

CERTIFICATION OF AGREED STRUCTURE PLAN

(SCHEDULE 8)

CERTIFIED THAT AGREED STRUCTURE PLAN No. 5, COOK AVENUE (C-AIR HOUSING DEVELOPMENT) STRUCTURE PLAN WAS ADOPTED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON _____.

.....
being an officer of the Commission duly authorised by the
Commission pursuant to section 57 of the *Western Australian
Planning Commission Act 1985*

AND BY RESOLUTION OF THE COUNCIL OF THE CITY OF JOONDALUP ON _____ AND THE SEAL OF THE CITY OF JOONDALUP WAS PURSUANT TO THE COUNCIL'S RESOLUTION HERETO AFFIXED IN THE PRESENCE OF

.....
Chairman of Commissioners

.....
Chief Executive Officer

Record of Amendments made to the Agreed Cook Avenue (C-Air Housing Development) Structure Plan

Amendment No.	Description of Amendment	Endorsed by Council	Endorsed by WAPC

Investa Developments Proprietary Ltd

C-Air Housing
Development: Achieving
Sustainability in Housing
Cook Ave Structure Plan

May 2004

Reference: 0010255

For and on behalf of
Environmental Resources Management
Australia

Approved by: Ian Brashaw

Signed: 

Position: Project Director

Date: 10 May 2004

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1.1

STATUTORY BASIS

Clause 9.8 of the City of Joondalup District Planning Scheme No. 2 (hereinafter called "the Scheme") provides, amongst other things that a provision, standard or requirement of a Structure Plan approved under Part 9 of the Scheme shall be given the same force and effect as if it was a provision, standard or requirement of the Scheme. Furthermore, Clause 9.8.3(g) of the Scheme states that an agreed structure plan may distinguish between provisions, requirements or standards which are intended to have effect as included in the Scheme, and those that are not. It is hereby provided that such force and effect shall only be given to Part 1 of this Structure Plan. Part 2 of this Structure Plan is for explanatory purposes only, providing a descriptive analysis of the structure plan.

Subclause 9.8.3 (f) of the Scheme, states that, where, in the event of there being any inconsistency or conflict between any provision, requirement or standard of the Scheme and any provision, requirement or standard of an Agreed Structure Plan, the provision, requirement or standard of the Scheme shall prevail.

1.2

SUMMARY

The Cook Avenue (C-Air Housing Development) Structure Plan refers to Lot 124, Cook Avenue in the suburb of Hillarys, Swan location 16388 (Vol. 1902, folio 554). This lot has an area of 3.99964 hectares.

The site is reserved as Local Reserve: Public Use - Primary School under the Scheme for primary school purposes. A scheme amendment is proposed that would see this land zoned to Urban Development Zone, with a low to medium density residential coding.

This Structure Plan provides the framework for the progressive development of the subject land. The area is divided into three residential precincts, each of which has different design elements to ensure a variety of residential dwellings are developed.

**COOK AVE (C-AIR
HOUSING DEVELOPMENT)
STRUCTURE PLAN**

PART 1

2.1

STATUTORY WEIGHT

As provided for under the provisions of Clause 9.8.3, and Part 9 of the Scheme, this part of the Structure Plan has the same force and effect as a provision, standard or requirement of the Scheme.

Part 1 of this Structure Plan has been endorsed by the Western Australian Planning Commission (WAPC) as a general guide to future subdivision, zoning and development of the land included in the *Cook Avenue (C-Air Housing Development) Structure Plan* area.

If a variation to the Structure Plan criteria is sought, planning approval must be sought by way of a development approval application to the Council.

2.1.1

Subject Area

The Cook Ave (C-Air Housing Development) Structure Plan area comprises the sum of Lot 124, being approximately 4 hectares of Swan location 16388, Cook Avenue, Hillarys. The Certificate of Title is contained in *Annex A* for reference.

2.2

PRECINCTS

Plan 1 - 'Structure Plan Map' - indicates the Residential Precincts for the subject land described in the text. This map defines the following Precincts:

- Perimeter Dwelling Precinct;
- Internal Dwelling Precinct; and
- Grouped Dwelling Precinct.

2.3

DEFINITIONS

The terms used in this Structure Plan shall have the interpretations set out hereunder:

"BUILDING HEIGHT" means the vertical distance at any point from natural ground level to the uppermost part of the building above that point (roof ridge, parapet or wall), excluding minor projections above that point. Minor projections include finials, chimneys, vent pipes, aerials or other appurtenance of like scale.

"GROUND FLOOR LEVEL" means the floor level of a grouped dwelling at or nearest to the finished ground level of the lot immediately adjacent to the grouped dwellings.

"GROUND LEVEL" means the finished level of the lot relative to the finished Australian Height Datum (AHD) level of the road that it fronts (existing or as established at subdivision stage) and immediately adjacent to the lot. The finished level of the lot shall be +/- 0.5 metres from the AHD level of the midpoint of the road and measured from the midpoint of the frontage of each lot frontage.

"STOREY" shall mean the vertical space extending from one habitable floor of a building to the floor above and for residential properties shall be deemed to be no more than 3.5 metres. The term shall not include any space within a roof, whether used for habitation or not.

"THE SCHEME" shall mean the City of Joondalup District Planning Scheme No 2 (as amended) gazetted 28 November 2000 or such amendments or modifications thereto that may be current.

2.4

THE SCHEME

Unless provided for by specific requirements in this Structure Plan, all requirements shall be in accordance with the City of Joondalup District Planning Scheme No 2 (as amended) gazetted 28 November 2000 or such amendments or modifications thereto that may be current.

2.5

RESIDENTIAL DESIGN CODES

All dwellings are required to comply with the Acceptable Development Provisions (ADP's) of the Residential Design Codes of Western Australia (the Codes), unless otherwise provided for by the specific requirements of this Structure Plan. Any proposed development that deviates from the ADP's will be required to address the Performance Criteria of the Codes by way of an application for development approval to the City of Joondalup.

Pursuant to Clause 4.2.5 of the Scheme, Plan 1 - 'Structure Plan Map' - identifies the location of the R25 and R40 residential densities that apply to the site.

2.6

TOWER ELEMENTS

Tower elements are encouraged on corner lots of the Perimeter and Internal Dwelling Precincts, and at the entrances to the Cook Ave (C-Air Housing Development). Tower elements are not permitted in the Grouped Dwelling

precinct. Tower elements must be consistent with the design provisions described for each Precinct, with a variation from the specified design provisions requiring the tower element to be approved as the subject of a development application.

Any application for development approval shall be accompanied by an explanation of the likely impact of the height and location of the tower element on the amenity of surrounding areas and adjacent residential lots, having particular regard to:

- (i) overshadowing and sun-shading; and
- (ii) the protection of privacy for private outdoor areas and internal spaces.

The locations of potential tower elements are demonstrated on Plan 3 – 'Indicative Building Footprint Plan'.

2.7

RESIDENTIAL DESIGN

The aim of each Precinct is to create a distinguishable built form character through design and materials. It is also the intention to create a sustainable housing development that makes the most of aspects such as solar access, pedestrian accessibility, and neighbourhood amenity. Plan 2 – 'Development Layout Plan' illustrates the layout of the overall subdivision.

Plan 4 – 'Indicative Streetscape and Section Plan' indicates the street elevation from the Public Open Space looking west and the cross section from Willandra Drive to the north. It indicates the finished floor levels of the indicative dwellings.

Solar Access

Where subdivisional design constraints allow, passive solar access can be achieved through the northerly orientation of daytime living areas and windows. It is the intention at the Cook Ave (C-Air Housing development) to achieve passive solar access as part of the design, in order to fulfil acceptable development criteria.

Building Bulk

With zero lot line development permitted, it is important to ensure that dwellings are not designed with large expanses of blank wall. It is Investa's intention that dwellings be designed with windows overlooking public spaces and roads.

Willandra and New England Street Frontages

Proposed dwellings fronting Willandra and New England Drives are to be of single storey height to acknowledge the existing views of residents in these streets.¹ Furthermore, only one boundary to each property can be of zero lot line to create breaks in the development and built form.

Grouped Dwellings

Because of the steep ground contours in the Grouped Dwelling Precinct, it is proposed to contour the precinct with the use of retaining walls. The natural ground slope will be terraced to create three level building platforms, on which the three grouped dwellings will be constructed. The maximum building height in this precinct has therefore been defined from ground floor level rather than ground level, in order to accommodate the steep ground contours.

Roof Pitch

Roof pitches will be no less than 26 degrees and no greater than 35 degrees across all precincts.

Materials

All dwellings will be constructed with non-reflective materials such as masonry (rendered or brick finish), roof tiles and / or Colorbond roofing. Colours will vary across the precincts.

2.8 *TRAFFIC MANAGEMENT*

2.8.1 *Parking*

Investa has provided on-street parking for visitors in various locations around the site. There are 53 on-street visitor car parks provided internally to the site (note, parking is possible on both sides of the main east-west internal access). In addition, on-street parking is available in Willandra Drive, New England and Ferndene Mews (it is estimated there are at least 48 car parks available along New England and Willandra Drives alone). In addition, each lot has 2 car parks provided on-site.

¹ With the exception of the single lot on the corner of Willandra and New England Drives which shall be two storey.

2.8.2 *Traffic Measures*

The local residents have concerns about the existing traffic speeds along Cook Avenue. In order to address this existing issue and to accommodate proposed vehicle access to the site appropriate road widths to Cook Avenue, inclusive of a bike lane and dual use path, Investa have undertaken to make alterations to that Avenue. Accordingly, the proposed alterations to Cook Avenue are to be detailed in a management report as part of the subdivision application process. The measures will include:

- creation of a pavement suitable to accommodate a single carriageway on both sides of the road inclusive of a bike lane;
- inclusion of a dual use path in the road reserve;
- provision of a centralised median to tighten the pavement and reduce speeds along Cook Avenue;
- inclusion of trees in the medians to add a vertical element to assist in speed reduction; and
- location of proposed crossovers to acknowledge the location of existing driveways to the existing residential properties to the north.

2.9 *PROVISIONS*

This document identifies three precincts, distinguished by built form character. Together these precincts will provide a diversity of housing choice and lifestyle options for residents choosing to locate there. For each precinct, provisions include *objectives* (which describe in general terms the intentions to be addresses in each precinct); and *criteria* (which set out built form requirements ("shall..") and preferred treatments ("should...")).

