 trips = 4,200 trips per day

The daily traffic generation of the local centre is likely to reflect the worst case as the potential for walking trips is significantly increased with the local centre when compared to Currambine district centre.

Community Centre

The development plan indicates a 1,000m² community centre located adjacent to the proposed coastal village. The traffic generation of this facility is not expected to be high and will vary from day to day. No account of the trips associated with this centre is included within this report, as a typical daily attraction will not exist.

3.0 TRAFFIC DISTRIBUTION

To provide a comparative base, the distribution of the Iluka development traffic is based upon the original structure plan report (SKB 1992). The assumptions used in the 1992 report are reproduced below.

Home Based Trips

- 10% locally within the area
- 10% to district shopping centre
- 30% to destinations south of Iluka (Perth City etc)
- 40% east to Joondalup
- 10% north to Alkimos etc

Home based trips comprise of trips to work, visiting friends, going shopping and travelling to entertainment facilities. It is suggested that a greater attraction will exist to Perth, Whitfords and locations to the south than to Joondalup. It is suggested that an attraction of 40% to Perth and the south and 30% to Joondalup and the east would be more realistic. Discussions held with the City of Joondalup and the Ministry for Planning indicates that these authorities concur with this view.

Non-Home Based Trips

- 20% locally within the area
- 30% to destinations south of Iluka (Perth city etc)
- 30% east to Joondalup
- 10% north to Alkimos
- 10% east to district centre

Non-home based trips comprise of deliveries and other trips not originating from the residential lots. It is odd therefore that 20% of these trips are associated to local land uses. It suggests that there are interactive movements between the residential lots that are of a business nature. This is an unlikely situation. It is suggested that the distribution be changed to reflect 50% of trips originating in Perth and areas to the south (such as Whitfords, Osborne Park etc) and 5% from the local and district centres.

Table 3.1 indicates the distribution assumptions used for Iluka.

Table 3.1 Iluka Distribution (non-education trips)

Origin / Destination	Home Based	Non Home Based
South and Perth	40%	50%
East and Joondalup	30%	30%
North	10%	10%
Local Centre	10%	5%
District Centre	10%	5%
Totals	100%	100%

The change to non-home based trips will generally increase the overall impact of the development upon the surrounding highway network.

Education Trips

The education trips consist of primary, secondary and tertiary based education. The predominant car use will be to primary schools as children frequently are dropped off and picked up. The original structure plan report considered a 50/50 split between the primary and other education trips. There is no reason to change this assumption.

There are several primary schools within a 5-minute drive of Iluka:

- Currambine Catholic Primary less than 1 km due east
- Kinross Primary approximately 1.5 km due north east
- Beaumaris Primary approximately 1.5 km due south

The distribution of the education trips are indicated in Table 3.2.

Table 3.2 Distribution of Education Trips

School	Distribution
Currambine Catholic Primary	10%
Kinross Primary	20%
Beaumaris Primary	20%
Kinross Secondary (due 2002)	20%
Prendiville Catholic College / Ocean Reef Senior High	20%
Edith Cowan University	10%

Applying the Generated Traffic to the Highway Network

The generated traffic has been distributed onto the surrounding highway network as indicated in Table 3.1 and 3.2.

Trips distributed to the south have 3 alternative route choices:

- Mitchell Freeway
- Marmion Avenue
- West Coast Highway / coastal route.

To provide a realistic distribution of trips onto the highway network it has been assumed that southbound traffic will be attracted to each of the above routes in proportion to the traffic volumes. To achieve the percentage split, a comparison of traffic flows on these links has been made in Table 3.3.

Table 3.3 Southbound Traffic Proportions

	Coastal route	Marmion Avenue	Mitchell Freeway
1996 Traffic Count	6,490 vpd	22,530 vpd	46,110 vpd
% of total traffic	8.6%	29.9%	61.5%
Assume	9%	30%	61%

Traffic to the east has been assigned to Joondalup townsite 20%, Wanneroo area 5% and Gnangara area 5%.

The assumptions outlined above have been used to distribute the generated traffic onto the local highway network. A simple time and distance method has been used as this will provide the most likely demand patterns within the site. Speed / flow relationships are considered on the main access roads to the site. The resulting flows for the traffic generated by the proposed development are indicated in Figure 3.1. Two flows are provided and reflect the following assumptions:

- Unbracketed flows assume that the Mitchell freeway terminates at Shenton Avenue.
- Bracketed flows assume that the Mitchell Freeway terminates at Burns Beach Road.

Discussions with Main Roads Western Australia indicate that at the present time there is no money allocated for the future extension of the Freeway to Burns Beach Road. Traffic modelling undertaken by MRWA for 2011 shows the Mitchell Freeway terminating at Shenton Avenue.

4.0 EXTERNAL TRAFFIC GENERATION AND EXISTING TRIPS

The traffic flows indicated in Figure 3.1 are trips associated with the Iluka residential development and include trips made by dwellings already built in the area west of Marmion Avenue and north of Shenton Avenue. No account of external traffic flows has been made.

It is not the purpose of this report to provide a detailed analysis of the external traffic situation. However to assist with an understanding of the possible future situation, a rough estimate of the probable distribution of trips is indicated in Table 4.1. The percentages of distribution have been based upon the distribution analysis undertaken for Iluka.

Table 4.1 Overall Distribution of Residential Traffic

Destination	Percentage of Residential Trips
East (Gnangara etc)	5%
North East (Wanneroo etc)	5%
Joondalup	20%
North	9%
South via Freeway	24%
South via Marmion Avenue	12%
South via the Coast	4%
Local Shopping Trips	16%
School trips	5%
Total	100%

Existing Traffic on Burns Beach Road

Burns Beach has a small element of residential dwellings and a restaurant associated with a caravan park. Existing traffic counts indicate that there are in the order of 1,000 trips per day associated with the existing uses. There is no reason to expect this traffic volume to change. When Iluka is developed there will be alternative routes for the existing traffic to access the regional highway network. Traffic from Burns Beach heading south via the coast and accessing the Iluka local centre is likely to be attracted to the proposed foreshore road to the west of Iluka.

Using the general distribution patterns adopted in Table 4.1, the 1,000 trips associated with Burns Beach are reassigned in Figure 4.1

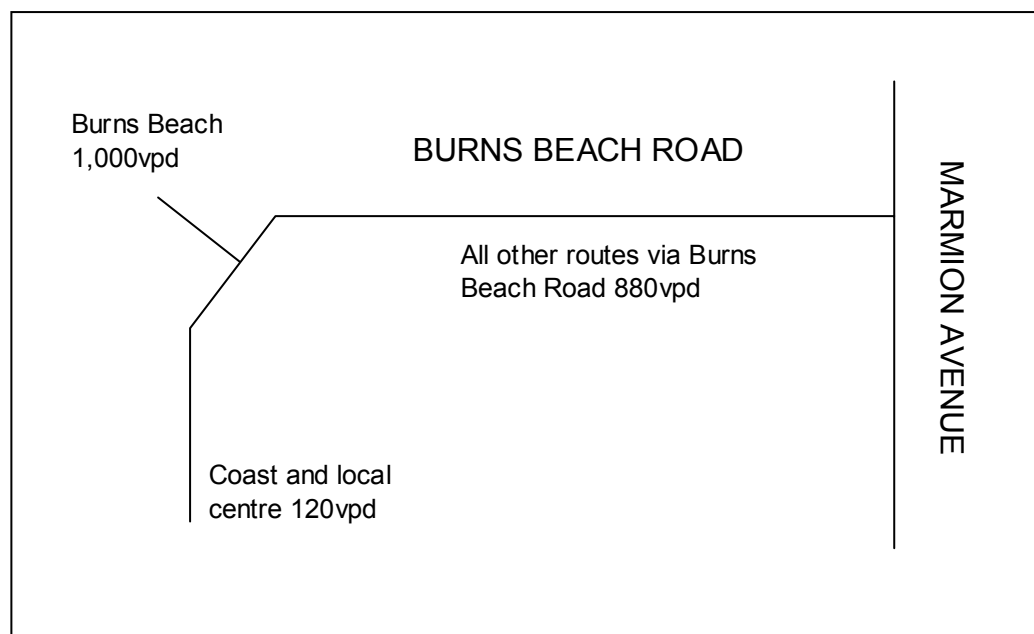


Figure 4.1 Existing Burns Beach Daily Trips Reassigned

Future Development Burns Beach

The land to the north side of Burns Beach Road has been allocated for future residential development. At the time of this report no details of the potential development have been finalised, although an indicative plan by Taylor Burrell planning consultants is available. The plan indicates that the future development could accommodate up to 1,300 lots and a local centre of 5,000m² GLA located adjacent to Marmion Avenue.

Discussions with the City of Joondalup and the Ministry for Planning have indicated that two scenarios for this future development should be considered. It is not proposed to provide an in-depth analysis of the future development, only a rough estimation of the potential trips likely to affect roads adjacent to Iluka.

The two scenarios consider:

- The full development of the site to accommodate 1,300 lots with access to Burns Beach Road and Marmion Avenue.
- Part development of the site to provide approximately 480 lots with access to Burns Beach Road and left-in / left-out access to Marmion Avenue.

An assessment has been made of the plan and it is considered that with full development, approximately 400 lots would favour Burns Beach Road, whilst with part development 480 lots would favour Burns Beach Road. It is noted that full development provides for a full movement intersection with Marmion Avenue. Part development of the site indicates that a left-in/ left-out access to Marmion Avenue would be provided. Using the assumptions on traffic distribution indicated in Table 4.1, the expected traffic flows from the Burns Beach development have been derived. Figure 4.2 indicates the anticipated daily traffic movements for full

development and Figure 4.3 indicates the anticipated traffic movements for part development.

The plans provided for the Burns Beach development indicate a commercial centre could be provided adjacent to Marmion Avenue. It is suggested that this commercial element will service the Burns Beach and Kinross developments and would be unlikely to have a significant impact on Burns Beach Road or Iluka.

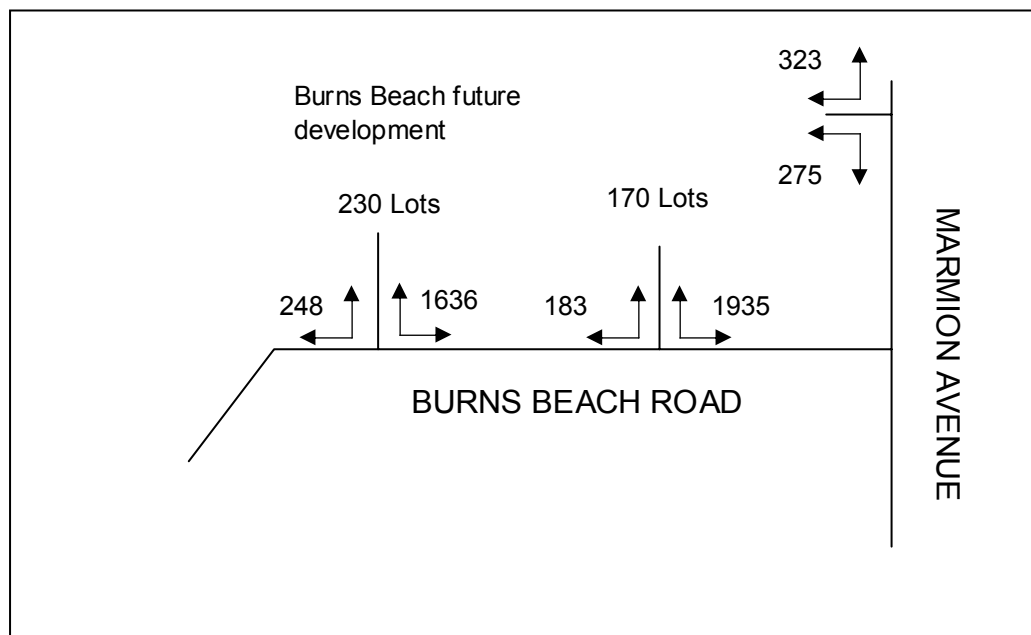


Figure 4.2 Burns Beach Full Development - Daily Traffic Volumes

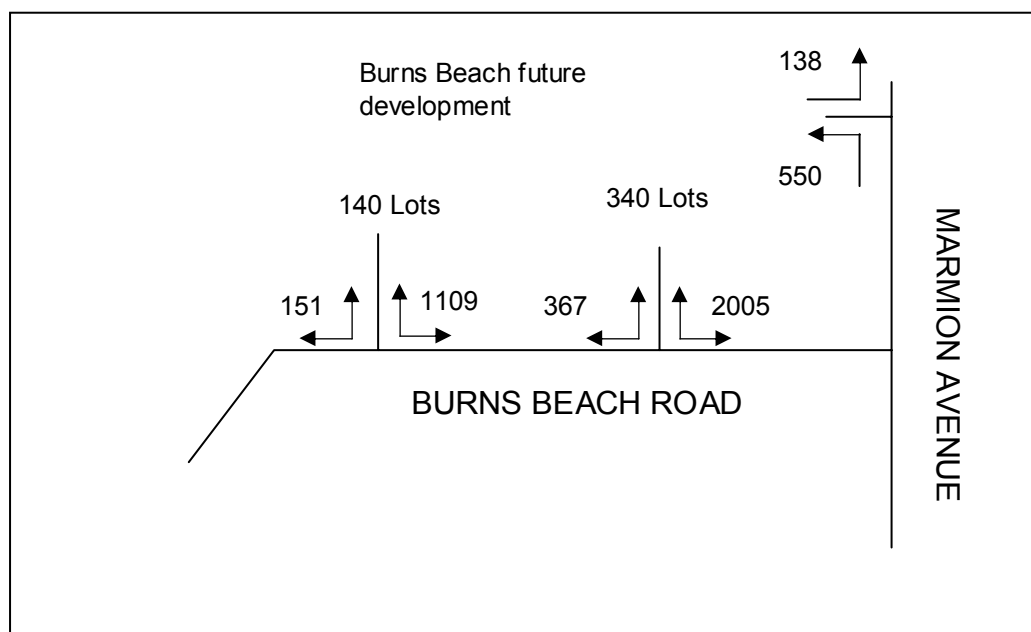


Figure 4.3 Burns Beach Part Development - Daily Traffic Volumes

Traffic from the future development of Burns Beach is unlikely to attract significant movements through Iluka, although some school trips would be expected.

