APRIL 2005

EGERTON DEVELOPMENT PLAN ONE (ODP 73) REVIEW - 2004

AS APPROVED BY THE WESTERN AUSTRALIAN PLANNING COMMISSION

C H A P P E L L
& L A M B E R T

T O W N P L A N N I N G
U R B A N D E S I G N

ENDORSEMENT PAGE

This structure plan is prepared under the provisions of the City of Swan
Local Planning Scheme No.17

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

29 JANUARY 1997

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 2030**

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This Structure Plan is prepared under the provisions of Appendix 6 "Special Purpose – Ellenbrook" zone of the City of Swan Town Planning Scheme No.9

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1.0 BACKGROUND

1.1 Introduction

The purpose of this document is to describe a Development Plan One (ODP 73) review, covering the south-western sector of the Egerton property, the Project now referred to as Vale. An earlier review of Development Plan One was conditionally approved by Council in June 2000.

This document must be read in conjunction with the 2004 Egerton Structure Plan Review (ODP 50) document which is being advanced simultaneously and provides both a district and local context to these proposals.

The 2004 Development Plan One (ODP73) Review refines and updates the 2000 Development Plan One Review to reflect the Council decision of June 2000 and contains further revisions which embrace more contemporary planning directions. It will be used as the basis for further subdivision applications, preparation of Detailed Site Plans and development in this western sector of the Project area.

1.2 Statutory Planning Framework

The land covered by ODP 73 is zoned "Special Purpose – Ellenbrook" in Town Planning Scheme No.9 (Figure 2). Appendix No.6 of the Scheme outlines the special statutory provisions which relate to the Zone, including the requirements for a Structure Plan and a Development Plan.

The general purpose of a Development Plan is to refine the proposals in a Structure Plan affecting the same land and to guide development of land to which the plan relates. Any such plan shall conform with the zoning and land use policies, guidelines, development standards and objectives contained in an approved Structure Plan. A proposed Development Plan is required to show such detail as the Council requires to ensure that the development of the land within the plan is consistent with orderly

and proper planning and the achievement of the highest appropriate level of amenity. It must include information or detail dealing with the following:

- The definition of reserves and zones in accordance with the range of reservations and zones set out in Clauses 2.1 and 2.2 respectively of the Scheme;
- (i) Proposed residential densities within zones where residential use is permissible;
  (ii) Development objectives, standards and criteria and design guidelines;
- Proposed transportation systems; road layouts and vehicular traffic, cycle and pedestrian networks; underpass locations; and public transport routes;
- Provision for major land uses including residential, shopping, commercial, office, educational, civic, employment centre, open space, recreational, and community facilities;
- Indicative lot pattern and general location of any major buildings; and
- The integration of land use and development.

A proposed Development Plan must include information sufficient to demonstrate the contemplated method of implementation of its proposals.

1.3 Site Description & Local Context

1.3.1 Development Plan One Area

The complete Egerton project area consists of approximately 537 hectares located on Gnangara Road, Ellenbrook 12 kilometres north of Midland (Figures 1 & 2). The western boundary of Development Plan One abuts the future Henley Brook Drive immediately adjacent the eastern boundary of Ellenbrook. The southern boundary of the development area follows Gnangara Road (and the proposed deviation through to Middle Swan Road). The eastern edge of the property (not included in the current Development Plan proposal) follows the Ellen Brook and has recently been rationalised through an MRS Amendment 1020/33 (refer Figure 3). The Vines

development lies to the north-east and land immediately east is included within the Swan Valley (Act) Area.

1.3.2 District Context - Egerton Structure Plan Review (2004)

The entire Egerton property is also the subject of a review of the Structure Plan (ODP 50) which has been lodged simultaneously with the City of Swan. It provides the district context to this Development Plan and also fulfils the statutory requirements of Appendix 6 of the Scheme. The ODP 50 – 2004 Structure Plan Review map is included at Figure 4. This Development Plan must be read in conjunction with this Structure Plan document.

1.3.3 Local Context - Development Plan One Review

The Development Plan One (ODP 73) area (refer Figure 9) occupies around 194 hectares of the south-west sector of the landholding. It includes land covered by an existing subdivision approval over Stages 1a, 1b & 1c (DPI reference 122997 - Refer Figure 5). The Development Plan has a strong interface with the existing development at Ellenbrook, particularly linkages to Woodlake Village and its amenities. This is reflected and encouraged in the local road network with high connectivity being promoted.

The major access to this Development Area will be via Egerton Drive which is being constructed as part of Stage One works and a second local road connection off Gnangara Road with neighbourhood connector links through to Ellenbrook.

1.4 Historical Background to Development Plan

Section 1.0 of the 2004 Structure Plan Review report provides considerable detail on the background to the approval status of this project. The initial Development Plan One (ODP 73) was adopted by Council in 1997 following the completion of a

Consultative Environmental Review, lifting of Urban Deferment and adoption of the Structure Plan (ODP 50). The original (1997) ODP 73 is reproduced at Figure 6

In June 2000 Council conditionally approved reviews of both ODP 50 and ODP 73. The 2000 Development Plan Review supported by Council is included at Figure 8. The 2000 Development Plan One Review was then used as the basis for approval to a subdivision application, which covered the entire southern portion of the estate (DPI reference 111089 – refer Figure 11). This has now expired. Stage One is covered by a current subdivision approval (122997 – Figure 5) and works are well advanced.

In adopting the 2000 Development Plan Review Council required the following modifications:

- Deletion of all references to the proposed (large) Business Park at the corner of Gnangara Road and Henley Brook Avenue within the Structure Plan and the Development Plan, and allocation of Residential Land Use to this area.
- Increasing the active open space area within the Development Plan 1 to a minimum of five hectares.
- Providing a 4000m^2 park in the south eastern area of the site in accordance with WAPC advice.
- Redesign of lots to overlook the main public open space to the east of Development Plan 1.
- Provision of a north south link in the south east corner of the Development Plan 1 site as described in the WA Planning Commission advice dated 27 April 2000.
- Negotiation with the applicant regarding a more direct route for road "NS2" to the proposed town centre.
- Clarification of the function of the central area of POS within Development Plan One.

This 2004 Development Plan Review incorporates these modifications and importantly includes a number of other changes reflecting the 2004 Structure Plan (ODP 50) Review including the re-distribution of retail floorspace following deletion of

the District Centre and providing a neighbourhood centre within Development Plan One. This is discussed in more detail later.

The balance of the changes involves local road refinements and a general increase in densities and mixed-use potentials around what is now the stronger neighbourhood centre (Centre A) on Egerton Drive. The connection points to Gnangara Road and Henley Brook Drive have been retained with slightly modified alignments. All changes constitute refinements in detail which flow from those initiatives described in the 2004 Structure Plan (ODP 50) Review document.

1.5 Key Initiatives

Key elements of the 2004 Development Plan One Review (Figure 9) include:

- Residential development at a predominantly R20 density with higher codings (up to R60) within and around the neighbourhood centres and other nodes.
- A main street based Neighbourhood Centre off Egerton Drive accommodating 4,800m^2 of retail floorspace and mixed uses including short term "school in shops".
- An integrated open space, conservation and drainage network.
- Use and management of conservation areas within open space to be in accordance with environmental approvals issued by the Minister for the Environment and consistent with the policies and standards of the City of Swan.
- A 10 hectare private school site located on Gnangara Road.
- An interconnected street network and lot layout reflecting "New Urbanist" principles promoting legibility and walkability.
- A local centre of 1.0ha on the corner of Henley Brook Drive and Gnangara Road for retail, service station and fast food uses and deletion of all references to the proposed (large) Business Park at the same corner.
- Preparation of supporting technical documents including Wetland Open Space Management Plans, preliminary Landscape Concept Plans, a Drainage & Nutrient Management Programme and a Community & Economic Development Plan.

2.0 ENVIRONMENTAL CONSIDERATIONS

2.1 Introduction

The 2004 Structure Plan Review document provides a detailed background to all of the environmental issues including wetlands, Bush Forever, conservation and drainage matters affecting Egerton. A brief summary follows.

To support the initial lifting of Urban Deferment and zoning to Urban under the Metropolitan Region Scheme a Consultative Environmental Review (CER) was prepared and the Minister for the Environment set the environmental Conditions of Approval on 18 November 1994. Broadly these conditions required the preparation of more detailed Management Plans during the planning and development phases comprising;

- A Wetland Management Strategy (1995)
- A Drainage and Nutrient Management Plan (1995)
- A Bandicoot Protection Strategy (1995)
- A Western Swamp Tortoise Assessment (1995/1997)

These were subsequently prepared and approved by the relevant authorities and were used as the basis for approval of the original 1997 Development Plan One - ODP 73 (Figure 6) and subsequent subdivision application (Figure 11). Importantly the Department of Environmental Protection (DEP) gave notice on the 9 February 1998 that urban development at Egerton had "substantially commenced" by virtue of the number of conditions satisfied and the lifting of Urban Deferment.

Development at Egerton is covered by the requirements of this approved CER and the four endorsed Management Plans. ODP 73 since inception has and will continue to be guided by these Management Plans and more detailed strategies prepared pursuant to these documents. The planning implications are discussed briefly below.

2.2 The Wetland Management Strategy (1995)

The open space/drainage network and accompanying land use strategies are strongly based around the WMS Management Priority Areas which are all included within open space. These are:

- Conservation MPA
- Special Conservation MPA
- Passive Recreation MPA
- Drainage MPA
- Access MPA

These Management Priority Area boundaries remain unaltered in this 2004 Development Plan review and all will continue to be included as open space. The varying recreational utility of these MPA's is described further in Section 5.0 for the purpose of calculating the open space provision. These areas and their roles are also described in detail in the 2004 Structure Plan review document.

Importantly the WMS establishes the requirement for more detailed Wetland Open Space Management Plans for each of the wetland areas prior to subdivision. Relevant to this Development Plan One area, a WMP has been prepared for the Mid West wetland and the North-South wetland and are available as separate documents.

2.3 Drainage and Nutrient Management Plan (1995)

Prepared pursuant to the requirements of the CER and endorsed by the EPA, the DNMP describes the strategy to be implemented in order to meet water quality, runoff and ground water level criteria. In essence it describes a broad strategy for Egerton based generally on;

- Wet detention basins and artificial wetlands along existing creek lines.
- Attenuation of drainage flows and the stripping of nutrients prior to discharge.

- Basins with bases below the water table to contain water all year round (this level will fluctuate).
- Integration with open space and management priority areas to provide habitat and biological and recreational corridors between the Egerton wetland's and Ellenbrook.

In terms of setting targets and meeting standards the endorsed DNMP remains the prime operative document except that there is now a strong focus on "at source" control, which is a more recent initiative pursued by the authorities. More detailed Drainage and Nutrient Management Programmes will be prepared for each local drainage catchment at each Development Plan stage. These are more detailed local drainage strategies, prepared pursuant to the DNMP, and will also be a condition of subdivision approval. They provide more detailed engineering descriptions of the work and monitoring to be undertaken to meet DNMP targets.

The background to drainage and nutrient management is explained in full in Section 4.0 of the 2004 Structure Plan Review document. The DNMP Programme relevant to Development Plan One is included in the Appendix.

2.4 Bandicoot Strategy and Western Swamp Tortoise Study

These requirements of the CER have been finalised and adopted by the EPA. Implementation of the Bandicoot Strategy is an ongoing process. Extensive field research revealed no western swamp Tortoises in any of the Egerton wetlands. More detail is included in Section 4.0 of the 2004 Structure Plan Review.

2.5 Supporting Documents and Strategies

ODP 73 is essentially a planning document outlining a range of land use planning strategies. The effective implementation of ODP 73 (and ODP 50 – the Structure Plan) is reliant on a range of supporting technical documents. Many of these have been prepared and approved as part of either the CER, the 1997 Structure Plan or the 1997

Development Plan approval processes or as part of the subdivision approvals. Others are in various stages of preparation and adoption as part of this ODP review process. A summary of these documents follows.

Approved/Adopted Supporting Documents

- Consultative Environmental Review (1994)
- Drainage and Nutrient Management Plan (1995)
- Wetland Management Strategy (1995)
- Bandicoot Management Strategy (1995)
- Western Swamp Tortoise Survey (1995)
- Section 18 Clearance – Aboriginal Heritage Act (1995)
- Stage One Subdivision – 111089 (2003)

In Preparation and/or to be Adopted

The following documents shall be considered and/or adopted by the appropriate authorities as part of the 2004 review of Development Plan One (ODP 73) and/or as subdivision condition requirements.

- Drainage and Nutrient Management Programmes (sometimes referred to as Local Catchment Drainage Strategy[s])
- Wetland Open Space Management Plan(s)
- Preliminary Landscape Concept Plan(s)
- Community and Economic Development Plan
- Implementation Strategy and Joint Contribution Agreement.

This review provides a summary and background to these documents, however, for full details each Report and/or Strategy should be referenced directly.

3.0 LAND USE SUMMARY

The Land Use Schedule below describes the 2004 Development Plan One Review included at Figure 9 and within the Statutory Documentation at Section 10.0 of this Report. To assist in interpreting these statutory documents an indicative Development Concept Plan is also included at Figure 10 (this is a non statutory document).

TABLE NO.1 LAND USE SCHEDULE – 2004 DEVELOPMENT PLAN ONE REVIEW

Gross (Development Plan) Area		= 194 ha
Non Residential Land Uses		
• Private High School	= 10.3 ha	
• Local Centre A - Retail Uses	= 2.00 ha (est)	
• Henley Brook Drive/Gnangara Road Local Centre	= 1.00 ha	
• Henley Brook Drive	= 3.67 ha	
Total		= 16.97 ha
Gross Residential Area		= 177.03 ha
(194 less 16.97)		
Therefore Open Space requirement for Development Plan Area @ 10% of GRA		= 17.70 ha
Credit Open Space Provided (refer POS Schedule)		= 24.07 ha
Surplus POS @ 10% (for this cell)		= 6.37 ha

4.0 HOUSING STRATEGY

The Section 6.0 of the 2004 Egerton Structure Plan Review describes the overall Egerton Housing Strategy together with dwelling unit estimates. Figure 15 and Table 2 are an extract from that document relevant to this Development Plan. The intention is that the Egerton project will provide for a variety of residential opportunities both in terms of density and housing type and potential uses. The density plan depicts the majority of the site at an R20 coding with higher codings around the Centre and some of the parks.

The principles of the Housing Strategy for Egerton are:

- To create a diversity of product type and lifestyle opportunities.
- To generally work to an R20 density over the major portion of the estate.
- To pursue higher density development in the following general locations;
    - Within 400 metres of the local centres
    - Around select open space sites and community facilities
    - R60 development in close proximity to the neighbourhood centres including aged persons accommodation.
- To promote mixed use development around and within the neighbourhood centre including home based business.
- To pursue environmentally sustainable design approaches in terms of solar orientation of lots.
- Provide variety in housing choice and allotment sizes (the latter generally 300-1000sqm).

Based on the Yield Precinct Plan at Figure 15, Table 2 below estimates dwelling unit/lot yields based on an average lot size of 580m^2 to 620m^2 which equates to around 11.8 dwellings per nett residential hectare. Table 2 demonstrates that the potential dwelling yield from the cell will be around 1500 dwellings.

TABLE NO.2 – YIELD ESTIMATES

Cell	Cell Area - approx ha (Excludes POS)	No. of lots	R40
9	10.619	118	
10	23.090	250	
14	10.400	118	
15	9.070	106	
16	10.296	113	
17	15.590	182	
18	13.630	160	
19	7.300	86	
24	17.000	200	
28	2.429		60
29	1.230		30
Retirement Village	2.00		100
Total		**1333**	**190**

Total Estimated Dwelling Units = 1523

(Note: Excludes any allowance for Mixed Use R60 Residential in Neighbourhood Centre A lot)

5.0 PUBLIC OPEN SPACE STRATEGY

Section 5.0 of the 2004 Structure Plan Review describes the overall open space strategy for Egerton. There are seven different categories of open space described which include:

- Large Parks (LP)
- Pocket Parks (PP)
- Passive Recreation (PR)
- District Recreation (DR)
- Drainage Open Space/Multi-use Corridors (MUC)
- Conservation (Con)
- Bush Forever & Special Conservation (BF)

Figure 16 depicts this open space (and pedestrian) strategy relative to this Development Plan area. Table 3 overleaf provides a summary of these open space types and the rate to which each may be credited towards subdivisional open

space. These ratios have been provided by the City of Swan and are explained further in the Structure Plan document.

Table 4 describes the open space contribution for the Development Plan One area using the criteria established in Table 3. Note that Table 3 in the Structure Plan report describes the overall contribution to open space for the entire Egerton area. Based on the overall calculation the total POS at Egerton is in excess by around 4.6ha. A large portion of this open space is included in this Development Plan One as described in Table 4.

The City of Swan has requested the preparation of preliminary Landscape Concept Plans for each open space area in each Development Plan area. These are included in the Appendix relating to this 2004 Development Plan One Review. The preliminary Landscape Concept Plans, Wetland Management Strategies and Drainage & Nutrient Management Programme are all co-ordinated in content.

TABLE NO.3
PUBLIC OPEN SPACE TYPES & SUMMARY

Use Category		Description	Contribution Rate Agreed by City (2000)	Contribution Rate agreed by City (2004)	Suggested Rates
Public Open Space	Large Parks (LP)	Parks with strong active recreation focus. Generally 1.0 to 3.5ha (or above) and can be co-located with primary schools	100%	100%	100%
	Pocket Parks (PP)	Smaller parks generally 0.4ha-0.6ha	100%	100%	100%
	Passive Rec. (PR)	Defined in WMS as Passive Recreation areas. Generally located on land adjacent degraded wetlands within Management Priority Areas (refer WMS)	100%	100%	100%
	District Open Space (DOS)	Organised sports	100%	100%	100%
	Drainage Open Space/Multi-Use Corridors (MUC)	Defined in WMS. Multi-use corridors on existing drainage lines. Enhanced to include drainage basins, drainage swales, artificial wetlands, recreation/grassed areas and walk trails etc (Note: areas exclude permanent water)	50%	50%	50%
Conservation (Con)		Defined in WMS. Vegetation and Wetlands protected and managed for low impact passive recreation (paths, BBQ etc)	50%	25%	25%
Includes Bush Forever & Special Conservation (BF)		Special Conservation Area defined in WMS. Bush Forever Site No.22. Conservation only with limited public access	50%	Nil	Nil

Note: Areas ultimately credited toward subdivisional open space will need to be adjusted to take account of any drainage considerations. A partial credit will apply for land areas set aside as drainage swales which accommodate more than the 1:10 year event.

TABLE NO. 4

DEVELOPMENT PLAN ONE - OPEN SPACE SCHEDULE

Category	Locations	Gross Area	P.Water (est.)	Nett Area	Contribution Rate	Credit Area
Larger Parks (LP)	1	2.52	NIL	2.52	100%	2.52
	2	6.00	2.155	3.845		3.845
	Sub Total	**8.52**	**2.155**	**6.365**		**6.365**
Pocket Parks (PP)	1	0.30	NIL	0.3000	100%	0.3000
	2	0.40	NIL	0.4000		0.4000
	3	0.30	NIL	0.3000		0.3000
	4	0.55	NIL	0.5500		0.5500
	5	0.43	NIL	0.4300		0.4500
	Sub Total	**1.98**	**NIL**	**1.98**		**1.9800**
Passive Rec. (PR)	1	2.68	NIL	2.68	100%	2.68
	2	5.65	NIL	5.65		5.65
	Sub Total	**8.33**	**NIL**	**8.33**		**8.33**
Drainage Open Space/Multi-Use Corridor (MUC)	1	2.73	1.02	1.71	50%	0.855
	2	1.115	0.5	0.615		0.307
	3	2.64	NIL	2.64		1.320
	Sub Total	**6.485**	**1.52**	**4.965**		**2.482**
Conservation (Con)	1	16.24	NIL	16.24	25%	4.0600
	3	3.45	NIL	3.45		0.8625
	Sub Total	**19.69**	**NIL**	**19.69**		**4.9225**
Bush Forever & Special Conservation	BF	NA	NA	NA	NA	NA
District Rec. (DR)		NA	NA	NA	NA	NA
TOTAL AREA (DEV. PLAN ONE)		**45.0**	**3.675**	**41.33**		**24.07**

Note: Estimate only of permanent water in drainage features

6.0 COMMERCIAL CENTRE

The 2004 Structure Plan Review (ODP 50) proposes some new initiatives with respect to retail structuring with the central feature being the deletion of the proposed Egerton District Centre in favour of a retail structure based on two stronger neighbourhood centres. Section 7.0 of the 2004 Egerton Structure Plan review describes this strategy in detail and the updated Centres Strategy prepared by Shrapnel Urban Planning is included in the Appendix of this report. The revised approach to retail structure is also recommended in the City of Swan Commercial Centres Strategy.

The 2004 Development Plan Review proposes to increase the scale and role of the neighbourhood centre on Egerton Drive (Centre A). The Development Plan sets aside a large 2.0 hectare site plus smaller adjacent areas for the more retail/commercial based elements zoning these "General Commercial". Residential and mixed use potentials and higher densities are provided on the periphery. Centre A will accommodate a retail floorspace of 4800m² nla with supporting office, community and mixed uses. A draft Concept Plan is included at Figure 14 for information purposes.

The Structure Plan/Development Plan 1 varies the size classification of the proposed Neighbourhood Centres as adopted in the City of Swan Commercial Centres Strategy (Pol-C-083) in accordance with Note 2 of Appendix 1 of the Strategy from a maximum of 4,500m² shop/retail floorspace each to a maximum of 4,800m² shop/retail floorspace for Village Centre A and 4,100m² shop/retail floorspace for Village Centre B. The remaining provisions, in particular Note 6 of Appendix 1 of the Commercial Centres Strategy still apply.

The planning objectives for Centre A are:

- To promote a main street base form of development which encourages mixed use development and vibrancy.
- To create high quality builtform, landscape and streetscape within the centres.

- To ensure the character and theme of the centre defines and reflects the overall character of the estate.
- To promote high flow clientele home based business in close proximity to the centre.
- To integrate social facilities and privately provided social community facilities, i.e. child care, leisure facilities.

Detailed (Commercial Centre) Site Plans pursuant to Appendix 6 of the Scheme will be developed for the Centre in consultation with the City of Swan prior to development. The Detailed Site Plan for the Centre and its surrounds will include details of:

- Land use precincts and proposed commercial mix
- Builtform guidelines
- setbacks
- Ancillary features and landscaping, e.g. Seating, lighting, bike parking
- Integration with community facilities
- Car parking, traffic management and access
- Integration of mixed use residential (neighbourhood centres).
- Pedestrian linkages.

The 2004 Development Plan Review also proposes a small corner store on the corner of Ellenbrook Drive and one of the proposed neighbourhood connectors. The Retail Strategy suggests that this smaller centre is likely to accommodate a corner store with the maximum retail potential of around 500m^2 nla.

The 2004 Development Plan review provides for a local centre accompanied by a minor component of highway business use on the corner of Gnangara Road and Henley Brook Drive. The site area is limited to 1.0ha consistent with Council's previous decision of June 2000 to delete the larger highway commercial precinct which was proposed in this location in the 2000 Development Plan Review.

This intersection has a somewhat reduced amenity due to high traffic volumes, yet these features enhance commercial prospects for a service station and fast food outlets. This proposed land use arrangement reflects a Council decision in March 1998 to approve a service station and two fast food outlets on the adjacent south west corner in Morgan Fields.

The retail floorspace component is limited to 250m² nla in accordance with the updated Egerton Centres Strategy (refer Appendix).

The Development Plan also provides for a strong neighbourhood connector link into Fortescue Road providing a strong local connection between Centre A and the Ellenbrook Centre at Woodlake Village. This will be an important link in the early days of the Egerton Estate to provide access to retail and community infrastructure for the initial residents.

7.0 MOVEMENT NETWORKS

7.1 Roads and Traffic

The major elements of the road network within the Development Plan are described in Section 8.0 of the 2004 Structure Plan Review document and in the Sinclair Knight Merz Traffic Modelling Report which is included within the Appendix of this document for information purposes.

Key road network elements relevant to the 2004 Development Plan Review are depicted in Figure 12. This describes the network hierarchy and predicted volumes. These are summarised as follows:

- The road hierarchy consists of
    - Other Regional Roads (Gnangara Road & Henley Brook Drive)
    - District Distributor B (Ellenbrook Drive)

- Main Neighbourhood Connector(s) (Egerton Drive)
- Other Neighbourhood Connectors
- Important local roads

- Egerton Drive provides the main entry to the Development Cell with volumes from 7000 to 7500vpd. This is a major neighbourhood connector within a road reserve of 20m to 25m. Special frontage treatment will be required for residential lots along this road to control access.
- Ellenbrook Drive forms the northern edge of the Development Cell linking back to Ellenbrook. As a District Distributor (B) it is forecast to carry 9000 to 12,000 vpd and will require special frontage treatment for residential lots. The volumes suggest a single split carriage in a reserve of 22m to 27m.
- Henley Brook Drive is an Other Regional Road (MRS) located between Egerton and Ellenbrook and is forecast to carry up to 18,000 vpd. Along with Gnangara Road it is classified as an Other Regional Road in the MRS. No direct lot access will be permitted to Henley Brook Drive and Gnangara Road.
- The Development Plan also identifies a notional internal neighbourhood connector network with roads carrying between 1500 vpd to 3500 vpd. Generally these roads will be within 18 to 20 metre reserves. Direct residential lot frontage will be encouraged to these roads.
- All roads and intersections will be constructed to the design requirements of the City of Swan.
- Special consideration will be given to the design, landscaping and parking/access requirements for those sections of the neighbourhood connectors which pass adjacent the Neighbourhood Centres. These will be treated as interactive main streets with a calmed traffic environment.

7.2 Public Transport

All neighbourhood connectors and district distributors can accommodate bus routes with a pavement width of at least 7.4m or 3.7m for a one lane carriageway. Figure 12 identifies the preferred Transperth bus routes.