2.10 *PERIMETER DWELLING PRECINCT*

2.10.1 *Objectives*

Objectives intended for the Perimeter Dwelling Precinct include:

- (i) Encourage a variety of single residential dwelling types at a maximum density of R25;
- (ii) Promote layouts that provide for pedestrian-friendly streetscapes with passive surveillance of the public spaces;

- (iii) Encourage the creation of a consistent form and character through the consistent use and combination of appropriate dwelling design, colours and material; and
- (iv) Ensure that development has regard for the amenity of adjacent lots and surrounding areas.

2.10.2

Criteria

Criteria to be satisfied in this precinct are:

- (i) Notwithstanding the provisions of the Residential Design Codes, buildings should achieve a setback from the front boundary as follows:
Dwellings - 3m; and Rear - nil;
- (ii) Notwithstanding the provisions of the Residential Design Codes, garages to the laneway rear boundary shall achieve a nil setback, and garages to the front boundary shall achieve a setback of 4.5m;
- (iii) Each dwelling must provide at least 2 covered car-bays on site. Car parks shall be accessed from rear lanes where they are provided;
- (iv) In order to maximise site usage, zero lot line development is permitted to one site boundary, provided that any overshadowing of adjoining lots does not exceed 50% of the private outdoor living area. The setback on the remaining side boundary should comply with the provisions of the Residential Design Codes;
- (v) Notwithstanding the provisions of the Residential Design Codes and the Building Codes and Regulations, retaining walls of up to 2m in height are permitted;
- (vi) Notwithstanding any existing or proposed City of Joondalup policy, dwelling sites in this precinct may have a slope gradient of greater than 1 in 10;
- (vii) Buildings on corners shall address each street frontage and the corner with equal importance;
- (viii) Buildings shall be designed to have active frontages with no blank facades fronting the street or public open space;
- (ix) Advertising, signage or hoardings will not be permitted except in conformity with the provisions of the City of Joondalup Signs Local Law for a residential area;
- (x) Roofs: Where pitched, roofs shall be no less than 26 degrees and no greater than 35 degrees. Minor projections such as verandahs and

canopies may have shallower pitches. Curved roofs and flat roofs concealed by parapets shall also be permitted;

- (xi) Utility areas such as bin and service areas shall be screened from view from streets and public open spaces;
- (xii) The provisions of City of Joondalup Policy 3.1.9, "Height and Scale of Buildings within a Residential Area" shall not apply;
- (xiii) The maximum Building Height shall be as follows: *Wall height* - 7m; *Roof ridge* - 9.5m;
- (xiv) Notwithstanding clause xiii above, dwellings fronting Willandra and New England Drives shall be single storey at these street frontages, with a maximum building height as follows: *Wall height* - 4m; *Roof ridge* - 6.5m. The exception shall be the single lot on the corner of Willandra and New England Drives which shall be two storey;
- (xv) Tower elements must contribute to the landmark quality of the building, and can take the form of towers, lookouts, and lofts. Tower elements can only be located on corner lots and at the entrance to the Cook Ave (C-Air Housing Development), and shall have a maximum building height as follows: *Roof ridge* - 11m, and plan dimensions no greater than 4m by 4m; and
- (xvi) Notwithstanding the provisions of the Residential Design Codes, open space shall not be less than 40% of each individual lot.

2.11 INTERNAL DWELLING PRECINCT

2.11.1 Objectives

Objectives intended for the Internal Dwelling Precinct include:

- (i) Encourage a diversity of dwelling types at a maximum density of R40;
- (ii) Encourage a strong sense of architectural identity at special locations, such as opposite public open space and corner sites; and
- (iii) Ensure that development has regard for the amenity of adjacent lots and surrounding areas.

2.11.2 Criteria

Criteria to be satisfied in this precinct are:

- (i) Notwithstanding the provisions of the Residential Design Codes, buildings should achieve a setback from boundaries as follows: *Front*: dwelling - 3m; *Side*: nil setbacks to both boundaries is permitted (provided Clause (iv) below is satisfied); *Rear*: nil setback is permitted;
- (ii) Notwithstanding the provisions of the Residential Design Codes, garages to the laneway rear boundary shall achieve a nil setback, and garages to the front boundary shall achieve a setback of 4.5m;
- (iii) Where lots front onto public open space and notwithstanding the provisions of the Residential Design Codes, the dwelling shall be set back 2m to the open space boundary;
- (iv) Zero lot line development will be permitted as set out in Clause (i) above, provided that any overshadowing of adjoining lots does not exceed 50% of the private outdoor living area;
- (v) Carparking shall be accessed from rear lanes where they are provided. Each dwelling must provide 2 on site car parking bays of which at least 1 must be covered;
- (vi) Notwithstanding the provisions of the Residential Design Codes and the Building Codes and Regulations, retaining walls of up to 2m in height are permitted;
- (vii) Notwithstanding any existing or proposed City of Joondalup policy, dwelling sites in this precinct may have a slope gradient of greater than 1 in 10;
- (viii) Buildings on corners shall address each street frontage and the corner with equal importance;
- (ix) Buildings shall be designed to have active frontages with minimal blank facades fronting the street or public open space;
- (x) Advertising, signage or hoardings will not be permitted except in conformity with the provisions of the City of Joondalup Signs Local Law for a residential area;
- (xi) Roofs: Where pitched roofs shall be no less than 26 degrees and no greater than 35 degrees. Minor projections such as verandahs and canopies may have shallower pitches. Curved roofs and flat roofs concealed by parapets shall also be permitted;
- (xii) Utility areas such as bin and service areas shall be screened from view from streets and public open spaces;
- (xiii) The provisions of City of Joondalup Policy 3.1.9 "Height and Scale of Buildings within a Residential Area" shall not apply;

- (xiv) The maximum Building Height shall be as follows: *Wall height* - 7m; *Roof ridge* - 9.5m;
- (xv) Tower elements must contribute to the landmark quality of the building, and can take the form of towers, lookouts, and lofts. Tower elements can only be located on corner lots and at the entrance to the Cook Ave (C-Air Housing Development), and shall have a maximum building height as follows: *Roof ridge* - 11m, and plan dimensions no greater than 4m by 4m; and
- (xvi) Notwithstanding the provisions of the Residential Design Codes, open space shall not be less than 40% of each individual lot.

2.12 *GROUPED DWELLING PRECINCT*

2.12.1 *Objectives*

Objectives intended for the Grouped Dwelling Precinct include:

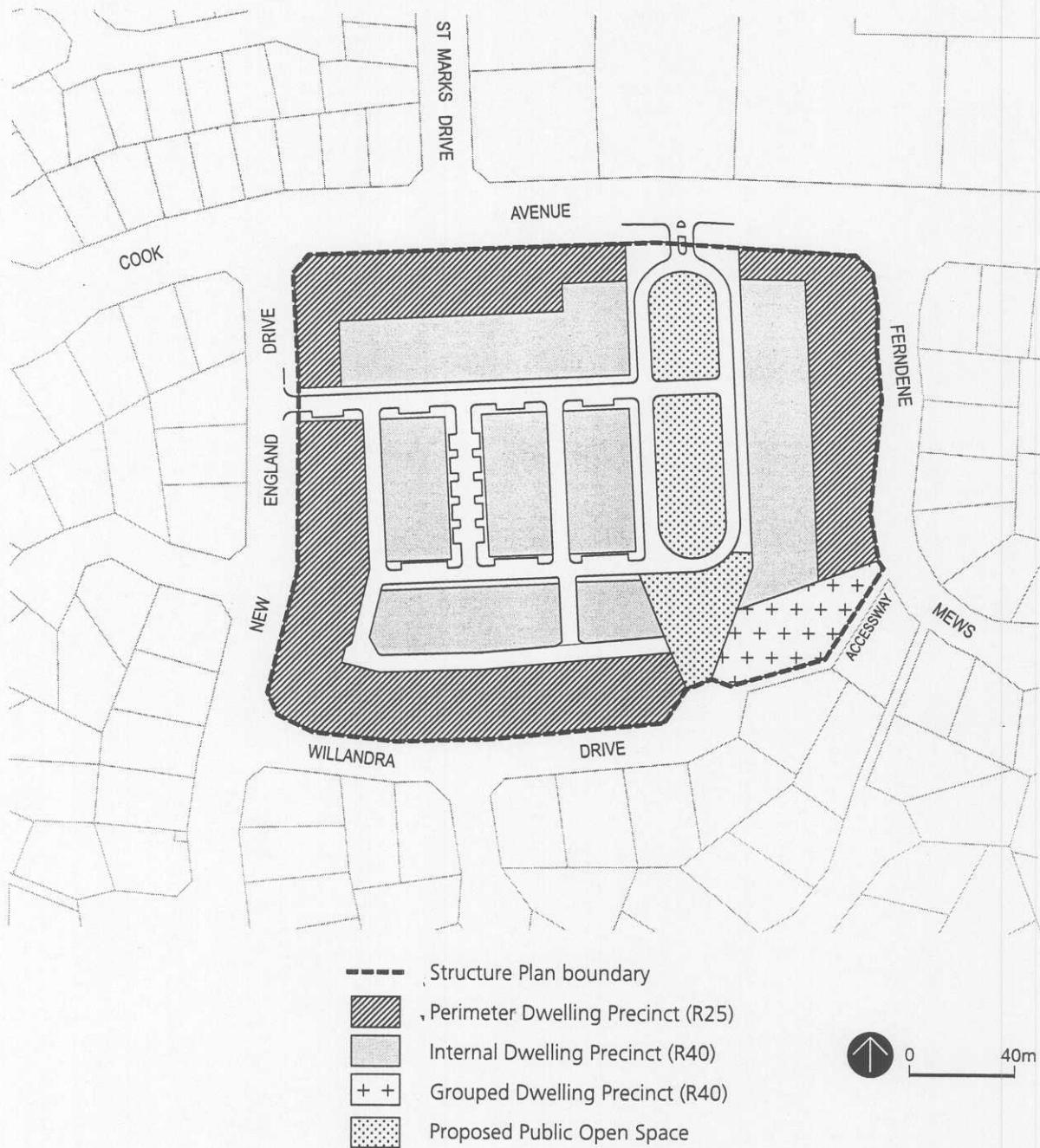
- (i) Encourage a diversity of grouped dwelling types at a maximum density of R40;
- (ii) Encourage a strong sense of architectural identity at special locations, such as opposite public open space; and
- (iii) Ensure that development has regard for the amenity of adjacent lots and surrounding areas.