Attraction of Coastal Highway Trips

Burns Beach Road will link through to the coastal foreshore road and Ocean Reef Road. The scenic drive along this route will attract a proportion of through movements. Ocean Reef Road and Burns Beach Road will not provide a high capacity link, such as West Coast Highway and the attraction to this route will, therefore, be reduced. Further, the foreshore road has been designed for a low speed environment.

Reference to Table 3.3 Indicates that the attraction of Oceanside Promenade to the south of Ocean Reef Road is in the order of 7,000 vpd. This traffic flow equates to 9% of the total north-south movements (Oceanside Promenade, Marmion Avenue and Mitchell Freeway 1996). Based on the attraction of Oceanside Promenade being 9% of north-south movements, the expected traffic attraction onto Burns Beach Road could be as shown in Table 4.2.

Table 4.2 Coastal Road Traffic Attraction

Location of Count	Daily Flow	9% Coastal Road
Marmion Avenue daily traffic volume north of Shenton Avenue 1998/99	24,900	2241
Marmion Avenue daily traffic volume north of Burns Beach Road 1998/99	23,460	2111
Marmion Avenue MRWA model daily traffic volume north of Shenton Avenue 2001	27,300	2457
Marmion Avenue MRWA model daily traffic volume north of Burns Beach Road 2001	33,100	2979
Marmion Avenue MRWA model daily traffic volume north of Shenton Avenue 2011	30,300	2727
Marmion Avenue MRWA model daily traffic volume north of Burns Beach Road 2011	42,800	3852*

*The MRWA traffic model for the year 2011 indicates that the attraction to the coastal route is 7.2% of the total north-south movements, which would reduce the predicted attraction in 2011.

For the purpose of this report the highest level of through movements on Burns Beach Road has been assumed.

Impact on Burns Beach Road and the Foreshore Access Road

The future Burns Beach development and the potential through movements result in a significant increase to the traffic volumes expected on Burns Beach Road. Figure 4.4 indicates the predicted maximum levels of daily traffic volume on Burns Beach Road.

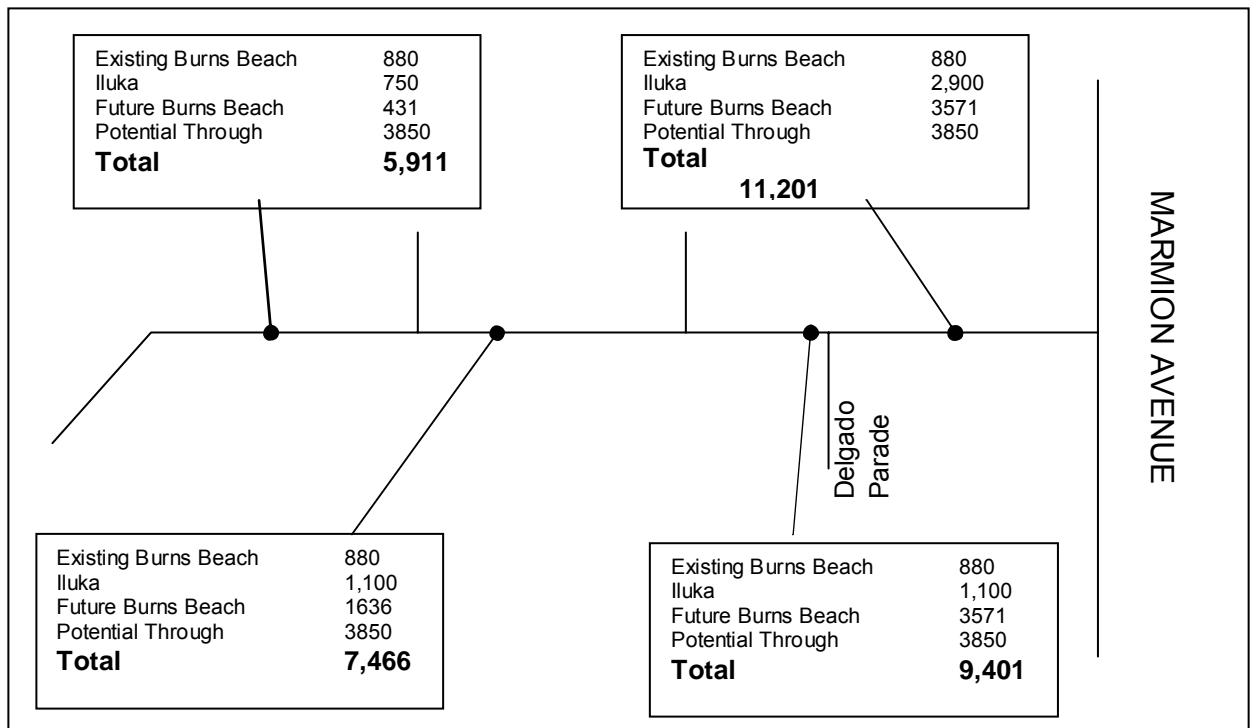


Figure 4.4 Predicted Maximum Daily Traffic Volumes – Burns Beach Road

Figure 4.4 indicates that Burns Beach Road could experience daily traffic volumes of up to 11,200. However, should the future Burns Beach development not proceed then the maximum daily traffic flow would reduce to 7,600 vehicles. At the time when the Mitchell Freeway connects to Burns Beach Road, the daily traffic volume on Burns Beach Road (Marmion Avenue to Delgado Parade) could increase by 1,800 vehicles per day. However, it is likely that the access to the Burns Beach development may distribute more traffic to Marmion Avenue.

The predicted daily traffic volumes on Burns Beach Road assume a very high level of through movements attracted to this route. It is considered that such a high attraction for through movements may not mature as the design of the foreshore road will not provide a high speed route and the views of the coast are restricted at this location. Removing the through movements from Burns Beach Road results in a daily traffic volume of 7,400 vehicles.

The resultant traffic flows on the highway network are indicated in Figure 4.5. The future traffic volumes indicated on roads external to the development site have been taken from the Main Roads 2011 traffic model. The MRWA traffic model includes for the Iluka development and the potential development of Burns Beach to the north.

5.0 ROAD HIERARCHY

The traffic flows indicated in Figure 3.1 have been used to determine the road hierarchy for the Iluka development. The hierarchy is based upon advice contained in *Liveable Neighbourhoods* (Edition 2) and is shown in Figure 5.1.

Table 5.1 reproduces the road designations that are suggested by *Liveable Neighbourhoods*.

Table 5.1 *Liveable Neighbourhoods* Road Hierarchy

Indicative Daily Traffic Flow*	Designation	Street Characteristics
< 300 vpd	Laneway	Laneways may incorporate services and provide rubbish collection areas.
< 1,000 vpd	Access Street	Narrower access streets (5.5 to 6m) may be appropriate in locations further away from centres and activity where traffic flows are less than 1,000 vpd and a low on-street parking demand exists.
1,000 to 3,000 vpd	Access Street	Wider access streets (7 to 7.5m) cater for higher traffic volumes and are located closer to neighbourhood centres.
3,000 to 7,000 vpd	Neighbourhood Connectors	Generally 2-lane undivided. These are 'special' streets and their design needs to have regard to context, function and adjacent land uses.
7,000 to 20,000	District Distributor Type B	Typically will have 1 clear lane of travel in each direction and a parking / manoeuvring lane.
15,000 to 35,000	District Distributor Type A	Typically have service roads and development frontage with ample on-street parking to support a mixture of land uses. Direct vehicle access from adjoining property should be limited where no service roads are provided.
35,000 vpd	Primary Distributor	Typically 4-lane with limited intersections and local connections.
50,000 vpd	Primary Distributor	Typically 6-lane with limited intersections and local connections.

* Function of streets needs to be considered as well as traffic volume.

The following section provides guidance on the suggested hierarchy with regard to reserve and carriageway widths. Comment is also provided on the function of the streets. The cross-sections of the streets will be designed in accordance with *Liveable Neighbourhoods* and advice from the City of Joondalup and Ministry for Planning.

Laneways

Laneways are proposed at Iluka to assist with retaining the existing vegetation on blocks located to the centre of the site (refer to Roberts Day). The width of a laneway can be 3 metres as there is no specific need to pass two vehicles. However, such a width would restrict access to adjacent property. Planning Bulletin No 32 (WAPC) considers the provision of laneways having a width of 5 metres. The layout considered provides an additional 1-metre garage setback to increase the effective width of the laneway. Based on requirements for parking areas, it is preferable to provide a 6 metre wide manoeuvring area for private garages. This can be achieved either as a 6 metre wide lane or a reduced lane width with an appropriate garage setback.

It would appear obvious that a 6 metre laneway is an appropriate construction width. However, a 6 metre lane provides ample room for two cars to pass at speeds greater than 40kph. It is likely that such widths may introduce problems of speeding to the rear of the residential properties and may require traffic management measures to be introduced at a later date. It should also be borne in mind that parking on the laneway is highly likely if local residents and visitors perceive adequate width. To overcome these problems a lane of reduced width is recommended.

Liveable Neighbourhoods provides the following comment on carriageway widths:

- 3.5 metre pavement allows a car to pass a cyclist (or pedestrian) but is clearly too narrow for parking without blocking the street.
- 5.0 - 6.0 metre pavement allows a car to pass a parked car or a moving car.

It is suggested that to retain a very low speed environment and remove the potential for parking, 3.5 metre laneways are considered. 2.5 metre setbacks to residential garages are suggested to ease manoeuvring.

It is recognised that a 3.5 metre width may cause some concern to local authorities. It is suggested therefore that a reserve width of 6 metres be provided and the lane artificially reduced with the introduction of planting boxes or similar feature.

It is suggested that narrow pavements be considered for all laneways by introducing appropriate narrowing treatments. A 6m reserve should be provided.

Access Streets

The Iluka development generally has traffic flows of less than 1,000 vehicles per day and the appropriate treatment would be the use of Access Streets. The target speed for the Access Streets is 40kph. This speed should provide a safer environment for residents and deter use by unnecessary through movements.

Access Streets that provide a more direct route to the local highway network and destinations away from Iluka are suggested to be constructed with a typical carriageway width of 6.5 metres where demand for on-street parking is low. Close

to the local centre a carriageway width of 7.2 metres may be used to assist with on-street parking.

It is suggested that access streets with traffic volumes of less than 1,000 vehicles per day be constructed with a carriageway width of 5.5 metres. The reduced width will provide a sense of restriction for traffic and should assist in keeping speeds at 40 kph.

Intersection treatments between Access Streets should be designed in accordance with the general policies of *Liveable Neighbourhoods*.

Neighbourhood Connectors

Liveable Neighbourhoods provides the following comment on neighbourhood connectors:

Neighbourhood connectors link neighbourhoods and towns, are carefully designed to calm traffic, limit noise and facilitate pedestrian use. They have frequent local street connections. They should not attract substantial long distance through traffic, but provide for safe and convenient local travel to and from arterial routes, usually at signal controlled intersections.

Within Iluka there are 3 roads which perform the function of the neighbourhood connector. These roads are:

- Delgado Parade
- Naturaliste Boulevard
- O'Mara Boulevard

Delgado Parade

Delgado Parade is a north south link between Burns Beach Road and Shenton Avenue. It provides convenient access to the residential development from the district distributor of Shenton Avenue to the local highway network and has traffic flows of 1,000 vpd to slightly over 3,000 vpd. It is proposed to provide bus services along this street and a carriageway width of 7.3 metres would be suitable. Complying with the requirements of *Liveable Neighbourhoods*, the following intersections are indicated for control by roundabouts:

- Silver Sands Drive / Delgado Parade
- O'Mara Boulevard / Delgado Parade

Naturaliste Boulevard

This is an existing road that creates a main link into Iluka. To the east it provides connectivity to Miami Beach Promenade and the regional road system at Marmion Avenue. There are no changes proposed to the existing construction of this street.