7.3 Cyclists and Pedestrians

Provision has been made for cyclists on each of the road types as determined by Bikewest, Austroads Guidelines and forecast traffic volumes. District distributors require on-road provision for cyclists. These can be either on-road bicycle lanes (recommended width 1.5m for a 60km/h speed environment) or wide kerbside lanes (3.7m lanes without a median or 4.2m if a median if provided). In addition a shared path (recommended width of 2.5m) is required on at least one side of the road, with a footpath (1.5m) on the other side.

Widened lanes to accommodate cyclists are recommended for Neighbourhood Connectors, however bicycle lanes may be more appropriate on Egerton Drive and some of the busier north-south neighbourhood connectors. At least one shared path is required, with a footpath on the other side.

On local access roads it is envisaged that cyclists will share the roadway with motorists due to the low traffic volumes (less than 3,000vpd) and small speed differential (helped by the introduction of the 50kp/h speed limit in built up areas). Footpaths should be provided on some access streets (for example to provide a link to some POS, a school or retail area) with a minimum width of 1.5m increasing to 2m in the vicinity of schools. Figure 16 depicts the recommended network.

8.0 COMMUNITY DEVELOPMENT

8.1 Community and Economic Development

The developer is committed to participating in a Community Development Working Group, including representatives of Multiplex, the City of Swan, other key agencies and community groups and to prepare, implement and monitor a Community and Economic Development Plan (refer Section 10.0 of 2004 Structure Plan Review). It is intended to complete this Community and Economic Development Plan during the

advertising period of both the 2004 Structure Plan Review and this 2004 Development Plan Review. The objectives of the Community Development Plan are described in Section 10.0 of the 2004 Structure Plan Review.

8.2 Schools

The Primary School which will ultimately service the Development Area catchment is located on the east side of Egerton Drive (refer Structure Plan). A private K-12 school is proposed on the corner of Egerton Drive and Gnangara Road. It is anticipated this will be operational in 2006.

Discussions with the Education Department have resulted in the proposal to develop a "school in shops" arrangement in the Neighbourhood Centre A as an interim Primary School. Multiplex will develop these facilities within the next 2 years and they are expected to have a 5 year lifespan pending construction of the Primary School. The High School servicing this catchment will be located in Ellenbrook.

9.0 SERVICING & INFRASTRUCTURE

A full description of the servicing and infrastructure strategy is included in Section 9.0 of the 2004 Structure Plan review report. It covers;

- Sewerage
- Water Supply
- Electricity
- Gas
- Telecommunications
- Headworks (Water Corporation)
- Optic fibre cabling

9.1 Staging of Major Infrastructure

Stage 1a, 1b and 1c works pursuant to Subdivision 122997 are well underway with further stages proposed in the south western cell in the immediate future. Figure 17 depicts main staging initiatives at this time. It is intended to lodge the next application for subdivision for around 500 lots in the south western portion of the Development Plan Area as per Figure 17. This is referred to as Stage 2.

Key initiatives being undertaken as the project develops from the current approved Stages into the next major phase of the Development Area are summarised below.

Main Stage 1a, 1b and 1c Works

- Construction of the first section of Egerton Drive from Gnangara Road.
- Development of the main sewer pump station (permanent infrastructure) to service the entire western cell is being undertaken on the southern side of the Gnangara Road deviation.
- Construction of the drainage basins either side of Egerton Drive as a key element of the Drainage and Nutrient Management Strategy.
- Develop the local open space.

Main Stage 2 Works (next subdivision application)

- Construct second entry and intersection treatments to Gnangara Road.
- Construction of neighbourhood connector and servicing links to Fortescue Road, Ellenbrook, as a key infrastructure linking the two communities. It allows for:
  - Pedestrian and traffic movement to the Woodlake Village centre;
  - An important drainage overflow route from Ellenbrook into the Egerton network;
  - Servicing corridor for the main water supply to Egerton.
  - Second exit point for Ellenbrook.
- Timing of construction of Henley Brook Drive is unknown at this time but anticipated at year six of the project. As a Regional Road this will involve

developers sharing the cost of full earthworks and construction of one carriageway.

- Provision of fibre optic cabling.
- Development in consultation with Council of those open space areas in the subdivision application area. Note that this includes the southern tip of the central open space, excluding the aviary/lake area.
- Development of "school in shops" in Village Centre.

10.0 STATUTORY DOCUMENTATION

The provisions of Appendix No.6 of the Scheme "Special Purpose - Ellenbrook" zone sets out the statutory planning requirements for the Egerton Estate.

This document has been prepared to satisfy the requirements for a "Development Plan". The statutory components comprise the following plans which are included separately under the Statutory Documentation Plan section of the Figures.

- Development Plan
- Zoning Classification Plan
- R-Code Plan
- Public Open Space and Pedestrian

10.1 Special Purpose Zones

Three Special Purpose zones are being created in Development Plan One. These allow for mixed use and commercial development in an integrated manner, appropriate in the Egerton context.

These three zones are:

1. "Special Purpose - Gnangara Local Centre"
2. "Special Purpose - Neighbourhood Centre"
3. "Special Purpose - Aged Persons Accommodation"

The following requirements apply to development within each of these zones, in accordance with Clause 2.2.5, Part 9 and Appendix 5 "Special Purpose – Ellenbrook" of the City of Swan Town Planning Scheme No 9.

SPECIAL PURPOSE - GNANGARA LOCAL CENTRE

Zone Purpose & Objective:

To allow for commercial uses that provide convenience services in an accessible location to the benefit of the local community and contribute to the amenity of the locality without compromising the role and function of the Neighbourhood Centre.

Land Use Definitions and Permissibility:

Land use definitions shall be in accordance with Schedule 1 of Town Planning Scheme No.9.

Land use permissibility for uses in the "Special Purpose – Gnangara Local Centre" zone shall be in accordance with the following table:

Use Class	**Permissibility**
Service Station	AA
Fast Food Outlet	AA
Car Wash Station	AA
Car Park	AA
Convenience Store	AA
Restaurant	AA
Shop - Local	AA
Any other uses not listed above	AA

Development Standards:

All development standards within the "Special Purpose - Gnangara Local Centre" Zone shall be in accordance with relevant planning policies and provisions contained in the City of Swan Town Planning Scheme No.9 Sections 5.3 and

Appendix 6 "Special Purpose – Ellenbrook", unless stated otherwise and depicted on an approved Detailed Site Plan.

A Detailed Site Plan shall address, but is not limited, to land use mix and compatibility, street block layout, built form and character, landscaping and public infrastructure, signage, integration of civic and/or community uses and spaces, integration of residential uses, pedestrian and cycle movement, vehicle parking and access, integration of public transport services, infrastructure servicing, development staging and relationship to surrounding land uses.

SPECIAL PURPOSE - NEIGHBOURHOOD CENTRE

Zone Purpose & Objective:

To facilitate the development of an integrated, mixed use neighbourhood centre that provides goods, services and facilities to the surrounding community and contributes to the overall amenity of the locality. Residential uses will be incorporated into the Neighbourhood Centre, complementing commercial uses and will not be the predominant use.

Land Use Permissibility:

Land use definitions shall be in accordance with Schedule 1 of Town Planning Scheme No.9.

Land use permissibility for uses in the "Special Purpose – Neighbourhood Centre" zone shall be in accordance with the following table:

Use Class	**Permissibility**
Auction Mart	AA
Amusement Parlour	AA
Betting Agency	AA
Car Park	AA

Car Wash Station	AA
Child Day Care Centre	AA
Cinema / Theatre	AA
Civic Building	AA
Club Premises	AA
Consulting Rooms	AA
Consulting Rooms: Grouped	AA
Convenience Store	AA
Cultural Use	AA
Dwelling Grouped	AA
Dwelling Multiple	AA
Educational Establishment	AA
Fast Food Outlet	AA
Food and Beverage Industry	AA
Funeral Parlour	AA
Health Centre	AA
Health Studio	AA
Hire Service: Non-Industrial	AA
Home Based Business	AA
Hotel Private	AA
Infant Health Centre	AA
Lunch Bar	AA
Market	AA
Medical Centre	AA
Milk Depot	AA
Museum	AA
Night Club	AA
Office: General	AA
Office: Professional	AA
Office: Service	AA
Produce Store	AA

Public Amusement	AA
Reception Lodge	AA
Recreation Public	AA
Recreation Private	AA
Restaurant	AA
Shop	AA
Shopping Centre	AA
Showroom	AA
Tavern: Less Than 200sqm GLA	AA
Veterinary Consulting Rooms	AA
Veterinary Hospital	AA
Wine House	AA
Wet Fish Shop	AA
Any other uses not listed above	AA

Development Standards:

All development standards within the "Special Purpose - Neighbourhood Centre" Zone shall be in accordance with relevant planning policies and provisions contained in the City of Swan Town Planning Scheme No.9 Sections 5.3, Appendix 6 "Special Purpose – Ellenbrook" and the Residential Design Codes of WA, unless stated otherwise and depicted on an approved Detailed Site Plan.

A Detailed Site Plan shall address, but is not limited, to land use mix and compatibility, street block layout, built form and character, landscaping and public infrastructure, signage, integration of civic and/or community uses and spaces, integration of residential uses, pedestrian and cycle movement, vehicle parking and access, integration of public transport services, infrastructure servicing, development staging and relationship to surrounding land uses.

SPECIAL PURPOSE - AGED PERSONS ACCOMMODATION

Zone Purpose & Objective:

To facilitate the development of an independent living facility (aged persons accommodation) integrated with the adjacent Neighbourhood Centre. The independent living facility should comprise predominately residential uses and aged persons accommodation, as well as services and facilities incidental to the aged persons accommodation, for use by both residents of the aged persons accommodation as well as the local community.

Land Use Permissibility:

Land use definitions shall be in accordance with Schedule 1 of Town Planning Scheme No.9.

Land use permissibility for uses in the "Special Purpose – Aged Persons Accommodation" zone shall be in accordance with the following table:

Use Class	**Permissibility**
Cultural Use	AA
Dwelling Aged or Dependent Persons	AA
Dwelling Grouped	AA
Dwelling Multiple	AA
Education Establishment	AA
Funeral Parlour	AA
Health Centre	AA
Health Studio	AA
Car Park	AA
Civic Building	AA
Child Care	AA
Club Premises	AA
Consulting Rooms	AA

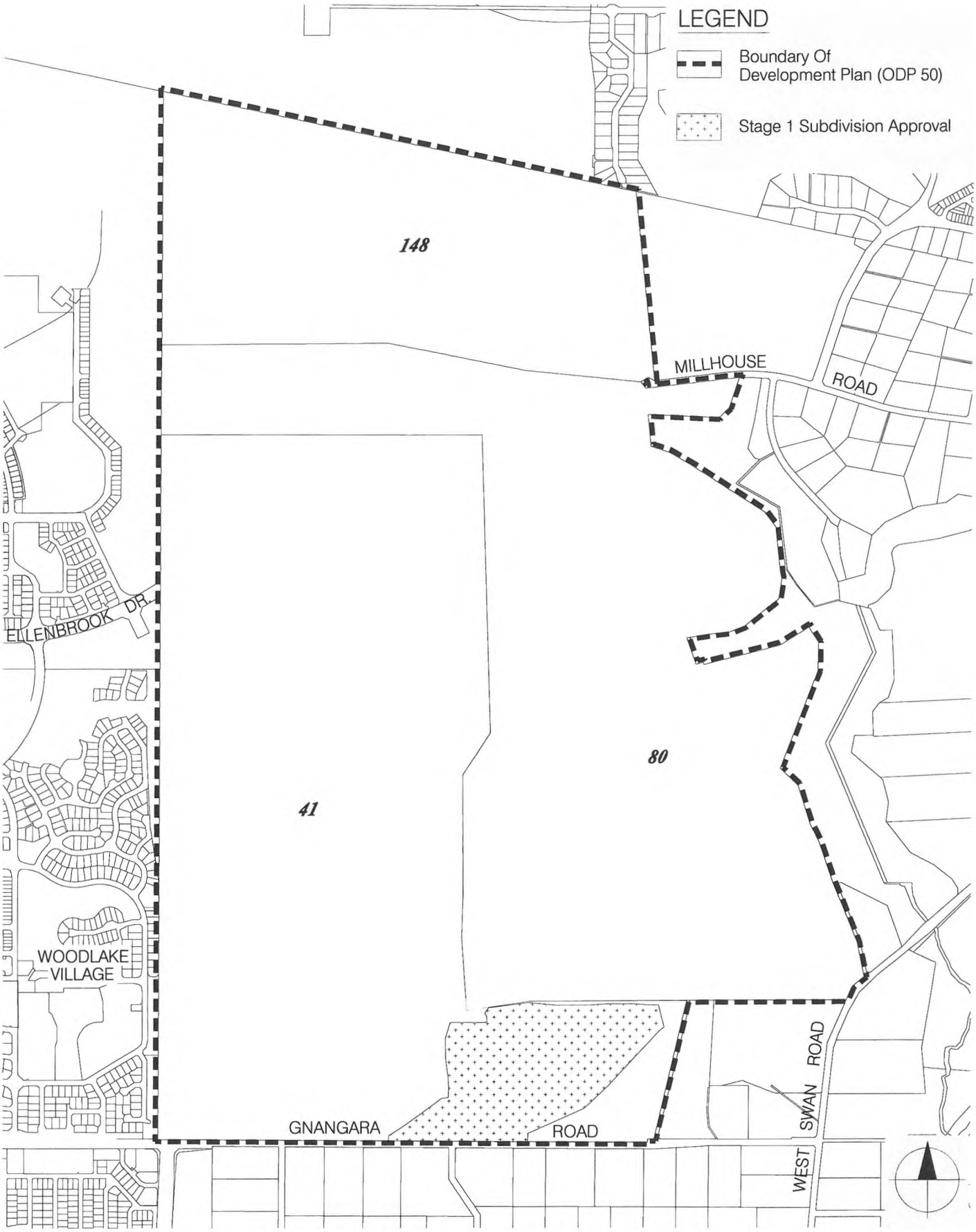
Consulting Rooms: Grouped	AA
Lunch Bar	AA
Medical Centre	AA
Museum	AA
Office: General	AA
Public Amusement	AA
Recreation Public	AA
Recreation Private	AA
Restaurant	AA
Shop	AA
Any other uses not listed above	AA

Development Standards:

All development standards within the "Special Purpose - Neighbourhood Centre" Zone shall be in accordance with relevant planning policies and provisions contained in the City of Swan Town Planning Scheme No.9 Sections 5.3, Appendix 6 "Special Purpose – Ellenbrook" and the Residential Design Codes of WA, unless stated otherwise and depicted on an approved Detailed Site Plan.

A Detailed Site Plan shall address, but is not limited, to land use mix and compatibility, street block layout, built form and character, landscaping and public infrastructure, signage, integration of civic and/or community uses and spaces, integration of residential uses, pedestrian and cycle movement, vehicle parking and access, integration of public transport services, infrastructure servicing, development staging and relationship to surrounding land uses.

FIGURES

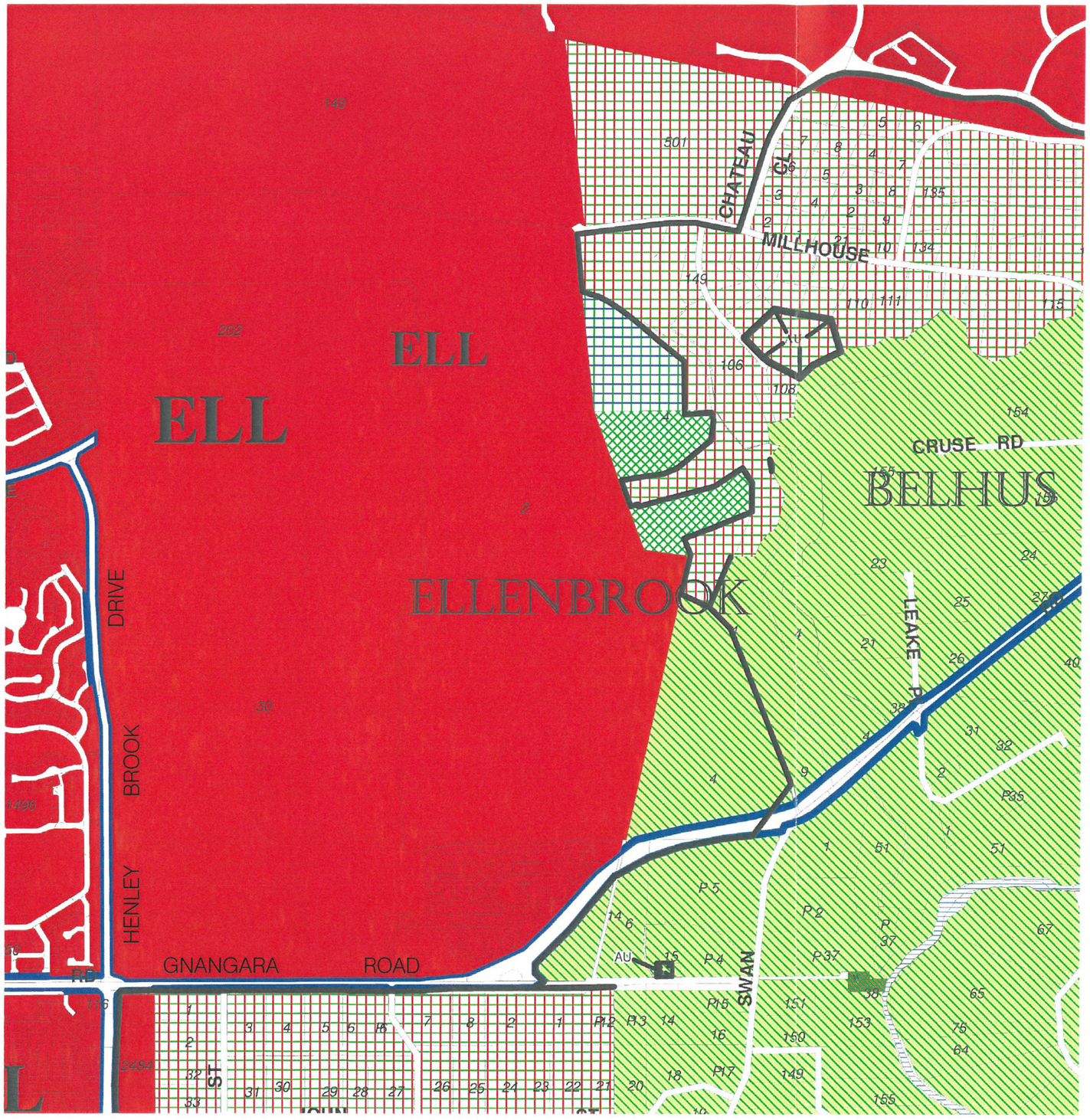


EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

LOCATION PLAN

V A - 04.07.04

FIGURE 1



REGIONAL RESERVES

- PARKS & RECREATION
- PRIMARY REGIONAL ROADS
- OTHER REGIONAL ROADS
- RAILWAYS
- STATE FORESTS
- WATERWAYS
- PUBLIC PURPOSES

LOCAL RESERVES

- RECREATION
- IMPORTANT LOCAL ROAD
- LOCAL ROAD
- PUBLIC PURPOSES
- CIVIC & CULTURAL AREAS
- PROPOSED ROAD WIDENING & NEW STREET ALIGNMENT
- ROAD TO BE CLOSED
- PUBLIC PARKING

RURAL ZONES

- GENERAL RURAL
- SPECIAL RURAL
- SWAN VALLEY RURAL
- RURAL LIVING
- RURAL RESIDENTIAL
- LANDSCAPE
- RESOURCE

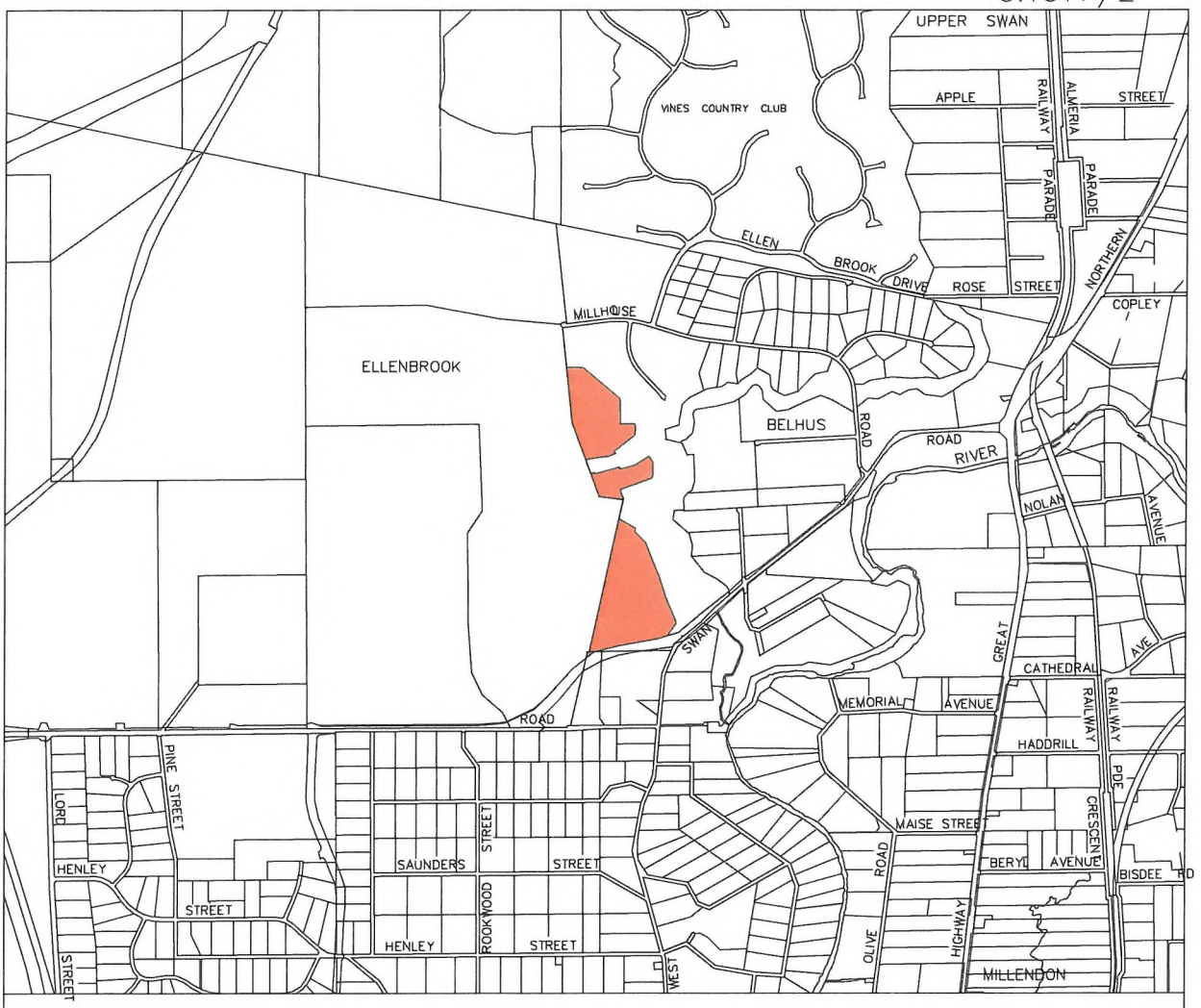
RESIDENTIAL ZONES

- RESIDENTIAL DEVELOPMENT
- RESIDENTIAL 1
- RESIDENTIAL 2
- RESIDENTIAL 3
- R20 R CODE & BOUNDARY
- CONSERVATION PRECINCT

OTHER ZONES

- SPECIAL PURPOSE
- AU ADDITIONAL USE

3.1317/2



SIGNED FOR AND ON BEHALF OF THE
WESTERN AUSTRALIAN PLANNING COMMISSION

An officer duly authorised by the Commission
Pursuant to section 57 of the
Western Australian Planning Commission Act 1985
for that purpose in the presence of :

WITNESS _____

DATE _____

APPROVED _____
GOVERNOR

_____
DATE

Excluded from Rural Zone and included in Urban Zone.

METROPOLITAN REGION SCHEME
SECTION 33 AMENDMENT
MAP No 12/65m
AMENDMENT No. 1020/33
AS MODIFIED

1000 750 500 250 0 1 2
metres kilometres

WESTERN AUSTRALIAN PLANNING COMMISSION

GDA

FILE REFERENCE 3.1317/2
PREPARED BY STATUTORY MAPPING SECTION
PLANNING INFORMATION - MAPPING AND SPATIAL

AUTHORISED: P. STEPHENS
DRAFTSPERSON: S. JENKINS
EXAMINED: _____
REVISED: _____
DATE: EF&P/3443 21-OCT-2003

NORTH
N
SCALE 1:25000

PLAN No
3.1317/2
2234

FILE REF: 809/2/21/11
PLAN REF: SWAN 21.03, 21.04
MRS 1:25000 SHEET12, 3.1295/1

BAR CODE

0 125 250 375 500m

Development of the North Western residential area will be addressed at Development Plan stage and will be subject to hydrological monitoring.

NOTES

1) Larger lots (of a minimum size of 2000m² to be provided along the Ellen Brook.
2) All boundaries, land uses, road alignments and residential densities will be refined and expanded upon in the subsequent Development Plans also prepared pursuant to the Scheme. R60 sites are not limited to the locations shown on this Structure Plan.
3) Pocket Park locations are notional only and for calculation purposes.
These will be refined through the Development Plan stage.
4) Location of footpaths on access streets to be determined in liaison with the City of Swan at subdivision stage.
5) Ellenbrook Drive, Egerton Drive & Millhouse Road will be integrated with surrounding development and will not form a pedestrian barrier.
6) Any Development Plan/Detailed Site Plan prepared for lots adjoining Ellen Brook Regional Open Space shall address : design of larger lots (over 2000m²), roads abutting Regional Open Space interface and access between urban and rural areas, water sensitive urban design, landscape values, building envelopes on larger lots, detailed site plans and the preparation of a Landscape & Environmental Management Plan.
7) Traffic management for school sites to be subject to a more detailed workshop process with the relevant agencies.