2.12.2 *Criteria*

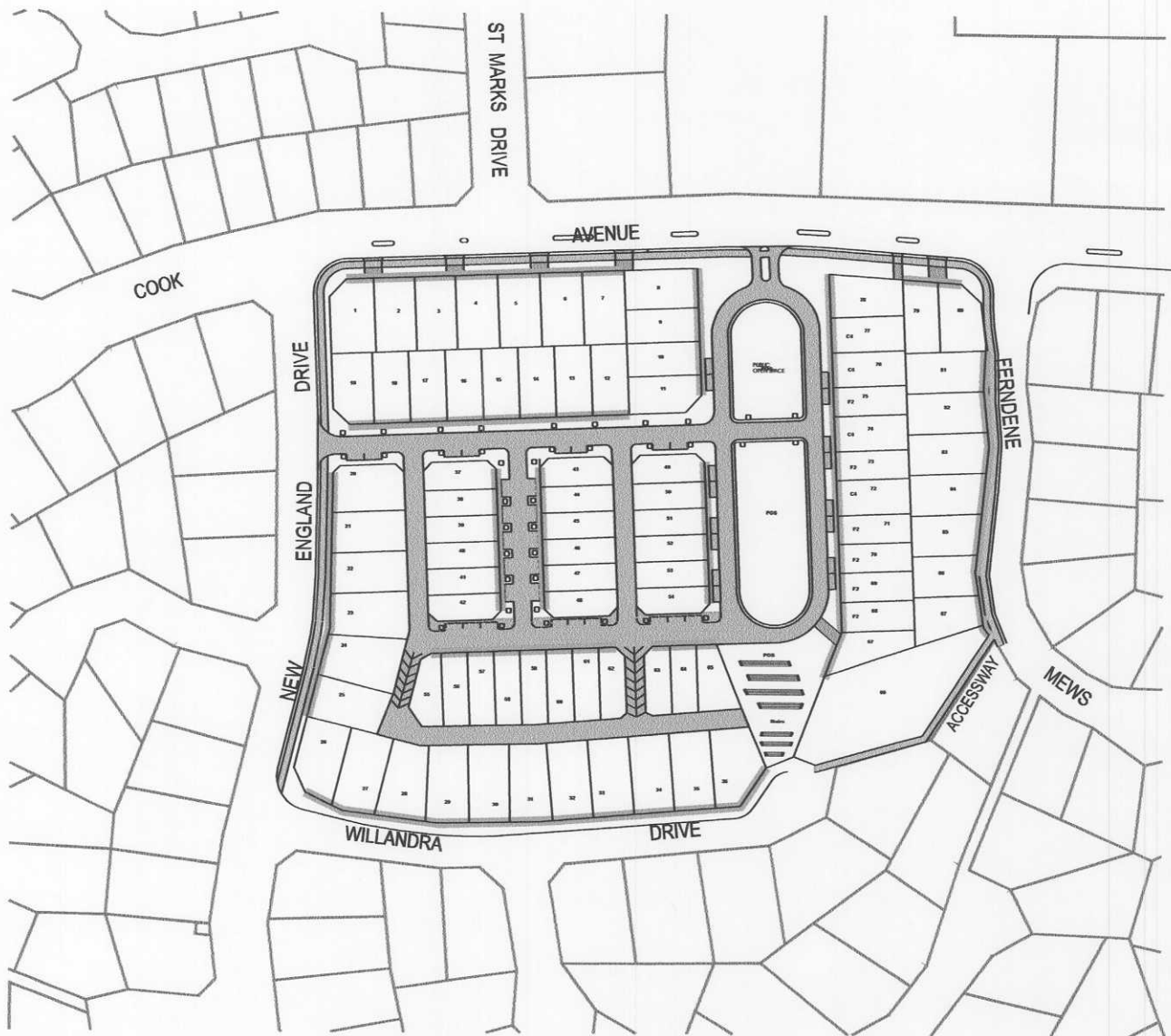
Criteria to be satisfied in this precinct are:

- (i) Notwithstanding the provisions of the Residential Design Codes, buildings should achieve a setback from boundaries as follows: *Front* - 6m; *Public Open Space* - 3m; *Public Access Way* - 1.5m;
- (ii) Each residential dwelling must provide 2 on site car parking bays, of which at least 1 must be covered;
- (iii) Buildings shall be designed to have active frontages with minimal blank facades fronting the street or public open space;
- (iv) Notwithstanding the provisions of the Residential Design Codes and the Building Codes and Regulations, retaining walls of up to 2m in height are permitted;





- (v) Notwithstanding any existing or proposed City of Joondalup policy, dwelling sites in this precinct may have a slope gradient of greater than 1 in 10.
- (vi) Advertising, signage or hoardings will not be permitted except in conformity with the provisions of the City of Joondalup Signs Local Law for a residential area;
- (vii) Roofs: Where pitched roofs shall be no less than 26 degrees and no greater than 35 degrees. Minor projections such as verandahs and canopies may have shallower pitches. Curved roofs and flat roofs concealed by parapets shall also be permitted;
- (viii) Utility areas such as bin and service areas shall be screened from view from streets and public open spaces;
- (ix) The provisions of City of Joondalup Policy 3.1.9 "Height and Scale of Buildings within a Residential Area" shall not apply;
- (x) The maximum Building Height measured from Ground Floor Level shall be as follows: *Wall height* - 9m; *Roof ridge* - 11m;
- (xi) No tower elements are permitted in this precinct; and
- (xii) Notwithstanding the provisions of the Residential Design Codes, a minimum of 16m² of balcony space for each residential dwelling shall be provided in lieu of communal open space.



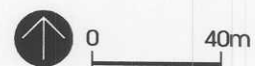
Plan 1: Structure Plan Map



LEGEND

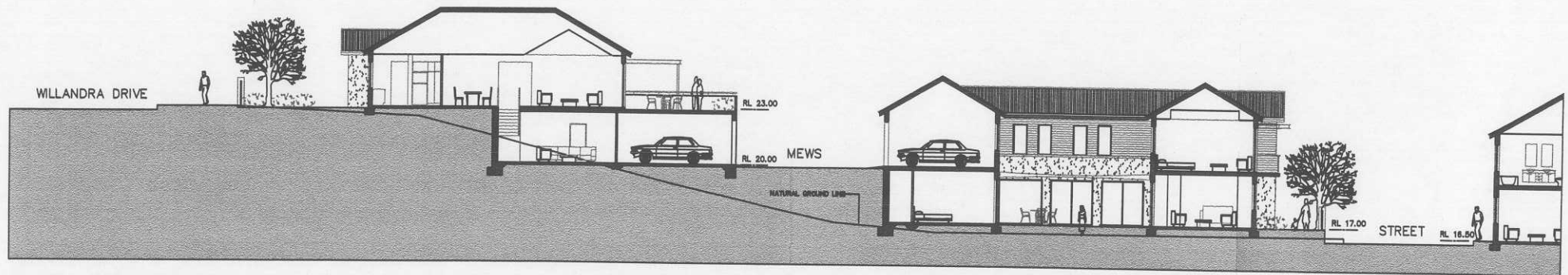
-  Dual Use Path 2.4m wide
-  Future Crossover
-  Road Pavement
-  Frontage of Lots

Plan 2: Development Layout Plan





Elevation from Public Open Space Looking West



Western Cross Section

Note: All levels are
subject to final
engineering design.

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**COOK AVE (C-AIR
HOUSING DEVELOPMENT)
STRUCTURE PLAN**

PART 2

PRECIS

In Western Australia, and internationally, there is an increasing focus on achieving sustainable outcomes in planning and development. The impetus for achieving sustainable outcomes grew out of the 1992 Rio de Janeiro Earth Summit, which introduced the international community to the concept of sustainable development. The fact that this concept has become increasingly recognised and accepted internationally is reflective of the mounting understanding that development must respect the environment and communities within which it is located. Increasingly, it is no longer acceptable just to focus on the economic bottom line when considering a development proposal.

In response to this international agenda, the State Government released its draft State Sustainability Strategy in 2002. The aim of this strategy is to protect the State's living standards and the environment, while concurrently allowing development to occur. Releasing this strategy reinforced Western Australia's commitment to the sustainability agenda.

Investa Developments Proprietary Ltd (Investa) recognises the increasing importance of sustainable development, and is committed to achieving sustainable housing outcomes.

In accordance with sustainability principles, the *C-Air* Housing Development (the development) offers a diversity of dwelling styles on an in-fill land parcel at Lot 124, Cook Avenue, Hillarys (the site), in close proximity to regional facilities and services. The development is promoted on the quality of dwelling design set amongst a formal park setting, with all necessary infrastructure services being available to the site. The site's topography has been reflected in the responsive dwelling design, avoiding the use of retaining walls while acknowledging the existing residential environment. It also takes advantage of the views across Hillarys and through the central landscaped park. An innovative stormwater disposal and drainage system has also been developed that avoids the need for the creation of an unsightly drainage sump.

With the *C-Air* Housing development, Investa will create appealing, high quality, residential housing incorporating innovative site and dwelling design, based on sustainable development principles.

3.1

OVERVIEW

Following its acquisition of the site, Investa resolved to develop it as a quality residential development. At the time of purchase, the site was zoned for primary school purposes, and consequently Investa is seeking a town planning scheme amendment to rezone the site for residential purposes. The site was initially subdivided and given over to the Department of Education in the early 1990's as part of Whitfords Beach Estate, Hillarys. It subsequently became surplus to the Department's requirements, and was sold back to the developer of the Whitfords Beach Estate (now a wholly owned subsidiary of Investa). As required by the City of Joondalup, this Structure Plan has been prepared to outline how the site will be developed.

3.1.1

The Location

The site is approximately 4 ha in area, and sits in the residential neighbourhood of Hillarys. Bounded by New England Drive, Cook Avenue, Willandra Drive and Ferndene Mews, it is located in close proximity to the beach, community, commercial and recreation facilities, and also has access to public transport routes and facilities.