O'Mara Boulevard

Linking Naturaliste Boulevard and Delgado Parade to Burns Beach Road, this east-west connection provides the main spine of Iluka linking the existing residential development to the local centre and the beach. Traffic flows are indicated to be less than 5,000 vpd along the length of the street. A boulevard treatment is proposed for

O'Mara Boulevard to provide a high quality, aesthetically pleasing approach to the local centre. A minimum carriageway width of 4.1 metres is suggested to remove any potential for overtaking and retain traffic speeds to a level appropriate to the local environment. Within 200 metres of the local centre the boulevard carriageway can be widened to accommodate on-street parking. It is suggested that the proposed layout be considered with regard to planning requirements. However, with daily volumes indicated to be less than 4,000 vehicles, there is a potential to provide angled parking, or even centre median parking to compliment the environment of the local centre.

Intersections on neighbourhood connectors should be designed in accordance with the general policies of *Liveable Neighbourhoods*.

District Distributor Type B

Liveable Neighbourhoods provides the following comment on District Distributor type B roads:

These routes serve the dual function of carrying traffic efficiently and providing development frontage for adjoining properties. District distributor B routes suit pedestrian-based retail streets, with enough traffic to support the retail, but not needing 4 lanes. Development frontage should be provided in all but exceptional circumstances.

Burns Beach Road

The future traffic volumes on Burns Beach Road may reach 11,200 vehicles per day, should the development of Burns Beach proceed and 9% of north-south movements on Marmion Avenue use the coastal route to reach destinations to the south. These volumes of traffic are indicated in the section of Burns Beach Road from Marmion Avenue to Delgado Parade. This length of Burns Beach Road is in the order of 400 metres. West of Delgado Parade traffic volumes reduce to between 5,000vpd and 9,000vpd (including full development of Burns Beach and 9% of 2011 Marmion Avenue traffic).

Reference to *Liveable Neighbourhoods* may suggest that Burns Beach Road should be classified as a District Distributor Type B as traffic volumes are above 7,000 vehicles per day. However, the route characteristics indicated in *Liveable Neighbourhoods* for district distributors are:

Typically will have at least one clear travel lane in each direction and a parking / manoeuvring lane. On street bike lanes or separate dual use paths are required.

Further, *Liveable Neighbourhoods* states that the function of streets needs to be considered as well as the traffic volume.

There would be no requirement to provide a parking / manoeuvring lane on Burns Beach Road. There are no frontage residential uses and no residential accesses except at appropriate intersections. It is suggested that the function of Burns Beach Road will be to provide for local access to residential development and Burns Beach. An element of traffic will be attracted to the local centre from external

developments, however this is likely to be low as the potential Burns Beach development is indicated to provide 5,000m² of retail adjacent to Marmion Avenue and alternative facilities already exist at Currambine district centre.

Clearly Burns Beach Road will not perform the function of a district distributor and to the west of Delgado Parade volumes are more indicative of a neighbourhood connector.

Adjacent to the foreshore the City of Joondalup has agreed that Burns Beach Road be constructed as a meandering boulevard that will provide a pleasant route in keeping with the foreshore environment. It is strongly suggested that this boulevard treatment be continued through to Ocean Parade.

There is no traffic justification to construct Burns Beach Road to more than a single two-lane carriageway road throughout its length.

Proposed Road Reserves

The following tables provide advice on the road reservation requirements for Iluka. Figure 5.2 shows the local road network and identifies the streets referred to in the following tables. Figure 5.2 also indicates the suggested traffic management of local intersections.

Table 5.2 Reservations for Neighbourhood Connectors

Plan Ref	Width	Flow vpd	Comment
O'Mara Boulevard	25m	3,000 to 4,000	Boulevard treatment to provide focal link to local centre. 2x 4.5m carriageways, 6m median, dual use paths. On-Street parking embayments at suitable locations.
Delgado Parade	20m	3,000 to 4,000	Neighbourhood connector and bus route. 7.3 metre single carriageway + dual; use paths. On-Street parking embayments at suitable locations.
Burns Beach Road South of Ocean Parade	26m excl CAP's	5,000 to 11,000	Continuation of existing boulevard treatment
Burns Beach Road North of Ocean Parade	To be agreed with the city	6,00 to 11,000	Geometry to be agreed with City of Joondalup
Naturaliste Boulevard	Existing	1,000 to 6,700	On-Street parking at suitable locations.

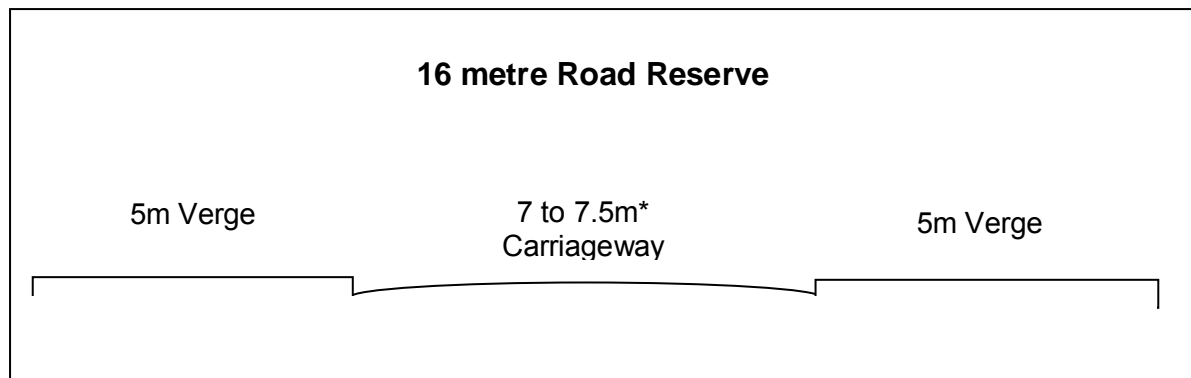
Table 5.3 Road Reservations for Access Streets North of O'Mara Boulevard

Plan Ref	Width	Flow vpd	Comment
A	14m	<200	Typical quiet residential street
B	16	400	Through access to Burns Beach Road
C	14m	<200	Typical quiet residential street
D	16m	700	Through access to Burns Beach Road Major pedestrian route
E	14m	<200	Typical quiet residential street. On-Street parking embayments at suitable locations.
F	14m	<200	Typical quiet residential street
G	14m	<200	Typical quiet residential street
H	16m	200-600	Higher order local area access road
I	14m	<200	Typical quiet residential street
J	16m	<200	Ridge access road, widened reserve for additional landscaping
K	16m	<200	Ridge access road, widened reserve for additional landscaping
L	14m	<200	Typical quiet residential street
M	14m	<200	Access to local highway network
N	14m	<200	Typical quiet residential street
O	14m	<200	Typical quiet residential street. On-Street parking embayments at suitable locations.
P	16m	<200	Higher density may require on-street parking
Q	16m	<200	Access to local centre may require on-street parking
R	14m	<200	Typical quiet residential street
S	16m	1000	Access through to Delgado Parade

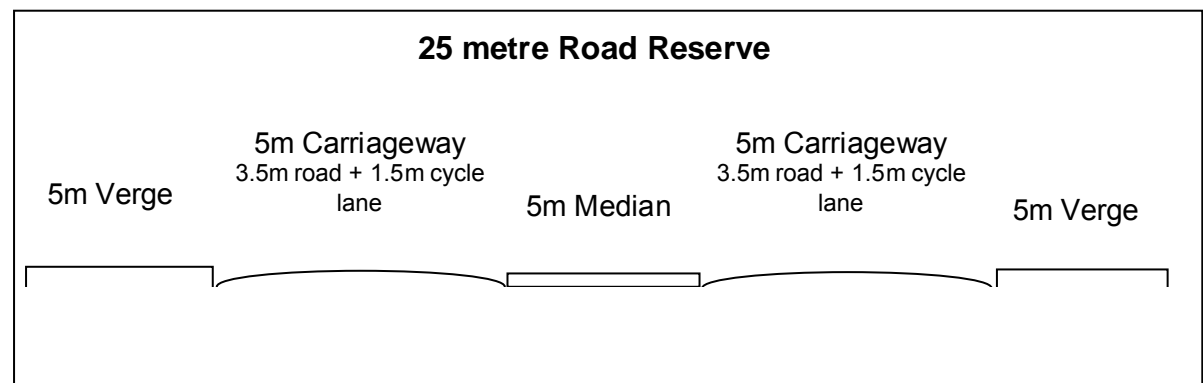
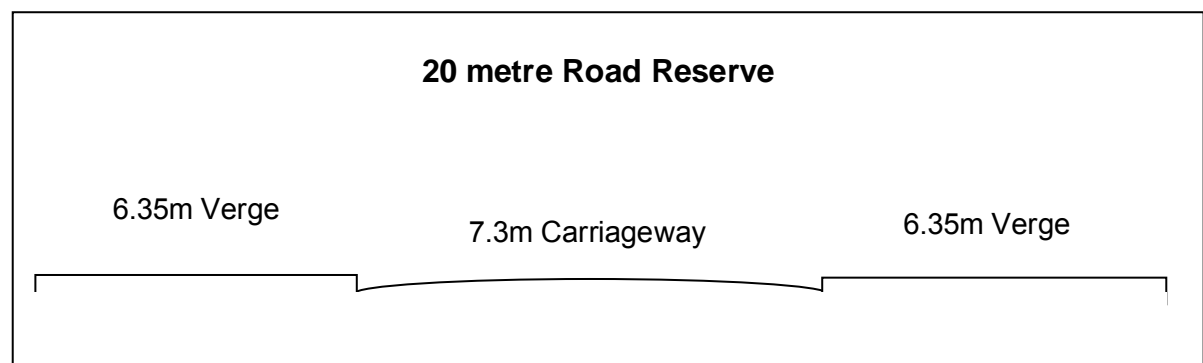
Table 5.4 Road Reservations for Access Streets South of O'Mara Boulevard

Plan Ref	Width	Flow vpd	Comment
AA	14m	<200	Typical quiet residential street on-Street parking embayments at suitable locations.
AB	16m	400	Access to local area centre on-Street parking embayments at suitable locations.
AC	14m	<200	Typical quiet residential street
AD	14m	<200	Typical quiet residential street on-Street parking embayments at suitable locations around POS.
AE	14m	<200	Typical quiet residential street
AF	14m	500	Typical quiet residential street
AG	14m	<200	Typical quiet residential street
AH	16m	800	Access to local highway network
AI	16m	700	Ridge access road, widened reserve for additional landscaping
AJ	16m	<200	Ridge access road, widened reserve for additional landscaping
AK	16m	400	Access to local highway network. On-Street parking embayments at suitable locations.
AL	14m	<200	Typical quiet residential street
AM	14m	<200	Typical quiet residential street
AN	14m	<200	Typical quiet residential street. On-Street parking embayments at suitable locations.
AO	16m	400	Ridge access road, widened reserve for additional landscaping
AP	16m	400	Access to local area centre on-Street parking embayments at suitable locations.

The following page indicates typical cross sections of streets within various reservation widths. These cross sections are indicative of carriageway composition and represent the possible carriageway treatments which may be introduced into the development. These cross sections will be agreed in consultation with the City of Joondalup



* Note: The ridge access road is shown to have a 16m reservation and a 6 metre carriageway to provide greater opportunities for landscaping.



Note:
Cross sections are indicative only.

6.0 PEDESTRIANS, CYCLISTS AND BUSES

The Iluka development has been planned to provide good east-west connections between the proposed residential development, the proposed local centre, the beach and the existing Iluka community.

Pedestrians

The Iluka development is proposed to provide a high degree of connectivity for pedestrians to the local attractions and the beach. High quality links are suggested along many of the Access Streets and a minimum footpath of 2 metres is suggested for streets identified with pedestrian desire paths.

Streets with higher traffic flows should have footpaths of a 2.5 metre standard so that cyclists may be accommodated.

Figure 6.1 indicates the potential pedestrian desire paths between local attractions.

Cyclists

Cycling in Iluka is to be encouraged. A dual use path along the foreshore between Silver Sands Drive and Burns Beach currently exists and is particularly suited to recreational cycling trips. A signed cycle route exists to the south of Iluka and the cycle network will form positive links to this route. Figure 6.2 indicates the cycle routes suggested for the site. It may be noted that between the beach at Burns Beach and the signed cycle route, two routes are identified. The first takes a straight line, being the most convenient route. However the topography of this route would make it suitable for younger and more energetic cyclists. The second route, although slightly longer, utilises the land contours to provide as near a level route as possible.

Bus Routes

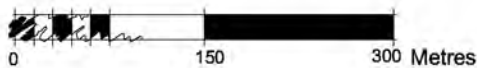
Discussions with Transperth indicate that two bus routes will service the Iluka development. The routes and locations of bus stops are indicated on Figure 6.3.