✱ Preferred location for possible 9.0ha. District Open Space (to be confirmed).

High School 4.25ha.

Open Space

148

Final location of Village Centre, Mixed Use & Primary School to be determined at Development Plan stage in liaison with the relevant Government agencies.

MILLHOUSE RD

Open Space

ROAD

Mixed Use Mainstreet Village Centre

Primary School 4.0ha.

Open Space

M.U.

MILLHOUSE

DRIVE

Rural - Refer MRS Amendment 1020/33

Larger Lots Along Ellen Brook (refer note 6)

Open Space

EGERTON

Open Space

Rural - Refer MRS Amendment 1020/33

80

210.0263ha

Ellen Brook Regional Open Space

Larger Lots Along Ellen Brook (refer note 6)

41

239.8439 ha

Open Space

Open Space

AVENUE

BROOK

Open Space

Primary School 3.5ha.

Open Space

DEVIATION

HENLEY

M.U.

Mixed Use, Mainstreet Village Centre

Stage One

ROAD

Private School 10.3ha.

GNANGARA

Open Space

ROAD

Service Station, Convenience Store And Fast Food (1.0ha.)

LEGEND

- Structure Plan Boundary
- Residential (Refer Development Plan For Densities)
- Mixed Use Around Centres (R30-R60)
- School
- Public Open Space/ Conservation/Drainage
- Commercial And/Or Mixed Use
- Rural Zone MRS (Excluded from WAPC approval of the Structure Plan)
- Other Regional Road (MRS)
- District Distributor (Bicycle lane, shared path one side, footpath one side)
- Main Neighbourhood Connector (Bicycle lane, shared path one side, footpath one side)
- Other Neighbourhood Connector (On road provision for cyclists, shared path one side, footpath one side)
- Important Local Road
- Possible Bus Route
- Local Centre - 450m Catchment
- Swan Valley Planning Act Boundary

CERTIFICATION
Egerton Structure Plan Review ODP 50

This Structure Plan is prepared under the provisions of Ellenbrook - Special Purpose Zone of the City of Swan Town Planning Scheme No.9.

Approved by resolution of the Council of the City of Swan on .....and the seal of the City of Swan was pursuant to the Council's Resolution hereto affixed in the presence of

.....
CHARLIE GREGORINI
MAYOR

.....
ERIC LUMSDEN
CHIEF EXECUTIVE OFFICER

Adopted by 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.

EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

REV D : 15.04.05

EGERTON STRUCTURE PLAN REVIEW 2004

FIGURE 4

Lot 80

Lot 41

20m Reserve

15m Reserve

8m Laneway

26m Reserve

13m Reserve

Public Open Space
4000m²

Future Residential
3877m²

Public Open Space & Drainage
2.7315ha

P.O.S. & Drainage
1.1157ha

Proposed Road Widening
(See inset)

7.9943ha
Balance of Title
(Lot 41)

LAKE YAKINE

GNANGARA ROAD

GNANGARA

ROAD CARRIAGEWAY DETAIL :

- *All carriageway detail depicted on this Plan including pavements, medians and embayments are for illustrative purposes only and subject to final engineering designs and relevant Council approvals. The depictions reflect the intent of the road network standards to be developed in this subdivision.*

INSERT N.T.S.

Balance of Title
(216.2720ha.)

15m Road Widening
Along Gnangara Road

LEGEND

- Total Application Area (Includes balance of title)
- Area within which residential lots, open space and drainage are being created

97
E 5

EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

EGERTON DEVELOPMENT PLAN (ODP 73) - 1997

V A - 04.07.04

FIGURE 6

PROPOSED LOT YIELD AND MIX (Approx)

LOT SIZE	R CODES	DWELLING YIELD (Approx)	% OF LOT SIZE	AREA (Approx)
320 - 450	R30	65	4%	3.0ha
450 - 600	R20	426	26%	24.9ha
600+	R15	961	70%	65.0ha
TOTAL		1452		92.7ha

NETT SUBDIVISION DENSITY 15.6 Dwellings/ha

ESTIMATED POPULATION (Assuming occupancy rate 3.2) 4646 persons

Note: Because the R15 lot sizes comply with the minimums prescribed for R20, the R15 areas are shown to be coded R20 on the plan.

Note: No further fragmentation of lots, and development in excess of an R20 coding shall be permitted except where nominated as such on Detailed Site Plans adopted by Council as a guide for development within the Development Plan.

LEGEND

PUBLIC OPEN SPACE

PUBLIC PURPOSES

'RESIDENTIAL 2 ZONE'

Policy Statement:
The purpose and intent of the Residential 2 Zone is to provide for a wide range of residential densities facilitating a balanced mix of housing types. This zone also provides for a arange of landuses compatible with residential development.

'GENERAL COMMERCIAL ZONE'

Policy Statement:
The purpose and intent of the General commercial zone is to provide for the creation of a village centre combining a range oi commercial, office and community functions creating a community focal point

IN ADDITION TO THE USE CLASSES STIPULATED IN TABLE 3B THE FOLLOWING SHALL APPLY:

VARIATIONS:

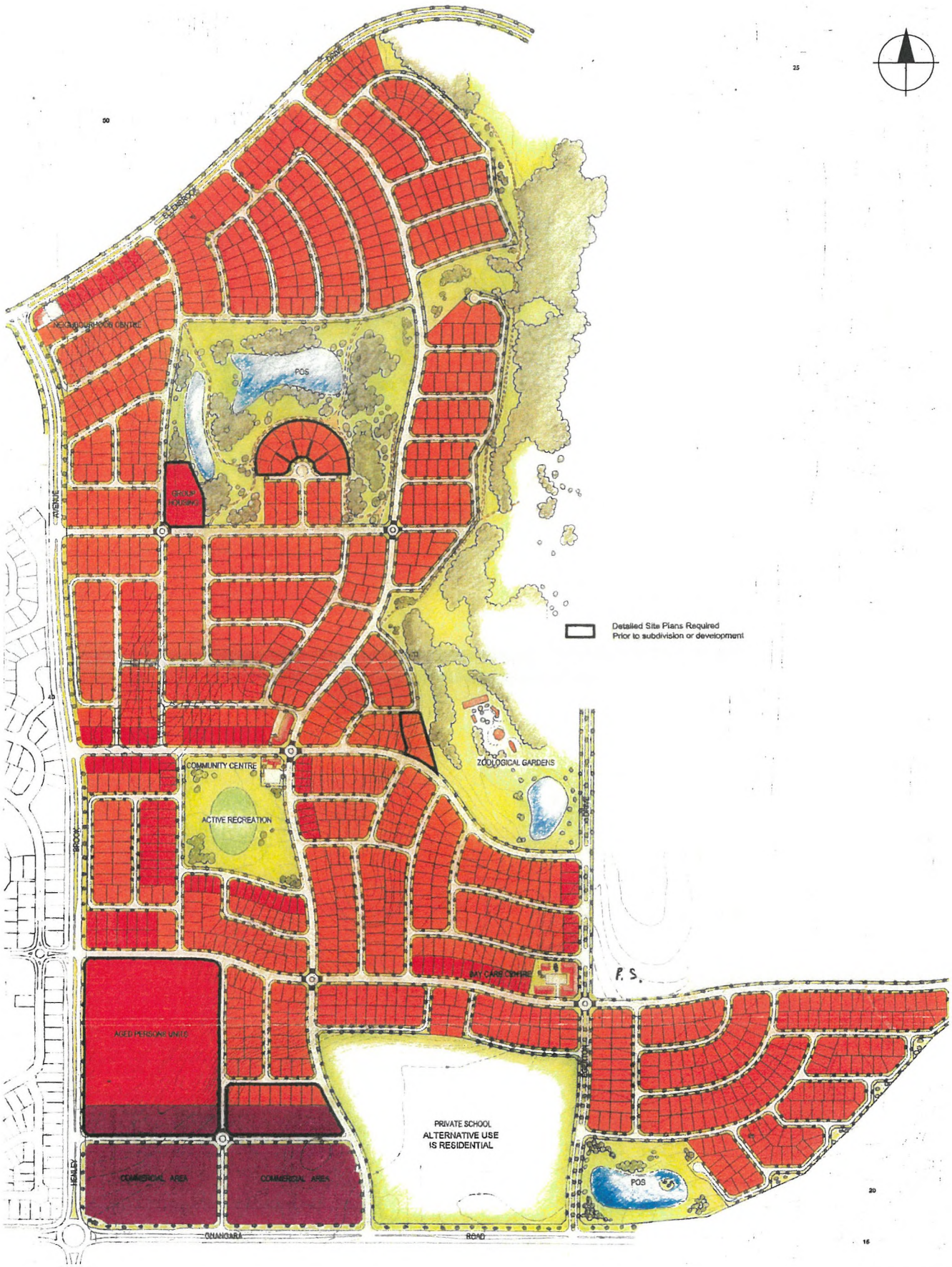
"P' USES
SHOP
SHOPPING CENTRE
DWELLING : ATTACHED HOUSE (MORE THAN 2)
DWELLING : GROUPED (MORE THAN 2)
DWELLING : MULTIPLE (MORE THAN 2)
"AA' USES
PUBLIC WORSHIP, PLACE OF

EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

REV A : 05.07.04

ODP 73 - ZONING CLASSIFICATION PLAN - 1997

FIGURE 7

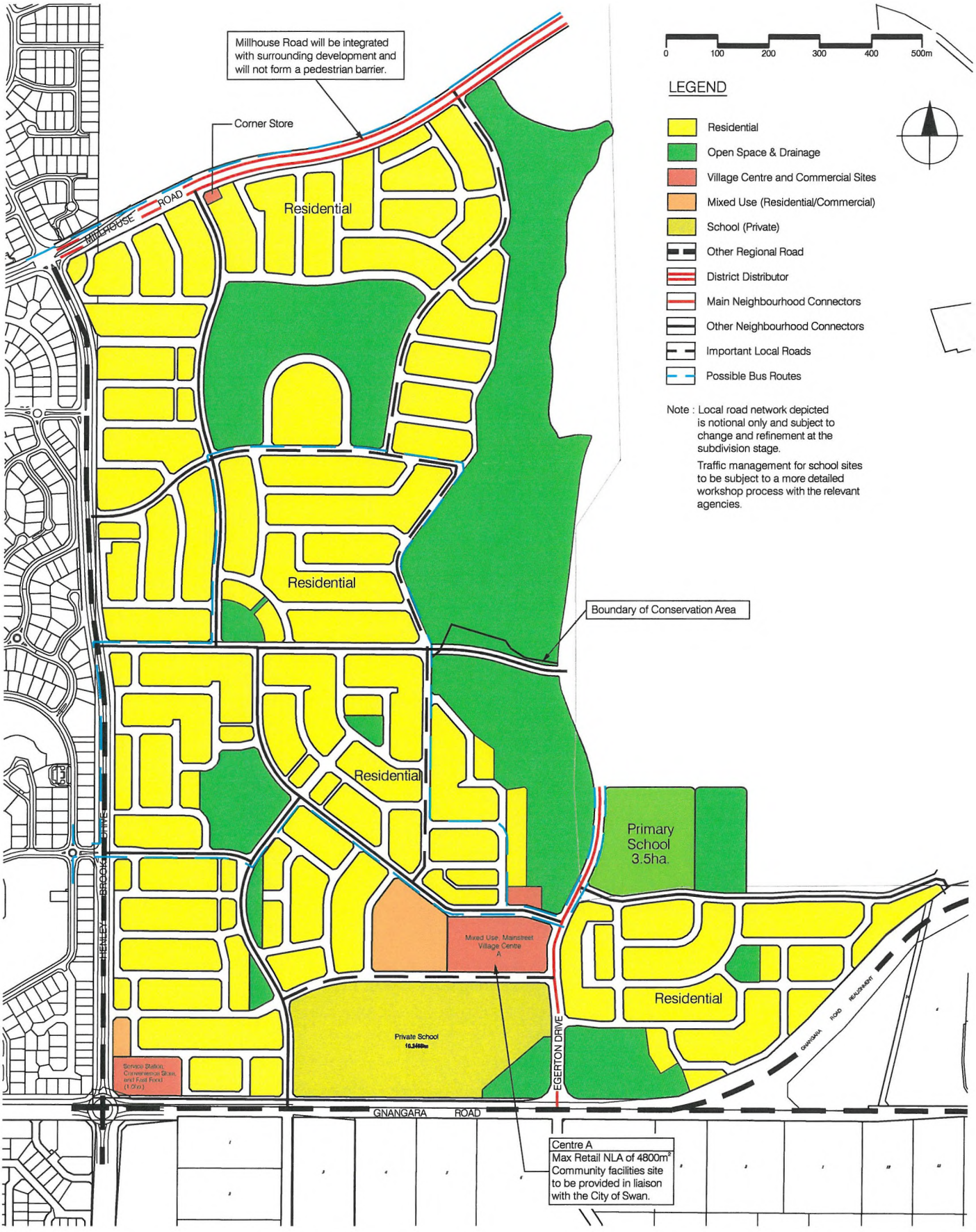


EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

V A : 17.06.04

EGERTON 2000
DEVELOPMENT PLAN ONE REVIEW

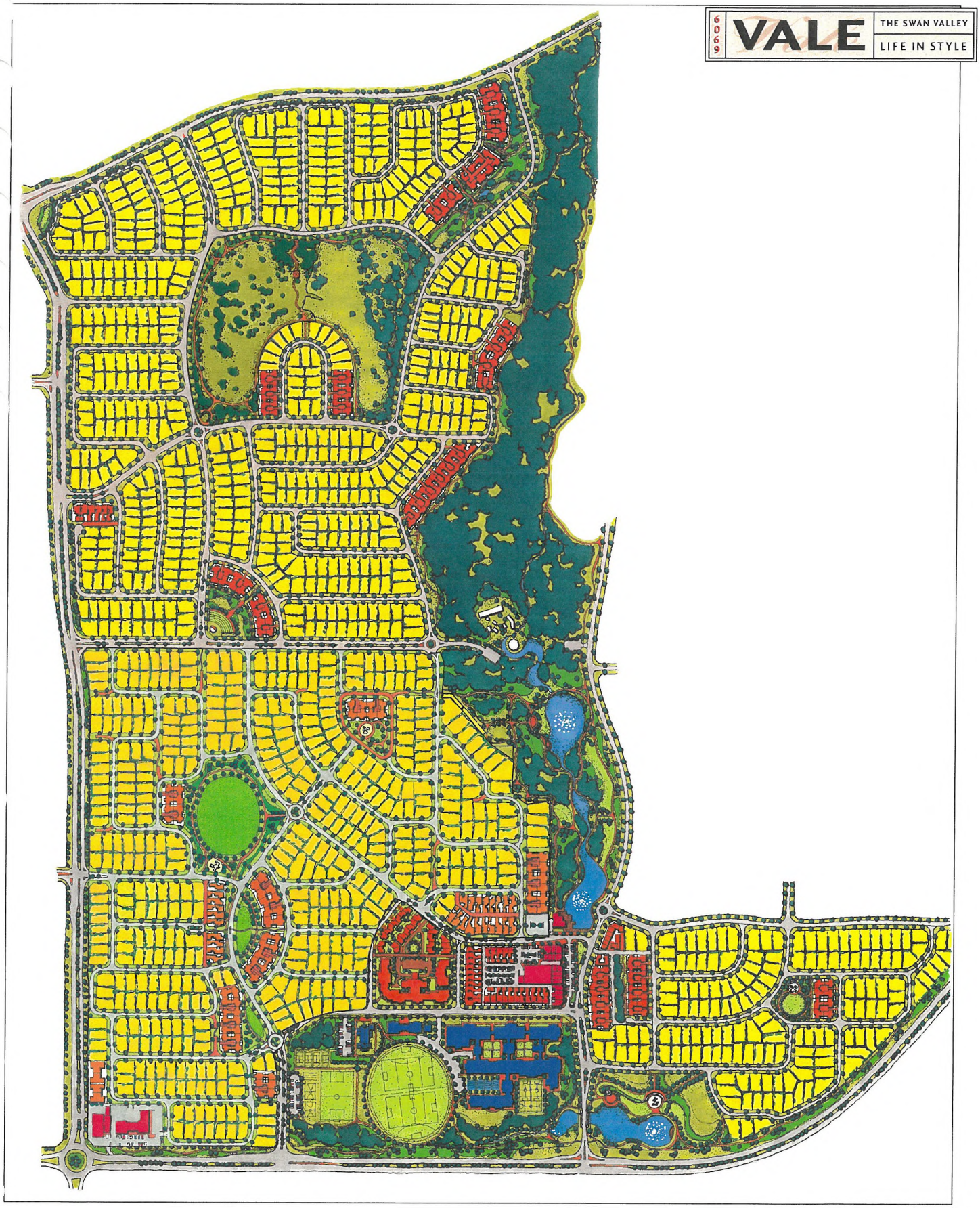
FIGURE 8



EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50) 2004 DEVELOPMENT PLAN ONE REVIEW

V D : 20.07.05 **FIGURE 9**

6069 VALE THE SWAN VALLEY LIFE IN STYLE



EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50) **DEVELOPMENT CONCEPT PLAN**

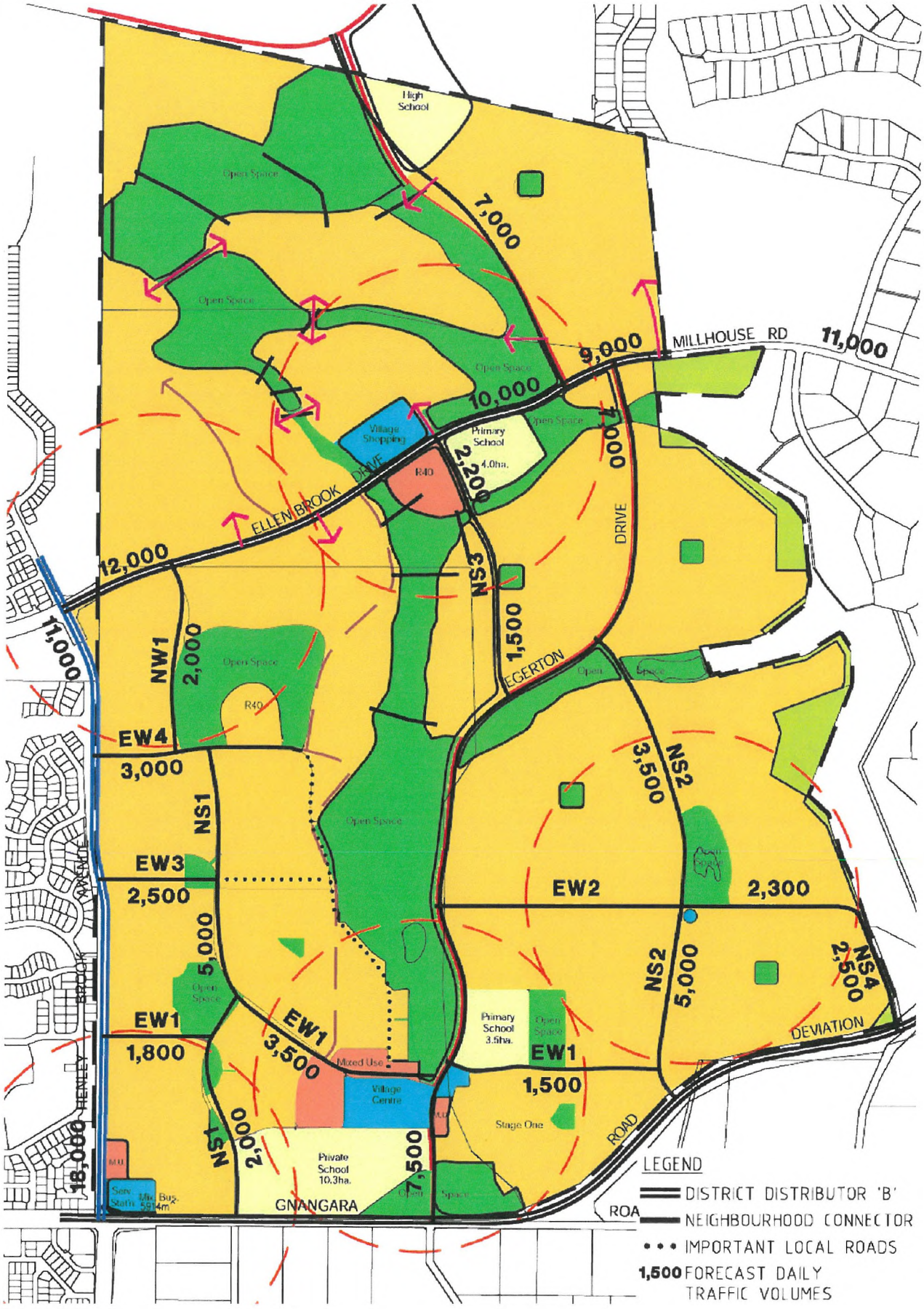
REV A : 17.06.04 **FIGURE 10**

EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

APPROVED PLAN OF SUBDIVISION - WAPC REF 111089

REV A : 05.07.04 - SOURCE : MITCHELL GOFF & ASSOC.

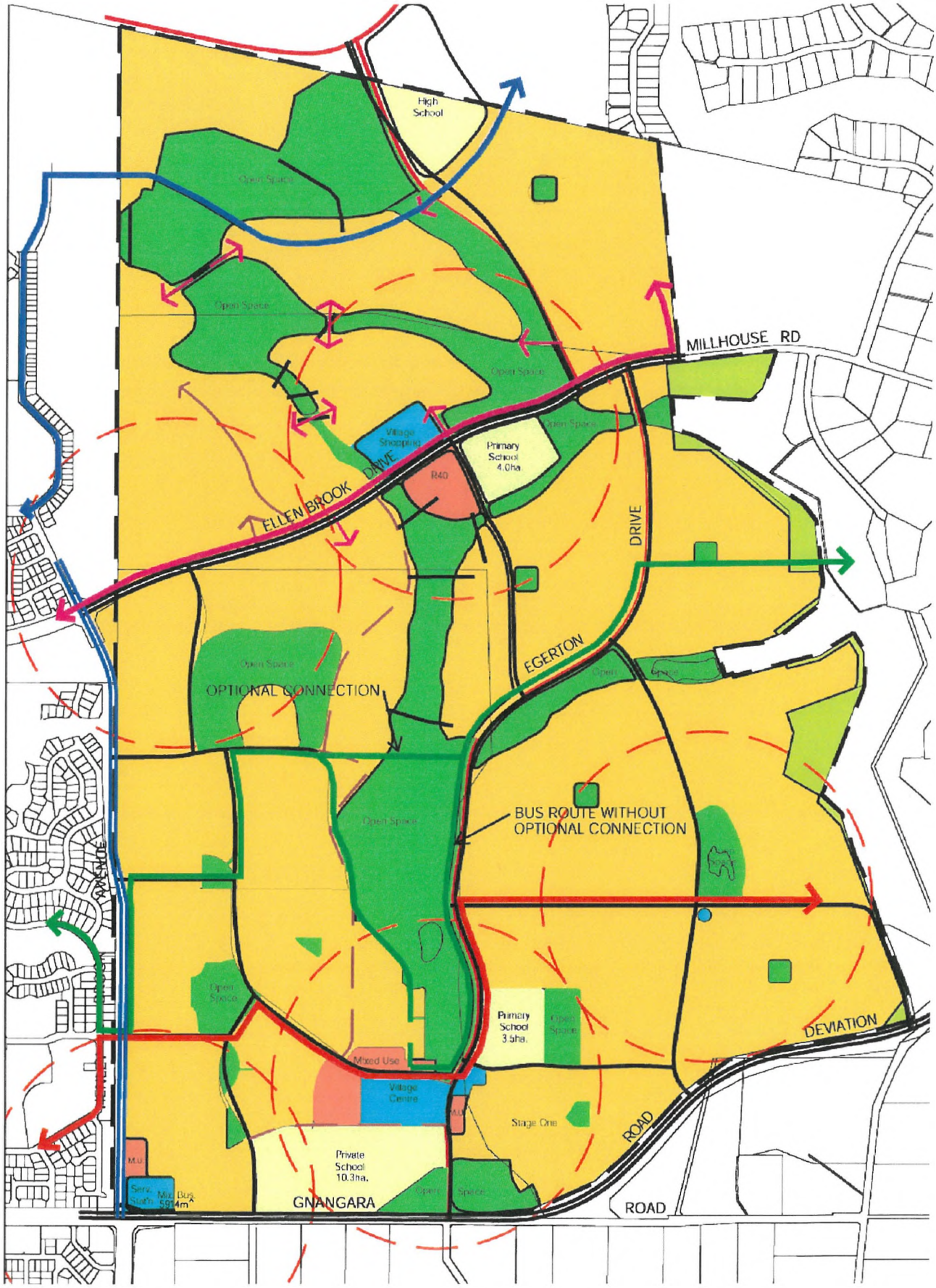
FIGURE 11



EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50) TRAFFIC VOLUMES & ROAD HIERARCHY