3.1.2

The Proposal

Investa is proposing to develop a quality medium density residential dwelling development on the site, based on sustainable design principles. This will complement the existing residential development in the surrounding streets, and develop a site that has been vacant for several years. Entitled 'C-Air Housing Development', there will be a variety of dwelling designs and styles available on appropriately sized allotments. The proposed residential development plan contained in *Annex B* shows a total of 87 lots being created (one of which is a group dwelling site).

A Public Open Space (POS) area of approximately 3,700m² will also be established, running through the interior of the site on a north-south axis. In addition to creating an area for passive recreation, some of the POS will be used to accommodate drainage - an innovative design response that avoids the need to create an unsightly drainage sump that is also an ineffective use of land.

Individual dwelling design and construction will also be based around sustainable design principles. Energy efficient appliances and dwelling design that maximises the benefits of solar orientation and natural ventilation

and cooling will contribute to the overall energy efficiency of the development.

3.2

INVESTA'S VISION AND COMMITMENT

In accordance with the State sustainability focus, Investa is committed to achieving sustainable outcomes at the C-Air Housing Development. In the context of the residential housing market, this can best be achieved through careful planning and design, and subsequently considerable time and effort has been spent to ensure that the development's design is compatible with sustainable development principles. *Sections 4, 5 and 6* outline the measures implemented by Investa that will result in sustainable benefits to the community and the environment.

The vision of Investa is to create an appealing, high quality, residential dwelling development incorporating innovative site and dwelling design, based on sustainable development principles, and in which housing and lifestyle options are enhanced.

3.2.1

Sustainable Outcomes

The C-Air Housing Development will achieve the following outcomes:

- a choice of medium density dwellings in close proximity to Whitfords Beach, Whitfords regional shopping centre and community facilities, schools, and public transport facilities;
- reduced need to use private cars due to proximity to community facilities, services and public transport routes;
- development of a site within an existing urban context, rather than traditional greenfields expansion;
- stormwater recharge of groundwater via an underground infiltration system beneath the POS area; and
- 5 Star energy rated dwellings that are equipped with rainwater tanks, greywater reuse systems and energy efficient appliances.

3.3

COMMUNITY CONSULTATION

In accordance with accepted sustainable development principles, community consultation with the surrounding residents was undertaken prior to entering the design phase. The aim of this consultation was to identify peoples' concerns and ideas for the future development of the site. More detail regarding the consultation undertaken is outlined in *section 7* of this report.

4.1

LAND USE

The predominant land use in the neighbourhood surrounding the proposed development is residential. The coast is approximately 2 kilometres to the west, while to the north, south and east are residential suburbs. The Whitfords Regional Shopping Centre and associated community facilities are further to the north. Local community POS is provided in the neighbourhood vicinity and further to the east is the Yellagonga Regional Park. Refer to *Figure 1* for a map of the neighbourhood.

Achieving Sustainable Outcomes

The Australian Greenhouse Office advises that local government should be encouraging more medium density development through:

- (i) identifying large government and privately owned sites suitable for infill redevelopment; and
- (ii) pursuing medium and high density development through urban consolidation.²

Investa's C-Air Housing Development is compatible with both these aims – it infills a large vacant site within a residential area, and it does so at a medium density. This helps reduce further urban expansion over greenfields sites and makes efficient use of the existing infrastructure and services in the neighbourhood.

4.2

PUBLIC TRANSPORT AND CYCLEWAYS

Reducing dependency on private car use and conversely increasing use of public transport, walking and cycling are key aspects of moving towards a more sustainable society. Reducing private car use can have benefits in terms of less greenhouse emissions, less congestion, cleaner air and waterways and reduced use of fossil fuels.

In Hillarys, there is a bus route along Cook Avenue (route 441) that provides access to the Whitfords commercial centre, and the suburbs of Padbury, Sorrento and Hillarys. This route also provides two connections to the

² Australian Greenhouse Office website; www.greenhouse.gov.au; accessed 22 July 2003



Legend

- Bus Route
- Subject Site

Figure 1

C-Air Housing Development
Locality Plant

Lot 124 Cook Avenue, Hillarys

Project No.8020804



Joondalup railway line (Whitfords Station and Warwick Station), that provides direct commuter transport into Perth.

Another bus route is also available from Whitfords City (a short walk from the C-Air development). This bus route services the AIUS Curtin University, Joondalup TAFE and Edith Cowan University campuses in Joondalup, in addition to the Lakeside Joondalup shopping centres.

Achieving Sustainable Outcomes

By locating an additional 85 households in the Hillarys suburb, the viability of the bus routes servicing this area is increased. The fact that the 441 bus route links up to the railway line servicing Perth also provides an alternative option for commuters working in Perth whom may choose to use public transport to get to work over the private car.

The location of the development close to facilities also makes walking and cycling a viable option for short trips. Cycling ability is enhanced by Investa's proposal to make changes to the Cook Avenue road layout as a result of community concerns over traffic speed. The revised road layout will result in a road reserve of 10 metres, consisting of a central median of 1.8 metres, 2 carriage lanes of 3.3 metres and 2 cycle lanes of 1.2 metres. Shared footpaths will also be constructed along the site frontage of Cook Avenue for use by cyclists and pedestrians.

4.3

COMMUNITY FACILITIES

The surrounding neighbourhood is well serviced by community facilities. Within a short distance (500m – 2,000m) there are:

- the Whitfords Beach coastline;
- 3 parks (James Cook, Mawson and Flinders);
- 4 schools (St Marks Anglican Community School, Bambara and Padbury Primary Schools, and Padbury Senior High School);
- the Whitfords Regional Shopping Centre (complete with library, cinemas, community centre and shops); and
- MacDonald Reserve – a recreational reserve with netball, basketball and recreation centre facilities.

Achieving Sustainable Outcomes

Locating medium density housing in this vicinity is consistent with accepted sustainability principles that suggest higher densities of people living within easy walking distance of services and facilities leads to a number of benefits. These benefits include decreased use of cars, increased public transport patronage and viability, and safer, more active neighbourhoods.³

4.4

HOUSING DENSITY

The residential density of surrounding development is generally R20, although there some is R40 and R25 development on the north side of Cook Avenue. The proposed residential density of the C-Air Housing development will be between R25 – R40, with a lot size range between 220m² to 400m². It is noted that the larger lots are located around the perimeter of the site to maintain a similar level of density to adjacent development. The higher density lots are located internal to the proposed development, with an outlook over the POS.

Achieving Sustainable Outcomes

Medium density housing in proximity to services and facilities is increasingly being recognised as a more sustainable form of housing. Increased efficiencies in energy and public transport usage, and reductions in private car use and greenfields development all combine to make this form of housing a more viable alternative to the traditional stand-alone dwelling on a quarter acre section.⁴

In accordance with this, the Australian Greenhouse Office advises that local government should be encouraging more medium density development through:

- pursuing medium and high density development through urban consolidation;
- encouraging a range of dwelling types matched to needs, including affordable and smaller dwellings, so that energy use particularly through heating is reduced;
- encouraging more energy-efficient housing, reduced use of transport, and less development in outer urban areas; and

³ Planning SA (November 2000). "Urban Transport and Climate Change – Developing an Integrated Investment Framework". (Planning SA, Adelaide)

⁴ Australian Greenhouse Office website; www.greenhouse.gov.au; accessed 22 July 2003

- identifying large government and privately owned sites suitable for infill redevelopment.⁵

4.5

MARKET RESEARCH

According to *Peard & Associates* (local real estate agents), the current real estate market in Hillarys is very buoyant. Agents are experiencing an increasing demand for low maintenance homes on smaller lots with strong emphasis on security, small gardens and new building innovation. This demand is being driven predominantly by the 'baby boomer' market, seeking to either upgrade from non-beachside suburbs, or downsizing out of larger homes in the area. The current strong demand is expected to continue for the foreseeable future.

Achieving Sustainable Outcomes

Providing housing to meet demand allows people to downsize into a smaller dwelling while remaining in their suburb of choice. This encourages maintenance of social networks and contacts, and avoids the problems of social isolation that may occur if people are forced to move elsewhere to obtain a dwelling within their means. Relocation to a smaller lot and dwelling should also assist with affordability.

⁵ ibid

5.1

INTEGRATION WITH EXISTING DEVELOPMENT

Community concerns were raised regarding the potential impact of development on view corridors and amenity. These social issues have been dealt with through sensitive design that will ensure that the development will contribute positively to the neighbourhood. For instance, the development will not be walled to create a 'gated' style community, with dwellings instead been designed to front the surrounding streets and internally to the POS. In addition, the development has been designed so as to avoid a landscape of identical dwellings and rooftops, thus creating a sense of urban identity and distinctiveness. Finally, view corridors have been protected by utilising the slope of the site, which means that dwellings along Willandra Drive are single storey at the streetscape level, but have additional stories to the rear as the slope subsides.

Achieving Sustainable Outcomes

Avoiding walls, and facing dwellings to the street and POS ensure that there is passive surveillance of these public areas. This contributes to public safety and importantly *perceptions* of safety. The integration of the C-Air Housing Development into the surrounding development also contributes to a sense of community and place that would not be as significant if the development was walled and private. Finally, views have been protected by ensuring that only single storey development occurs along Willandra Drive – the highest point of the site.

5.2

LOCAL ROAD NETWORK

Access to the development will be achieved through dual access points off Cook Avenue and New England Drive. Internally, a two-way road system will be provided around the POS in the centre of the development, with a small internal road grid being established.

Dimensions of the proposed roads are specified in *Table 5.1*, and represented graphically in *Figure 2*.

Table 5.1 *Proposed Road Dimensions*

Road	Road Reserve Width	Verge Width	Pavement Width	Parking
Access Road off Cook Avenue	10.5m	4m and 1m	5.5m	Not demarcated - will occur in road reserve
Internal Road	11m	2.2m and 1m	5.5m	2.3m
Access road off New England Drive	14m	4m and 1.5m	6m	2 x 2.3m

Achieving Sustainable Outcomes

The internal roads have been designed to create a low speed traffic environment that is conducive to pedestrians and cyclists. Cook Avenue will be widened to accommodate a central median that will again separate and reduce speed of motorists. Use of laneways creates a human scale environment that favours pedestrian movement and utilises land more efficiently.