- LEGEND
- DUAL USE PATHS/CYCLIST FACILITY
 - PEDESTRIAN FOOTPATH
 - ROUNDABOUT (PROPOSED OR EXISTING)
 - STOP/GIVEWAY CONTROL
 - SUBJECT TO FURTHER PLANNING
 - ON-STREET PARKING EMBAYMENTS



TRAFFIC MANAGEMENT & PEDESTRIAN / CYCLE NETWORK PLAN
 ILUKA- CITY OF JOONDALUP
 BEAUMARIS LAND SALES



Client: SATTERLEY
 Scale: 1:6000 at A3
 Drawn: PV
 Checked: JB
 Approved: DC
 Date: 1.7.03
 XREFS:

Size A3
 Dwg. No. BEASTR PLA 05
 Rev A

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BEAUMARIS BEACH ESTATE ILUKA STRUCTURE PLAN - LANDSCAPE COMPONENT

LOCATION

Works shall occur to the nominated planning area covered by the Iluka Structure Plan, refer to Roberts Day Group planning Concept dated 31 July 2000.

The location of proposed landscape works is the area bounded by Silver Sands Drive, Sir James McCusker Park, Burns Beach Road, Delgado Parade and Naturaliste Boulevard and includes minor landscape upgrade works to Sir James McCusker Park.

EXTENT OF WORKS

The Extent of landscape works will encompass betterment and various landscape works to the following areas;

- Ocean Parade POS (approximately one hectare),
- O'Mara POS (approximately 1.4 ha.),
- Streetscape Planting to Boulevards and Distributor Roads,
- Street planting to Residential Roads,
- Low Key Precinct Entry statements,
- Minor works to Sir James McCusker Park,
- Minor works to the Foreshore Reserve,
- Landscape Maintenance.

LANDSCAPE PHILOSOPHY

Beaumaris Beach Estate is an extensive and successful residential subdivision that has been under establishment since 1990. The ongoing and award winning success of the project is due in no small part to the Landscape planning and character that has been undertaken over the last decade. It is Beaumaris Land Sales philosophy to continue this successful past landscaping approach.

This approach shall include continuation of Beaumaris's past and current landscape amenity, incorporating the use of similar planning philosophies, landscape design, use of quality materials, similar levels of detailing and similar planting themes (as detailed following).

It is however proposed that some upgraded elements be included in the new subdivision area in response to a desire to create new and individual residential and commercial precincts. The developers will liaise with Council in this regard.

EXISTING BUSHLAND

Existing Site

The new proposed subdivision area incorporates areas of cleared land, degraded land and low coastal heath bushland. The area is characterised by gently undulating topography and is crisscrossed by a series of vehicular and pedestrian tracks. Small numbers of individual mature native tree specimens currently exist in sparse areas. Refer to the ATA Environmental assessment attached for further detail.

Bush Retention

The retention of existing bushland is considered important where practical and possible as it is viewed as an asset by the developer in minimising planting costs and establishment while maximising visual impact.

As part of this subdivision area the retention of existing areas of suitably established and aesthetic bushland is recommended however, extensive clearing is to be undertaken in response to the lands residential zoning and the predominance of proposed residential lots and engineering requirements within the area.

DRAINAGE

Further to Councils standard engineering requirements the incorporation of storm water drainage within public open space areas is envisaged. The extent of water volume to be incorporated is to be determined by Cossill and Webley Civil Engineers. The incorporation of Councils safety and environmental standards shall be applied in relation to water bodies within public areas.

PUBLIC OPEN SPACE

The current planning design (Roberts Day Group 31 July 2000) indicates two POS areas of approximately one hectare each. The current POS locations correspond to a combination of existing cleared land and coastal heath. Existing POS areas within Beaumaris are characterised by open grass areas, shade planting in native and exotic species and public facilities. All usual Council approval processes will apply in the developing the POS areas.

Ocean Parade POS (1ha)

The mix of informal recreation areas such as walking paths, open grass kick-a-bout areas and seating combined with play facilities has proved successful in catering for a variety of users, this is planned to be continued. A central axis along Ocean Parade aligned with built structures is desirable to provide views and to locate the POS within the local street system.

O'Mara POS (1.4 ha)

Located adjacent the proposed commercial and retail precinct this POS is expected to incorporate a more formal use area in association with the retail use such as lunch, sitting and gathering areas. Pedestrian links to adjoining streets and residential areas and the Beaumaris foreshore path system is envisaged to formalise expected desired access routes. Storm water drainage will be held within this POS area in formal or informal surrounds depending on final water volume quantities.

PUBLIC FACILITIES

Open Grass Areas

Both POS areas will contain open irrigated grass areas suitable for informal active recreation purposes. These are expected to incorporate seating, drinking fountains, and shade tree planting.

Built Structures

Built form is considered appropriate in continuing the estate's colour and detailing schemes, providing shade and panoramic views, formalising recreational use and strengthening axis lines thereby making the planning design more legible. All built structures will undergo Councils approval and building licence processes as required.

Street Furniture and Lighting

Beaumaris currently has a set street furniture theme, which is proposed to be continued into this new estate precinct. In particular locations alteration to colour or detailing may be considered to emphasise new precinct characters. All street furniture and lighting selected shall be of quality materials and construction. Councils' approval process will be incorporated in selection or individual construction. Lighting is proposed to be similar to the existing Beaumaris style.

Bollards

The use of bollards will be installed subject to Council approval.

Footpaths

The incorporation of standard dual use and pedestrian paths is proposed. The path system shall link to adjoining residential areas and streets. Paths traversing the POS areas via built structures and features are envisaged. Paths may be of concrete or asphalt construction.

STREETSCAPES

Entries

Beaumaris currently has locational signage at various Entry points along its frontage. The use of smaller precinct locational signage within the new sub-divisional area is currently being considered. This signage will consist of solid and long lived materials to be designed and located in accordance with Councils approval processes including building licenses as required. Entries may also incorporate feature planting.

Medians

Currently planned median locations occur on main access and distributor roads within the current plan. It is proposed that the medians be a strong landscape feature to assist in the presentation, image and legibility of the estate area by defining main access ways.

Planting is proposed to consist of larger tree species and turf or groundcover material. Tree species and spacing will pay due regard to all sight line requirements and safety issues. All planting will be issued to Council for the usual approval process.

Verges

Verge planting is proposed to be minimal. Street tree planting has occurred successfully throughout Beaumaris this is planned to continue. The developer reserves the right to install street trees either before or after house construction based on past best success rate.

FORESHORE RESERVE

Generally

The current sub-division area fronts the existing Foreshore Reserve area swimming beaches and coastline. The Foreshore Reserve is considered attractive to future residents and is expected to be utilised accordingly. As such the installation of basic public facilities aimed at providing security and formalising access is proposed to best retain the bushland in its best state.

Path Access

The installation of basic and direct footpath access to the existing Foreshore path system with associated re-vegetation is necessary in preventing the establishment of sand tracks due to the influx of new residents. New informal tracks will cause erosion and damage to bushland species and the sites stability. At grade and elevated boardwalks are being considered and are consistent with the original Iluka foreshore Management Plan.

Boardwalks or simple structures that provide lookout vantagepoints over the Reserve and local beach areas are being considered subject to Council approval.

Re-vegetation

As part of the sub-division construction process the interface between the Foreshore Reserve and the sub-division will undergo re-vegetation to disturbed areas to provide a solid and stable interface to reduce weed invasion. During construction of paths and structures re-vegetation will be undertaken to present a stable edge to any disturbed areas.

Signage

The incorporation of interpretive signage to the Foreshore Reserve to highlight species, describe the ecosystem or provide location is under consideration and may be proposed by the developer to Councils approval.

SIR JAMES McCUSKER PARK UPGRADE

The current sub-division design directly fronts onto Sir James McCusker Park, landscape upgrade works are proposed for the Park to manage this interface. The works may consist of clearing of portions of existing bushland for residential lots as previously proposed and approved. Landscape works will include restoration of interface edges between cleared areas proposed to be future residential and the existing park in order to best maintain the parks current appeal. No disturbance to the existing built public facilities, lake or path system is proposed. A final design will be forwarded to Council for approval.

PLANT SPECIES

Bushland

In locations where proposed sub-divisional works abut existing coastal heath bushland that is to be retained such as the Foreshore Reserve, re-vegetation is proposed to be undertaken. All re-vegetation shall incorporate local species in accordance with those currently found on the site. All works shall occur to best industry standards and undergo Council approval prior to works.

Formal Native

Due to the prevalence of native species within Beaumaris generally and being retained adjacent the site, native species are expected to dominate the planting numbers to be installed in the new sub-divisional area. Planting style will vary from informal re-vegetation to formal planting in rows where appropriate.

Exotic

The use of exotic species is considered necessary to highlight particular character or use zones within the proposed sub-divisional area. These are expected to provide shade and colour to the local area. Species selection will take into account local soil and climactic conditions. All planting species and locations will undergo Council approvals.

IRRIGATION

The use of irrigation is planned throughout the proposed sub-divisional works. The extent and length of irrigation shall be subject to review during the design process based on the speed of plant establishment and new bore license restrictions. Irrigation is expected to be operated during the life of the developers maintenance period as per other existing POS areas within Beaumaris. Irrigation to re-vegetation areas is considered desirable depending on the time of planting, however the length of irrigation is expected to be minimal based on fast plant establishment.

MAINTENANCE

Maintenance Works

Beaumaris Land Sales currently undertakes and manages an extensive and comprehensive maintenance program funded currently via a combination of Council (to handed over areas), the developer and the local residents through a differential rating system, which is expected to be continued within the proposed area. Council approval will be undertaken, any additional Council maintenance requirements as may be agreed will be considered as part of the maintenance program.

Maintenance Period

The maintenance period undertaken by the developer prior to hand over to Council will consist of a length as determined between Council and the developer. The developer may choose to undertake an additional maintenance period if desired depending on land sales.

**SERVICING REPORT ASSOCIATED WITH THE
STRUCTURE PLANNING FOR ILUKA**

FEBRUARY 2001

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6.0	SEWERAGE
7.0	WATER SUPPLY
8.0	OTHER SERVICES

1. INTRODUCTION

This report summarises the results of a review of engineering aspects of the development of part of Lot M1722 bounded by Burns Beach Road to the west and north. Silvers Sands Drive to the south and Naturaliste Boulevard to the east. The landholding is located within the district of Iluka and forms part of the Beaumaris Beach Estate.

The report outlines servicing strategies for drainage, sewerage, water supply and other public utility services for the development at the land for housing and associated landuses. It has been prepared for inclusion in and to support a submission by Roberts Day Group for approval to the structure plan proposed.

2. DESCRIPTION OF THE SITE

The topography of Iluka is dominated by a ridge that runs north-south through the site. Elevations on the ridge range from RL 24 in the saddles to a peak of RL 44. Either side of the ridge the slope of the land is generally between 3% and 10%.

The ground conditions within the site are predominantly Safety Bay sands with outcrops of Tamala limestone. It is considered that the extent of limestone will not be as great as that being encountered in the subdivision of Pt Lt 1722 east of Marmion Avenue (ie Currambine).

3. SITEWORKS

Given the features outlined above it is clear that careful design of siteworks will be required to ensure that the physical attributes of the site are not destroyed and that development is itself feasible to implement in a cost-effective manner. The extent of this will be controlled by a number of factors including the environmental and landscape appreciation objectives, servicing requirements, road and lot grades, and the aim to maximise the aspect and attractiveness of lots and, in particular, to maximise ocean views from residential areas.

The engineering of the development works will be aimed at being sympathetic to the existing topography and to facilitate the retention of natural coastal vegetation where possible.

It is envisaged that retaining walls will be used to retain views and minimise siteworks as due to the predominance of hard rock in areas, the construction of walls will minimise siteworks costs in building construction.

Where earthworks is unavoidable, all earthworks areas will be evenly graded to prevent ongoing erosion by wind and the works would be carried out during the winter period, where possible, to minimise the risk of dust nuisance.

4. ROADS

The site is well served by the roads that form the perimeter of the site, which then connect into the adjoining major roads, namely Marmion Avenue, Shenton Avenue and Burns Beach Road.

Marmion Avenue provides good access to the north and south whilst Burns Beach Road and Shenton Avenue provide links to the Joondalup City Centre and future Mitchell Freeway.

It is proposed that where Burns Beach Road abuts Iluka it be designed as Foreshore Access Road. This road will have the roles of providing recreational links to coastal facilities adjacent to Iluka and local distribution and accordingly will need to be designed to suit. It is envisaged that the design will incorporate traffic management devices to reduce operating speeds The

issue of Foreshore Access Road at Beaumaris has specifically been addressed previously with City of Joondalup with approval received to the concept from Shenton Avenue to the Burns Beach Townsite in WAPC approval 106778 .The portion of this road between Shenton Avenue and Silver Sands Drive is currently being constructed to this standard.

Within the Iluka cell, provision has been made for a system of neighbourhood connectors which connect with lower order roads. The length and curvature of these distributors has been planned to discourage speed and through the use of features such as roundabouts , it is considered that these roads will provide safe access to residential cells.