V A : 05.07.04 - SOURCE : SKM

FIGURE 12

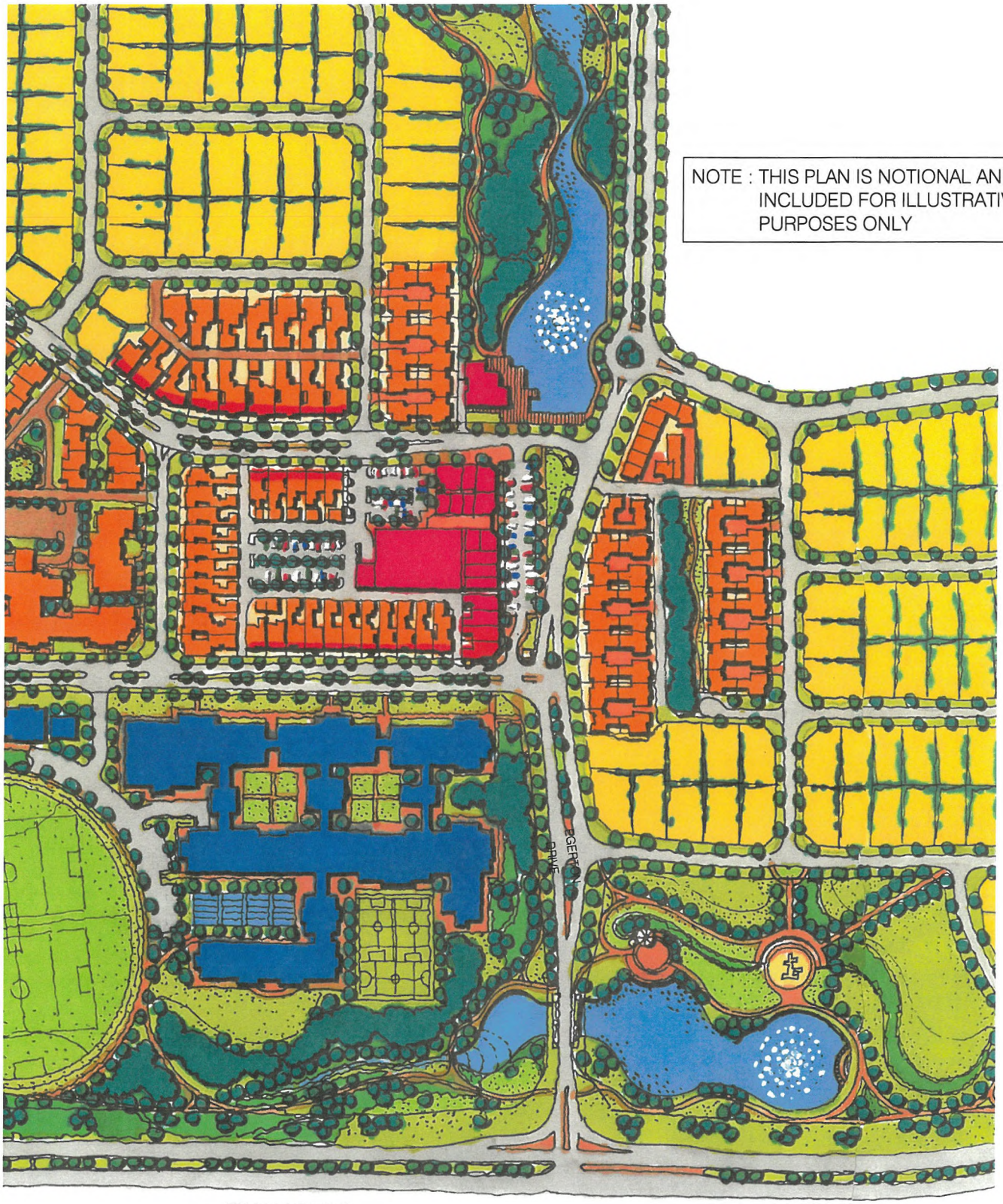


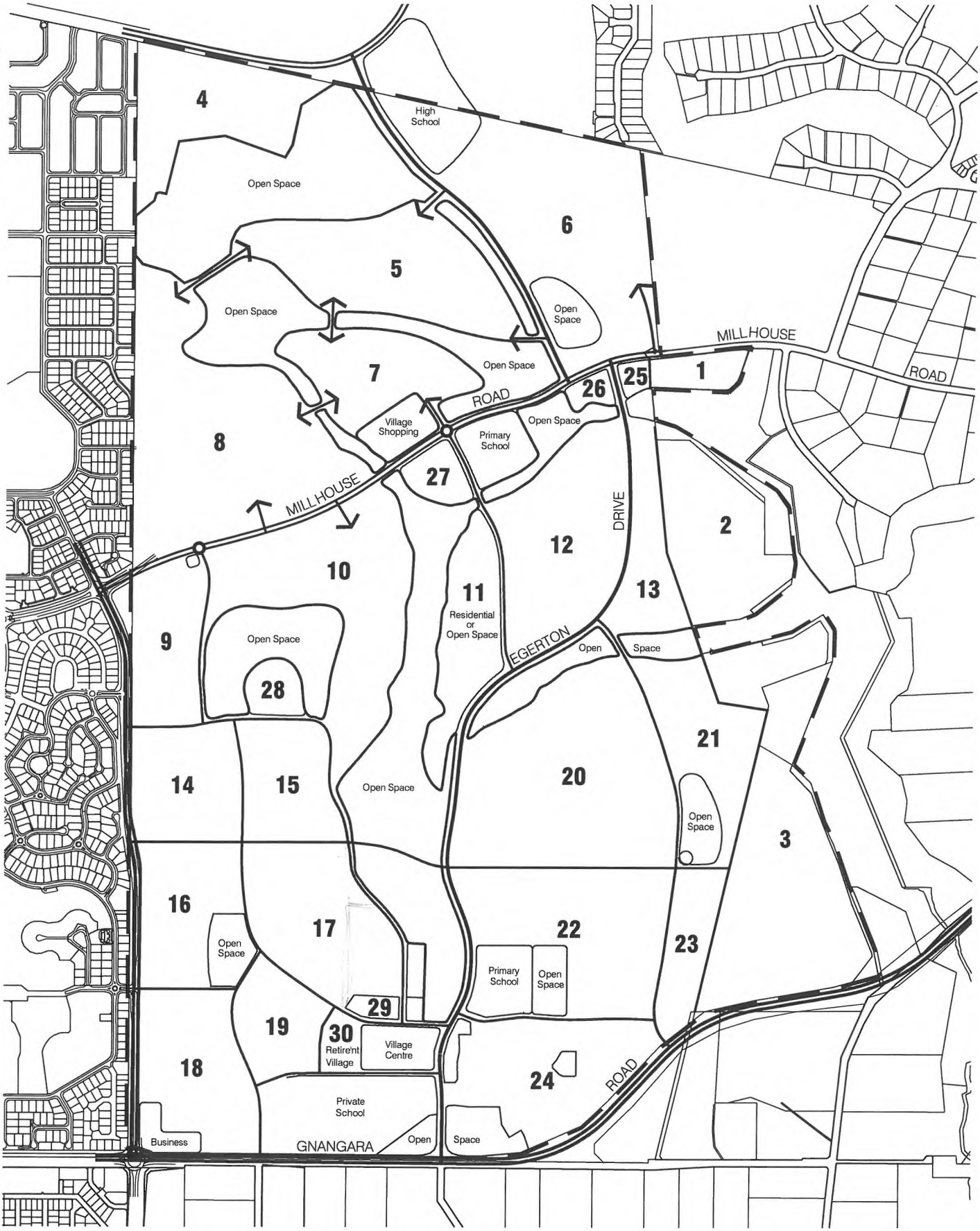
EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

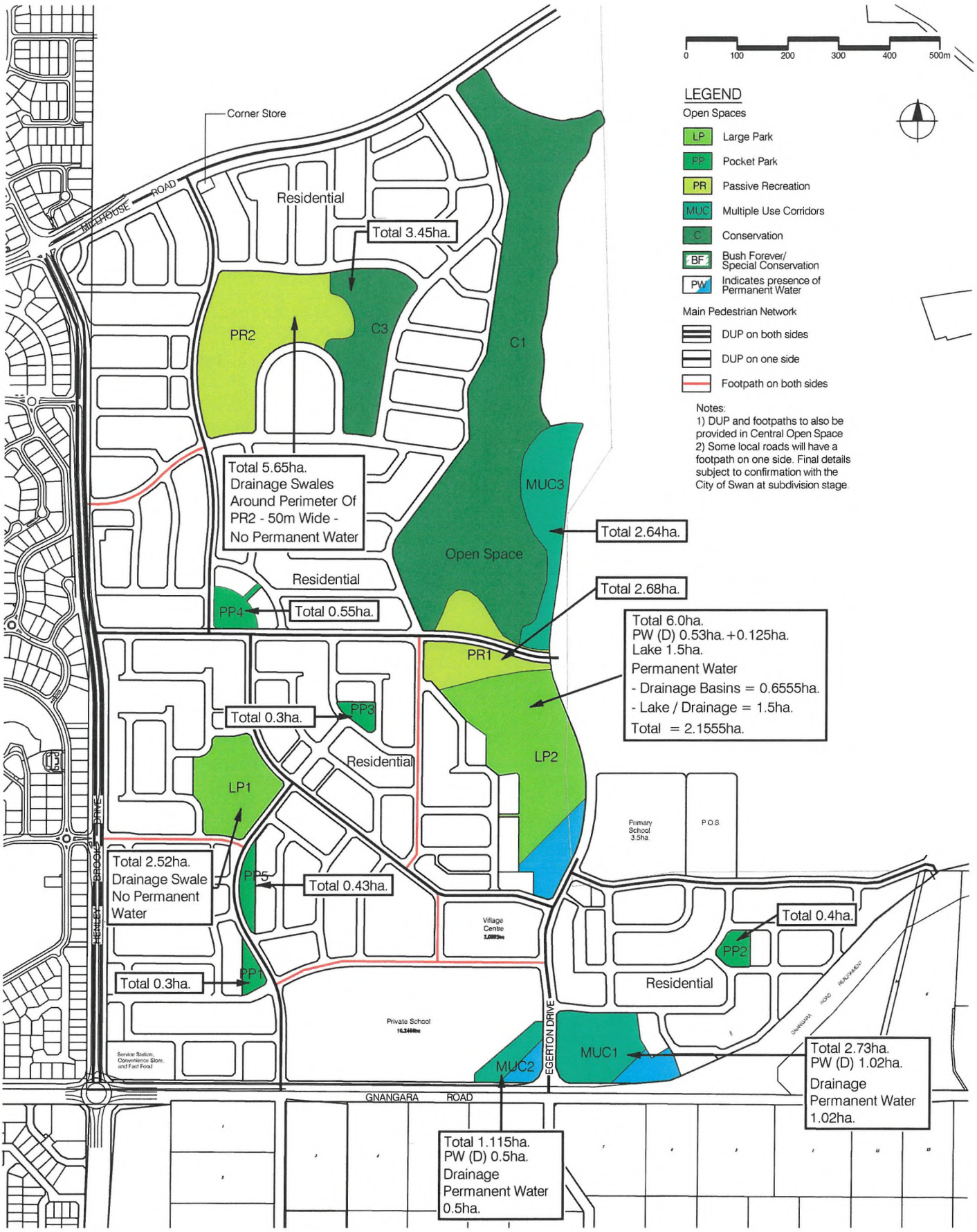
BUS ROUTES

A : 05.07.04 - SOURCE : SKM

FIGURE 13


NOTE : THIS PLAN IS NOTIONAL AND INCLUDED FOR ILLUSTRATIVE PURPOSES ONLY
EGERTON DRIVE
GNANGARA
ROAD


4
High School
Open Space
6
5
Open Space
Open Space
7
Open Space
MILLHOUSE
ROAD
25
1
26
ROAD
Village Shopping
Primary School
Open Space
8
27
MILLHOUSE
DRIVE
2
12
10
11
Residential or Open Space
13
9
Open Space
EGERTON
Open
Space
28
21
14
15
Open Space
20
Open Space
3
16
17
22
23
Open Space
Primary School
Open Space
29
19
30
Retire'nt Village
Village Centre
18
24
ROAD
Private School
Business
GNANGARA
Open
Space

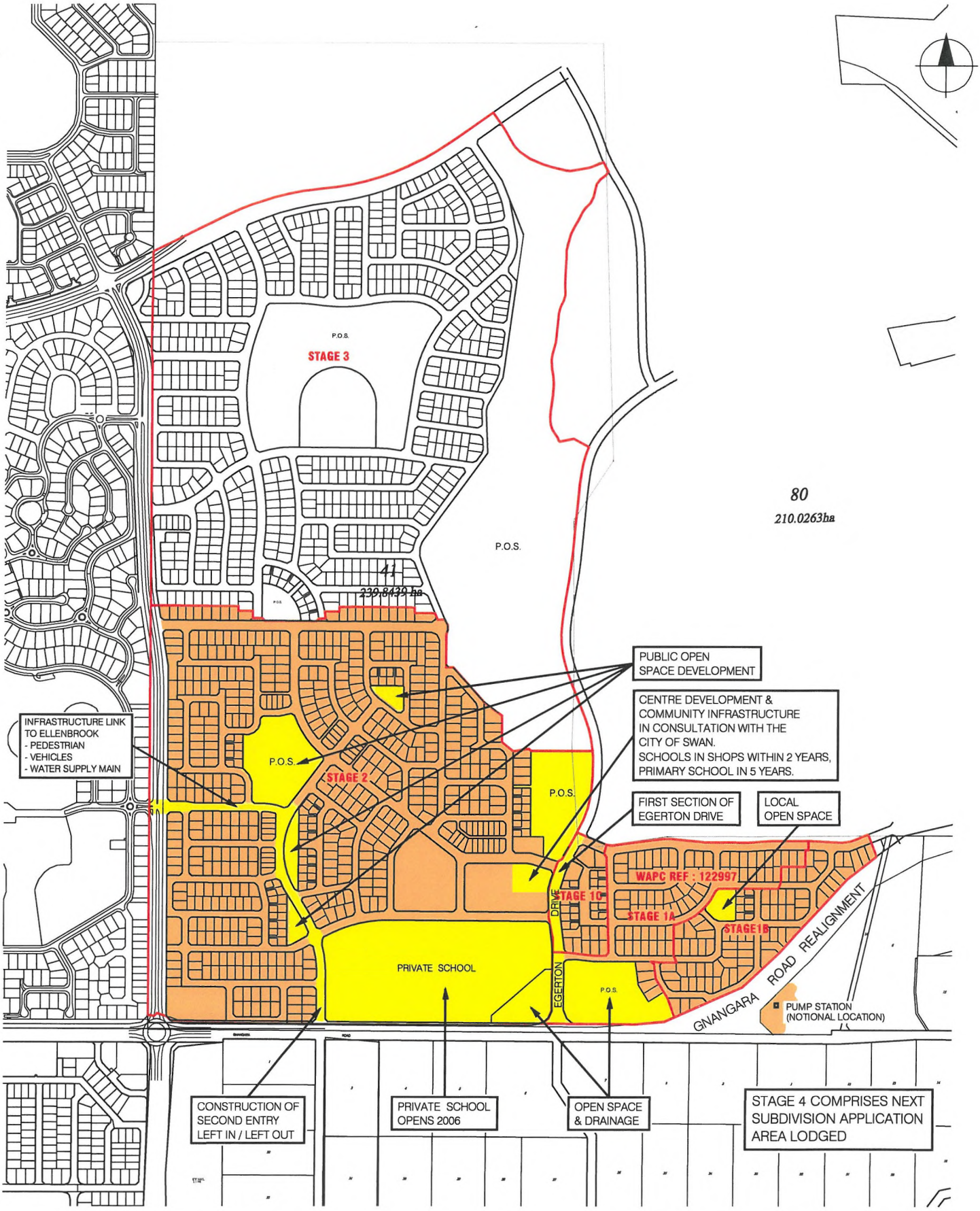


EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

PUBLIC OPEN SPACE AND PEDESTRIAN NETWORK

`V D : 20.07.05

FIGURE 16



EGERTON DEVELOPMENT PLAN REVIEW - 2004 (ODP 50)

STAGING PLAN

V B : 20.07.04

FIGURE 17

STATUTORY DOCUMENTATION
PLANS

Western Australian Planning Commission

Enquiries: Mek Piggott (6551 9281)
Our Ref: 808/2/1/4 P19 Vol 3
Your Ref: ODP-73/1

Chief Executive Officer
City of Swan
P O Box 196
MIDLAND WA 6936

Attention: Andrina Johnson

Dear Sir

AMENDMENT TO STRUCTURE PLAN – THE VALE DEVELOPMENT PLAN 1 AVELEY OUTLINE DEVELOPMENT PLAN NO 73(H) & (I)

I refer to your letter dated 16 March 2012 requesting the Western Australian Planning Commission's endorsement of the abovementioned modified Outline Development Plans.

The Western Australian Planning Commission has resolved, in accordance with Clause 5A.1.10 of the City of Swan Local Planning Scheme No 17, to endorse the modified Structure Plan (Outline Development Plan No 73((H) & (I), adopted by the City of Swan on 10 May 2010, 13 April 2011 and 19 April 2011 as a guideline for the consideration of subdivision and development proposals.

Accordingly, two copies of the modified Structure Plan (Outline Development Plan No 73 (H) & (I), duly endorsed, are returned for your records.

Should you wish to discuss this matter further, please contact the assigned planning officer listed above.

Yours faithfully

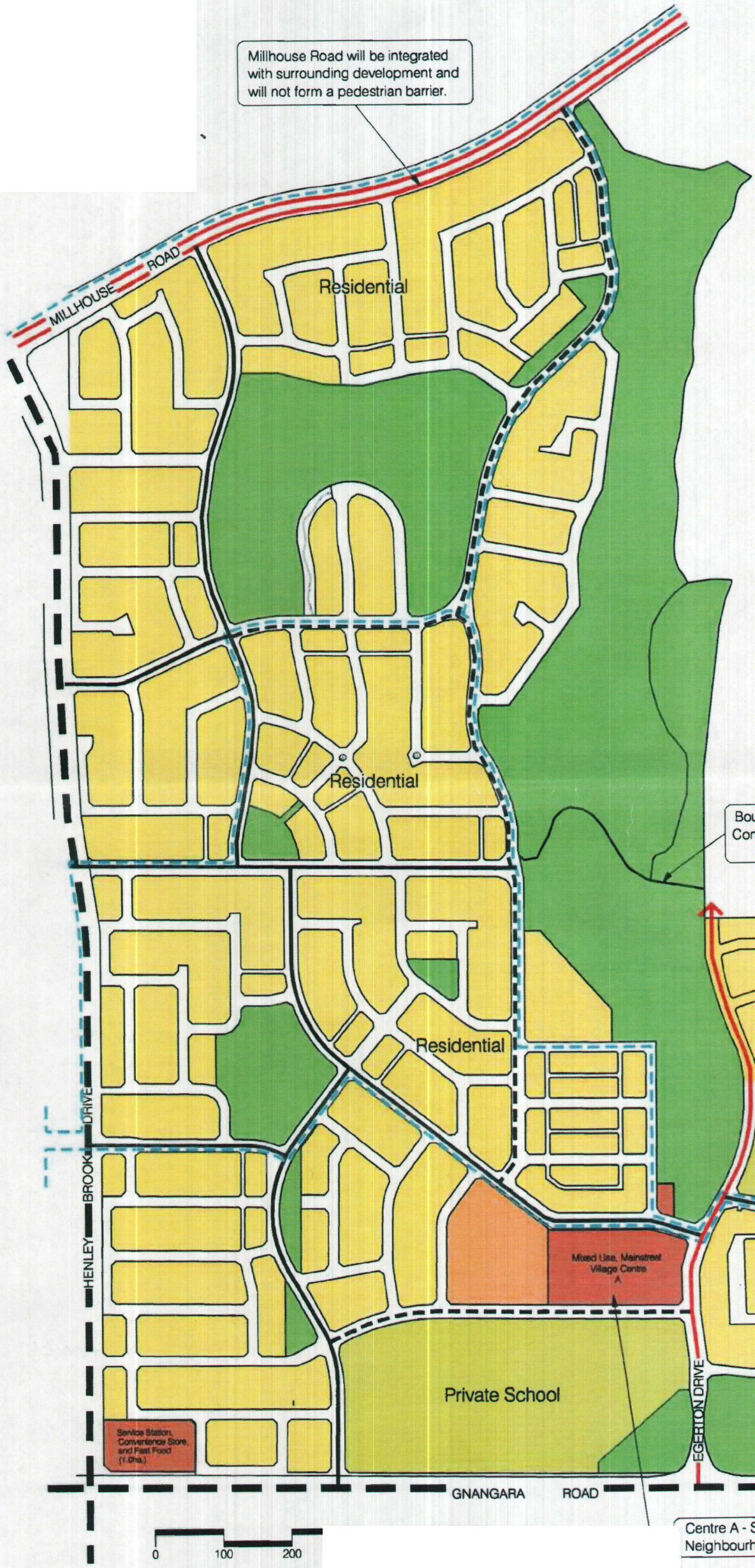
Neil Thomson
Secretary
Western Australian Planning Commission
30 July 2012

CITY OF SWAN
- 1 AUG 2012
RECEIVED

Attached: 2 copies Structure Plan (Outline Development Plan No 73 (H) & (I)

Postal address: Locked Bag 2506 Perth WA Street address:140 William Street Perth WA 6000
Tel: (08) 655 19000 Fax: (08) 655 19001 TTY: 655 19007 Infoline: 1800 626 477
corporate@planning.wa.gov.au www.planning.wa.gov.au
ABN 35 482 341 493

wa.gov.au



LEGEND

- Residential
- Open Space & Drainage
- Village Centre and Commercial Sites
- Mixed Use (Residential/Commercial)
- School
- Other Regional Road
- District Distributor
- Main Neighbourhood Connectors
- Other Neighbourhood Connectors
- Important Local Roads
- Possible Bus Routes

Notes:

1. Lots affected by Aviary Noise buffer as indicated in Figure 1A of the Vale Aviary Noise Management Plan (October 2005) shall not be created until the matter of the aviary has been resolved to Council's satisfaction.

2. Visually permeable fencing is to be provided to all lots on the boundary which directly abuts open space areas to the City's satisfaction.

3. Prior to lodgement of Deposited Plans the proponent to demonstrate all relevant requirements under the respective Management Plans has been met, covering:

   a) Drainage and Nutrient Management Program
   b) Wetland Management Plans
      (including Wetland Open Space Management Plans)
   c) Bandicoot Strategy
   d) Western Swamp Tortoise Survey
   e) Preliminary Landscape Plans

4. Local road network depicted is notional only and subject to change and refinement at the subdivision stage.

5. Traffic management for school sites to be subject to more detailed workshop process with the relevant agencies.

Centre A - Small Neighbourhood Centre

Retail NLA between 1500m² to 3500m².

Community Facility Site to be integrated with Primary School Site and Public Open Space in liason with the City of Swan.

ODP 73 - DEVELOPMENT PLAN ONE

Figure S1

995-433a (23.09.09)

11.1 Residential Zone
The objectives of the Residential Zone, shown on Figure S2 as Residential 1, 2 and 3, are as per clauses 4.2.13 of the LPS 17. Land use definitions shall be in accordance with LPS 17. Land use permissibility for uses in the Residential Zone shall be in accordance with clause 4.3 - Zoning Table of LPS 17.

Notes:

1. Lots affected by Aviary Noise buffer as indicated in Figure 1A of the Vale Aviary Noise Management Plan (October 2005) shall not be created until the matter of the aviary has been resolved to Council's satisfaction.

2. Visually permeable fencing is to be provided to all lots on the boundary which directly abuts open space areas to the City's satisfaction.