5.3

LANDSCAPING AND PUBLIC OPEN SPACE

The proposed development contains a POS area of approximately 3,700m². Given this does not meet the minimum POS requirement of 10%, Investa will provide cash-in-lieu for the 312m² shortfall. This POS runs north-south through the interior of the development, and is intended as an amenity and passive recreation area. Landscape works are planned, and involve simple verge treatments along the road reserves, and a formal style in the POS. This formal style integrates the POS with the surrounding residential area and offers a pedestrian linkage through an existing desire line to nearby facilities. The POS has been slightly sunk to improve the presence of the formal setting and to improve the safety aspects of the park for children playing in the area (ie. less likely to run out onto the road). Refer to *Figure 3* for an image of the POS.

Achieving Sustainable Outcomes

- **Vegetation**

Lawn and street trees, spaced at approximately one tree per lot line will be planted along the external verges of Willandra Drive, New England Drive and Cook Avenue. Street tree species will be chosen according to the City of Joondalup policy, and will be specially selected for their ability to tolerate strong, salt-laden winds and limestone based soils that are typical of coastal conditions in the area. Lawns will be used as an attractive, low-lying, obstacle free way of treating verges that will survive a summer-time watering regime. Low-lying shrubs and groundcovers are proposed to be included on the lot

truncations on New England Drive to create interest and accentuate the entrances into the subdivision.

- Integration of Drainage

In addition to its role as an amenity and passive recreation area, the POS has been designed to accommodate stormwater drainage (beyond the capacity of the underground drainage basin) whilst retaining access through the site. Formal landscape treatment will allow for simple planting to the edges of the POS that emphasise the edge of the sunken lawn area (for informal play and passive recreation). Steps and low retaining walls are proposed to accommodate the changes in level across the POS, whilst still allowing for alternative universal access. All trees and supplementary planting will be chosen for their proven abilities to cope with coastal conditions, drought tolerance, and will be native where possible.

Pending approval from the Waters and Rivers Commission, it is proposed that a bore will provide the source of water for the irrigation system of the POS. Sprays will be used for watering the lawn areas and drippers for watering all other planted areas, as these are the most efficient methods of irrigation for this scale of project.

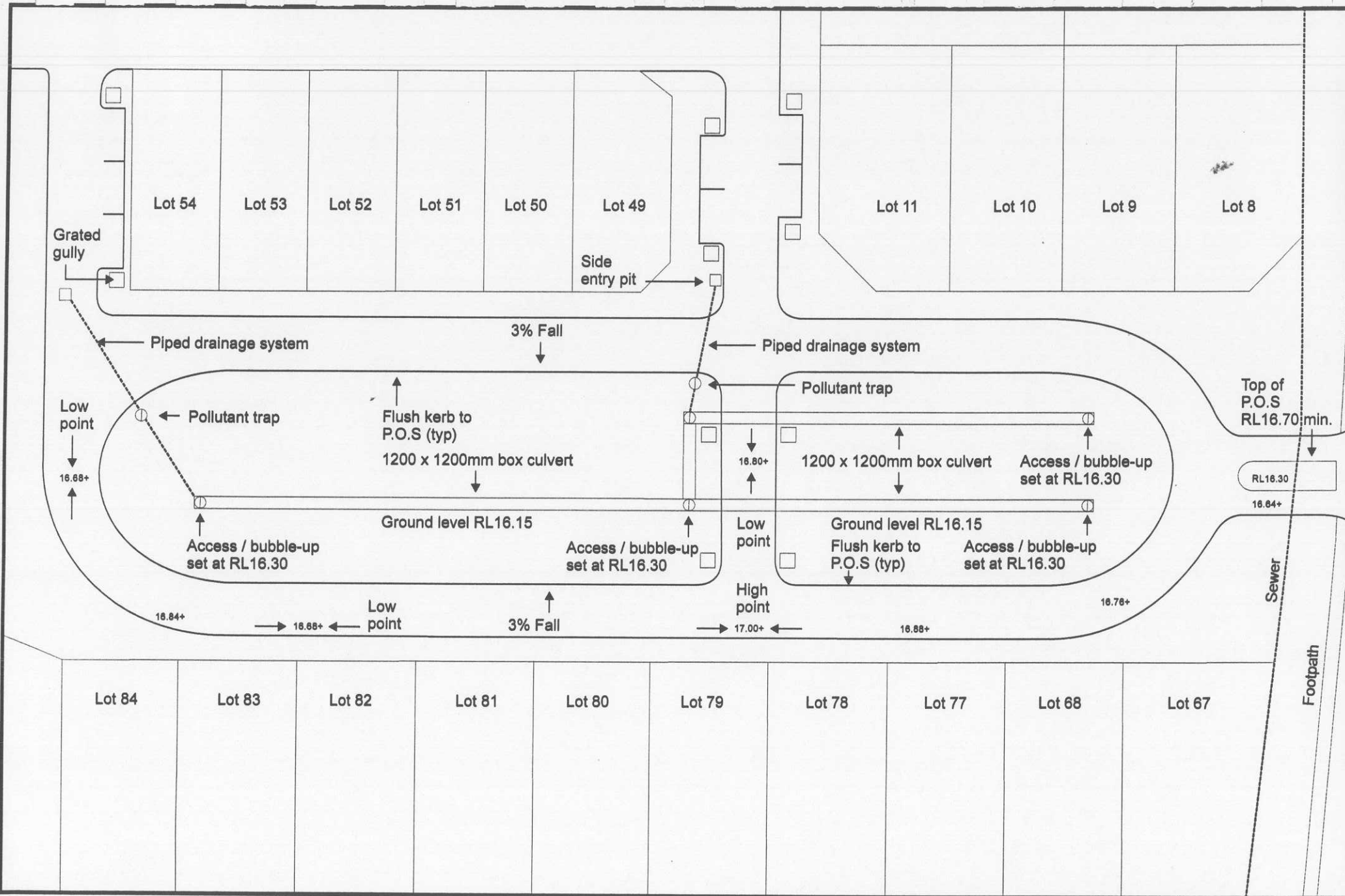
5.4

STORMWATER DRAINAGE

Stormwater in Perth is traditionally disposed of by channelling runoff into a drainage sump to enable infiltration. Drainage sumps are generally large, visually intrusive depressions in the ground that can be unsightly and unkempt, and represent an inefficient use of land. Following community concern over the negative amenity a drainage sump would create, Investa has developed an innovative design response that will achieve an alternative means of disposing of stormwater runoff, based on the implementation of a 'Water Sensitive Urban Design' approach. Features of this approach include:

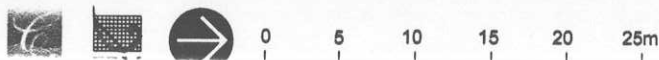
- Roof and lot runoff will be distributed to soakwells on each individual lot.
- Stormwater runoff from the roads, and surplus lot runoff within the development will be collected in a piped drainage system, and directed to a system of box culverts beneath the POS (refer *Figure 3* and *4*). The box culverts are dimensioned at 1.2m by 1.2m, and Investa proposes to locate 155 of the culverts under the POS. These culverts have significant storage capacity, and will be able to store the piped runoff from a 1 in 2 year storm event (approximately 310m³). The culverts store water, from where it will infiltrate slowly into the ground beneath the POS, thus recharging the groundwater while filtering out nutrients.

20.06.03 8020804 LS4.cdr

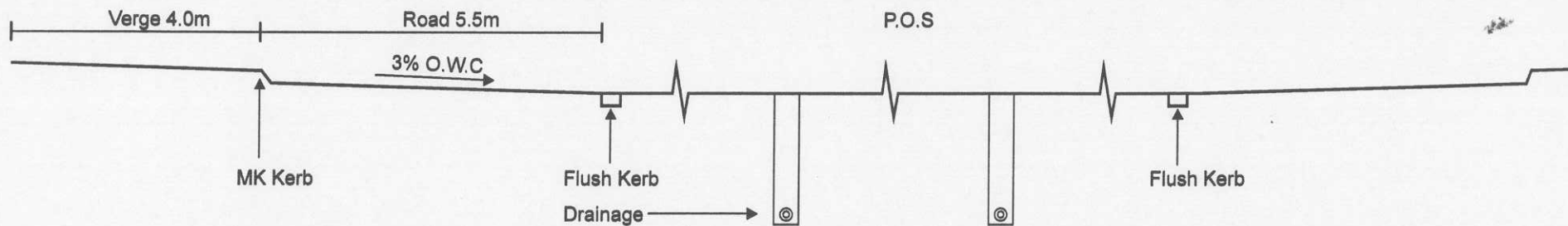


Project No. 8020804

Figure 3 POS Stormwater Drainage



Typical Detail 1-1
Road adjacent P.O.S (no drainage required)



- Roads around the POS will be constructed with flush kerbs, considerably reducing the amount of water entering the piped drainage and box culvert system. Flush kerbs will cause stormwater runoff to discharge directly onto the POS and other grass verges, from where it will quickly infiltrate. It is noted that under current soil conditions on-site, the northern portion of the POS has an infiltration rate of 2m/day, while the southern portion has an infiltration rate of 3m/day. These infiltration rates will increase once the POS is constructed, as Investa is intending to use a more porous soil in the POS to enhance infiltration. In storm events greater than a 1 in 2 year storm, drainage will 'bubble up' across the northern portion of the POS. In the event that this storage capacity is exceeded, additional bubble up will occur across the southern POS area.

Investa's project engineers have carried out calculations which indicate that the overflow ability of these culverts is significant (refer *Annex C*). Under very extreme circumstances, overflow will be accommodated within the POS. While the cost associated with this response is significant (more so than establishing a drainage sump), Investa is committed to this outcome as an effective, sustainable and viable alternative to the community concerns over the creation of an unsightly drainage sump.