Access streets and laneways have been laid out along guidelines specified in current WAPC policies on Liveable Neighbourhoods. The detailed design of these facilities will be carried out in close liaison with Council and the servicing authorities to develop systems which are feasible from an engineering point of view, cost-effective, enhance the amenity and safety of the future residents and best achieve the town planning objectives for the area.

It is proposed that controlled access places be incorporated along sections of Burns Beach Road to improve the streetscapes of these roads.

It is envisaged that the roads within Iluka will incorporate varied pavement treatments (red asphalt, pressed concrete, brick paving, etc), special kerbing, special street lighting, landscaping and street furniture to facilitate the creation of attractive streetscapes.

5. DRAINAGE

5.1 General

Stormwater drainage for the proposed subdivision will be via a system of pits and underground pipes designed to cater for runoff from a 5 year frequency storm. Run-off from less frequent storms, up to 1 in 100 years, will be catered for in an overland flow system incorporating roads, POS and PAW's designed to ensure that buildings remain free from flooding in these more severe events. This will mean, in some instances, recontouring of the land to provide these overland drainage routes.

Both the underground and overland flow systems will be designed to discharge to disposal areas comprising either fenced sumps, landscaped water features or localised swales in public open space.

5.2 Catchments

The site can be divided into three catchments, each of which has its own disposal area. These catchments and disposal sites are:

(i) North-east Catchment

This catchment is bounded by the north-south ridge to the west and Miami Beach Promenade to the south and is to dispose via the existing pipework system into the existing fenced sump located on Miami Beach Promenade adjacent to the Iluka District Open Space. This sump has been designed and constructed to accommodate this catchment.

(ii) South-east Catchment

This catchment is bounded by the north-south ridge to the west and Silver Sands Drive to the south and is to dispose into the existing drainage soakage area constructed to the south of the lakes within Sir James McCusker Park. The drainage soakage area and associated existing pipework has been designed and constructed to accommodate this catchment.

(iii) Western Catchment

This catchment is bounded by the north-south ridge to the east and consists of the western portion of the site including contribution from existing areas south of Silver Sands Drive. The pipework currently constructed has been designed to accommodate the proposed catchments.

It is proposed that the disposal area for this catchment will be within the POS to the south of the coastal village (O'Mara POS). A drainage disposal facility of appropriate capacity is able to be incorporated into this POS with room to construct ancillary areas of open space available for separate uses.

5.3 O'Mara POS

Previous structure plans and designs have proposed the development of a formal landscaped water feature within this POS. More recently, the City of Joondalup has indicated that it may not be prepared to support the establishment of a perched lake within this area.

The developer shall formulate a design solution for the O'Mara POS to accommodate the necessary drainage features in a manner most sympathetic to the future coastal urban environment.

Lots surrounding the O'Mara POS shall be premium lots where residents shall expect to be able to take advantage of the elevated aspect over the POS and coastline. The design of the formal or informal drainage facility shall need to achieve high levels of amenity in addition to its functionality as a drainage disposal facility. There will be a requirement to use the generally low lying nature of the topography in this area to accommodate stormwater flows in addition to the use of existing drainage network capacity. The solution will recognise the residential nature of the surrounding area to the east and south, and the presence of the neighbourhood commercial centre to the north.

Depending upon the future design of the commercial centre, the need to design the northern end of the O'Mara POS to integrate with the centre will be assessed. This will necessitate the consideration of a range of criteria across the entire POS, including;

- definition of active and passive areas,
- separation of drainage facilities from active POS areas,
- physical and visual barriers to drainage swales,
- landscaping and planting themes for active areas, passive areas and swale areas,
- opportunities for vegetation retention,
- access paths, walkways, boardwalks and hard landscape furniture,
- slope gradients, retaining walls and fencing requirements,
- flood capacity and runoff routes,
- integration of access paths and landscape features with resident demand and usage profiles for the POS.

Council will be involved through the design phase to ensure that the final product recognises all of Council's concerns particularly ongoing maintenance and water quality aspects. No

drainage disposal would be accommodated in the foreshore reserve without Council's approval. Detailed landscaping concept plans and full detail of drainage calculations shall be submitted to Council as part of the detailed design at the appropriate stage of the subdivision.

6. SEWERAGE

The sewerage reticulation system for Iluka will consist of a conventional system of underground sewers located predominantly within road reserves.

The site falls within two broad catchments, viz:

- (i) A catchment west of the dominant ridge which gravitates to the existing pumping station in the Burns Beach town site. The reticulation pipeworks along Burns Beach Road to link the site to this pump station has already been constructed.
- (ii) A catchment east of the ridge that gravitates to the existing permanent sewerage pumping station located at the intersection of Naturaliste Boulevard and Silver Sands Drive.

The existing sewer reticulation network has been designed and constructed to accommodate the proposed development.

Sewerage from all of the above catchments is ultimately pumped into the Burns Beach Main Sewer located east of Marmion Avenue and south of Shenton Avenue.

7. WATER SUPPLY

The development of Iluka will be served via a conventional system of water supply reticulation connected to existing and planned water supply trunk and distributive mains within the adjoining street network.

8. OTHER SERVICES

The other public utility services, electricity, gas and telephone supply, are available or are currently being installed in the adjacent development area and can be readily extended to serve the development of Iluka. Prefunding will not be required provided development is undertaken in an orderly manner.

All public utility services supply will be via underground installations within the subdivision areas.

It is proposed that all public utility services be located within a common service trench to optimise the land available within roads for landscaping.

BEAUMARIS LAND SALES

ILUKA

**FLORA & VEGETATION SURVEY
& FAUNA HABITAT ASSESSMENT**

FINAL REPORT

FEBRUARY 2001

REPORT NO: 2000/184

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An internal quality review process has been applied to each project task undertaken by us. Each document is carefully reviewed by core members of the consultancy team and signed off at Director level prior to issue to the client. Draft documents are submitted to the client for comment and acceptance prior to final production.

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1. INTRODUCTION

1.1 Purpose

A Structure Plan for the Iluka area in the City of Joondalup was prepared for Beaumaris Land Sales in August 2000. The Structure Plan area forms the northern portion of Beaumaris Estate.

The area covered by the Structure Plan is presently zoned “Urban” under the Metropolitan Region Scheme and “Urban Development” under the City of Joondalup Town Planning Scheme (TPS) No. 2. A Structure Plan is required for land zoned “Urban Development” prior to subdivision or development.

The Iluka Structure Plan outlines the overall land use and form of development for the area. The area is projected to yield approximately 900 allotments, catering for an estimated population of 2300 people.

As part of the planning process and proposed future development of the site, specific detailed information in relation to environmental characteristics was sought by Beaumaris Land Sales. This flora and vegetation survey and fauna habitat assessment has been undertaken to provide additional information to assist preparation of development plans. The information also assists assessment of potential environmental impacts of the Structure Plan and subsequent development.

1.2 Study Area

The structure plan area refers to the land within the locality of Iluka, approximately 28km north west of the Perth Central Business District and 3.5km west of the City of Joondalup centre. The site is located within Swan Location 1370 and includes Pt Lot M1722.

The study area is bounded by Burns Beach Road to the west and north, Silver Sands Drive to the south, and Naturaliste Boulevard and Delgado Parade to the east. The site comprises an area of approximately 95 hectares. The site has been partially cleared as a result of the overall earthworks program on the site. Uncleared portions of bushland comprise the majority of the site.

The site is located within the Spearwood Dune System, which is characterised by a low hilly to undulating terrain and is comprised of sands derived from Tamala Limestone. Portions of the site consist of exposed limestone and shallow brown soils over limestone. Inland of this, particularly within the southern section, the site comprises Karrakatta sand characterised by grey-brown sand over yellow sand, with limestone generally at a depth of two metres.

2. METHODOLOGY

2.1 Flora & Vegetation

The flora and vegetation survey was undertaken in October and December 2000, by suitably qualified botanists. Particular emphasis was made to identify and record the locations of any Declared Rare and Priority Flora species present.

The flora and vegetation survey consisted of traversing the bushland by foot and vehicle. All native and introduced flora were recorded and notes taken on the type and general condition of the vegetation associations present. Specimens were identified in the field and verified at the Western Australian Herbarium where required. Vegetation was described according to the structure and species composition of the dominant stratum (eg. *Banksia attenuata* Low Open Woodland) using [Muir's \(1977\)](#) classification, while the Bushland Condition Scale, as outlined in the draft Perth's Bushplan ([Government of Western Australia, 1998](#)), was used to determine the condition of each association.

Prior to the field survey, a search was undertaken of the Department of Conservation and Land Management's (CALM) Threatened (Declared Rare) Flora database, CALM's Priority Species List and the W.A. Herbarium Specimen database for Priority Species to determine the presence of Declared Rare and Priority Flora on the site or in the vicinity of the site. Results of this search are attached ([Appendix 1](#)).

2.2 Fauna Habitat Assessment

The fauna habitat assessment involved a one-day site inspection in November 2000. The study area was traversed by vehicle and on foot enabling habitats to be identified and assessed, and fauna to be recorded through active searching and opportunistic observations.

All species seen or heard and able to be identified were recorded including evidence of species present from scats, burrows, tracks or other signs. Binoculars were used to facilitate detection and identification of bird species.

Active searching techniques included examining microhabitat refugia such as raking leaf litter, turning over rocks, examining hollow logs including dead specimens of *Xanthorrhoea preissii*, checking burrows and looking under rubble and rubbish.

A list of expected species was prepared based on experience in the region and published records, particularly the results of a recent vertebrate fauna survey of coastal property immediately north of the Iluka site ([Alan Tingay & Associates, 1999](#)). General zoogeographic information has been derived from [Bush et al. \(1995\)](#), [Tyler et al. \(1994\)](#), and [Storr et al. \(1983, 1986, 1990 and 1999\)](#) for amphibians and reptiles; [Blakers et al. \(1984\)](#) and [Slater et al. \(1986\)](#) for birds; and [Strahan \(1998\)](#) in relation to mammals.

The nomenclature adopted in this report follows that presented in [Bush et al. \(1995\)](#) and [Storr \(1999\)](#) for herpetofauna, [Christidis and Boles \(1994\)](#) for birds, and [Strahan](#)

(1998) for mammals. Nomenclature from more recent taxonomic revisions however, has been used for certain species where applicable.

A search of CALM's Specially Protected and Priority Fauna database was undertaken prior to the field investigation to identify significant fauna that are known to occur on site or in the vicinity of the site. Results of this search are attached ([Appendix 2](#)).

3. VEGETATION & FLORA

3.1 Vegetation

Six principal native vegetation associations were recorded from the study area. All associations Cottesloe Complex – Central and South Vegetation Complex. The distribution of the major vegetation associations is related strongly to the underlying soil and landforms. These associations are shown in [Figure 1](#).

***Dryandra sessilis* Closed Heath (Ds)**

This unit commonly exists as isolated dense patches in areas where limestone outcroppings occur surrounded by yellow sand. The association ranges in height between 1-3m. Associated shrub, sedge and herb species include *Hakea trifurcata*, *Xanthorrhoea preissii*, *Solanum nigrum*, *Dryandra lindleyana*, *Quinetia urvillei*, *Mesomelaena pseudostygia*, and *Drosera erythrorhiza*.

Vegetation condition: >75% Excellent to Very Good with >20% Good to Degraded, with the vegetation structure severely modified in areas. The association is often impacted by the edge effects of access tracks and cleared areas.

***Banksia attenuata*/*Banksia menziesii* Low Open Woodland (BaBm)**

This is the predominant vegetation association occurring over the deep Spearwood sands that occur in much of the study area. The association ranges between 2m and 4m in height over an understorey that includes *Hibbertia hypericoides*, *Xanthorrhoea preissii*, *Acacia pulchella*, *Gompholobium tomentosum*, *Calothamnus quadrifidus*, *Phyllanthus calycinus*, *Petrophile macrostachya*, *Acacia saligna*, *Lysinema ciliatum*, *Conostephium pendulum* and *Petrophile linearis*. *Nuytsia floribunda* and *Eucalyptus tottiana* also occur sporadically within the tree stratum in some areas.

Vegetation condition: <25% Pristine to Excellent, >50% Excellent to Very Good with >20% Good to Degraded with the vegetation structure severely modified in areas, particularly in areas that are adjacent to access tracks, Beaumaris Central Park, residences and cleared areas.

***Acacia rostellifera*/*Acacia saligna* Closed Heath (ArAsCH)**

This association occurs most predominantly within and on the fringes of the disturbed and modified sections of Beaumaris Central Park. The association ranges between 1-2.5m in height, with *Jacksonia furcellata*, *Hakea trifurcata*, *Olearia axillaris*, *Hakea prostrata*, *Daviesia triflora*, *Xanthorrhoea preissii* and *Dryandra sessilis* prominent in the middle and lower stratum.

Vegetation condition: >50% Very Good to Good with >45% Good to Degraded and the vegetation structure severely modified in some areas, particularly where the association fringes Beaumaris Central Park.