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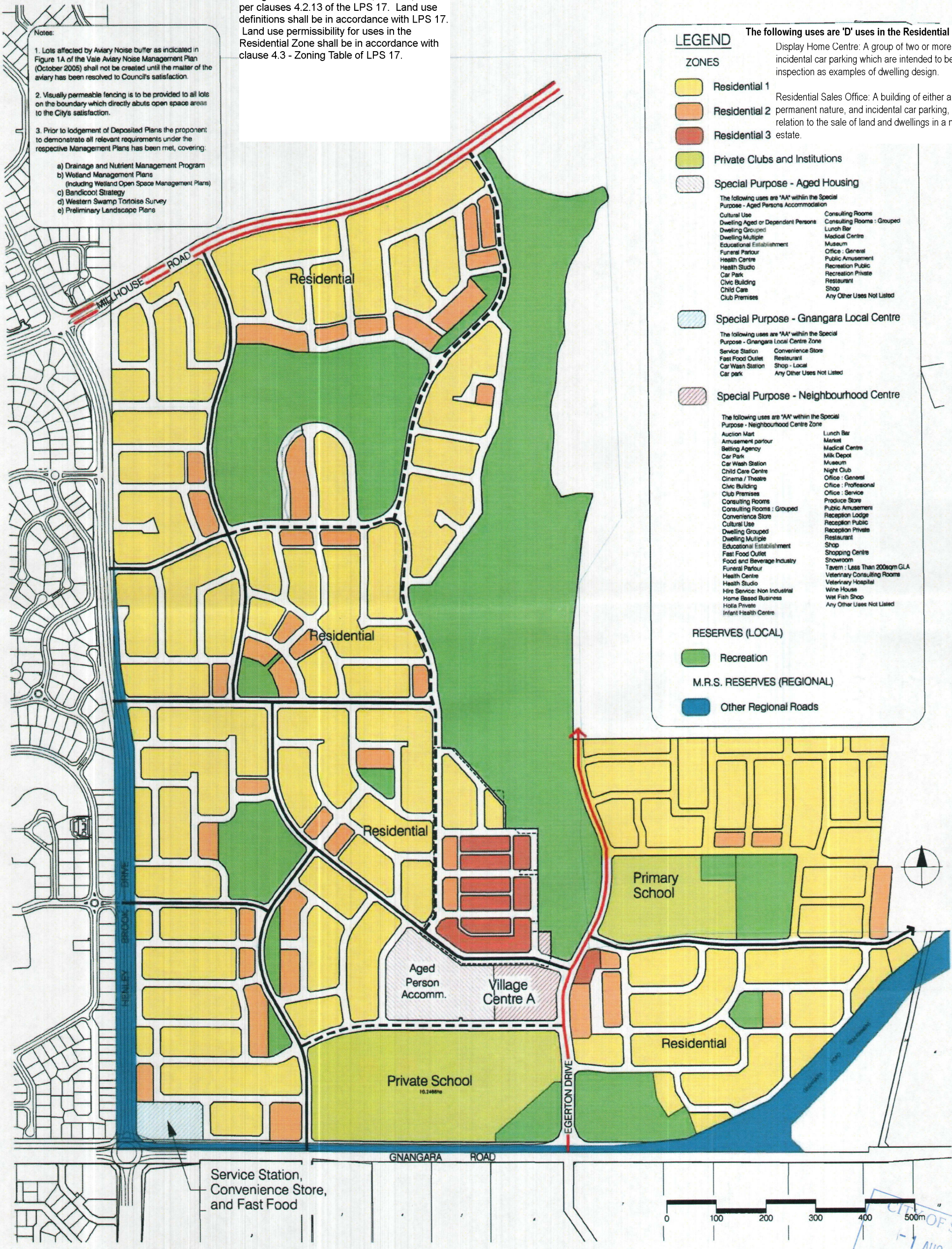


LEGEND

ZONES

- Residential 1
- Residential 2
- Residential 3
- Private Clubs and Institutions
- Special Purpose - Aged Housing

The following uses are 'AA' within the Special Purpose - Aged Persons Accommodation

Cultural Use	Consulting Rooms
Dwelling Aged or Dependent Persons	Consulting Rooms : Grouped
Dwelling Grouped	Lunch Bar
Dwelling Multiple	Medical Centre
Educational Establishment	Museum
Funeral Parlour	Office : General
Health Centre	Public Amusement
Health Studio	Recreation Public
Car Park	Recreation Private
Civic Building	Restaurant
Child Care	Shop
Club Premises	Any Other Uses Not Listed

- Special Purpose - Gnangara Local Centre

The following uses are 'AA' within the Special Purpose - Gnangara Local Centre Zone

Service Station	Convenience Store
Fast Food Outlet	Restaurant
Car Wash Station	Shop - Local
Car park	Any Other Uses Not Listed

- Special Purpose - Neighbourhood Centre

The following uses are 'AA' within the Special Purpose - Neighbourhood Centre Zone

Auction Mart	Lunch Bar
Amusement parlour	Market
Betting Agency	Medical Centre
Car Park	Milk Depot
Car Wash Station	Museum
Child Care Centre	Night Club
Cinema / Theatre	Office : General
Civic Building	Office : Proffesional
Club Premises	Office : Service
Consulting Rooms	Produce Store
Consulting Rooms : Grouped	Public Amusement
Convenience Store	Reception Lodge
Cultural Use	Reception Public
Dwelling Grouped	Reception Private
Dwelling Multiple	Restaurant
Educational Establishment	Shop
Fast Food Outlet	Shopping Centre
Food and Beverage Industry	Showroom
Funeral Parlour	Tavern : Less Than 200sqm GLA
Health Centre	Veterinary Consulting Rooms
Health Studio	Veterinary Hospital
Hire Service: Non Industrial	Wine House
Home Based Business	Wet Fish Shop
Hotla Private	Any Other Uses Not Listed
Infant Health Centre	

RESERVES (LOCAL)

- Recreation

M.R.S. RESERVES (REGIONAL)

- Other Regional Roads

The following uses are 'D' uses in the Residential Zones 1, 2 and 3:

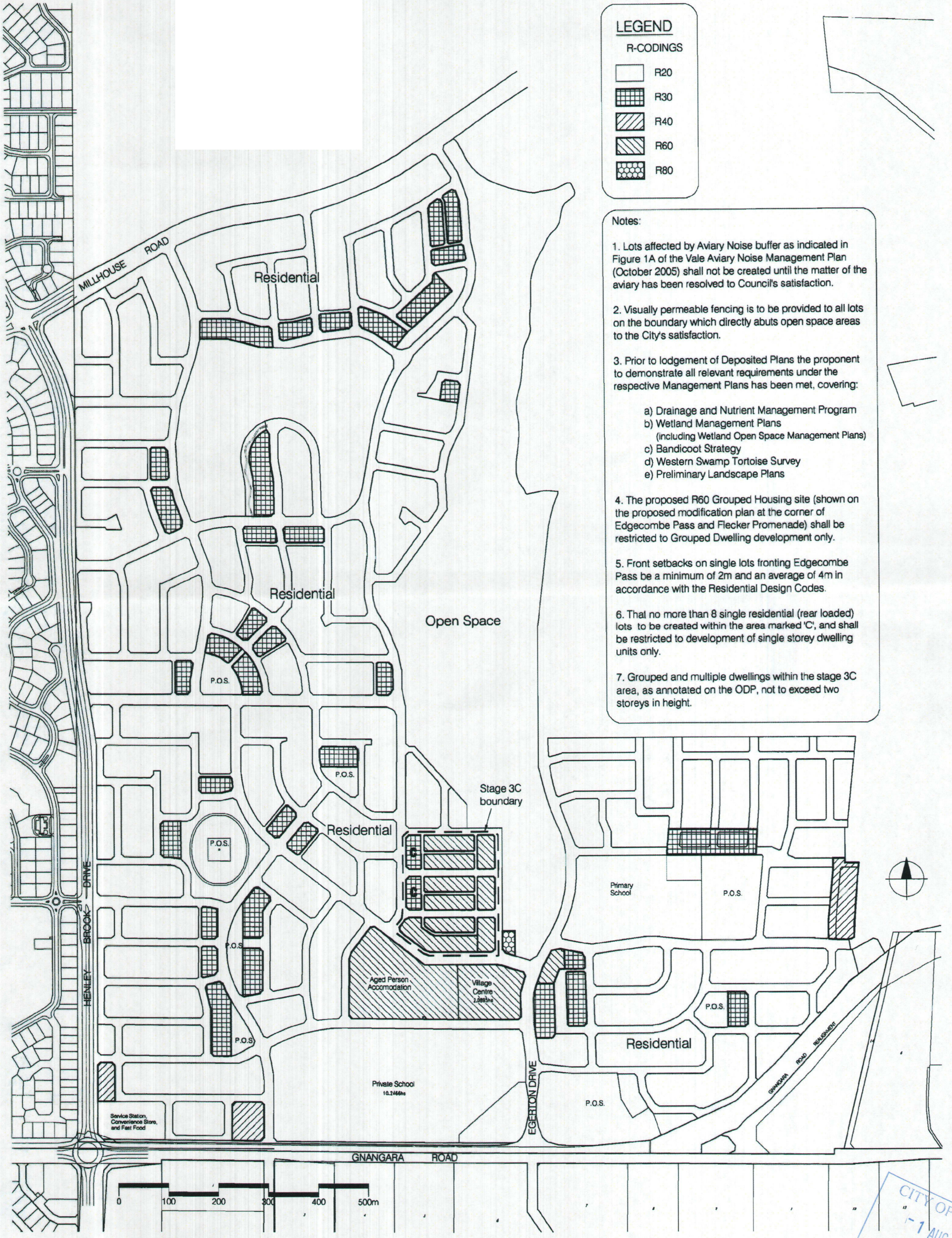
Display Home Centre: A group of two or more dwelling and incidental car parking which are intended to be open for public inspection as examples of dwelling design.

Residential Sales Office: A building of either a temporary or permanent nature, and incidental car parking, used directly in relation to the sale of land and dwellings in a new residential estate.

ODP 73 - DEVELOPMENT PLAN ONE - ZONING CLASSIFICATION

995-434 (04.09.09)

Figure S2



Notes:

1. Lots affected by Aviary Noise buffer as indicated in Figure 1A of the Vale Aviary Noise Management Plan (October 2005) shall not be created until the matter of the aviary has been resolved to Council's satisfaction.

2. Visually permeable fencing is to be provided to all lots on the boundary which directly abuts open space areas to the City's satisfaction.

3. Prior to lodgement of Deposited Plans the proponent to demonstrate all relevant requirements under the respective Management Plans has been met, covering:

   a) Drainage and Nutrient Management Program
   b) Wetland Management Plans
      (including Wetland Open Space Management Plans)
   c) Bandicoot Strategy
   d) Western Swamp Tortoise Survey
   e) Preliminary Landscape Plans

4. The proposed R60 Grouped Housing site (shown on the proposed modification plan at the corner of Edgecombe Pass and Flecker Promenade) shall be restricted to Grouped Dwelling development only.

5. Front setbacks on single lots fronting Edgecombe Pass be a minimum of 2m and an average of 4m in accordance with the Residential Design Codes.

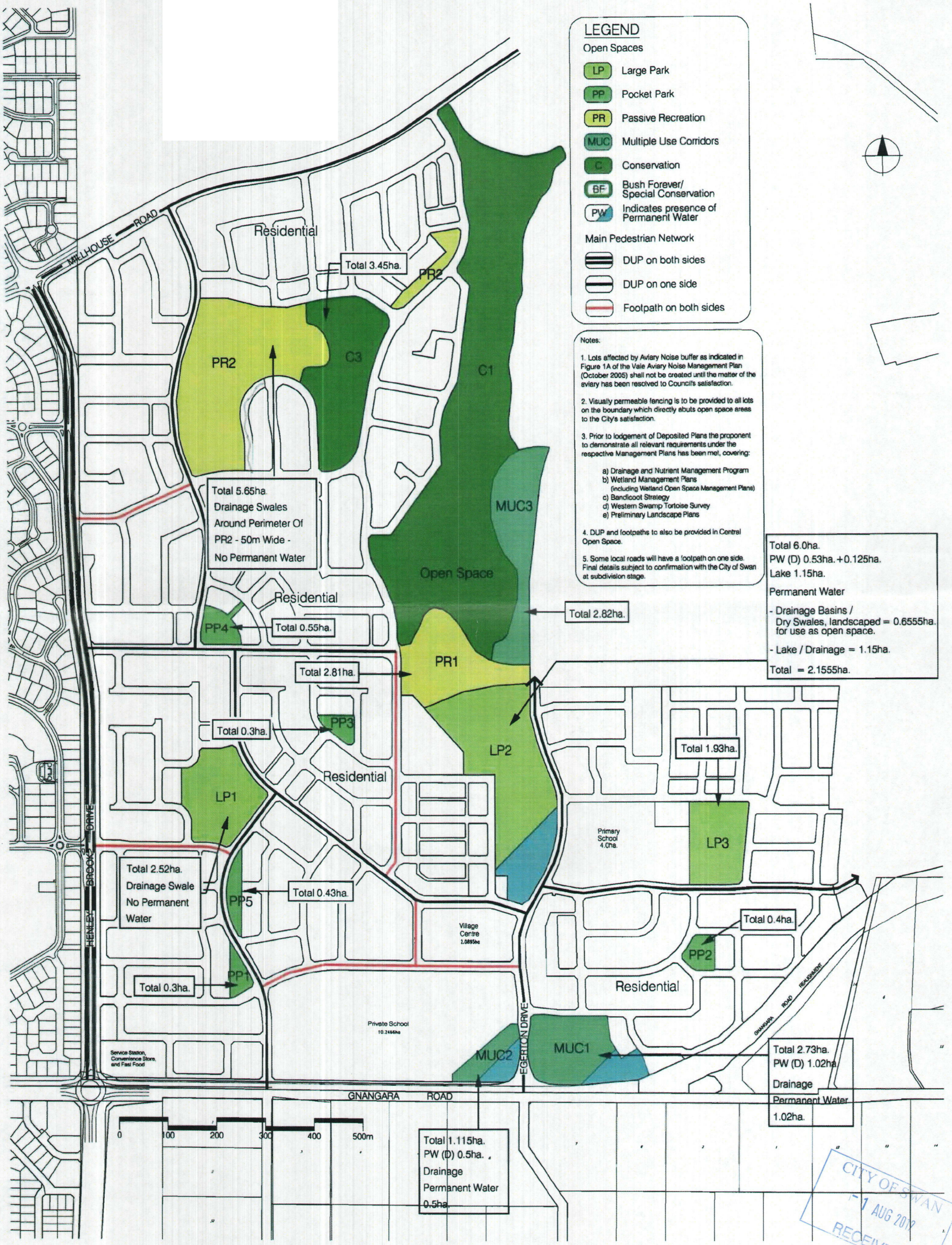
6. That no more than 8 single residential (rear loaded) lots to be created within the area marked 'C', and shall be restricted to development of single storey dwelling units only.

7. Grouped and multiple dwellings within the stage 3C area, as annotated on the ODP, not to exceed two storeys in height.

ODP 73 - DEVELOPMENT PLAN ONE - DENSITY SITES PLAN

995-435C (16.11.09)

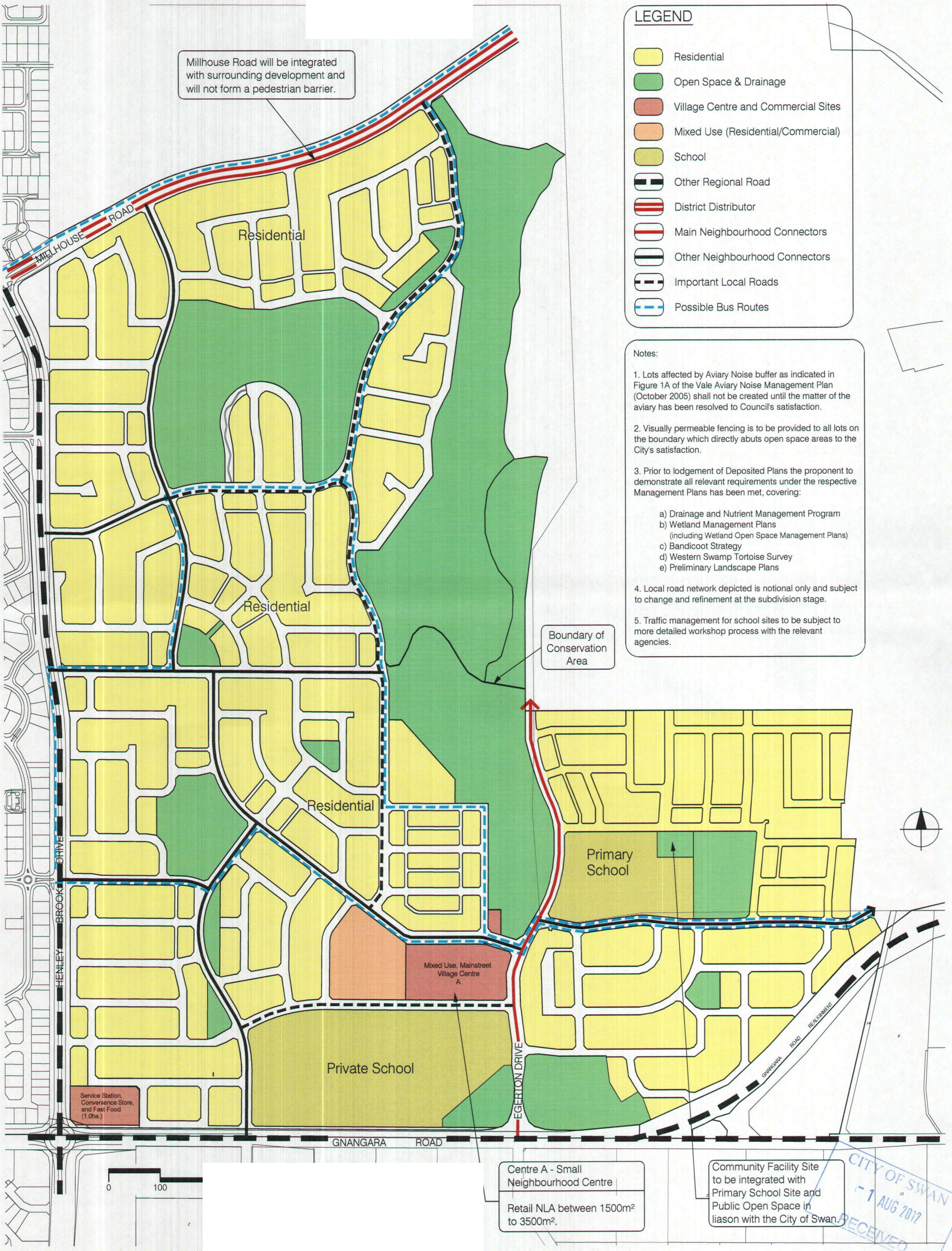
Figure S3



ODP 73 - DEVELOPMENT PLAN ONE - PUBLIC OPEN SPACE AND PEDESTRIAN NETWORK

995-436a (23.09.09) **Figure S4**

CHAPPELL LAMBERT EVERETT



LEGEND

- Residential
- Open Space & Drainage
- Village Centre and Commercial Sites
- Mixed Use (Residential/Commercial)
- School
- Other Regional Road
- District Distributor
- Main Neighbourhood Connectors
- Other Neighbourhood Connectors
- Important Local Roads
- Possible Bus Routes

Notes:

1. Lots affected by Aviary Noise buffer as indicated in Figure 1A of the Vale Aviary Noise Management Plan (October 2005) shall not be created until the matter of the aviary has been resolved to Council's satisfaction.

2. Visually permeable fencing is to be provided to all lots on the boundary which directly abuts open space areas to the City's satisfaction.

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4. Local road network depicted is notional only and subject to change and refinement at the subdivision stage.

5. Traffic management for school sites to be subject to more detailed workshop process with the relevant agencies.

Centre A - Small Neighbourhood Centre

Retail NLA between 1500m² to 3500m².

Community Facility Site to be integrated with Primary School Site and Public Open Space in liason with the City of Swan.

ODP 73 - DEVELOPMENT PLAN ONE

Figure S1

995-734 (20.01.11)

11.1 Residential Zone
The objectives of the Residential Zone, shown on Figure S2 as Residential 1, 2 and 3, are as per clauses 4.2.13 of the LPS 17. Land use definitions shall be in accordance with LPS 17. Land use permissibility for uses in the Residential Zone shall be in accordance with clause 4.3 - Zoning Table of LPS 17.

Notes:

1. Lots affected by Aviary Noise buffer as indicated in Figure 1A of the Vale Aviary Noise Management Plan (October 2005) shall not be created until the matter of the aviary has been resolved to Council's satisfaction.

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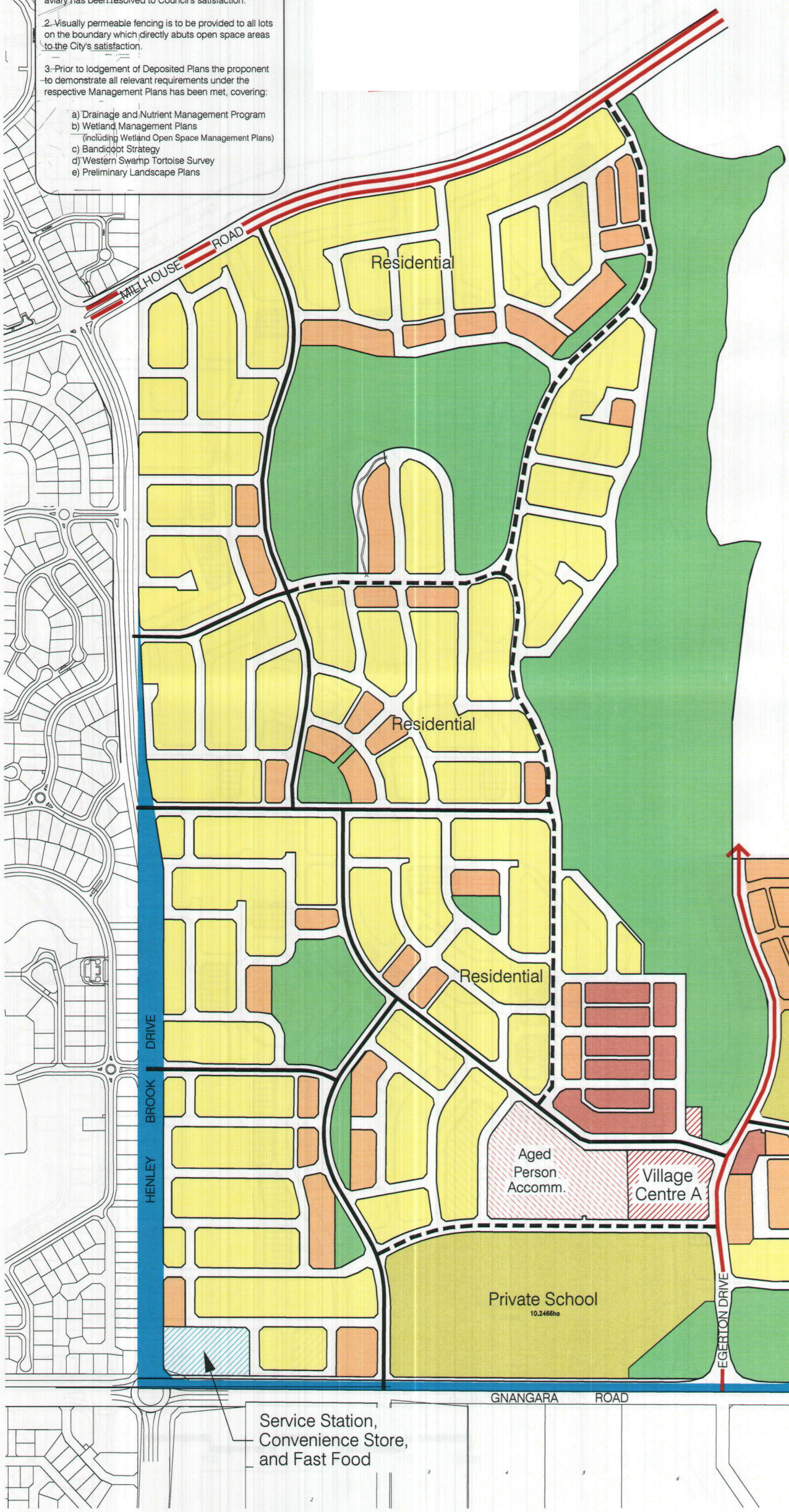

LEGEND

ZONES

- Residential 1
- Residential 2
- Residential 3
- Private Clubs and Institutions
- Special Purpose - Aged Housing

The following uses are "AA" withiin the Special Purpose - Aged Persons Accommodation

Cultural Use	Consulting Rooms
Dwelling Aged or Dependent Persons	Consulting Rooms : Grouped
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Dwelling Multiple	Medical Centre
Educational Establishment	Museum
Funeral Parlour	Office : General
Health Centre	Public Amusement
Health Studio	Recreation Public
Car Park	Recreation Private
Civic Building	Restaurant
Child Care	Shop
Club Premises	Any Other Uses Not Listed

- Special Purpose - Gnangara Local Centre

The following uses are "AA" withiin the Special Purpose - Gnangara Local Centre Zone

Service Station	Convenience Store
Fast Food Outlet	Restaurant
Car Wash Station	Shop - Local
Car park	Any Other Uses Not Listed

- Special Purpose - Neighbourhood Centre

The following uses are "AA" withiin the Special Purpose - Neighbourhood Centre Zone

Auction Mart	Lunch Bar
Amusement parlour	Market
Betting Agency	Medical Centre
Car Park	Milk Depot
Car Wash Station	Museum
Child Care Centre	Night Club
Cinema / Theatre	Office : General
Civic Building	Office : Proffesional
Club Premises	Office : Service
Consulting Rooms	Produce Store
Consulting Rooms : Grouped	Public Amusement
Convenience Store	Reception Lodge
Cultural Use	Reception Public
Dwelling Grouped	Reception Private
Dwelling Multiple	Restaurant
Educational Establishment	Shop
Fast Food Outlet	Shopping Centre
Food and Beverage Industry	Showroom
Funeral Parlour	Tavern : Less Than 200sqm GLA
Health Centre	Veterinary Consulting Rooms
Health Studio	Veterinary Hospital
Hire Service: Non Industrial	Wine House
Home Based Business	Wet Fish Shop
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Infant Health Centre	

RESERVES (LOCAL)

- Recreation

M.R.S. RESERVES (REGIONAL)

- Other Regional Roads

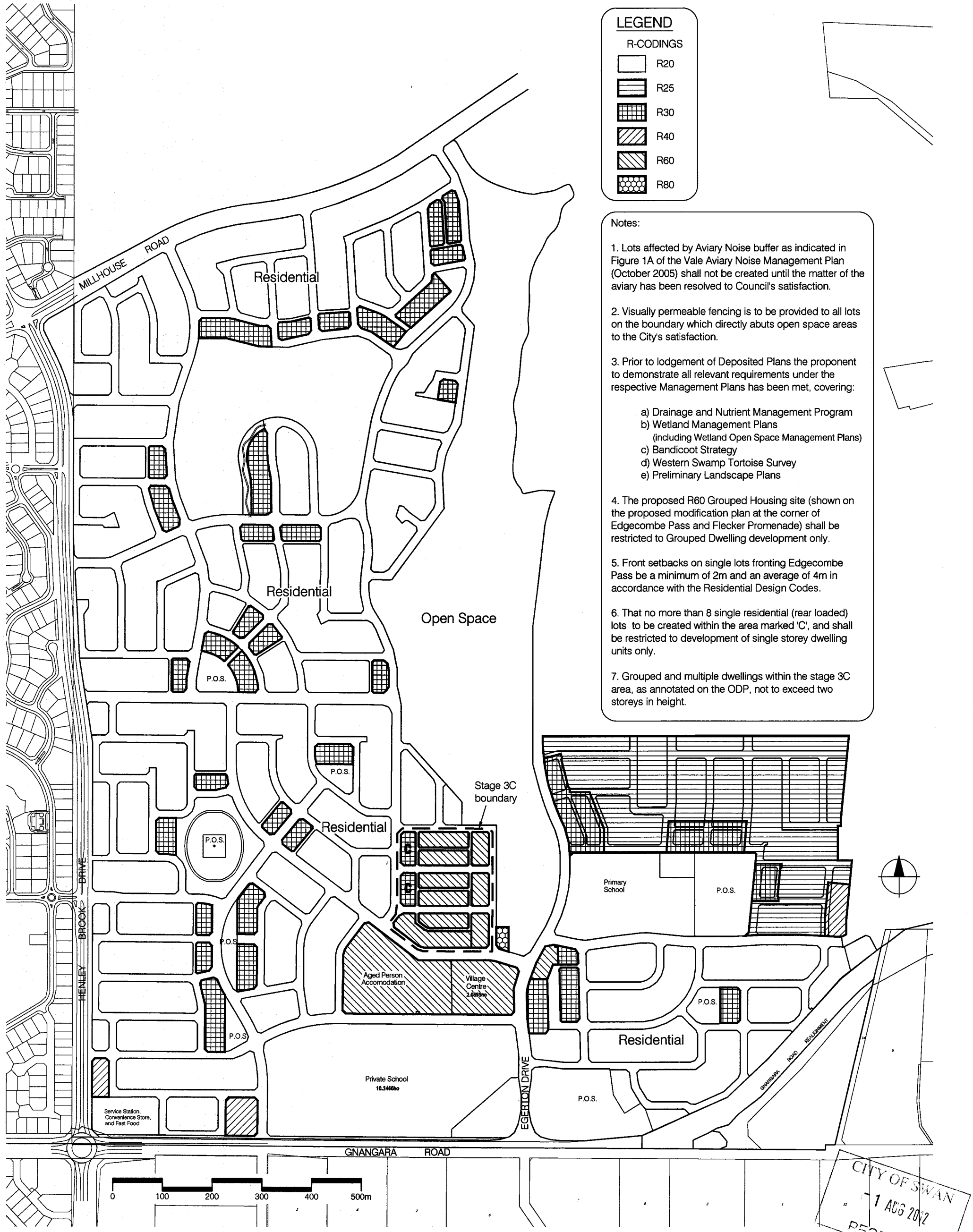
The following uses are 'D' uses in the Residential Zones 1, 2 and 3:

Display Home Centre: A group of two or more dwelling and incidental car parking which are intended to be open for public inspection as examples of dwelling design.