Achieving Sustainable Outcomes

Creating drainage sumps is not an efficient form of land use, and can have a negative impact on visual amenity. Sumps can also have a negative effect on neighbourhood land values. Investa has subsequently developed an alternative drainage system that will achieve a more sustainable outcome. Stormwater and drainage will be managed in the development as follows:

- lots with external frontage to existing roads will drain towards the existing stormwater network;
- individual roof and lot runoff will be directed to soak wells installed on each lot;
- runoff from the roads will be piped to the POS in the centre of the development. The use of flush kerbs will reduce the runoff entering the POS significantly by allowing water to infiltrate through the verges; and
- runoff will be stored in 155 box culverts located under the POS, and will infiltrate into the surrounding ground. This storage is sufficient to store a 1 in 2 year storm event. In the event of a severe storm, a drainage area within the POS has been designated.

6.1

HOUSING DESIGN PRINCIPLES

The housing has been designed around sustainability principles, and is consistent with best practice in relation to the following design aspects:

- Energy efficiency
- Solar orientation
- Dwelling footprint size
- Roof eaves
- Glazing
- Cross ventilation
- Construction materials
- Insulation, material and colour palate

Achieving Sustainable Outcomes

Dwelling design has been used to create a sense of place, and to create a development that is unique. Innovative design utilises the lot area effectively, including zero lot line development. Quality materials will be used in the construction of the dwellings to improve the insulation qualities, and lot orientation will assist with cross ventilation and passive solar heating.

6.2

WATER EFFICIENCY

Perth is one of the most inefficient water consuming cities in Australia.⁶ While average per capita usage is comparable to other Australian cities, when lawn, garden and industrial bore water consumption is considered, Perth's water usage becomes considerably more inefficient. At present, total water use in an average Perth single residential household is estimated at 1,207 litres. A recent study indicates that this water is used in the following ways:

- Garden (57%);
- Bath and Shower (14%);
- Washing machine (12%);
- Toilet (9%);

⁶ Office of Water Regulation website; www.ourwaterfuture.com.au; accessed 22 July 2003; Department of Premiere and Cabinet; "The Gallop Government's Long Term Water Strategy".

- Tap (7%); and
- Other (1%).⁷

In an effort to ensure Perth's water use becomes more sustainable, the State Government is preparing a State Water Conservation Strategy that will provide a framework in which to reduce water waste and usage while not compromising quality of life. This development proposal is consistent with the objectives of this Strategy.

Achieving Sustainable Outcomes

This issue has been recognised and provided for in the proposed C-Air Housing Development through a combination of the following measures (to be implemented subject to authority approvals):

- provision and fitting of AAA rated water efficient appliances (including washing machines, dishwashers, and shower heads);⁸
- use of a rainwater collection tank for garden watering and / or toilet flushing; and
- collection and reuse of a portion of greywater for toilet flushing.

While the C-Air Housing Development will therefore be more water efficient than most contemporary developments, it is difficult to accurately estimate the savings that will be made from the implementation of these water efficiency measures. Savings will vary according to household type and composition. However it is possible to estimate some likely savings based on the single residential household model (refer Table 6.1).

Table 6.1 *Estimated Savings from Water Efficient Appliances in a Single Residential Household*

Water Efficient Appliance	Average Daily Savings
Shower Head	17 L/day
Washing Machine (automatic front loader)	41 L/day
Toilet (dual flush)	34 L/day
Garden (rain water tank and greywater)*	227L/day
TOTAL SAVINGS	319 L/day
<i>Source: Water Corporation (March 2003). "Domestic Water Use Study in Perth, Western Australia". (Water Corporation, Perth) at 21-23</i>	
<i>* Assume that a third of daily garden water requirements can be met through tank and greywater reuse</i>	

⁷ Water Corporation (March 2003). "Domestic Water Use Study in Perth, Western Australia". (Water Corporation, Perth) at 20.

⁸ The National Water Conservation Rating and Labelling Scheme is a type test certification program that awards an appropriate A-rating to water efficient products that comply with all the relevant requirements of Joint Australian/ New Zealand Standard AS/NZS6400 *Water efficient products - Rating and labelling*. The A-rating is indicated on a label which provides consumers with point of sale information on the relative water efficiency of those products (Source: Water Services Association of Australia).

If an average of 319 litres per day per dwelling can be saved in the C-Air Housing Development, this represents an average of 116,435 litres per household annually, and almost 10 million litres per year overall for the development.

6.3

ENERGY EFFICIENCY

The Australian Greenhouse Office recognises that improving energy efficiency in the home is one of the most effective ways of reducing greenhouse gas emissions.⁹ Energy consumed by equipment and appliances in the home is a major source of greenhouse gas emissions, and is responsible for more than a quarter of net greenhouse gas emissions in Australia (excluding land use change and forestry).

Achieving Sustainable Outcomes

The C-Air Housing Development recognises this by using a combination of the following star rated energy efficient appliances (4 star or higher).¹⁰

- Washing machine;
- Dishwasher; and
- Gas instantaneous water heating.

On this basis, significant energy savings will be made.

⁹ Australian Greenhouse Office website; http://www.greenhouse.gov.au/community_household.html; accessed 22 July 2003.

¹⁰ The Energy Rating label enables consumers to compare the energy efficiency of domestic appliances on a fair and equitable basis. First introduced in 1986, it is now mandatory nationally for refrigerators, freezer, clothes washers, clothes dryers, dishwashers and air-conditioners (single phase only) to carry the label when they are offered for sale.

The Star Rating of an appliance is determined from the energy consumption and size of the product. These values are measured under Australian Standards which define test procedures for measuring energy consumption and minimum energy performance criteria. Appliances must meet these criteria before they can be granted an Energy Rating Label. The star rating system has a minimum of 1 star and a maximum of 6, shown in half star increments. Various "algorithms" or equations have been developed to rate the least efficient products at around 1 star (Source: Australian Greenhouse Office).

7.1

OVERVIEW

Community consultation is an important part of achieving sustainable outcomes. Subsequently Investa wished to involve the local community in the master planning process from the start. Consultation was initiated when Investa invited approximately 120 households (via a letterbox drop) to attend a community consultation meeting on Tuesday, 11 February 2003. The objective of the meeting was to present Investa's initial ideas to the community, and allow residents to identify their concerns or opinions about any future development of the site.

Approximately 65 residents attended this meeting, and both ERM and Investa consider the meeting to have been a success in terms of the numbers of people who attended, and the feedback and information gained from those present. A number of issues were raised, which Investa was then able to take into account in the design and planning for the site. The issues raised, and the design response undertaken to address these issues are identified in *Table 7.1*.

A second community consultation occurred on Tuesday, 19 August 2003. The aim of this meeting was to present the design proposal to the community, and explain how their issues and concerns had been addressed. Subsequent to this, the Cook Ave Structure Plan and scheme amendment documentation was lodged, and in accordance with statutory requirements was advertised for public comment.

Table 7.1 Issues Raised at Community Consultation Meeting on 11 February 2003

Topic Area	Issues Raised	Design Response
Traffic	<ul style="list-style-type: none"> • Vehicular access to and from the site • Impacts on existing traffic flow • Impacts on safety (ie. school crossings and pedestrians) • Visitor parking • Impact on existing traffic problems (eg. speed, noise, congestion) 	<p>The C-Air development will be accessed of Cook Avenue and New England Drive. Cook Avenue will be widened to allow a central median and cycle paths to be placed in the road reserve adjacent to the development. This will have a traffic calming effect and reduce speeds along this section of Cook Avenue. Visitor parking will be provided internal to the development along the road reserves and in specifically designated parking bays. While Investa acknowledges that traffic flows will increase as a result of the development, it considers that the impacts will be no greater than that associated with a primary school, which the site was originally intended to be developed for. Traffic flows will be managed through the small road reserve width, which precludes speeding, and the proposed traffic median in Cook Avenue.</p>
Landscaping	<ul style="list-style-type: none"> • Quality of landscaping • Use of native plants and trees • Incorporation of landscaping throughout the development site • Long-term maintenance of landscaping • Incorporation of drainage area into landscaping 	<p>A landscape architecture firm was engaged to formally landscape the site. A formal landscaping style has been applied to the POS area, creating a park like environment that offers a pedestrian linkage through an existing desire line to nearby facilities. Simple planting will occur along the edges of the POS to emphasise the edge of the sunken lawn area, and steps and low retaining walls are proposed to accommodate the changes in level across the POS. All trees and supplementary planting will be chosen for their proven abilities to cope with coastal conditions, drought tolerance, and will be native where possible.</p> <p>Street tree species will be chosen according to the City of Joondalup policy, and selected for their ability to tolerate the coastal conditions in the area. Lawns will be used as an attractive means of treating verges, low-lying shrubs and groundcovers are proposed to be included on the lot truncations to create interest and accentuate the entrances into the subdivision. It is proposed that a bore will provide the source of water for the irrigation system of the POS. Sprays will be used for watering the lawn areas and drippers for watering all other planted areas, as these are the most efficient methods of irrigation for this scale of project.</p>
Public Open Space	<ul style="list-style-type: none"> • Accessibility and useability of POS for all surrounding community • Reticulation of POS per vegetation type • Location and size of POS • Mixed use in POS – e.g. children's play area, seats, grass, trees • Long-term maintenance of POS • Inclusion of water feature in POS 	<p>The proposed development contains a POS area of 3,700 m². This POS runs north-south through the interior of the development, and is intended as an amenity and passive recreation area. It will be attractively landscaped with species and treatments that are suited the coastal environment. The POS will not be exclusive to the development, and will be available to all of the public. Given its intended use as a passive recreation and amenity area, no children's' play equipment has been provided for, however there will be seating, grass and trees. The POS area is intended to be low maintenance, and will be maintained by the City of Joondalup as part of its regular community maintenance activities.</p>