***Banksia attenuata/Banksia menziesii/Allocasuarina fraseriana/Eucalyptus tottiana* Low Open Woodland (BaBmAfEt)**

This association occurs as a narrow fringe along a portion of Burns Beach Road at the northern edge of the study area and as a small stand to the north-west of Beaumaris Central Park. This association is similar in structure and understorey species composition to the *Banksia attenuata/Banksia menziesii* Low Open Woodland but differs in that it sporadically supports both *Allocasuarina fraseriana* and *Eucalyptus tottiana* trees (to 8m).

Vegetation condition: >95% Good to Degraded and the vegetation structure is severely modified particularly where the fringe is narrow immediately adjacent to Burns Beach Road.

Mixed Low Closed Heath (MLCH)

This association occurs over Spearwood dune crests in the central portion of the study area and covers an area of approximately 2 hectares. The height of this association ranges between 0.5 to 1.0m, with the occasional scattered *Banksia menziesii* and *Xanthorrhoea preissii* reaching 2m in height. Although no one species dominates the association, commonly occurring species include *Hibbertia hypericoides*, *Calothamnus quadrifidus*, *Jacksonia furcellata*, *Dryandra lindleyana*, *Acacia pulchella*, and *Allocasuarina humilis* with *Mesomelaena pseudostygia*, *Leucopogon sprengelioides*, *Melaleuca acerosa*, *Synaphea petiolaris*, *Conostylis setigera*, *Bossiaea eriocarpa*, *Hakea costata*, *Lysinema ciliatum*, *Conostephium pendulum* and *Hakea prostrata* occurring at lower densities.

Vegetation condition: >75% Pristine to Excellent with >20% Very Good to Good with The association is relatively unaffected by recent clearing and access tracks.

***Eucalyptus foecunda* Mallee (Ef)**

This association occurs as a strip of regrowth mallee to 2m in height, immediately to the south of Burns Beach Road over the crest of a low dune covered by shallow sand with areas of exposed limestone. A dense area of *Dryandra sessilis* regrowth surrounds the association on either side of the dune crest. A significant proportion of the association is comprised of saplings and seedlings to 0.5m.

Vegetation condition: >75% Very Good to Good with >20% Good to Degraded. The condition of the association is buffered against disturbance by the dense *Dryandra sessilis* regrowth.

Floristic Community Types

The vegetation units recorded from the study area belong to the following floristic community types (Gibson *et al*, 1994):

- 24 Northern Spearwood shrublands and woodlands
- 28 Spearwood *Banksia attenuata* or *B. attenuata-Eucalyptus* Woodlands

3.2 Flora

A total of 111 flora species from 42 families were recorded during the October and December 2000 field surveys ([Appendix 3](#)). This included 17 introduced, non-endemic or invasive species, which were largely restricted to, and adjacent to, areas that had been left cleared for a period of time or in areas immediately adjacent to the many internal access tracks that intersect the bushland. The native species total comprised one cycad, 29 monocotyledons and 81 dicotyledons. The most represented families were the Proteaceae (*Banksia* family, 18 species), Papilionaceae (Pea family, 12 species) and Myrtaceae (Eucalyptus family, 8 species).

None of the species recorded is listed as a Declared Rare Flora (DRF) species or on CALM's Priority flora list ([Appendix 1](#)). Two of the species from the list *Sarcozona bircarinata* and *Hibbertia spicata* have previously been recorded from the vicinity of the study area. Although neither was recorded during this study the timing of the survey was appropriate for identification of both species.

3.3 Conservation Significance

The survey area contains vegetation associations that are typical of near-coastal Spearwood vegetation units. The *Eucalyptus foecunda* Mallee association is not common in the Spearwood Dunes. This association occurs at a single location over a low dune to the south of Burns Beach Road. All associations with the possible exception of *Eucalyptus foecunda* Mallee are represented within the conservation and reservations estates (including the nearby Neerabup National Park) and as a consequence are not considered to be of high conservation value.

The vegetation on the site has not been identified as being regionally significant in Bush Forever ([Government of Western Australia, 2000](#)). The Government objective of protecting a minimum of 10% of each vegetation complex is satisfied in relation to the Cottesloe Complex – Central and South Vegetation Complex. Over 15% of the original extent of this vegetation complex in the Perth Metropolitan Region presently has some existing protection. Bush Forever proposes protection for a total of 18% in the Perth Metropolitan Region.

None of the two floristic community types occurring over the site (Gibson *et al*, 1994) is listed as Threatened Ecological Communities ([English & Blythe, 1997](#)).

4. VERTEBRATE FAUNA

4.1 Habitats

Based on the vegetation survey and site assessment of the property, the study area can be broadly separated into three major habitat categories that dominate the site. These habitat types are based primarily on vegetation units that reflect the underlying soil types.

The principal habitats identified as occurring within the property are:

- *Banksia* woodland;
- Mixed heath; and
- *Dryandra* heath.

These dominant habitat types are evident in Figure 1, which shows the coverage of the each of the vegetation associations within the site. Much of the vegetation and habitat is in good condition with little evidence of weed invasion and disturbance. Some areas particularly near the edges of existing development, along Burns Beach Road and surrounding the central lake and open space show greater disturbance due to access and weed invasion.

Typically, a relatively high overall species diversity is recorded within habitats of the Spearwood Dune System. This is probably largely due to the greater structural complexity, floristic richness of flowering plants, and resources available for feeding, roosting and breeding, and shelter in logs, peeling bark and rock crevices. The woodland areas on site particularly offer habitat for a greater variety of birds. Areas of *Dryandra* heath are important for species requiring dense vegetation, such as the Splendid Fairy-wren and White-browed Scrubwren.

The habitats on the site therefore, would be expected to support a relatively diverse fauna reflecting the heterogeneity and condition of the habitats and typical of the habitat types available.

4.2 Species

A list of the vertebrate fauna species recorded during the site assessment of the study area on 29 November 2000 is provided in Appendix 4. The assessment recorded 4 reptiles, 22 birds and 4 mammals (including 3 introduced species). Diggings suspected to be that of an additional native mammal were detected, however the occurrence of this species on site was not confirmed.

All of the species detected have widespread distributions in the coastal and southwest regions of Western Australia. None is restricted to the habitats found within the property.

Species that are considered likely to occur within the site based on the habitats available and distribution information are indicated in [Appendix 2](#). Fauna recently

recorded or expected to occur within coastal property immediately north of the Iluka site are also listed in [Appendix 4](#).

4.2.1 Amphibians

No amphibians were recorded within the study area during the site assessment. The study area does not contain any wetlands or naturally low-lying areas that would provide damp conditions suitable for breeding for many frog species. The created lake feature adjoining the study area however, would provide suitable breeding conditions for some species.

It is expected that three species of frog could occur within the study area. These comprise the Moaning Frog (*Heleioporus eyrei*), Pobblebonk (*Limnodynastes dorsalis*) and Turtle Frog (*Myobatrachus gouldii*).

The Turtle Frog is not dependent on surface water for breeding. The Moaning Frog and Pobblebonk however, rely on seasonal wetlands to breed, but disperse to surrounding areas during the non-breeding season. These species may inhabit the study area during the non-breeding periods provided suitable wetlands occur within several kilometres in nearby areas.

None of these species is specially protected under provisions of the *Wildlife Conservation Act 1950* or listed by CALM as Priority Fauna.

4.2.2 Reptiles

Four reptile species were recorded during the assessment. All species recorded are widespread and relatively common. Nearby survey data and distribution information suggests an additional 37 species could occur in the habitats available on site.

The Western Australian Carpet Python (*Morelia spilota imbricata*) could potentially occur on the site. This species is listed as Specially Protected Fauna on Schedule 4 under provisions of the *Wildlife Conservation Act 1950*.

4.2.3 Birds

Twenty-two bird species were recorded during the site assessment. The identification of one of these species was not confirmed. The species recorded was either the Brown Goshawk or Collared Sparrowhawk.

A number of the bird species recorded are considered to be of local significance as they tend to disappear from urban areas and bushland remnants within the urban landscape ([Government of Western Australia, 2000](#)). Among those species recorded, this includes the Brown Goshawk/Collared Sparrowhawk, Little Eagle, Splendid Fairy-wren, White-browed Scrubwren, Little Wattlebird, Yellow-throated Miner, White-Cheeked Honeyeater, and Black-faced Woodswallow.

Based on nearby survey data and distribution information a further 43 species could potentially occur as resident species, on a seasonal or periodic basis, or opportunistically at the site.

Of the species expected to be present, those of conservation significance are the Short-billed Black-Cockatoo (*Calyptorhynchus latirostris*) (Schedule 1), Peregrine Falcon (*Falco peregrinus*) (Schedule 4), and Square-tailed Kite (*Lophoictinia isura*) (Priority 4).

4.2.4 Mammals

One native mammal, the Western Grey Kangaroo (*Macropus fuliginosus*), was recorded during the assessment. Conical diggings similar to those of the Southern Brown Bandicoot (*Isodon obesulus fusciventer*) were observed suggesting the possible presence of this species on-site. A small number of diggings were recorded amongst low vegetation adjoining stands of *Dryandra* heath in the southern section of the site.

Evidence or sightings of the introduced fox, rabbit and cat were recorded during the assessment.

It is possible that an additional 12 mammals including 2 introduced species could occur within the habitats available. Over half of the native species expected are bats.

All of the species recorded or considered likely to occur are widespread and/or relatively common and not considered significant fauna with the exception of the Southern Brown Bandicoot and Western Brush Wallaby, which are listed as Priority taxa.

4.3 Significant Species

A search of the Department of Conservation and Land Management's database in November 2000 indicated three species that are Specially Protected under provisions of the *Wildlife Conservation Act 1950* and one species of Priority taxa are known to occur in the area (Appendix 2). These are:

- *Schedule 1 - Rare or likely to become extinct*
Short-billed (or Carnaby's) Black-Cockatoo, *Calyptorhynchus latirostris*
- *Schedule 4 - Otherwise in need of special protection*
Peregrine Falcon, *Falco peregrinus*
Carpet Python, *Morelia spilota imbricata*
- *Priority 4 - Taxa in need of monitoring*
Southern Brown Bandicoot (or Quenda), *Isodon obesulus fusciventer*

The Short-billed (Carnaby's) Black-Cockatoo, is listed at a national level as Threatened Fauna (Endangered) by ANZECC (May 2000). The Carpet Python and Southern Brown Bandicoot (Quenda) are not considered Threatened Fauna at a national level but are identified as Conservation Dependent species.

The Short-billed Black-Cockatoo seasonally visits the region but breeds in the Wheatbelt. This species may opportunistically feed on species such as *Banksia* sp.,

Dryandra sp., *Hakea* sp. and eucalypts throughout the site. This species was not recorded during the on-site inspection for the present study, however it has been observed on several occasions within the area and Beaumaris Estate.

The Peregrine Falcon and also the Square-tailed Kite (*Lophoictinia isura*) (Priority 4) may seasonally or opportunistically occur within the site in low numbers generally utilising woodland areas and possible foraging in nearby heathlands.

The Carpet Python tends to favour areas of heath over limestone but also occurs in woodland areas. This species is moderately common in areas in and around Neerabup and Yanchep National Parks.

Possible signs of the Southern Brown Bandicoot were recorded in one location on the site. Given the low density of diggings observed and the fact that a trapping program of the property north of Burns Beach Road did not capture any animals, the bandicoot, if present, would be only in low numbers at the site. Habitat within the coastal Foreshore Reserve would be suitable for this species if they continue to occur in the area.

The Western Brush Wallaby (*Macropus irma*) is listed as possibly occurring at the site. This species is listed as Priority 4 taxa and could potentially occur in low numbers on the site however, predation by foxes may be impacting on the occurrence of the species on the site and within the area. This species was not identified by CALM as occurring on site or in the nearby areas.

5. CONCLUSION & RECOMMENDATIONS

The flora and vegetation of the Iluka bushland contains species and vegetation types typical of near-coastal environments in the North-West Corridor (e.g. Mindarie, Alkimos, Ningana, Yanchep, Two Rocks). The Spearwood vegetation is dominated by species-rich *Banksia* woodlands and variations of this unit on deep sand, intermixed with areas of *Dryandra sessilis* (Parrot Bush) Heath and variants on outcropping limestone ridges.

All vegetation associations, with the possible exception of *Eucalyptus foecunda* Mallee which is naturally uncommon, are considered to be well represented within the conservation and reservation estates (including the nearby Neerabup National Park and coastal Foreshore Reserve). None of the vegetation associations is known to be of high conservation value. As a consequence their respective conservation values are not at any particularly risk.

No Declared Rare or Priority Flora species were recorded within the remaining bushland and clearing activities will not impact on any known significant species.

All of the fauna species recorded are typical of the location and available habitats. One species of significant fauna, Short-billed (or Carnaby's) Black Cockatoo, *Calyptorhynchus latirostris* (Schedule 1) is known to occur at the site. This species would occur as a seasonal visitor to the area during the non-breeding period.

Possible signs of the Southern Brown Bandicoot (Priority 4) were recorded in one location on the site. The presence of this species however, has not been confirmed. Given the low density of diggings and the fact that a trapping program of the property north of Burns Beach Road did not capture any animals, the bandicoot, if present, would be only in low numbers at the site.