Residential Sales Office: A building of either a temporary or permanent nature, and incidental car parking, used directly in relation to the sale of land and dwellings in a new residential estate.

ODP 73 - DEVELOPMENT PLAN ONE - ZONING CLASSIFICATION

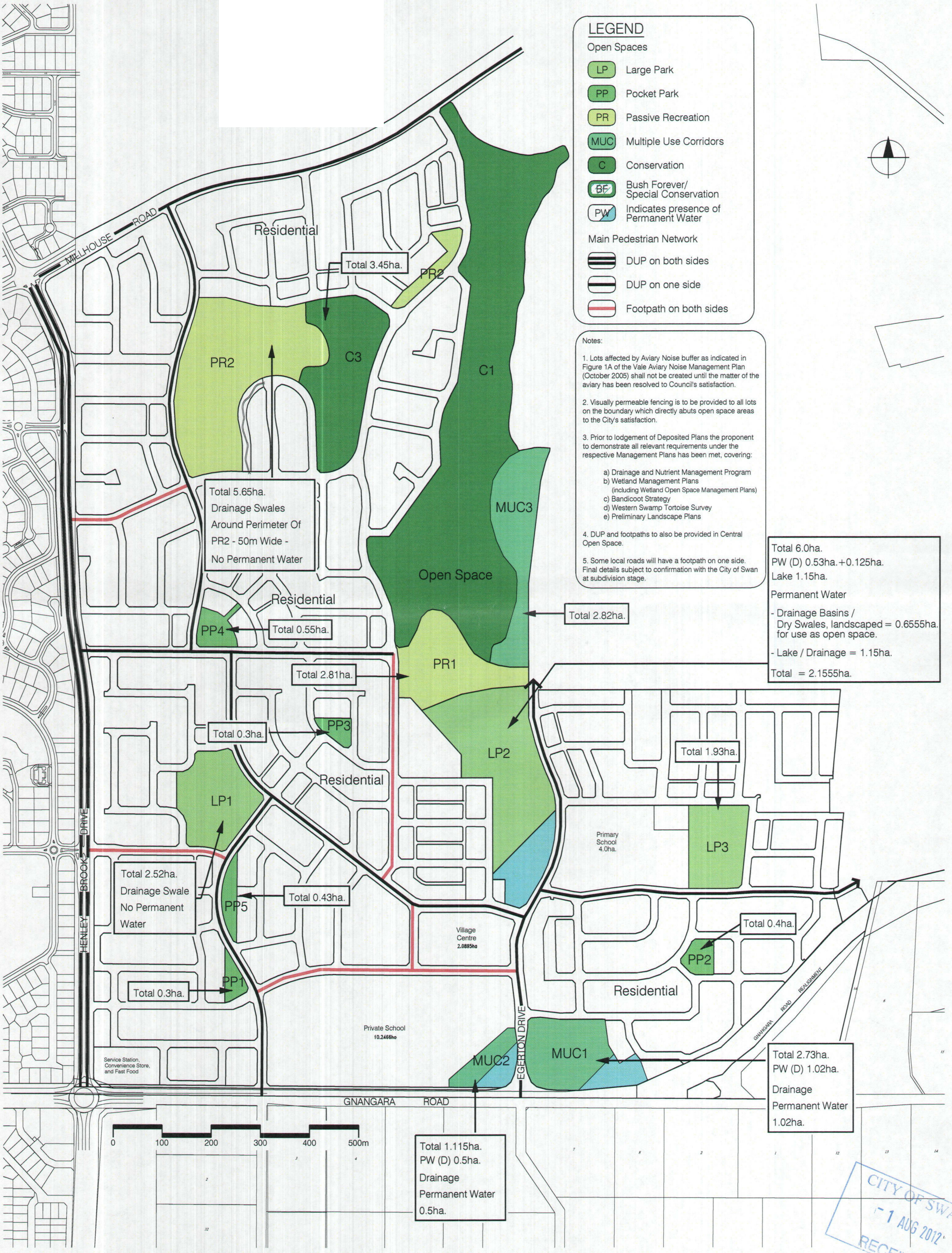
995-735 (20.01.11) **Figure S2**



ODP 73 - DEVELOPMENT PLAN ONE - DENSITY SITES PLAN

995-736 (20.01.11) **Figure S3**

CHAPPELL LAMBERT EVERETT



ODP 73 - DEVELOPMENT PLAN ONE - PUBLIC OPEN SPACE AND PEDESTRIAN NETWORK

995-737 (20.01.11)

Figure S4

APPENDIX 1

Updated Centres Strategy - Shrapnel Urban Planning

EGERTON STRUCTURE PLAN REVIEW

Updated Centres Strategy

Prepared for Chappell & Lambert

November 2003

Land Use Design Strategy Economics Research

SHRAPNEL URBAN PLANNING

Telephone: +61 8 9388-2893 Fax: +61 8 9381-4208 E-mail: shrapnel@ozemail.com.au Web: www.shrapnel.com.au

Contents

SUMMARY & CONCLUSIONS

1. This report is an update of an earlier Centres Strategy for the Egerton project area in the Shire of Swan, prepared in August 1999[1].

2. The pattern of centres proposed in the current Egerton structure plan is different to that pertaining in 1999. Current structure planning envisages the provision of two reasonably large neighbourhood centres and three small local centres.

3. The extent of the retail floorspace potential of the neighbourhood centres within the Egerton project area is influenced to some extent by the proximity of a proposed district centre in the Ellenbrook project area near Egerton's northern border (Figure 2-1 on Page 2 refers).

4. Strong dwellings and population growth within the study area (illustrated on page 2) is well underway and will continue for the next 15 years before starting to taper off. Dwellings in the total study area are expected to increase from 3,398 accommodating a population of 10,146 persons in 2001 to 19,943 dwellings accommodating a population of 52,731 persons by 2026.

5. At full development the Egerton project area is expected to accommodate some 4,969 dwellings, housing a population of 13,880 persons. Detailed population data is presented on Page 4.

6. The modelling and analysis carried out for this project indicates that the amount of retail floorspace currently planned in the Ellenbrook project area is excessive. Although the Ellenbrook district centre could certainly be tolerated from Egerton's perspective, it would be more appropriate for Egerton, and indeed the study area as a whole, if this centre was developed as a neighbourhood centre, rather than as a district centre.

7. The amount of neighbourhood/ local floorspace recommended for the Egerton project area is as follows:

	Shop/ Retail Floorspace (sqm NLA)			
Scenario	Corner Stores (3)	Centre A	Centre B	Total
LS1. With Ellenbrook District Centre (EDS)	600	4,100	3,500	8,200
LS2. EDS as Neighbourhood Centre	600	4,800	4,100	9,500

8. For the reasons stated in Point 6 above, Scenario LS2 is preferred. These figures should be used as a guide to the provision of neighbourhood/ local floorspace in the Egerton project area, but a flexible approach is recommended. The rationale for this is described on Page 12.

[1] Egerton Structure Plan Review Centres Strategy; SHRAPNEL URBAN PLANNING; August 1999

1 INTRODUCTION

In August 1999, as part of a major structure plan review process, SHRAPNEL URBAN PLANNING prepared a Centres Strategy[2] for the Egerton Area in the Shire of Swan. This was based on a structure plan prepared by Mitchell Goff & Associates, which envisaged a "town" centre with retail floorspace of up to 12,000 sqm located towards the eastern side of the project area; and five small local centres totalling 2,500 sqm distributed throughout the area.

The feasibility of this Centres Strategy depended heavily on the design of the proposed town centre and the need for its carefully staged implementation. It was also based in part on the significant assumption that there would be no district centres developed in the Ellenbrook/ Egerton project areas in accordance with the draft Metropolitan Centres Policy Statement, dated May 1999, that was being circulated at the time.

This situation changed with the final production of the new Metropolitan Centres Policy in October 2000 (formerly SPP 9, now SPP 4.2), where the potential for two district centres in the Ellenbrook/ Egerton area was reinstated, subject to determination by the Shire of Swan. At the time of writing the Ellenbrook developers are still planning a district centre near the northern border of the Egerton project area.

Several modifications to the structure plan have now been proposed by Chappell & Lambert, which alter the proposed role and distribution of the centres serving the Egerton project area. It is now proposed in the structure plan to provide a system of two fairly large neighbourhood centres and three local centres in convenient locations within the area. This modified system will still serve the local population very well, but is far less dependent on centres planning and development within the neighbouring Ellenbrook project area.

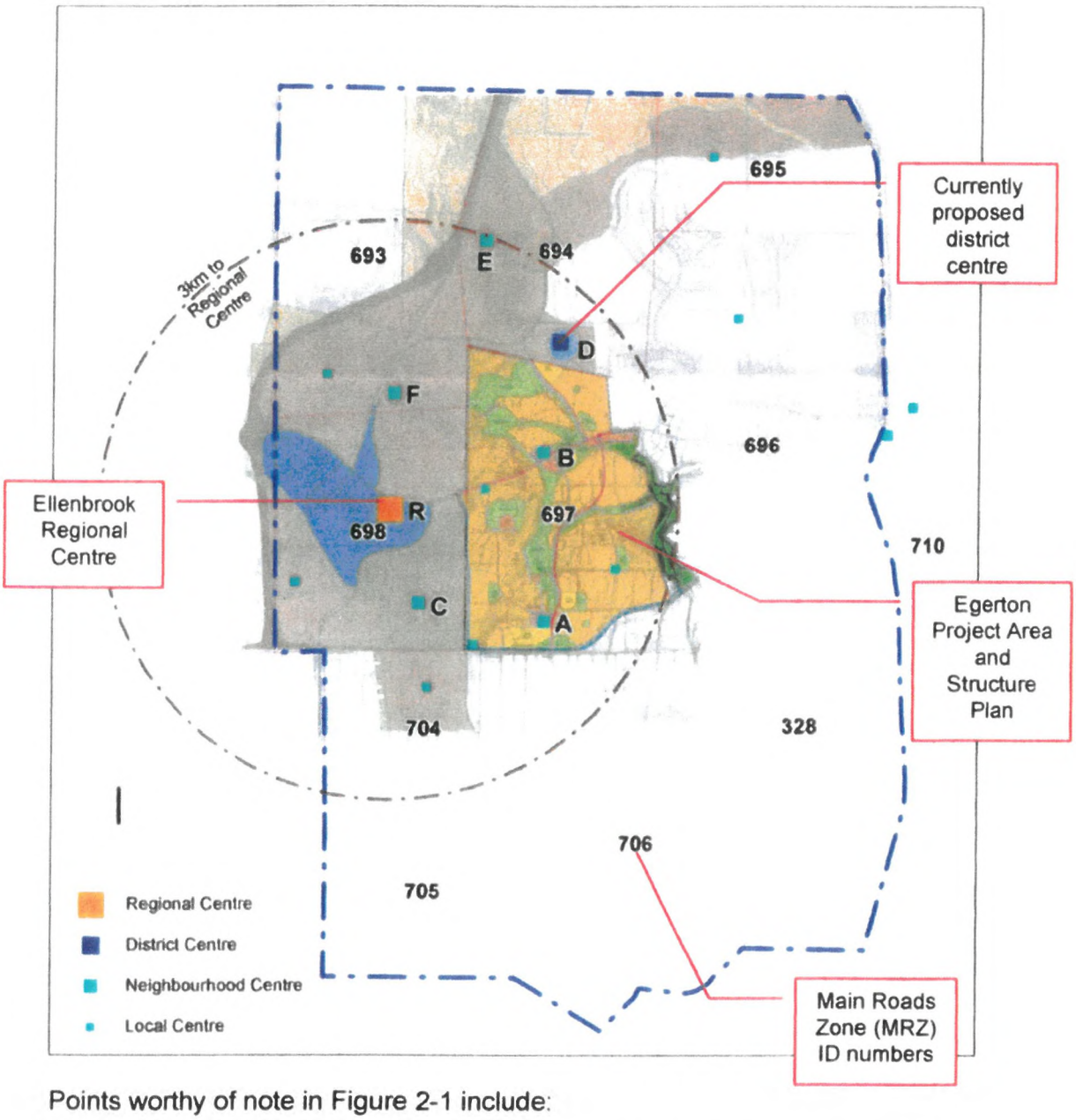
SHRAPNEL URBAN PLANNING has been requested by Chappell & Lambert to update the previous Centres Strategy for the Egerton area, based on the modified structure plan. As with our prior involvement with Egerton, it is the overall structure planning process itself that is determining the pattern and role of centres. The purpose of the Centres Strategy is to model the proposed structure plan and associated pattern of centres to determine the amount of retail floorspace appropriate to each centre, given its planned role.

[2] Egerton Structure Plan Review Centres Strategy; SHRAPNEL URBAN PLANNING; August 1999

2 STUDY AREA

The primary study area is indicated by the blue dashed line in Figure 2-1.

Figure 2-1 Egerton Project Area in Study Area Context



Points worthy of note in Figure 2-1 include:

- Within the Egerton Project Area (MRZ 697), two neighbourhood centres (Centres 'A' and 'B') and three small local centres are proposed.
- The entire Egerton Project Area is within a 3km radius of the Ellenbrook Regional Centre.

- Within the Ellenbrook Project Area, a regional centre (Centre 'R'), a district centre (Centre 'D'), three neighbourhood centres (Centres 'C', 'E' & 'F') and four small local centres are proposed.
- With one minor exception, all the Ellenbrook centres also fall within a 3 km radius of the Ellenbrook Regional Centre.

To assess the retail floorspace potential of the proposed Egerton Centres, the following 'ultimate' centre sizes were assumed for the Ellenbrook centres[3]:

- Regional Centre ('R'): 45,000 sqm
- District Centre ('D'): 15,000 sqm
- Centre 'C': 4,800 sqm
- Centre 'E': 5,000 sqm
- Centre 'F': 4,800 sqm
- Local Centre in MRZ 704: 679 sqm
- Other Ellenbrook Local Centres: 650 sqm combined.

As indicated in the above list, within the Ellenbrook Project Area, a total of 75,929 sqm of retail floorspace is currently proposed.

In addition to this, 250 sqm was assumed for the local centre in MRZ 696. Local centre retail floorspace in the other MRZ's in the study area was generated by the model, based on population estimates for each MRZ.

As well as the floorspace assumptions listed above, another scenario was examined that envisaged the district centre (Centre 'D') as a neighbourhood centre of 4,500 sqm, rather than a district centre of 15,000 sqm. The modelled results for each scenario are described later in this report.

2.1 Population

Population Forecasts for the study area are presented in Table 2-1 and the associated graph. These forecasts vary somewhat from those in the previous report as they have been adjusted to reflect the actual results of the 2001 ABS Census; and also include updated long-term lot yield estimates.

As a general guide to the total retail floorspace potential within the study area, a nominal retail floorspace requirement based on Metropolitan Centres Policy averages applied to the population forecasts has also been included in Table 2-1. As indicated, based on current metropolitan averages, at full development the study area would require some 81,200 sqm of retail floorspace. Being based on a metropolitan-wide average, this level of provision would be somewhat excessive in a new urban area.

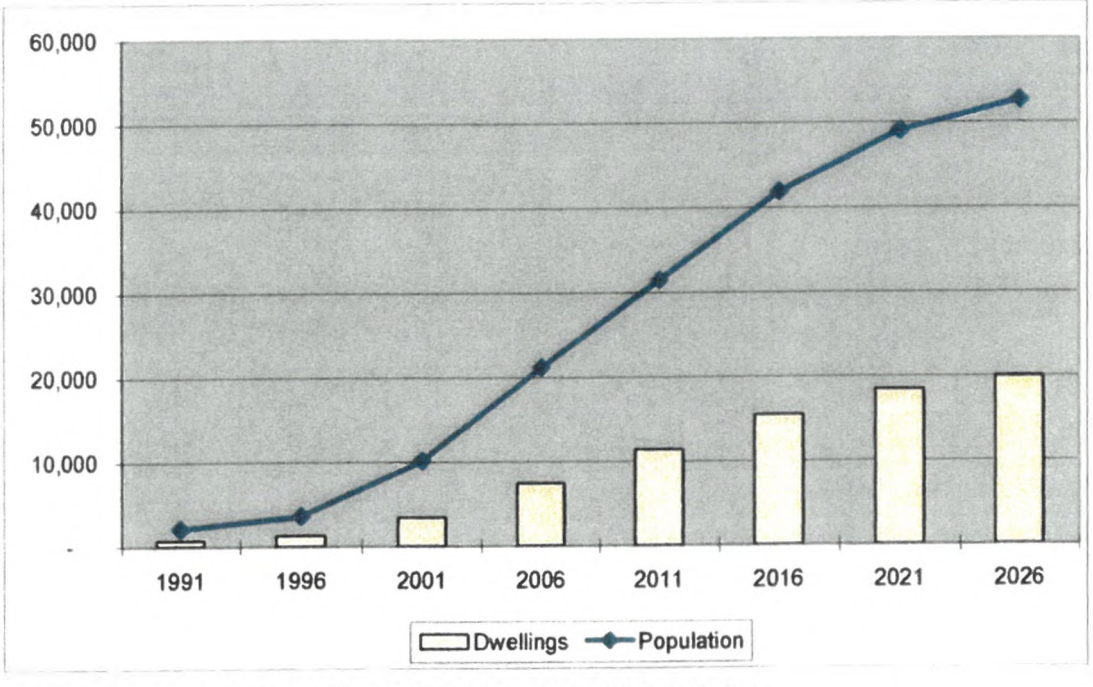
[3] Source: Roberts Day; SHRAPNEL URBAN PLANNING

Table 2-1 Dwellings & Population Forecasts

		Dwellings							
MRZ	SUBURB	1991	1996	2001	2006	2011	2016	2021	2026
328	BASKERVILLE	168	178	183	197	215	232	247	258
693	ELLENBROOK	-	-	-	1,200	1,830	2,250	2,600	2,896
694	ELLENBROOK	-	-	71	900	1,500	2,000	2,400	2,625
695	BULLSBROOK	-	-	35	140	300	500	760	884
696	BELHUS	236	528	693	725	755	785	806	806
697	EGERTON	12	32	32	300	1,300	3,000	4,300	4,969
698	ELLENBROOK	-	191	1,945	2,800	3,400	3,750	3,842	3,842
704	HENLEY BROOK	90	106	204	300	430	600	700	760
705	HENLEY BROOK	46	54	54	500	1,160	1,785	2,100	2,212
706	HENLEY BROOK	155	181	181	350	470	570	650	691
	Total	***707***	***1,270***	***3,398***	***7,412***	***11,360***	***15,472***	***18,405***	***19,943***

		Population							
MRZ	SUBURB	1991	1996	2001	2006	2011	2016	2021	2026
328	BASKERVILLE	535	488	500	532	570	603	630	645
693	ELLENBROOK	-	-	-	3,240	4,743	5,625	6,500	7,241
694	ELLENBROOK	-	-	195	2,475	3,900	5,051	6,000	6,563
695	BULLSBROOK	-	-	96	378	780	1,270	1,900	2,210
696	BELHUS	557	1,424	1,837	1,885	1,925	1,979	2,023	2,015
697	EGERTON	17	90	93	861	3,705	8,490	12,083	13,880
698	ELLENBROOK	-	601	6,068	8,680	10,404	11,250	11,257	11,063
704	HENLEY BROOK	336	321	618	795	1,101	1,500	1,750	1,900
705	HENLEY BROOK	163	163	171	1,420	3,202	4,798	5,460	5,596
706	HENLEY BROOK	515	548	568	915	1,156	1,351	1,528	1,618
	Total	***2,123***	***3,635***	***10,146***	***21,181***	***31,485***	***41,917***	***49,132***	***52,731***

Nominal Non-Perth CBD	**@**	**1.54**	**sqm/ capita**					
RFS Requirement (sqm)	**3,269**	**5,598**	**15,624**	**32,619**	**48,487**	**64,553**	**75,663**	**81,206**



Sources: Chappell & Lambert, Roberts Day; SHRAPNEL URBAN PLANNING; ABS; DPI

Note: Figures for 1991 to 2001 are a close approximation to actuals (subject to MRZ/ CD boundary differences)

As indicated in Table 2-1 strong dwellings and population growth within the study area is well underway and will continue for the next 15 years before starting to taper off.

Dwellings in the total study area are expected to increase from 3,398 units accommodating a population of 10,146 persons in 2001, to 19,943 units accommodating a population of 52,731 persons by 2026. At full development the Egerton project area (MRZ 697) is expected to accommodate approximately 4,969 dwellings housing a population of 13,880 persons.

3 MODELLING & ANALYSIS

Retail modelling for this review was carried out at two levels: Regional and Local. Our region-wide centres model applies to the study area and beyond and was used to determine the overall retail potential of neighbourhood/ local centres within the Egerton project area (MRZ 697), taking account of all competing floorspace in the study area. The local model covers the Egerton project area only and was used to estimate the retail floorspace potential of the individual neighbourhood centres within the project area.

3.1 Regional Model

Three scenarios for Egerton, based on varying assumptions about Ellenbrook, were examined using the regional model:

1. Egerton centres potential defined assuming development of Ellenbrook district centre to 15,000 sqm.

1a. Egerton floorspace determined as per Scenario 1, but with Ellenbrook district centre assumed to instead be a neighbourhood centre of 4,500 sqm.

2. Maintaining the Ellenbrook centre's neighbourhood status, but expanding Egerton centres floorspace to more-or-less match the Scenario 1 performance levels.

Each of these scenarios is explained more fully in the following sub-sections.

3.1.1 Scenario 1

The results of this scenario are presented on Output Summary Sheet S1 overleaf. In this scenario it was assumed that the Ellenbrook centres were all developed to the extent described in the bullet-point list on Page 3. This assumed a district centre of 15,000 sqm being developed to the immediate north of the Egerton Project Area as currently proposed (see Figure 2-1).

Neighbourhood level floorspace was then added to Egerton (MRZ 697) in an iterative process until the average "performance" of the total Egerton floorspace approximated $5,500 per square metre per annum (right-most column in Sheet S1). This level of performance is reasonably good by today's standards. Points to note from Sheet 1 include:

- The resultant floorspace for Egerton totals 8,272 sqm.
- The performance of retail floorspace in all other MRZ's is below this level, indicating some degree of over-provision.

	Datasets >>>	26Fd$	26NonFd$									
MR Zone	SUBURB	Reg / Dist Centre Name	IND Area IND Name	Food sqm	Non-Food sqm	Total sqm	Food Sales 2001$	Food Sales/sqm	Non-Food Sales 2001$	Non-Food Sales/sqm	Total Sales 2001$	Total Sales/sqm
697	ELLENBROOK	EGERTON N'HOODS	-	5,791	2,482	8,272	32,471,272	$5,608	13,062,100	$5,263	45,533,372	$5,504
698	ELLENBROOK	ELLENBROOK 1	-	16,500	33,500	50,000	75,663,354	$4,586	126,548,830	$3,778	202,212,184	$4,044
694	ELLENBROOK	ELLENBROOK	-	10,000	10,000	20,000	45,799,134	$4,580	38,356,870	$3,836	84,156,005	$4,208
328	BASKERVILLE	-	-	0	0	0	0	na	0	na	0	na
693	ELLENBROOK	-	-	3,500	1,500	5,000	16,909,766	$4,831	7,355,815	$4,904	24,265,580	$4,853
695	BULLSBROOK	-	-	200	50	250	906,479	$4,532	179,238	$3,585	1,085,717	$4,343
696	BELHUS	-	-	200	50	250	706,781	$3,534	154,201	$3,084	860,982	$3,444
704	HENLEY BROOK	-	-	476	204	679	1,577,914	$3,318	561,974	$2,757	2,139,888	$3,150
705	HENLEY BROOK	-	-	2,221	952	3,173	9,785,463	$4,405	3,275,423	$3,441	13,060,886	$4,116
706	HENLEY BROOK	-	-	403	173	576	1,373,850	$3,409	505,609	$2,927	1,879,458	$3,264

NB: These are calculated figures from a statistics-based "Retail Potentials" model, which is used for particular forms of comparative analysis.
Therefore, actual sales and floorspace performances may differ from those above, depending on various external physical and social factors.

Totals & Average for Selected Zone Set	39,290	48,910	88,201	$185.2	$4,713	$190.0	$3,885	$375.2	$4,254
Nhood Only	12,790	5,410	18,201	$63.7 (million)	$4,983	$25.1 (million)	$4,638	$88.8 (million)	$4,880

S1

3.1.2 Scenario 1a

The results of this scenario are presented on Output Summary Sheet S1a overleaf. In this scenario it was assumed that the Ellenbrook district centre would be modelled as a neighbourhood centre of 4,500 sqm, rather than as a district centre. All other floorspace has been retained at Scenario 1 levels, including the Egerton floorspace. Points to note from Sheet S1a include:

- The performance of floorspace in MRZ 694 (the zone containing the district centre) increases markedly from $4,208 per sqm per annum (S1) to $4,820 per sqm per annum (S1a).
- The performance of all other floorspace understandably improves to varying degrees.
- In particular, the performance of the Egerton floorspace increases to $5,743 per sqm per annum, which, in the context of the regional model and compared to the average for the other zones being modelled, is too high, indicating an under-provision of floorspace in the zone.