Topic Area	Issues Raised	Design Response
Drainage	<ul style="list-style-type: none"> Location and size of drainage sump Visual impact of drainage sump Incorporation of drainage into landscaping Enclosure of drainage sump 	Investa has developed an innovative design response that would achieve an alternative means of drainage for stormwater runoff. This would involve channelling all excess stormwater to storage culverts located under the development's POS, which would then infiltrate slowly into the surrounding ground. This storage is sufficient to store a 1 in 2 year storm event. In the event of a severe storm, a drainage area within the POS is provided. Individual roof and lot runoff will be directed to soak wells installed on each lot. This design response overcomes the issues associated with creation of a drainage sump, and represents a sustainable and innovative outcome.
Density	<ul style="list-style-type: none"> Mixture of lot sizes Consideration of higher internal densities and larger lots to perimeter housing density Potential for strata development 	The residential density of surrounding development in Hillarys is R20. The proposed residential density of the development will be between R25 – R40, with a lot size range between 220-400m ² , thereby providing the mixture of lot sizes that was flagged by the community. It is also noted that the larger lots are located around the perimeter of the site to maintain a similar level of density to adjacent development, with the higher density lots being located internal to the proposed development. While the C-Air development will create a residential development that has a slightly higher density than the surrounding area, it is consistent with current practice that recognises medium density housing as a more sustainable form of housing than traditional housing developments.
Access	<ul style="list-style-type: none"> Pedestrian / cyclist access through site Integration of site with surrounding streets (i.e. not a walled development) Ferndene PAW maintenance or removal 	The location of the development close to facilities makes walking and cycling a viable option for short trips. Cycling ability is enhanced by Investa's proposal to make changes to the Cook Avenue road layout as a result of community concerns over traffic speed. The revised road layout will result in a road reserve of 10 metres, consisting of a central median of 1.8 metres, 2 carriage lanes of 3.3 metres and 2 cycle lanes of 1.2 metres. Shared footpaths will also be constructed along section of Cook Avenue for use by cyclists and pedestrians.
Amenity	<ul style="list-style-type: none"> Protection / maintenance of views Impact of construction and earthworks Impact of staged development Impact on visual amenity for adjacent neighbours 	<p>Community concerns were raised regarding the potential impact of development on view corridors and amenity, which have been addressed through sensitive design. The C-Air development will not be walled to create a private development, with dwellings instead designed to front the surrounding streets and internally to the POS. The development has also been designed so as to avoid a landscape of identical dwellings and rooftops, thus creating a sense of urban identity and distinctiveness. Finally, view corridors have been protected by utilising the slope of the site, which means that dwellings along Willandra Drive are single storey at the streetscape level, but have additional stories to the rear as the slope drops away.</p> <p>Development will be staged, but this would occur anyway if the individual undeveloped lots were sold separately. In relation to the visual impact of earthworks and construction, Investa acknowledges that while there will be an impact, management measures will be implemented during construction to mitigate any effects as far as possible.</p>
Housing	<ul style="list-style-type: none"> Housing design, appearance and quality Type of dwelling Height of housing to Willandra (views) Site coverage, building setbacks 	A variety of housing design and types will be provided within the development to create a diverse development with a sense of place and urban distinctiveness. Housing will occur at a medium density on different lot sizes, making effective use of the lots through zero lot line development, minimal setbacks and innovative and compact design.

Annex A

Certificate of Title

DUPLICATE CERTIFICATE OF TITLE

DUPLICATE CERTIFICATE OF TITLE

DUPLICATE CERTIFICATE OF TITLE

959L
Exam - Post
1345185



WESTERN



AUSTRALIA

REGISTER NUMBER 124/P16388	
DUPLICATE EDITION 1	DATE DUPLICATE ISSUED 22/1/2003

DUPLICATE CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

VOLUME 1902
FOLIO 554

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and deposit held contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

J. Hyle
REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 124 ON PLAN 16388

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

INVESTA DEVELOPMENTS PTY LTD OF LEVEL 17/135 KING STREET, SYDNEY, NEW SOUTH WALES
(T1345108) REGISTERED 6 JANUARY 2003

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. EXCEPT AND RESERVING METALS, MINERALS, GEMS AND MINERAL OIL SPECIFIED IN TRANSFER 2591/1947.

Warning: A current search of the certificate of title held in electronic form should be obtained before dealing on this land.
Lot as described in the land description may be a lot of location.

-----END OF DUPLICATE CERTIFICATE OF TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: 1902-554.
PREVIOUS TITLE: 1852-633.
PROPERTY STREET ADDRESS: 92 COOK AV, HILLARYS.
LOCAL GOVERNMENT AREA: CITY OF ICONDALUT.

DUPLICATE CERTIFICATE OF TITLE

DUPLICATE CERTIFICATE OF TITLE

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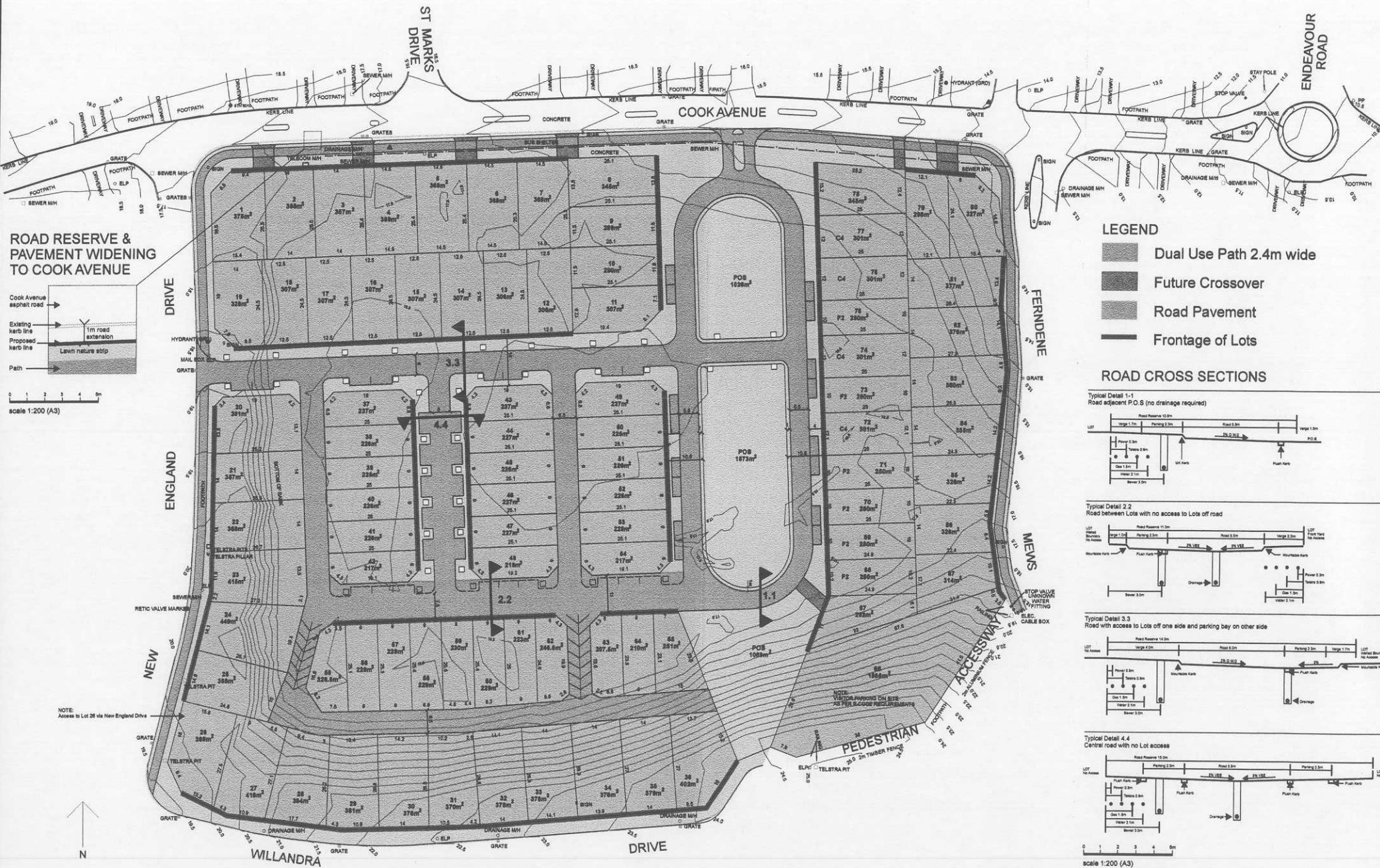
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Annex B

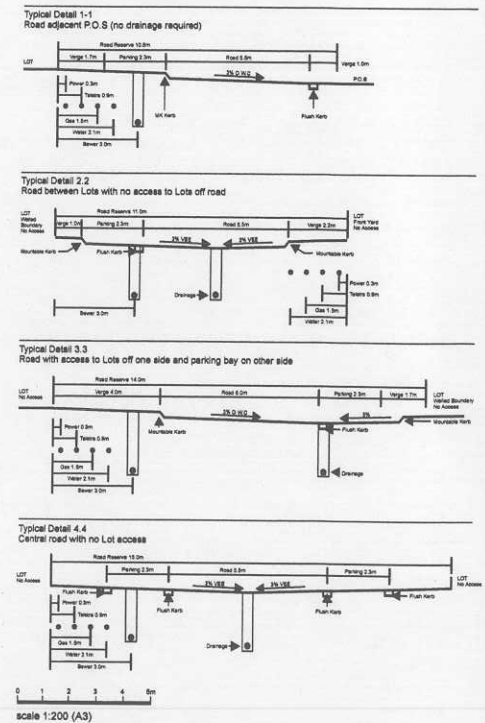
Proposed Residential Development Plan



LEGEND

- Dual Use Path 2.4m wide
- Future Crossover
- Road Pavement
- Frontage of Lots

ROAD CROSS SECTIONS



Annex C

Drainage Calculations



PJP:spe 2327.1

282 Rokeby Road
Subiaco
Western Australia 6008
Tel: (08) 9381 8955
Fax: (08) 9388 1038
Email: ewings@ewings.com.au

8 July 2003

The Chief Executive Officer
City of Joondalup
PO Box 21
JOONDALUP WA 6919

Environmental Resources Management Australia	
Referred to:	8020804
Date received:	14 JUL 2003
Checked by:	Magen Lewis
Accepted by:	23/7/03
Project Director:	

Attention: Mr D. Mather

Dear Sir,

RE: HILLARYS PRIMARY SCHOOL SITE - DRAINAGE

Jim Davies and Associates has remodelled the drainage system as suggested and put forward a table showing the number of 1200 x 1200 box culverts required to store the individual storm events underground to try and comply with City of Joondalup's requirements.

As it is proposed to direct roof and lot runoff to soak wells installed on individual lots the drainage catchment areas have also been revised.