Foxes and cats were both recorded on the site. These species are known to have significant impacts on native fauna and are likely to be affecting the survival and populations of species such as the Southern Brown Bandicoot.

Suitable habitats for fauna occurring or expected to occur on the site, including the bandicoot, are protected within existing and proposed reserves to the north and north-east of the site such as Neerabup National Park, linkage areas from the coast to the National Park and the coastal Foreshore Reserve.

Continued clearing of bushland for the expansion of the Iluka residential development will result in the removal of significant areas of high quality remnant vegetation and habitat. Wherever possible, retention of good quality vegetation should be considered as part of the allocation of Public Open Space (POS) for the subdivision development. In particular, retention of the area of *Eucalyptus foecunda* Mallee near Burns Beach Road should be considered.

Retention of small areas of potential habitat specifically for the Southern Brown Bandicoot within the development site is not likely to be viable given the likely low population and continuing predation by foxes and cats. Similar and suitable habitat is protected within the Foreshore Reserve and other nearby areas. Progressive

development and clearing of the site from the southern areas will enable any populations of the bandicoot that may be present to disperse to nearby areas. The need for a translocation program for the bandicoot however, should be determined in consultation with CALM prior to clearing.

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FIGURE

APPENDICES

APPENDIX 1

CALM DATABASE SEARCH - FLORA

APPENDIX 2

CALM DATABASE SEARCH - FAUNA

APPENDIX 3

FLORA SPECIES LIST

APPENDIX 3
ILUKA FLORA SPECIES LIST

GYMNOSPERMAE

CYCADACEAE

Macrozamia fraseri

MONOCOTYLEDONAE

ANTHERICACEAE

Caesia parviflora

Corynotheca micrantha

Thysanotus multiflorus

Thysanotus patersonii

ASPHODELACEAE

* *Trachyandra divaricata*

COLCHICACEAE

Burchardia umbellata

CYPERACEAE

Isolepis marginata

Lepidosperma angustatum

Mesomelaena pseudostygia

Schoenus latitans

Schoenus curvifolius

DROSERACEAE

Drosera erythrorhiza

HAEMODORACEAE

Anigozanthos humilis

Conostylis aculeata

Conostylis setigera

DASYPOGONACEAE

Lomandra caespitosa

IRIDACEAE

* *Gladiolus caryophyllaceus*

Orthrosanthos laxus

ORCHIDACEAE

Caladenia patersonii

PHORMIACEAE

Dianella divaricata

POACEAE

* *Aira carophyllea*

* *Briza maxima*

* *Bromus diandrus*

* *Ehrharta longiflora*

Poa porphyroclados

Austrostipa flavescens

RESTIONACEAE

Alexgeorgea nitens

Desmocladus flexuosus

Lyginia barbata

XANTHORRHOEACEAE

Xanthorrhoea preissii

DICOTYLEDONAE

AIZOACEAE

* *Carpobrotus edulis*

AMARANTHACEAE

Ptilotus polystachyus

APIACEAE

Xanthosia huegelii

ASTERACEAE

* *Arctotheca calendula*

* *Hypochaeris glabra*

Lagenifera huegelii

Olearia axillaris

Quinetia urvillei

* *Ursinia anthemoides*

Waitzia suaveolens

BRASSICACEAE

* *Heliophila pusilla*

CAMPANULACEAE

Wahlenbergia preissii

CARYOPHYLLACEAE

**Petrorhagia velutina*

CASUARINACEAE

Allocasuarina fraseriana

Allocasuarina humilis

CRASSULACEAE

Crassula colorata

DILLENIACEAE

Hibbertia hypericoides

EPACRIDACEAE

Conostephium pendulum

Leucopogon sprengelioides

Lysinema ciliatum

EUPHORBIACEAE

**Euphorbia* sp

Phyllanthus calycinus

**Ricinus communis*

GERANIACEAE

**Pelargonium capitatum*

GOODENIACEAE

Dampiera linearis

LAURACEAE

Cassytha racemosa

LORANTHACEAE

Nuytsia floribunda

MIMOSACEAE

Acacia pulchella

Acacia rostelifera

Acacia saligna

MYRTACEAE

Calothamnus quadrifidus

Calytrix fraseri

Daviesia divaricata

Eremaea pauciflora

Eucalyptus decipiens

Eucalyptus foecunda

Eucalyptus todtiana

Melaleuca acerosa

PAPILIONACEAE

Bossiaea eriocarpa

Daviesia divaricata

Daviesia triflora

Gompholobium tomentosum

Hardenbergia comptoniana

Hovea pungens

Hovea trisperma

Isotropis cuneifolius

Jacksonia furcellata

Jacksonia sternbergiana

Nemcia reticulatum

Sphaerolobium sp.

PORTULACCACEAE

Calandrinia corrigioloides

PRIMULACEAE

**Anagallis arvensis*

PROTEACEAE

Banksia attenuata

Banksia menziesii

Dryandra lindleyana

Dryandra sessilis

Grevillea thelemanniana

Grevillea vestita

Hakea costata

Hakea lissocarpa

Hakea prostrata

Hakea ruscifolia

Hakea trifurcata

Persoonia saccata

Petrophile linearis

Petrophile macrostachya

Petrophile media

Petrophile serruriae

Synaphea petiolaris

Stirlingia latifolia

RHAMNACEAE

Spyridium globulosum

SOLANACEAE

**Solanum nigrum*

RUBIACEAE

Opercularia vaginata

STYLIDIACEAE

Stylidium brunonianum

Stylidium junceum

Stylidium repens

Stylidium schoenoides

THYMELEACEAE

Pimelea sulphurea

VIOLACEAE

Hybanthus calycinus

APPENDIX 4

FAUNA SPECIES LIST

APPENDIX 4
FAUNA RECORDED NOVEMBER 2000 &
EXPECTED TO OCCUR

		Iluka¹	Burns²
AMPHIBIANS			
MYOBATRACHIDAE			
<i>Heleioporus eyrei</i>	Moaning Frog	+	+
<i>Limnodynastes dorsalis</i>	Western Banjo Frog/Pobblebonk	+	+
<i>Myobatrachus gouldii</i>	Turtle Frog	+	+
REPTILES			
GEKKONIDAE			
<i>Diplodactylus alboguttatus</i>	White-spotted Ground Gecko	+	+
<i>Diplodactylus polyophthalmus</i>	Speckled Stone Gecko	+	+
<i>Phyllodactylus marmoratus</i>	Marbled Gecko	+	+
<i>Strophurus spinigerus</i>	South-western Spiny-tailed Gecko	+	✓
<i>Underwoodisaurus milii</i>	Barking Gecko	+	+
PYGOPODIDAE			
<i>Aclys concinna</i>	Javelin Legless Lizard	+	✓
<i>Aprasia repens</i>	South-western Sandplain Worm Lizard	+	+
<i>Delma fraseri</i>	Fraser's Legless Lizard	+	+
<i>Delma grayii</i>	Gray's Legless Lizard	+	+
<i>Lialis burtonis</i>	Burton's Legless Lizard	+	✓
<i>Pletholax gracilis</i>	Keeled Legless Lizard	+	+
<i>Pygopus lepidopodus</i>	Common Scaly Foot	+	+
AGAMIDAE			
<i>Pogona minor</i>	Western Bearded Dragon	✓	✓
<i>Tympanocryptis adelaidensis</i>	Western Heath Dragon	+	+
VARANIDAE			
<i>Varanus gouldii</i>	Gould's Monitor	+	+
SCINCIDAE			
<i>Cryptoblepharus plagiocephalus</i>	Snake-eyed, Fence or Sun Skink	✓	✓
<i>Ctenotus fallens</i>	West Coast Ctenotus	+	✓
<i>Ctenotus lesueurii</i>	Western Limestone Ctenotus	+	✓
<i>Cyclodomorphus celatus</i>	Western Slender Bluetongue	+	✓
<i>Egernia kingii</i>	King's Skink	+	+
<i>Egernia napoleonis</i>	South-western Crevice Egernia	✓	✓
<i>Hemiergis quadrilineata</i>	Two-toed Earless Skink	+	+
<i>Lerista elegans</i>	West coast Four-toed Lerista	+	✓
<i>Lerista lineopunctulata</i>	West Coast Line-spotted Lerista	+	✓
<i>Lerista praepedita</i>	Western Worm Lerista	+	✓
<i>Menetia greyii</i>	Common Dwarf Skink	+	✓
<i>Morethia lineocellata</i>	Western Pale-flecked Morethia	+	+
<i>Morethia obscura</i>	Southern Pale-flecked Morethia	+	✓
<i>Tiliqua occipitalis</i>	Western Bluetongue	+	✓
<i>Tiliqua rugosa</i>	Bobtail	✓	✓

		Iluka ¹	Burns ²
TYPHLOPIDAE			
Ramphotyphlops australis	Southern Blind Snake	+	+
BOIDAE			
Morelia spilota	Southern Carpet Python	+	+
ELAPIDAE			
Demansia psammophis	Reticulated Whip Snake	+	✓
Echiopsis curta	Bardick	+	+
Neelaps bimaculatus	Black-naped Snake	+	+
Neelaps calonotus	Black-striped Snake	+	+
Pseudonaja affinis	Dugite	+	✓
Rhinoplocephalus gouldii	Gould's Hooded Snake	+	+
Simoselaps bertholdi	Jan's Banded Snake	+	+
Simoselaps fasciolatus	Narrow-banded Snake	+	+
Simoselaps semifasciatus	Southern Half-girdled Snake	+	+
BIRDS			
ACCIPITRIDAE			
Elanus axillaris	Black-shouldered Kite	+	+
Lophoictinia isura	Square-tailed Kite	+	+
Haliastur spheonurus	Whistling Kite	+	+
Circus assimilis	Spotted Harrier	+	+
Accipiter fasciatus	Brown Goshawk	?+	✓
Accipiter cirrhocephalus	Collared Sparrowhawk	?+	✓
Aquila audax	Wedge-tailed Eagle	+	+
Hieraaetus morphnoides	Little Eagle	✓	✓
FALCONIDAE			
Falco berigora	Brown Falcon	+	+
Falco longipennis	Australian Hobby	+	+
Falco peregrinus	Peregrine Falcon	+	+
Falco cenchroides	Nankeen Kestrel	+	✓
TURNICIDAE			
Turnix varia	Painted Button-quail	+	+
COLUMBIDAE			
Streptopelia senegalensis	Laughing Turtle-Dove	✓	✓
Phaps chalcoptera	Common Bronzewing	+	✓
CACATUIDAE			
Calyptorhynchus latirostris	Short-billed Black Cockatoo	+	✓
Cacatua roseicapilla	Galah	+	✓
PSITTACIDAE			
Barnardius zonarius	Australian Ringneck	+	✓
Purpureicephalus spurius	Red-capped Parrot	+	✓
Neophema elegans	Elegant Parrot	+	✓









		Iluka ¹	Burns ²
CUCULIDAE			
Cuculus pallidus	Pallid Cuckoo	+	+
Cacomantis flabelliformis	Fan-tailed Cuckoo	+	+
Chrysococcyx basalis	Horsfield's Bronze-Cuckoo	+	✓
Chrysococcyx lucidus	Shining Bronze-Cuckoo	+	+
STRIGIDAE			
Ninox novaeseelandiae	Southern Boobook	+	+
PODARGIDAE			
Podargus strigoides	Tawny Frogmouth	+	+
APODIDAE			
Apus pacificus	Fork-tailed Swift	+	+
MEROPIDAE			
Merops ornatus	Rainbow Bee-eater	✓	✓
MALURIDAE			
Malurus splendens	Splendid Fairy-wren	✓	✓
Malurus lamberti	Variegated Wren	+	+
Malurus leucopterus	White-winged Wren	+	✓
Stipiturus malachurus	Southern Emu-wren	+	+
PARDALOTIDAE			
Pardalotus striatus	Striated Pardalote	+	+
ACANTHIZIDAE			
Sericornis frontalis	White-browed Scrubwren	✓	✓
Gerygone fusca	Western Gerygone	✓	✓
Acanthiza apicalis	Inland Thornbill	+	✓
Acanthiza inornata	Western Thornbill	+	✓
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	+	✓
MELIPHAGIDAE			
Anthochaera carunculata	Red Wattlebird	✓	✓
Anthochaera chrysoptera	Little Wattlebird	✓	✓
Manorina flavigula	Yellow-throated Miner	✓	✓
Lichenostomus virescens	Singing Honeyeater	✓	✓
Lichmera indistincta	Brown Honeyeater	✓	✓
Phylidonyris novaehollandiae	New Holland Honeyeater	+	✓
Phylidonyris nigra	White-cheeked Honeyeater	✓	✓
Phylidonyris melanops	Tawny-crowned Honeyeater	+	+
Acanthorhynchus superciliosus	Western Spinebill	+	✓
PETROICIDAE			
Petroica multicolor	Scarlet Robin	+	+
Petroica goodenovii	Red-capped Robin	+	+