3.1.3 Scenario 2

The results of this scenario are presented on Output Summary Sheet S2, which follows Sheet 1a overleaf. In this scenario all floorspace was retained as in Scenario 1a, except the Egerton neighbourhood floorspace has been increased to a point where it is close to the performance levels set as a desirable target in Scenario 1. Points to note from Sheet 2 include:

- The resultant floorspace for Egerton totals 9,450 sqm.
- The performance of all other floorspace in the study area is improved over Scenario 1.

From this analysis it is concluded that, at full development, the Egerton project area could profitably support a total of some 8,200 sqm of neighbourhood/ local floorspace if the proposed Ellenbrook district centre was developed as such. If the Ellenbrook district centre was developed as a neighbourhood centre of 4,500 sqm instead of as a district centre, then the Egerton project area could profitably support a total of some 9,500 sqm of neighbourhood/ local floorspace. In fact some additional floorspace could be accommodated within the Egerton Project Area, but the preference in this context should be for a little less floorspace performing at above-average levels, rather than the converse.

The floorspace performance levels modelled in Scenarios 1, 1a and 2 indicate that the amount of retail floorspace currently proposed in Ellenbrook is excessive and that serious consideration should be given to facilitating an additional neighbourhood centre in Ellenbrook, rather than the district centre. Such a centre, together with the nearby regional centre would serve Ellenbrook very well; but this reduction in floorspace would also strengthen

	Datasets >>>	26FdS	26NonFdS									
MR Zone	SUBURB	Reg / Dist Centre Name	IND Area IND Name	Food sqm	Non-Food sqm	Total sqm	Food Sales 2001$	Food Sales/sqm	Non-Food Sales 2001$	Non-Food Sales/sqm	Total Sales 2001$	Total Sales/sqm
697	ELLENBROOK	EGERTON N'HOODS	-	5,791	2,482	8,272	33,817,771	$5,840	13,686,155	$5,515	47,503,926	$5,743
698	ELLENBROOK	ELLENBROOK 1	-	16,500	33,500	50,000	77,722,351	$4,710	131,000,378	$3,910	208,722,729	$4,174
694	ELLENBROOK	ELLENBROOK	-	6,500	3,000	9,500	31,200,195	$4,800	14,589,183	$4,863	45,789,377	$4,820
328	BASKERVILLE	-	-	0	0	0	0	na	0	na	0	na
693	ELLENBROOK	-	-	3,500	1,500	5,000	18,303,346	$5,230	8,053,601	$5,369	26,356,947	$5,271
695	BULLSBROOK	-	-	200	50	250	1,136,830	$5,684	221,021	$4,420	1,357,851	$5,431
696	BELHUS	-	-	200	50	250	810,123	$4,051	174,761	$3,495	984,883	$3,940
704	HENLEY BROOK	-	-	476	204	679	1,621,639	$3,410	580,539	$2,848	2,202,178	$3,241
705	HENLEY BROOK	-	-	2,221	952	3,173	10,018,779	$4,511	3,363,633	$3,533	13,382,412	$4,217
706	HENLEY BROOK	-	-	403	173	576	1,425,164	$3,536	526,832	$3,050	1,951,995	$3,390

NB: These are calculated figures from a statistics-based "Retail Potentials" model, which is used for particular forms of comparative analysis.
Therefore, actual sales and floorspace performances may differ from those above, depending on various external physical and social factors.

Totals & Average for Selected Zone Set	35,790	41,910	77,701	$176.1	$4,919	$172.2	$4,109	$348.3	$4,482
Nhood Only	12,790	5,410	18,201	$67.1 (million)	$5,249	$26.6 (million)	$4,918	$93.7 (million)	$5,150

S1a

	Datasets >>>	26Fd$	26NonFd$									
MR Zone	SUBURB	Reg / Dist Centre Name	IND Area IND Name	Food sqm	Non-Food sqm	Total sqm	Food Sales 2001$	Food Sales/sqm	Non-Food Sales 2001$	Non-Food Sales/sqm	Total Sales 2001$	Total Sales/sqm
697	ELLENBROOK	EGERTON N'HOODS	-	6,450	3,000	9,450	36,203,851	$5,613	16,203,503	$5,401	52,407,354	$5,546
698	ELLENBROOK	ELLENBROOK 1	-	16,500	33,500	50,000	77,072,014	$4,671	130,278,205	$3,889	207,350,219	$4,147
694	ELLENBROOK	ELLENBROOK	-	6,500	3,000	9,500	30,988,880	$4,768	14,522,925	$4,841	45,511,805	$4,791
328	BASKERVILLE	-	-	0	0	0	0	na	0	na	0	na
693	ELLENBROOK	-	-	3,500	1,500	5,000	18,259,565	$5,217	8,038,524	$5,359	26,298,089	$5,260
695	BULLSBROOK	-	-	200	50	250	1,131,661	$5,658	220,321	$4,406	1,351,982	$5,408
696	BELHUS	-	-	200	50	250	803,235	$4,016	173,877	$3,478	977,112	$3,908
704	HENLEY BROOK	-	-	476	204	679	1,608,344	$3,382	577,567	$2,834	2,185,911	$3,217
705	HENLEY BROOK	-	-	2,221	952	3,173	9,953,952	$4,481	3,350,149	$3,519	13,304,101	$4,193
706	HENLEY BROOK	-	-	403	173	576	1,407,231	$3,491	522,858	$3,027	1,930,090	$3,352

NB: These are calculated figures from a statistics-based "Retail Potentials" model, which is used for particular forms of comparative analysis.
Therefore, actual sales and floorspace performances may differ from those above, depending on various external physical and social factors.

Totals & Average for Selected Zone Set	36,450	42,429	78,878	$177.4	$4,868	$173.9	$4,098	$351.3	$4,454
Nhood Only	13,450	5,929	19,378	$69.4 (million)	$5,158	$29.1 (million)	$4,906	$98.5 (million)	$5,081

S2

the role of the proposed Egerton neighbourhood centres, enabling them to better serve the local convenience needs of the future Egerton community. The pattern of centres illustrated in Figure 2-1 also indicates that this would be a more appropriate long-term strategy for the study area as a whole.

3.2 Local Model

Having established an overall quantity of neighbourhood/ local retail floorspace that would work on the Egerton project area a local model was used to assign floorspace to the individual neighbourhood centres: Centre 'A' and Centre 'B'. This was achieved by allocating the retail floorspace potential of each small residential cell within Egerton to one or other of the two centres. These residential cells are illustrated in Figure 3-1 overleaf.

As there were so few centres involved, the assignment was done manually, rather than by setting up a computerised gravity model. The results of this process are presented in the Local Summary Sheets 1 and 2, which have been included at the end of this section.

In each case, it was assumed that the three local centres would need to be very small and have a total of 600 sqm of retail floorspace between them. This could be distributed evenly amongst the three centres, but an alternative arrangement could be 250 sqm assigned to the centre associated with the proposed service station at the corner of Henley Brook Avenue and Gnangara Road, and 175 sqm at each of the other two local centres.

3.2.1 Local Scenario 1

LS1 allocates the neighbourhood/ local floorspace identified in S1 to the individual centres. As indicated, of the 8,272 sqm to be allocated, the distribution is as follows:

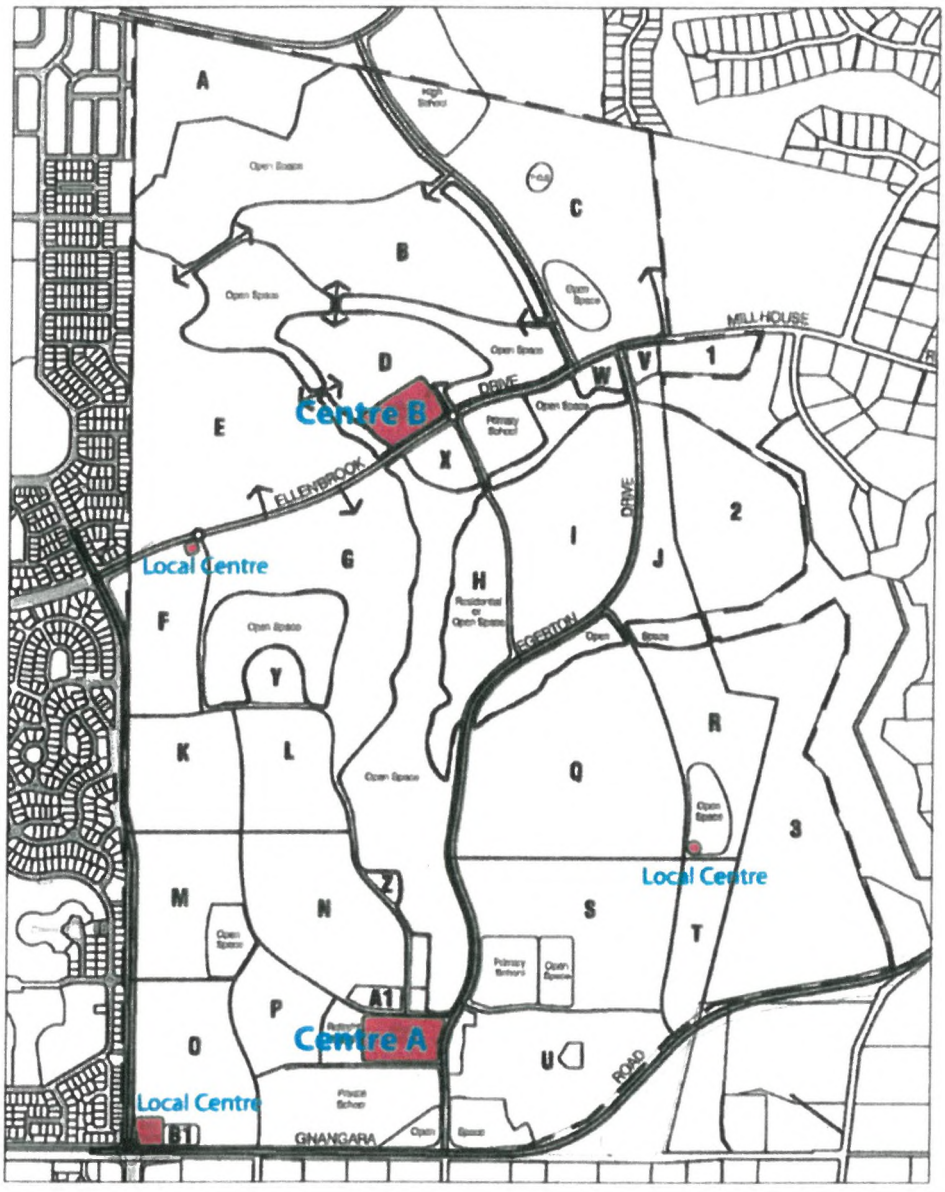
- Centre A: 4,131 sqm
- Centre B: 3,541 sqm
- Small Local Centres: 600 sqm.

3.2.2 Local Scenario 2

LS2 allocates the neighbourhood/ local floorspace identified in S2 to the individual centres. As indicated, of the 9,450 sqm to be allocated, the distribution is as follows:

- Centre A: 4,766 sqm
- Centre B: 4,085 sqm
- Small Local Centres: 600 sqm.

Figure 3-1 Residential Cells in Egerton Project Area



These figures have been rounded off to produce the recommended centre sizes, which are presented in Table 3-1.

Table 3-1 Recommended Retail Floorspace Allocation

Scenario	Shop/ Retail Floorspace (sqm NLA) Corner Stores (3)	Centre A	Centre B	Total
LS1. With Ellenbrook District Centre (EDS)	600	4,100	3,500	8,200
LS2. EDS as Neighbourhood Centre	600	4,800	4,100	9,500

The modelling and analysis clearly indicates that Local Scenario LS2 (reflecting regional Scenario S2) is the preferred scenario. While the currently proposed Ellenbrook district centre could certainly be tolerated from Egerton's perspective, it would be more appropriate for the Egerton area, and indeed the study area as a whole, if this centre was developed as a neighbourhood centre, rather than as a district centre.

INPUTS			**OUTPUTS**
HHld Exp	$22,256		
Prop.	0.41		
Turnover	$5,500		
Potential sqm		>>>>>>>>>>>>>>>>	8,244
Small Cents	600		
Balance (A, B)		>>>>>>> (control total)	7,644

Zone	Lots	Occ. Ratio	Population	Potential ($Million)	Assignment Prop External	Centre A	Centre B	Floorspace Centre A	Centre B
A	162	2.80	452	$1.47	1	0	0	-	-
B	234	2.80	655	$2.14	0.2	0	0.8	-	311
C	315	2.80	882	$2.87	0.2	0	0.8	-	418
D	126	2.80	353	$1.15		0	1	-	209
E	400	2.80	1,120	$3.65	0.1	0	0.9	-	597
F	130	2.80	364	$1.19	0.2	0.4	0.4	86	86
G	284	2.80	794	$2.59		0.2	0.8	94	376
H	119	2.80	332	$1.08		0.3	0.7	59	138
I	231	2.80	647	$2.11		0.2	0.8	77	307
J	92	2.80	258	$0.84		0.2	0.8	31	122
K	139	2.80	389	$1.27	0.2	0.8	0	184	-
L	132	2.80	370	$1.20		0.9	0.1	197	22
M	111	2.80	311	$1.01	0.2	0.8	0	147	-
N	224	2.80	627	$2.04		1	0	372	-
O	164	2.80	459	$1.50	0.2	0.8	0	218	-
P	90	2.80	252	$0.82		1	0	149	-
Q	378	2.80	1,058	$3.45		0.8	0.2	502	125
R	130	2.80	364	$1.19		0.7	0.3	151	65
S	230	2.80	643	$2.09		1	0	381	-
T	79	2.80	220	$0.72		1	0	130	-
U	210	2.80	588	$1.92		1	0	348	-
V	20	2.80	56	$0.18		0.1	0.9	3	30
W	28	2.80	78	$0.26		0.1	0.9	5	42
X	100	2.80	280	$0.91		0	1	-	166
Y	49	2.80	137	$0.45		0.7	0.3	57	24
Z	15	2.80	42	$0.14		1	0	25	-
A1	30	2.80	84	$0.27		1	0	50	-
B1	14	2.80	39	$0.13		1	0	23	-
RV	100	1.20	120	$0.91		1	0	166	-
1	68	3.00	204	$0.62		0.1	0.9	11	102
2	188	3.00	563	$1.71		0.3	0.7	93	218
3	380	3.00	1,140	$3.47		0.8	0.2	504	126
Total	4,969	2.79	13,880	$45.34				4,064	3,483
Adjusted to control total								***4,116***	***3,528***

LS1

INPUTS			**OUTPUTS**
HHld Exp	$22,256		
Prop.	0.41		
Turnover	$5,500		
Potential sqm		>>>>>>>>>>>>>>>>	8,272
Small Cents	600		
Balance (A, B)		>>>>>>> (control total)	7,672

Zone	Lots	Occ. Ratio	Population	Potential ($Million)	Assignment Prop External	Centre A	Centre B	Floorspace Centre A	Centre B
A	162	2.80	452	$1.48	1	0	0	-	-
B	234	2.80	655	$2.14	0.2	0	0.8	-	312
C	315	2.80	882	$2.88	0.2	0	0.8	-	420
D	126	2.80	353	$1.15		0	1	-	210
E	400	2.80	1,120	$3.66	0.1	0	0.9	-	599
F	130	2.80	364	$1.19	0.2	0.4	0.4	87	87
G	284	2.80	794	$2.60		0.2	0.8	94	378
H	119	2.80	332	$1.09		0.3	0.7	59	138
I	231	2.80	647	$2.12		0.2	0.8	77	308
J	92	2.80	258	$0.84		0.2	0.8	31	123
K	139	2.80	389	$1.27	0.2	0.8	0	185	-
L	132	2.80	370	$1.21		0.9	0.1	198	22
M	111	2.80	311	$1.02	0.2	0.8	0	148	-
N	224	2.80	627	$2.05		1	0	373	-
O	164	2.80	459	$1.50	0.2	0.8	0	218	-
P	90	2.80	252	$0.82		1	0	150	-
Q	378	2.80	1,058	$3.46		0.8	0.2	503	126
R	130	2.80	364	$1.19		0.7	0.3	151	65
S	230	2.80	643	$2.10		1	0	382	-
T	79	2.80	220	$0.72		1	0	131	-
U	210	2.80	588	$1.92		1	0	350	-
V	20	2.80	56	$0.18		0.1	0.9	3	30
W	28	2.80	78	$0.26		0.1	0.9	5	42
X	100	2.80	280	$0.92		0	1	-	166
Y	49	2.80	137	$0.45		0.7	0.3	57	24
Z	15	2.80	42	$0.14		1	0	25	-
A1	30	2.80	84	$0.27		1	0	50	-
B1	14	2.80	39	$0.13		1	0	23	-
RV	100	1.20	120	$0.92		1	0	166	-
1	68	3.00	204	$0.62		0.1	0.9	11	102
2	188	3.00	563	$1.72		0.3	0.7	94	218
3	380	3.00	1,140	$3.48		0.8	0.2	506	127
Total	4,969	2.79	13,880	$45.50				4,078	3,495
Adjusted to control total								***4,131***	***3,541***

LS2

3.3 Centres Classification System

SHRAPNEL URBAN PLANNING has defined a system for classifying neighbourhood and local centres for use in local commercial strategies, particularly where urban areas are being structured along Liveable Neighbourhood lines, with large numbers of potential neighbourhood/ local centre locations being identified. The objective is to classify centres according to their role and function, without specifying too precisely their sizes. This allows scope for market forces to refine centre sizes within a flexible, albeit guided, planning framework.

The classification system described below has been used in relation to the Egerton strategy. However, within this general framework, the City of Swan may freely choose to devise an alternative system, or refine the SUP system to better suit the City of Swan circumstances. The main point is to establish a framework that is firm enough for urban planning purposes, while allowing some scope for market forces to operate. The classification system as it stands at the moment (it is under constant review) is as follows.

Local-1 No Retail Floorspace

This is the most minor activity node. It is included in recognition of the distinct possibility that the provision of retail floorspace may not be possible at each and every "centre" location in a Liveable Neighbourhoods design. At its most basic it would be no more than a cross-road at which there might be a bus stop and/ or a post box and public telephone. In the future, such locations may prove suitable for some small-scale non-retail development, or some other commercial or civic activity at present unforeseen.

Local-2 Retail 100 sqm - 250 sqm

In addition to the non-retail convenience features in Local-1 (which should apply at all these levels), this level of centre would also include a corner deli, which might be stand-alone or part of the operator's dwelling. SUP research has indicated that it is not viable to contemplate a single suburban retail outlet of less than 100 sqm.

Local-3 Retail 250 sqm - 600 sqm

This level may be represented by a single 'super-deli' or comprise a complex of up to three individual shops, plus (perhaps) a local hairdresser.

Local-4 Retail 600 sqm - 1,500 sqm

This level of centre would contain a small supermarket of between 400 sqm and 1,000 sqm plus some supporting specialty shops. These might contain a newsagent, fish & chip shop and another local-serving take-away food outlet and/ or coffee shop.

Neighbourhood-1 Retail 1,500 sqm - 3,500 sqm

This small to medium neighbourhood centre would contain a small supermarket of between 1,000 sqm and 2,000 sqm plus a good but basic range of supporting specialty shops.

Neighbourhood-2 Retail 3,500 sqm - 4,500 sqm

This would be a large neighbourhood centre, potentially accommodating a medium to large supermarket of between 2,000 sqm and 3,000 sqm plus a reasonably large range of supporting specialty shops.

Neighbourhood-3 Retail 4,500 sqm - 6,500 sqm

This would also be a large neighbourhood centre, but containing a major chain supermarket of between 3,000 sqm and 4,000 sqm, with a reasonably large range and more complex array of specialty shops.

Neighbourhood-4 Retail 6,500 sqm - 9,500 sqm

This would be a very large neighbourhood centre, or may (at the higher end) be regarded more in the nature of a *minor district centre* containing a major chain supermarket plus (perhaps) a smaller supermarket (600 sqm). The array of specialty shops in such a centre might approach what one would normally find in a fully-fledged district centre, perhaps accommodating some of the national chains, including some fashion shops. In some circumstances such a centre could also contain a minor discount store such as a "Target Country".

3.3.1 Classifications in Egerton

Under the above centre classification system, in Scenario LS1, both major centres would be a "Neighbourhood-2" (3,500 sqm – 4,500 sqm). In Scenario LS2 Centre B would still be a "Neighbourhood-2", while Centre A would be a "Neighbourhood-3" (4,500 sqm – 6,500 sqm). Accordingly, if Scenario LS2 was adopted (as recommended), in the longer term, if market pressures indicate a potential for some further expansion of neighbourhood floorspace in the Egerton area, it should be directed towards Centre 'A', rather than towards Centre 'B'.

Under this system, all three local centres would be classified "Local-2" (100 sqm – 250 sqm).

3.4 The Need For Flexibility

It is clear from the above that a flexible approach to development control will be necessary. Having identified and recommended sizes for each of the main centres, the temptation for those managing development control is to seek to implement the recommended quantities fairly precisely. While careful

development control is essential, there is generally no need for a planning authority to "bean-count" retail floorspace too precisely.

While it is appropriate and necessary to maintain firm ***control*** over the retail floorspace provision in individual centres in order to ensure that the planned hierarchy of centres is properly implemented, it is unnecessary and potentially counterproductive to adhere too rigidly to the calculated floor areas presented in Table 3-1. The reasons are:

1 Although retail modelling is by far the best method of estimating retail floorspace potential in an urban area, this potential nevertheless remains a calculated estimate based on broad brush plans and demographic forecasts. It is only when plans are implemented that the true nature and ambience of a centre locality becomes apparent. Some of these locality and site-specific characteristics can affect retail floorspace potential.

2 These days centres are often encouraged to be designed along "main street" lines. Part of the intention is to facilitate more of a "natural" evolution of centres, similar to what has occurred in some of Perth's long-established urban areas. Provided traffic and amenity values are not compromised, and provided the proper functioning of the retail hierarchy is maintained, this evolutionary process is desirable and should not necessarily be thwarted by imposing shop retail floorspace limits that are excessively rigid.

In Egerton, development control should also be exercised to ensure that no form of commercial development is allowed to establish outside the centre locations identified in the structure plan. However, as and when individual development applications are received to establish and/ or expand the planned neighbourhood and local centres, each should be looked at on its individual merits. Unless clear reasons can be found to refuse the development, then it probably should be approved, even if the retail floorspace component exceeds the calculated "limit" by up to 15 percent.

While this level of flexibility should therefore be intelligently applied, considerable care should be taken before allowing any particular centre to move from one of the designated hierarchy categories to a higher one. For example, there would likely be very few problems associated with allowing a Local-2 centre to expand from its calculated potential of (say) 150 sqm to 250 sqm. However, it is much less likely to be desirable for the centre to expand from 150 sqm to 300 sqm, as it could then claim to be a "Local-3" centre, with a potential capacity to expand to 600 sqm.

Disclaimer

The estimates of floorspace viability presented in this report are for the urban planning purposes only, and not for commercial purposes. It is the responsibility of anyone wishing to establish or operate a business within any of the centres in the Egerton structure plan area to carry out their own due diligence in relation to these matters, taking account of the actual circumstances that are produced on the ground in each and every case.

APPENDIX 2

Traffic Modelling Report – Sinclair Knight Merz

Egerton

TRAFFIC MODELLING REPORT

- Multiplex
- FINAL
- June 2004

Egerton

TRAFFIC MODELLING REPORT

- Multiplex
- FINAL
- June 2004

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SKM

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SKM

1. Introduction

1.1 Purpose of This Report

Sinclair Knight Merz has been commissioned by Multiplex to undertake a traffic modelling review of the consolidated Egerton Structure Plan.

There have been some minor changes to the Structure Plan since Sinclair Knight Merz last undertook a traffic assessment, in October 1999. Most notable is the removal of the town centre and institutional land uses, and the realignment of Ellenbrook Drive. These changes are likely to impact the forecast traffic volumes and possibly the road reserve of some roads.

The Egerton Consolidated Structure Plan includes residential, local retail, primary school, and secondary school land uses. The total yields are very similar to the earlier versions of the structure plan.

This traffic report assesses the forecast daily traffic volumes resulting from the consolidated structure plan and the impact on regional, district and local roads.

1.2 Layout of this Report

This report is divided into a further six sections:

- Existing and Planned Transport Network;
- Proposed Development;
- Transport Model;
- Assessment of Road Network;
- Pedestrian and Cyclist Network; and,
- Public Transport.

SKM

2. Existing and Planned Transport Network

Egerton is located immediately north of Gnangara Road, and to the east of Ellenbrook, approximately 21 kilometres north east of the Perth CBD.

2.1 Gnangara Road

Gnangara Road, which forms the southern boundary of Egerton, is a strategic east-west transport route, carrying freight, commuter and recreational traffic movements. The most recent traffic counts reveal Gnangara Road (west of West Swan Road) is carrying less than 6,000 vehicles per day (vpd). Gnangara Road is currently constructed as a single carriageway.

2.1.1 Forecast Traffic Volumes

Numerous studies have been undertaken to determine the likely ultimate traffic volumes for Gnangara Road.

In 1994, the Main Roads regional strategic model was used to develop forecasts for the North Eastern Corridor. An ultimate traffic volume of 4,100 vpd was predicted for the section of Gnangara Road between Henley Brook Drive and West Swan Road. However this modelling did not take into account currently predicted North East Corridor growth.

In 1996, modelling undertaken on behalf of the former Ministry for Planning (now the Department for Planning and Infrastructure), predicted an ultimate traffic volume of 13,000 vpd for the section of Gnangara Road between Henley Brook Drive and West Swan Road. This assessment is known as Scenario 1.