The revised drainage catchment areas prepared in the attached submission from JDA has assumed that all roads are to be kerbed and drained but as we are proposing to install flush kerbing around the POS, stormwater drainage being piped to the POS will be considerably reduced. The initial catchment area being piped from JDA's figures is 28,203m², but with the use of flush kerbing around the POS this now becomes 12,210m² to be discharged by piped drainage.

Based on impervious area, figures for the revised piped drainage by proportioning JDA's figures shows we require 155 culvert units to store a 1 in 2 year storm event.

- Subdivision Catchment Area 9,320m² IMP (50%)
 - Southern POS Area 2,840m² IMP (15%)
 - Northern POS Area 6,300m² IMP (35%)
- 18,460m² IMP

The number of box culverts required, by proportioning JDA's figures to store in a 1 in 2 year storm event from all areas outside the POS equates to 310 No. x 50% = 155 No.

It should be noted that in JDA's calculations the pipe culverts are only being filled to a depth of 1m which allows for an additional 200mm of storage for the full length of the culverts before water will bubble out into the POS.

G.H. Locke B.E., M.I.E. (Aust.)
C.J. Conceicao A.M. (W.A.), M.I.E. (Aust.)

Assuming the northern and southern POS areas are built with flush kerbs so stormwater can discharge directly onto the POS you will have the following depths of water over the POS.

Site	Approx. Storage Area of POS	Storage Volume for 1 in 2 year storm	Depth of Water over POS	Storage Volume for 1 in 1 year storm	Depth of Water over POS
Northern POS	600m ²	75m ³	130mm	55m ³	90mm
Southern POS	1,000m ²	160m ³	160mm	125m ³	125mm

Note this presumes that all stormwater runoff drains directly to the POS and does not infiltrate somewhere else which is not what will actually happen.

For other stormwater events the flood levels in the POS for individual storms, based on JDA's maximum storage volumes are as follows:

	Both North and South POS Areas combined
• Area for drainage	1,600m ²
• Storage volume in box culverts based on 155 culverts	225m ³
• Storage required for 1 in 5 year storm event	587m ³
• Depth of water in POS for 1 in 5 year storm event	$587 - 225 / 1,600 = 230\text{mm}$
• Storage required for 1 in 10 year storm event	651m ³
• Depth of water in POS for 1 in 10 year storm event	$651 - 225 / 1,600 = 270\text{mm}$
• Storage required for 1 in 100 year storm event	976m ³
• Depth of water in POS for 1 in 100 year storm event	$976 - 225 / 1,600 = 470\text{mm}$

These depths are worst case as they are based on calculations for disposal of the stormwater drainage in box culverts and as the water will be spread over a larger area infiltration will be greater.

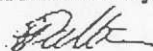
Would you please review the drainage proposed along with the preliminary plans and provide approval to this concept. We also require advice on any amendment the City may require to this system so we can review the drainage concept and achieve an acceptable drainage system.

Also included are some typical cross-sections for various roads showing pavement, and verge widths along with service locations.

Would you also confirm the City's acceptance to the road layouts so road reserve widths can be set.

Your earliest confirmation on these points is required so we can finalise the overall plan for this development.

Yours faithfully



PHILIP PATTERSON©
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Date: 1 July 03
Our Ref: J3183e
Pages: 4

COOK AVENUE PRIMARY SCHOOL SITE, HILLARYS
DRAINAGE DISPOSAL

COMD: 8020804

Philip,

As requested (30/6/03), new INFIL modelling has been performed to size box culvert underground infiltration areas for the 1, 2, 5, 10 and 100 year storms. This modelling takes in account that the lots joining New England Drive and Willandra Drive will not contribute flow. The new contributing catchment is illustrated in Figure 1.

The result of this modelling is attached as revised versions of Tables 4, 5 and 6 from our report. The infiltration areas are for nominal size 1200 x 1200 box culverts with a maximum ponded depth of 1.00 m, leaving a 0.2 m freeboard. Please note that the box culvert infiltration area is the exposed area available for infiltration whereas the actual box culvert area is the total area taken up by the box culverts.

As discussed, underground storage has been provided by other local authorities for infiltration of stormwater, for example, we understand concrete box culverts have been laid on strip footings within Subi Centro redevelopment in the City of Subiaco.

Regards,

Jim Davies

JDA CONSULTANT HYDROLOGISTS

Environmental Resources Management Australia	
Referred to:	IL Project: 8020804
Ref:	2 JUL 2003
By:	Morgan Lewis
Project ID:	8020804
Date:	3/7/03



TABLE 4. Landuse Types and Runoff Coefficients

Land use	Runoff Coefficient	Catchment Area (m ²)
R30 residential development	0.3	6818
R40 residential development	0.5	8405
Road reserve	0.9	8720
Public Open Space	0.2	4260
Total		28203

TABLE 5. Box Culvert Infiltration Areas with 3 m/d Hydraulic conductivity

	Catchment				
Catchment Area (m ²)	28203				
Hydraulic Conductivity (m/d)	3				
ARI (yrs)	100	10	5	2	1
Box Culvert Infiltration Area (m ²)	654	429	385	308	234
Number of Box Culverts*	426	280	251	201	153
Actual Box Culvert Area (m ²)*	718	472	423	339	268
Critical Storm Duration (hrs)	6	24	24	48	12
Average Intensity (mm/hr)	13.6	3.4	3.1	1.6	3.0
Runoff Volume (m ³)	1271	1264	1139	1171	541
Maximum Stored Volume (m ³)	651	427	385	309	234
Maximum Water Depth (m)	1.00	1.00	1.00	1.00	1.00

* Based on Box Culverts of nominal size 1200 x 1200

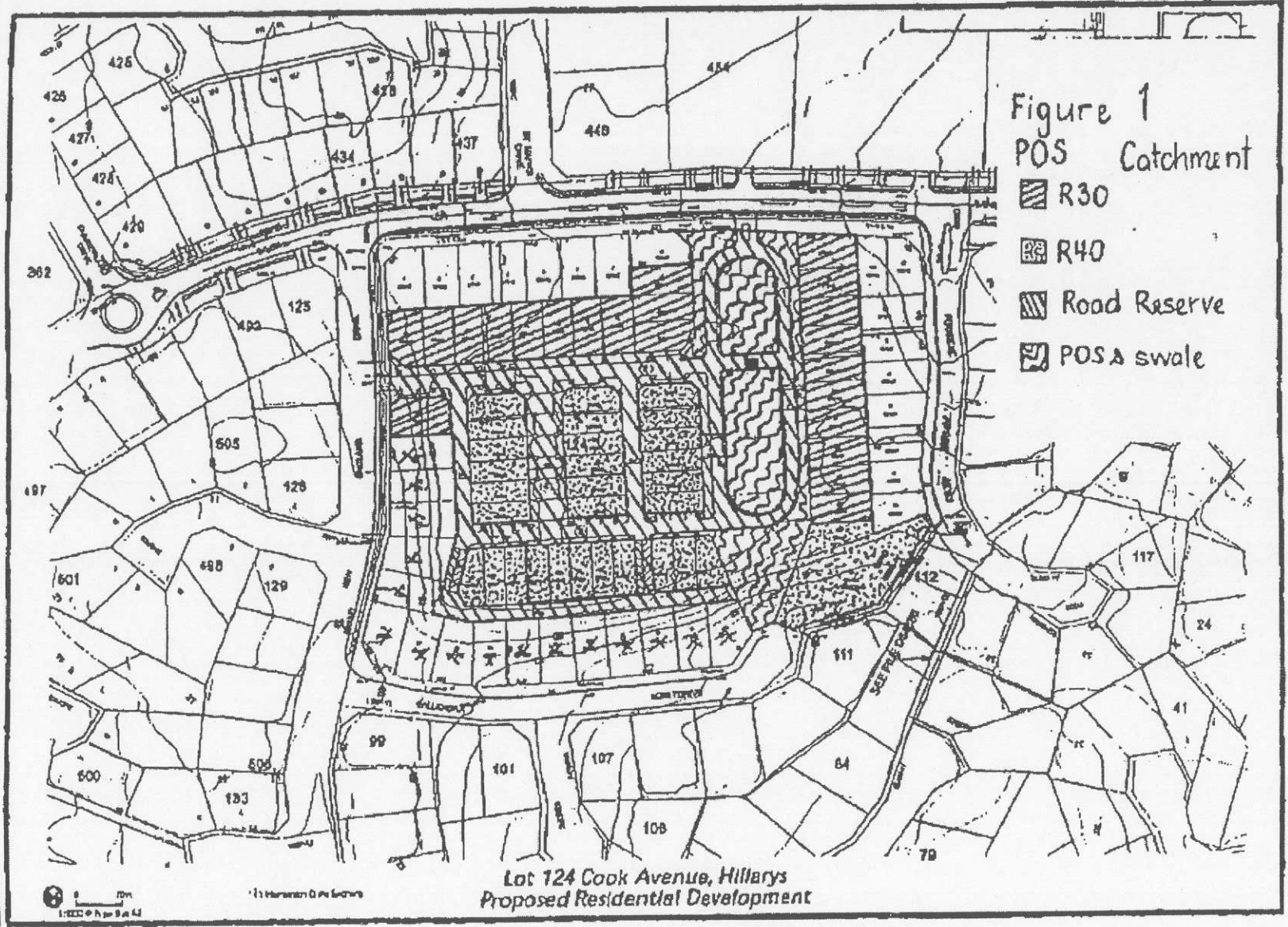


TABLE 6. Box Culvert Infiltration Areas with 1 m/d hydraulic conductivity

	Catchment				
Catchment Area (m ²)	28203				
Hydraulic Conductivity (m/d)	1				
ARI (yrs)	100	10	5	2	1
Box Culvert Infiltration Area (m ²)	978	652	587	475	355
Number of Box Culverts*	637	425	383	310	232
Actual Box Culvert Area (m ²)*	1074	716	645	522	391
Critical Storm Duration (hrs)	24	24	24	48	24
Average Intensity (mm/hr)	5.47	3.4	3.1	1.6	1.9
Runoff Volume (m ³)	2078	1282	1154	1183	697
Maximum Stored Volume (m ³)	976	651	587	475	354
Maximum Water Depth (m)	1.00	1.00	1.00	1.00	1.00

* Based on Box Culverts of nominal size 1200 x 1200