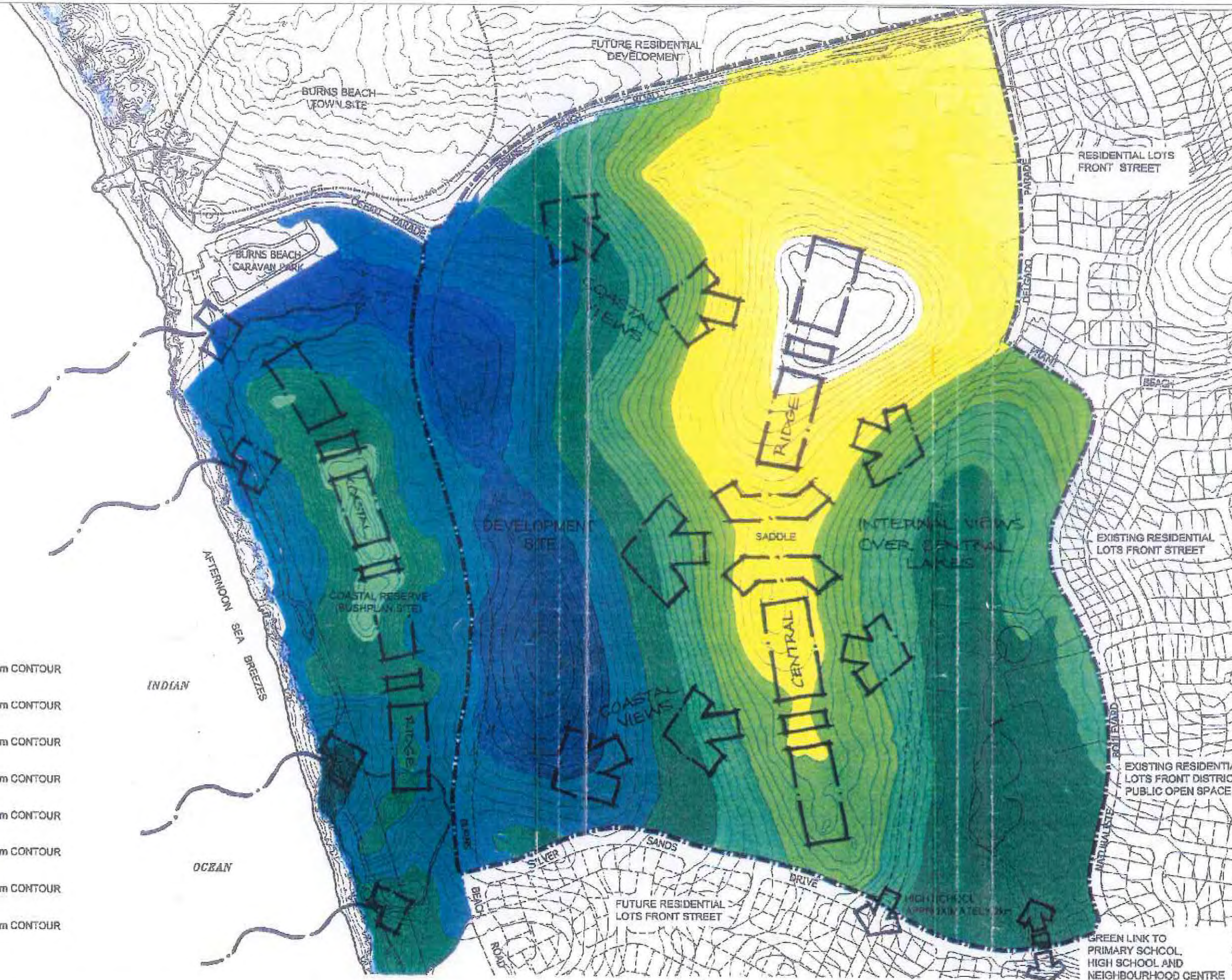
		Iluka¹	Burns²
PACHYCEPHALIDAE			
<i>Pachycephala rufiventris</i>	Rufous Whistler	✓	✓
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	+	✓
DICRURIDAE			
<i>Rhipidura fuliginosa</i>	Grey Fantail	+	✓
<i>Rhipidura leucophrys</i>	Willie Wagtail	✓	+
CAMPEPHAGIDAE			
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-Shrike	✓	✓
<i>Lalage sueurii</i>	White-winged Triller	+	✓
ARTAMIDAE			
<i>Artamus cinereus</i>	Black-faced Woodswallow	✓	✓
<i>Artamus cyanopterus</i>	Dusky Woodswallow	+	+
<i>Cracticus torquatus</i>	Grey Butcherbird	✓	✓
<i>Gymnorhina tibicen</i>	Australian Magpie	+	✓
CORVIDAE			
<i>Corvus coronoides</i>	Australian Raven	+	✓
MOTACILLIDAE			
<i>Anthus novaeseelandiae</i>	Richard's Pipit	✓	+
HIRUNDINIDAE			
<i>Cheramoeca leucosternus</i>	White-backed Swallow	✓	✓
<i>Hirundo neoxena</i>	Welcome Swallow	✓	✓
<i>Hirundo nigricans</i>	Tree Martin	+	✓
ZOSTEROPIDAE			
<i>Zosterops lateralis</i>	Silvereye	✓	✓
MAMMALS			
TACHYGLOSSIDAE			
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	+	✓
PERAMELIDAE			
<i>Isodon obesulus</i>	Southern Brown Bandicoot	?+	✓
TARSIPEDIDAE			
<i>Tarsipes rostratus</i>	Honey Possum	+	+
MACROPODIDAE			
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	✓	✓
<i>Macropus irma</i>	Western Brush Wallaby	+	+
MOLOSSIDAE			
<i>Nyctinomus australis</i>	White-striped Freetail-bat	+	+
VESPERTILIONIDAE			
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	+	+

		Iluka¹	Burns²
Nyctophilus timoriensis	Greater Long-eared Bat	+	+
Chalinolobus gouldii	Gould's Wattled Bat	+	+
Chalinolobus morio	Chocolate Wattled Bat	+	+
Vespadelus regulus	Southern Forest Bat	+	+
MURIDAE			
Mus musculus	House Mouse	+	✓
Rattus fuscipes	Bush Rat	+	+
Rattus rattus	Black Rat	+	+
CANIDAE			
Vulpes vulpes	Fox	✓	✓
FELIDAE			
Felis catus	Cat	✓	✓
LEPORIDAE			
Oryctolagus cuniculus	Rabbit	✓	✓

- 1 Based on present study
- 2 Based on Alan Tingay & Associates (1999)
- ✓ Recorded on site
- ? Not confirmed
- + Expected to Occur on the property

LEGEND

	55 - 60m CONTOUR
	50 - 55m CONTOUR
	45 - 50m CONTOUR
	40 - 45m CONTOUR
	35 - 40m CONTOUR
	30 - 35m CONTOUR
	25 - 30m CONTOUR
	20 - 25m CONTOUR



SITE ANALYSIS PLAN
ILUKA - CITY OF JOONDALUP
BEAUMARIS LAND SALES

Client: SATTERLEY
Scale: NTS at A3
Drawn: PV
Checked: JB
Approved: DC
Date: 1.7.03
XREFS:

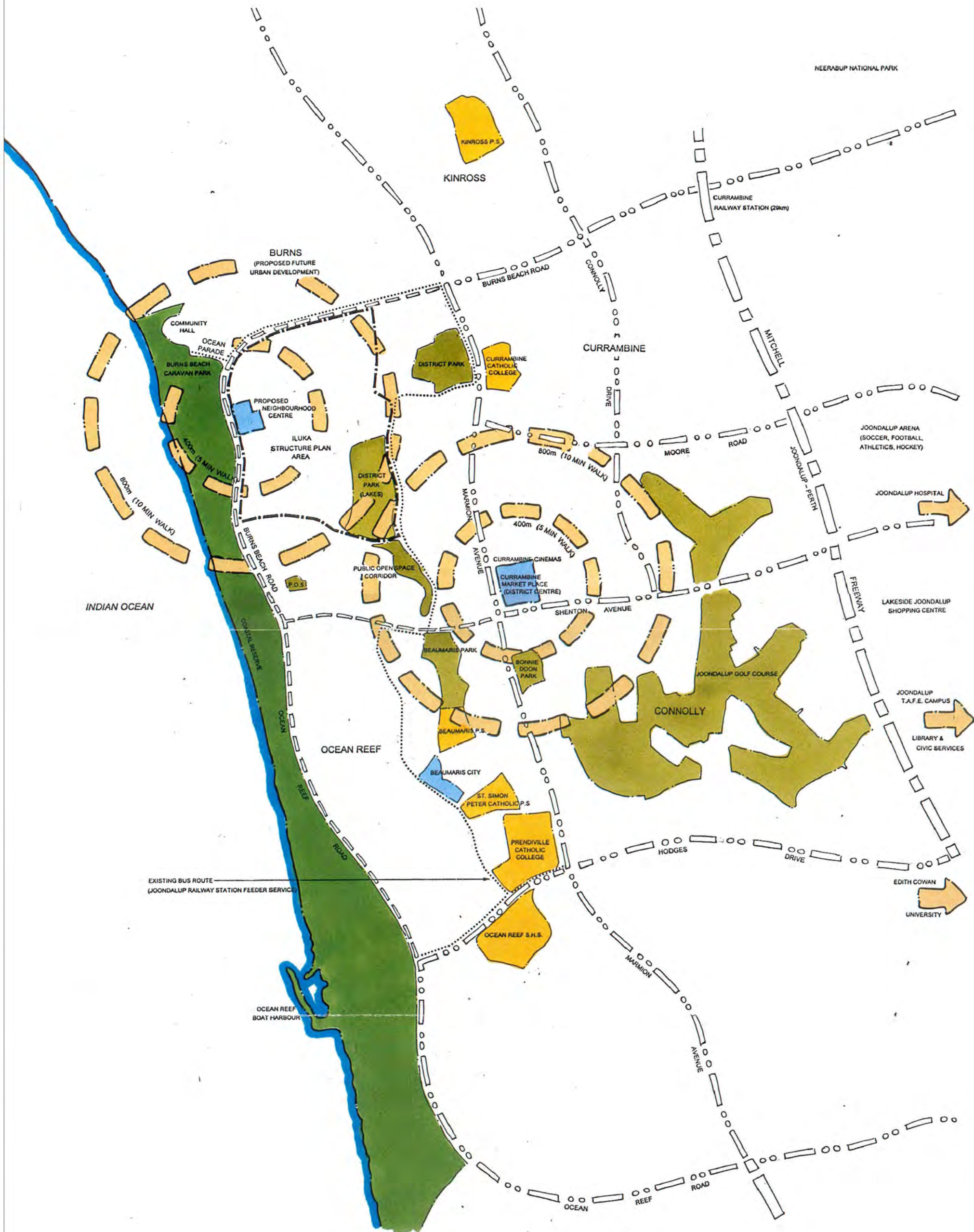
FIGURE 3

Size A3 Dwg. No. BEASTR PLA 01 Rev A

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<p>PERTH 9 Havelock Street West Perth 6005 PO Box 1498 West Perth Western Australia</p>	<p>Tel: (618) 9321 8888 Fax: (618) 9321 8888 rdg@robertsday.com.au</p>	<p>MELBOURNE Suite 2, 33 Chessell St South Melbourne Victoria</p>	<p>Tel: (613) 9645 0788 Fax: (613) 9645 0799 rdg@robertsday.com.au</p>
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CONTEXT ANALYSIS PLAN ILUKA - CITY OF JOONDALUP BEAUMARIS LAND SALES

FIGURE 4

Client: SATTERLEY
Scale: NTS at A3
Drawn: PV
Checked: JB
Approved: DC
Date: 1.7.03
XREFS:

Size: A3
Dwg. No.: BEA STR PLA 04
Rev: A

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- LEGEND**
- 400m WALKABLE CATCHMENTS
 - DISTRICT OPEN SPACE
 - LOCAL POS



PUBLIC OPEN SPACE PLAN
ILUKA - CITY OF JOONDALUP
BEAUMARIS LAND SALES

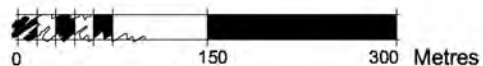


FIGURE 5

Client: SATTERLEY
Scale: 1:6000 at A3
Drawn: PV
Checked: JB
Approved: DC
Date: 1.7.03
XREFS:

Size A3
Dwg. No. BEASTR PLA 05
Rev A

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- LEGEND**
- PARKS AND RECREATION RESERVE
 - CENTRE ZONE
 - RESIDENTIAL ZONE
 - R30 DENSITY CODE
 - R25 DENSITY CODE
 - R20 DENSITY CODE
 - SUBJECT TO FURTHER PLANNING
 - 'SPECIAL STREETS' - SUBJECT TO DETAILED DESIGN

STRUCTURE PLAN
ILUKA - CITY OF JOONDALUP
BEAUMARIS LAND SALES



day

scale: 1:5000
 drawn: ES
 checked: CE
 approved: DC
 date: 31.01.05
 client: BEAUMARIS LAND SALES

Beaumaris
Land Sale
 Saturday Road Sale
FIGURE