An addendum to this modelling was undertaken in October 1996. Two further scenarios were assessed, with additional development in the North East Corridor over that in Scenario 1. Scenario 2 assumed an additional population of 50,000 with 2,400 additional jobs, with Scenario 3 assuming an additional population of 64,500 and 12,900 additional jobs. An ultimate traffic volume of 17,600 vpd was predicted for the section of Gnangara Road between Henley Brook Drive and West Swan Road for Scenario 2, with this volume further increased if Scenario 3 conditions were realised.

2.1.2 Ultimate Road Standard

Scenario 1, which assumes full development of all currently planned urban and rural areas within the North East Corridor, does not require Gnangara Road to be widened. The forecast volume of 13,000 vpd can be accommodated within a single two-lane carriageway. In addition, the MRS deviation to bypass the existing Gnangara Road /West Swan Road intersection would not be required. A roundabout would accommodate forecast traffic volumes at this intersection.

If the land uses associated with Scenario 2 or 3 are realised, Gnangara Road will require 4 lanes, and the deviation will be necessary. The additional development associated with Scenario 2 and 3 is mainly associated with Bindoon and Bullsbrook, and is totally independent of the Egerton development.

SKM

3. Proposed Development

The Egerton Consolidated Structure Plan includes the following land uses:

- Residential lots;
- Local retail (including 2 neighbourhood centres, and 2 local centres) ; and,
- Two primary schools, a single secondary school and a combined private primary and secondary school.

With the exception of the removal of the town centre and institutional land uses, the proposed land uses in the consolidated Structure Plan are very similar to those proposed in the earlier versions.

Four access points are proposed to Egerton from Gnangara Road, comprising:

- A left in left out access, 350m to the east of Henley Brook Drive (opposite the existing intersection with Robert Street);
- Egerton Drive, a full movement access opposite the extension of the Rookwood Street, potentially creating a four-way intersection;
- A full movement access a further 700m to the west of Egerton Drive (creating a T-intersection); and
- A full movement intersection at the eastern boundary of the site, 700m to the east of the previous intersection. This intersection will be close to (and may form part of) the intersection of the realigned Gnangara Road and West Swan Road.

Henley Brook Drive, when constructed, will connect Gnangara Road to Ellenbrook Drive, providing additional access to the western portion of the development. Henley Brook Drive is planned be constructed within the next four years.

The proposed road links between Egerton and Ellenbrook remain unchanged from the earlier versions of the Structure Plan.

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4. Transport Model

Sinclair Knight Merz has previously developed a traffic modelling tool for Egerton using the internationally recognised EMME/2 software platform. This program is used by the Department for Planning and Infrastructure in WA for such projects as Future Perth, and for forecasting the patronage of the proposed Perth to Mandurah rail link.

The Egerton transport model was initially developed in 1993 when Sinclair Knight Merz undertook the transport planning for the Ellenbrook and Egerton District Structure Plan. The Egerton portion of the model was refined in 1999, to reflect an earlier version of the Structure Plan.

4.1 Transport Modelling Package

EMME/2 represents a road network as a series of links (roads) and nodes (intersections). The traffic generating land uses are represented as a number of zones connected to the network.

For this application, a 24-hour average weekday model was developed. The average weekday was selected as it represents the typical activity on the area's roads. The forecast year is 2021, when full development of Egerton and the adjoining Ellenbrook is assumed to occur. The Egerton EMME/2 model has been developed for private vehicular traffic only.

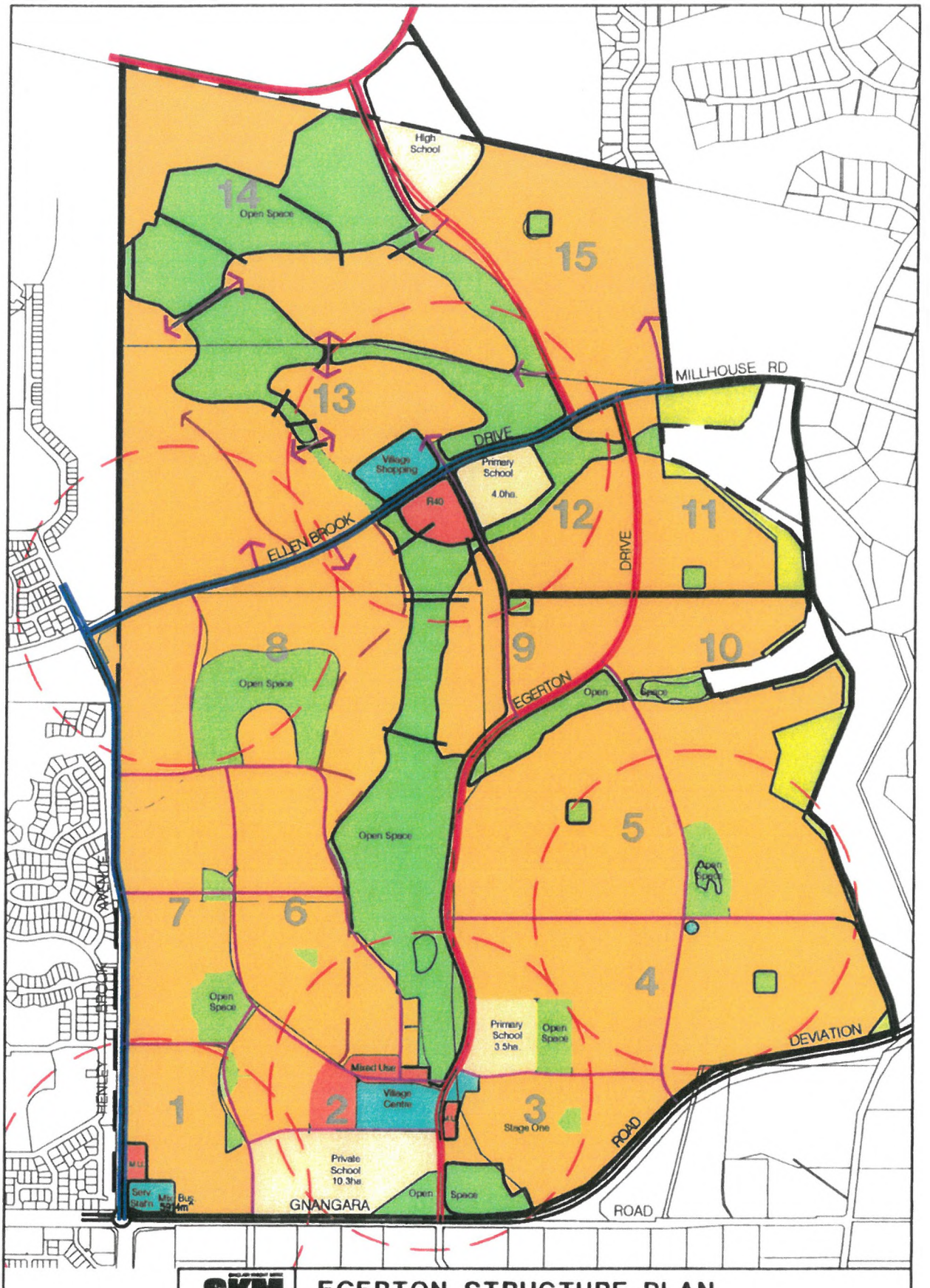
The process of developing the transport model is described in the following sections.

4.2 Modelled Road Network

The modelled road network comprises all the key routes proposed within the area (important local roads, Neighbourhood Connectors and above), and is shown in **Figure 1**. Minor local roads have not been included as they have little influence on the traffic operation of the network.

The road network coding was based on an estimate of the road hierarchy. Different road categories were given different traffic capacities through the use of volume-delay functions. These functions change the travel time based on the amount of traffic using that section of road. Higher-order roads with more lanes are given more capacity and hence their travel times will not be affected as significantly by large volumes of traffic as a local road. The EMME/2 model attempts to minimise the journey time and hence tends to concentrate traffic on the roads with the higher capacity.

The road categories used in the model are shown in **Table 1**.



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EGERTON STRUCTURE PLAN

TRAFFIC MODEL ZONE BOUNDARIES

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FIGURE 1

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Table 1 Model Road Categories

Road Category	Nominal Capacity Per Lane[1]	Operational Speeds
1	10,000 vpd	70 kph
2	8,000 vpd	60 kph
3	7,000 vpd	50 kph
4	3,500 vpd	50 kph
5	2,000 vpd	40 kph

Note 1: Nominal Capacity is the theoretical capacity of the road. It can be exceeded. However, the travel time on the link will increase rapidly as volumes increase beyond the theoretical capacity.

4.3 Landuse Data

The Consolidated Structure Plan was received from Chappell and Lambert, from which the following land use data was extracted:

- 4,484 residential lots within the urban zone and a further 665 lots within the non-urban zoned land;
- 2 Neighbourhood Centres (4,000m^2 GLA assumed for each);
- 2 Local centres (500m^2 GLA assumed);
- 2 Primary Schools (400 enrolments assumed per school);
- 1 Secondary School (800 enrolments assumed); and
- 1 private school (1,200 enrolments assumed).

Egerton was divided into 15 traffic generating and attracting zones. The zone boundaries for Egerton are shown in **Figure 1**.

The data sets assembled for input to the generation stage are summarised in **Table 2**.

SKM

Table 2 Proposed Land Uses in Egerton

Zone	Development	Zone	Development
1	Residential – 180 lots Service Station	8	Residential – 433 lots – 60 lots R40 Bushland Local Centre (Retail)
2	Residential – 93 lots Private School (primary and secondary) Neighbourhood Centre (Retail)	9	Residential – 245 lots – 100 lots R40
3	Residential – 220 lots Public Open Space	10	Residential – 146 lots
4	Residential – 521 lots Primary School Public Open Space	11	Residential – 240 lots – 20 lots R40
5	Residential – 731 lots Local Centre (Retail) Public Open Space	12	Residential – 121 lots – 28 lots R40 Primary School
6	Residential – 316 lots – 44 lots R40	13	Residential – 795 lots Neighbourhood Centre (Retail)
7	Residential – 265 lots Public Open Space	14	Residential – 292 lots
		15	Residential – 330 lots High School Public Open Space

4.4 Model Structure

The traditional four-step model includes the following processes:

- Trip Generation;
- Mode Split;
- Trip distribution; and
- Trip assignment.

In this instance the trip generation step only considered private vehicle motorised trips therefore the mode split process was not required.

Private vehicle was selected as the appropriate mode to assess the traffic impacts of the proposed development.

SKM

4.4.1 Trip Generation

The purpose of the trip generation model is to produce 24-hour trip productions and attractions for input into the trip distribution procedure. These trips include:

- Trips originating in the study area to any destination;
- Trips terminating in the study area from any destination; and,
- Through trips originating and terminating outside the study area but using roads within and around the study area.

4.4.1.1 Trip Productions (Trip Originating in the Study Area)

The 24-hour trip production model was based on combined trip rates dating back to the 1986 travel survey and the Road Reserves Review. A trip production rate of 7.45 trips per household was used (assuming a household size of 2.8 persons), and the resulting trips are shown in **Table 3**.

Table 3 Daily Motorised Trip Rates

Trip Purpose	Average Trips per Household	Trip Productions
Work	2.10	10,890
Education	0.56	2,900
Other	4.79	24,800
Total	**7.45**	**38,580**

Trips produced within the modelled area are destined for attractions both within and outside of the model area.

4.4.1.2 Trip Attractions (Trips Terminating in the Study Area)

While trip productions represent the number of trips associated with each household, trip attractions represent the destination side of the traffic model, ie the destinations within the study area.

Trips are attracted to work places, education facilities, shopping facilities, community facilities and residential areas. The trip attraction rates have been based on those determined from the 1986 Travel Survey:

Work Attractions	=		1.365 trips per job
Education Attractions	=		0.8 trips per primary/secondary enrolment
		+	0.897 trips per tertiary enrolment
Other Attractions	=		1.138 trips per dwelling units
		+	0.8 trips per m^2 retail floor area
		+	0.711 trips per school enrolment
		+	1.006 trips per job

SKM

The total trips attracted within the modelled area are shown in **Table 4**.

Table 4 Daily Motorised Trip Rates

Trip Purpose	Trip Attractions
Work	290
Education	2,240
Other	12,100
Total	**14,620**

These rates include trips to the model area originating within and from outside the model area.

4.4.1.3 Through Trips

External through trips were obtained from a sub-area cordon of the MRWA Regional model. This model has been revised since the 1994 North Eastern Corridor study to include the currently predicted North East Corridor growth (Scenario 1).

4.4.2 Trip Distribution

Trip distribution is the process whereby two-dimensional matrices of trips are produced from the one-dimensional production and attraction matrices. Trips within the study area have been distributed based on the following formula, which minimises the length of travel distance:

$$f = (\text{distance})^{-2}$$

External to modelled area, modelled area to external and external through trips were distributed separately based on the proportions obtained from the MRWA Regional model.

4.4.3 Assignment

The EMME/2 assignment model uses a linear approximation algorithm to solve the capacity restrained highway assignment.

The trips are distributed around the network by EMME/2 in such a way that their total travel time is minimised. The shortest travel time calculations for the road network take into consideration the road type, average speed and number of lanes along each route. This is done in several iterations to allow the congestion to be included in the travel time calculations.

SKM

5. Assessment of Road Network

5.1 Road Network Differences

The biggest change to the road network between the consolidated Structure Plan and the earlier version of the structure plan is the realignment of Ellenbrook Drive and Millhouse road. Under the earlier versions of the structure plan Ellenbrook Drive terminated in a T intersection with Egerton Drive approximately 500m south of Millhouse Road. East of Egerton Drive, Millhouse Road was aligned east-west, while to the west of Egerton Drive Millhouse Road was effectively aligned north-south. In the consolidated structure plan, Ellenbrook Drive becomes the western extension of Millhouse Road. The northern section of Millhouse Road terminates in a T intersection at Ellenbrook Drive/Millhouse Road. The consolidated structure plan therefore provides a stronger connection between Millhouse Road and Ellenbrook Drive.

Another road network change is that some discontinuities have been introduced to the north-south and east-west Neighbourhood Connectors. The road sections are therefore shortened, which will help to reduce vehicle speeds.

5.2 Forecast Traffic Volumes and Road Hierarchy

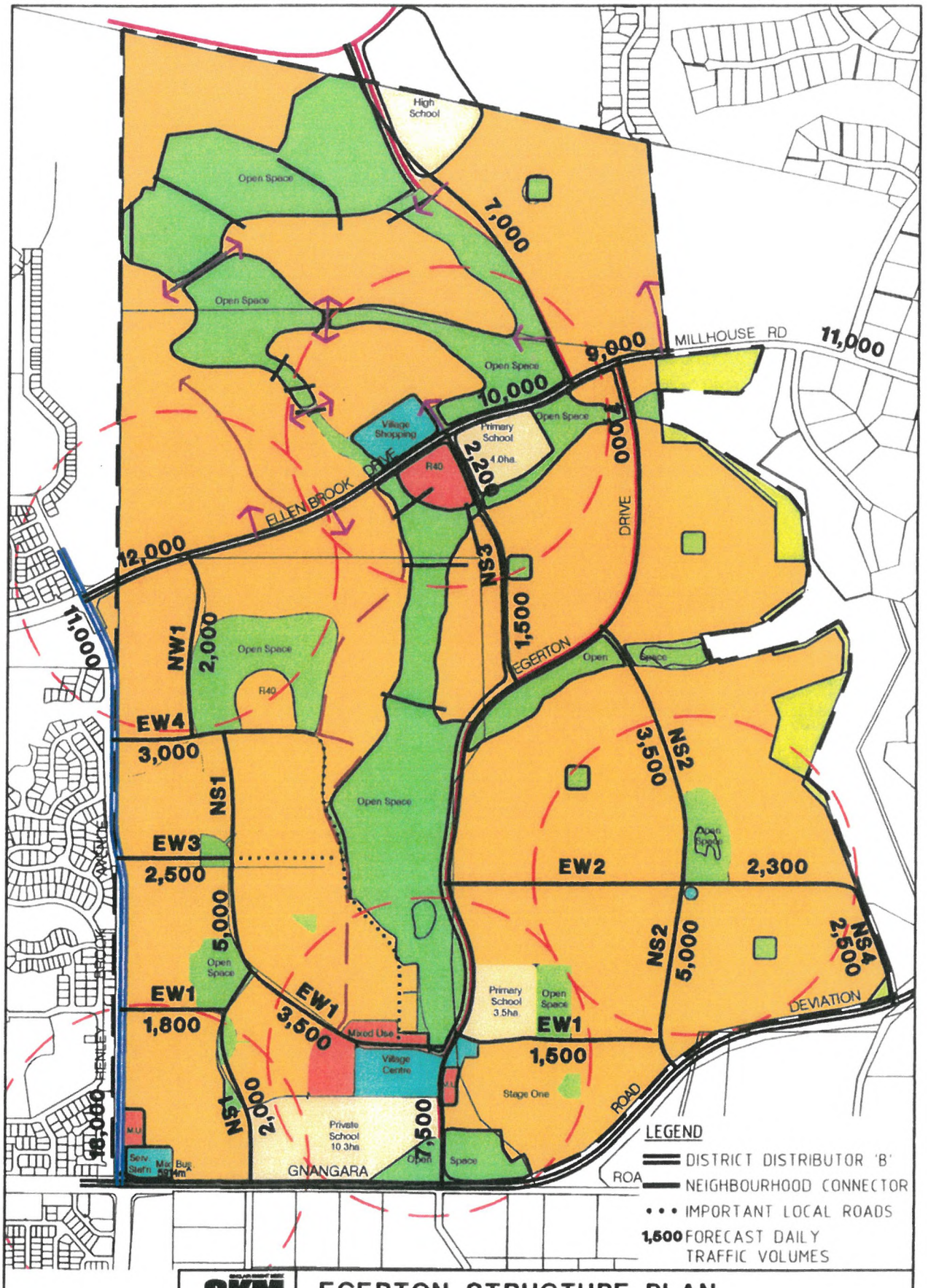
The forecast traffic volumes predicted by the EMME2 transport model for the consolidated structure plan are shown in **Figure 2**. These traffic volumes are based on the full development of Egerton and the adjoining Ellenbrook, assumed to occur by 2021.

Figure 2 also shows the road hierarchy most appropriate for the forecast traffic volumes and expected road uses.

5.2.1 Road Hierarchy

Egerton Drive provides a direct connection between Ellenbrook Drive/Millhouse Road and Gnangara Road, forming the major north-south link through the development. Egerton Drive is forecast to carry between 5,500 and 7,500 vpd (as a comparison, volumes of between 9,500 vpd and 10,900 were forecast under the earlier version of the structure plan). The Neighbourhood Connector classification is considered appropriate for Egerton Drive, within a road reserve of between 20 and 25 m.

Ellenbrook Drive provides the major internal link between Ellenbrook and Egerton. Between Millhouse Road and Road NS1 it is forecast to carry 9,000 to 10,000 vpd (volumes of between 4,000 vpd and 6,000 were forecast under the earlier version of the structure plan). Between NS1 and Henley Brook Drive Ellenbrook Drive is forecast to carry 12,000 vpd (7,000 vpd to 8,000 vpd under the earlier version of the structure plan).



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Sinclair Knight Merz Pty Ltd

EGERTON STRUCTURE PLAN

FORECAST TRAFFIC VOLUMES & ROAD HIERARCHY

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A District Distributor Integrator B classification is considered appropriate for Ellenbrook Drive, within a road reserve width of between 22 to 27 m.

Millhouse Road provides a direct connection between Ellenbrook Drive and West Swan Road. Forecast traffic volumes on the eastern section of Millhouse Road remain unchanged from the earlier versions of the structure plan. The section of Millhouse Road to the north of Ellenbrook Drive provides an internal connection between Egerton and the northern Ellenbrook Villages. With forecast traffic volumes of around 7,000 vpd (9,700 under the earlier version of the structure plan) a Neighbourhood Connector classification is appropriate within a road reserve of between 20 and 25 m.

Road **NS1** provides a secondary (and discontinuous) north-south route within Egerton and links the western residential areas with Gnangara Road and Ellenbrook Drive. Forecast traffic volumes range between 2,000 vpd and 5,000 vpd (1,500 vpd to 6,600 vpd under the earlier version of the structure plan). Road **NS2** is another secondary north-south route, linking the eastern residential areas with Gnangara Road and Egerton Drive. Traffic volumes of between 3,500 vpd and 5,000 vpd are forecast (2,500 vpd under the earlier version of the structure plan).

Road **NS3** is another secondary north-south route within Egerton, with forecast traffic volumes of between 1,500 and 2,200 vpd. This route was not in the earlier version of the structure plan therefore volume comparisons can not be made. Road **NS4** provides a direct connection to Gnangara Road at the eastern boundary of the site. Traffic volumes around 2,500 vpd are forecast. As this connection was not in the earlier version of the structure plan a volume comparison can not be made.

The Neighbourhood Connector classification is considered appropriate for these north-south routes, based on road function as well as forecast traffic volumes. Road reserve widths of between 18 and 20m are appropriate.

Six east-west routes have been identified. Road **EW1** is a discontinuous route parallel to Gnangara Road between Henley Brook Drive and Road NS2 in the southern section of the development. Traffic volumes of between 1,500 vpd and 3,500 vpd are forecast (1,500 vpd to 3,100 vpd under the earlier version of the structure plan). Road **EW2** will link the south eastern residential areas with Egerton Drive and is forecast to carry approximately 2,300 vpd (2,500 vpd under the earlier version of the structure plan).

Road **EW3** is a secondary east-west link, connecting Henley Brook Drive and Road NS1. Road EW4 is forecast to carry approximately 2,500 vpd (1,500 vpd under the earlier version of the structure plan). Road **EW4** is another secondary east-west link, connecting Henley Brook Drive and Road NS1, then continuing east before heading south and intersection again with Road NS1. Traffic volumes of approximately 3,000 vpd (1,500 vpd under the earlier version of the structure

plan) are forecast for the section of EW4 between Henley Brook Drive and Road NS1, with volumes up to 1,000 forecast for the loop to the east of Road NS1.

As with the north-south routes, the Neighbourhood Connector classification is considered appropriate for these routes, within a road reserve of between 18 and 20m.

The continuation of Roads EW3 and EW4 (north/east of Roads EW1 and NS1) may be described as Important Local Roads or Higher Order Access Streets. The exact requirements for these roads are subject to further investigation and a road reserve of between 16 and 20m is recommended to maintain flexibility.

Access roads have not been nominated within the Structure Plan, however these are expected to be constructed within a 16m road reserve.

5.3 Traffic Management

The proposed road network and the location of Egerton are expected to result in very little through traffic, with the exception of Ellenbrook Drive and Millhouse Road. Consequently, traffic management should not be focused on deterring through or unnecessary traffic, rather on appropriate intersection treatments and the control of vehicle speeds. Traffic management to control vehicle speeds will be discussed at the development plan stage.

5.3.1 Intersection Control

5.3.1.1 Intersections with External Road Network

The Consolidated Structure Plan proposes four access points to Egerton from Gnangara Road, comprising:

- Road NS1 left in left out access, 350m to the east of Henley Brook Drive (opposite the existing intersection with Robert Street);
- Egerton Drive, a full movement access opposite the extension of the Rookwood Street, potentially creating a four-way intersection; and,
- Road NS2, a full movement access a further 700m to the west of Egerton Drive (creating a T-intersection).
- Road NS4, a full movement intersection at the eastern boundary of the site, 700m to the east of the previous intersection.

The left in left out intersection of Road NS1 and Gnangara Road will operate safely with Give Way or Stop Sign control.

The four-way intersection that will be created (with Egerton Drive opposite the extension of Rookwood Street) will require either traffic signal or roundabout control (if the Gnangara Road

reserve has sufficient space). The introduction of traffic signals would provide protected pedestrian crossing opportunities for pedestrians, while the introduction of a roundabout would present fewer delays for Egerton traffic. Formal intersection control could also help to reduce the incidence of road crashes at this intersection. At this stage, roundabout control is preferred.

Stop sign control will comfortably accommodate the forecast volumes for the T- intersections created between Gnangara Road and Roads NS2 and NS4.

5.3.1.2 Intersections within Egerton

The Structure Plan proposes roundabouts for all internal four-way intersections identified at this stage. In addition, a number of staggered intersections are proposed in place of four-way intersections, which can operate under simple Give Way control.

SKM

6. Cyclists and Pedestrians

The general principles for the provision of routes for pedestrians and cyclists are:

- Walking is the best mode of transport for short trips. The disbenefits of using cars for these trips are such that walking should be encouraged.
- Pedestrian trips are the most common mode of transport, but also the most neglected.
- The bicycle is a convenient and viable transport mode, particularly for trips of between one and seven kilometres.
- Bicycles usage continues to increase and there is a responsibility on designers and engineers to provide for their use.
- The bicycle is an economical mode of transport and the only reasonably available mode for several groups in the population. Where cycling is not possible these groups will be disadvantaged.
- Walking is the most common means of travel to and from public transport and should be given priority to deliver patrons safely to public transport modes.
- The vast majority of pedestrian and bicycle trips are for transport purposes, ie to get from A to B, not for recreation. Consequently, in providing for these trips fast convenient travel should be the first priority, with equal importance being given to safety considerations.

As with the earlier version of the Structure Plan, provision has been made for cyclists on each of the road types as determined by Bikewest, Austroads Guidelines and forecast traffic volumes.

District Distributors require on-road provision for cyclists. These can be either on-road bicycle lanes (recommended width 1.5m for a 60km/h speed environment) or wide kerbside lanes (3.7m lanes without a median or 4.2m if a median if provided). In addition a shared path (recommended width of 2.5m) is required on at least one side of the road, with a footpath (1.5m) on the other side.

Widened lanes to accommodate cyclists are recommended for Neighbourhood Connectors, however bicycle lanes may be more appropriate on Egerton Drive and some of the busier north-south Neighbourhood Connectors. At least one shared path is required, with a footpath on the other side.

On local access roads it is envisaged that cyclists will share the roadway with motorists due to the low traffic volumes (less than 3,000 vpd) and small speed differential (helped by the introduction of the 50kph speed limit in built up areas). Footpaths should be provided on some access streets (for example to provide a link to some POS, a school or retail area) with a minimum width of 1.5m, increasing to 2m in the vicinity of schools.

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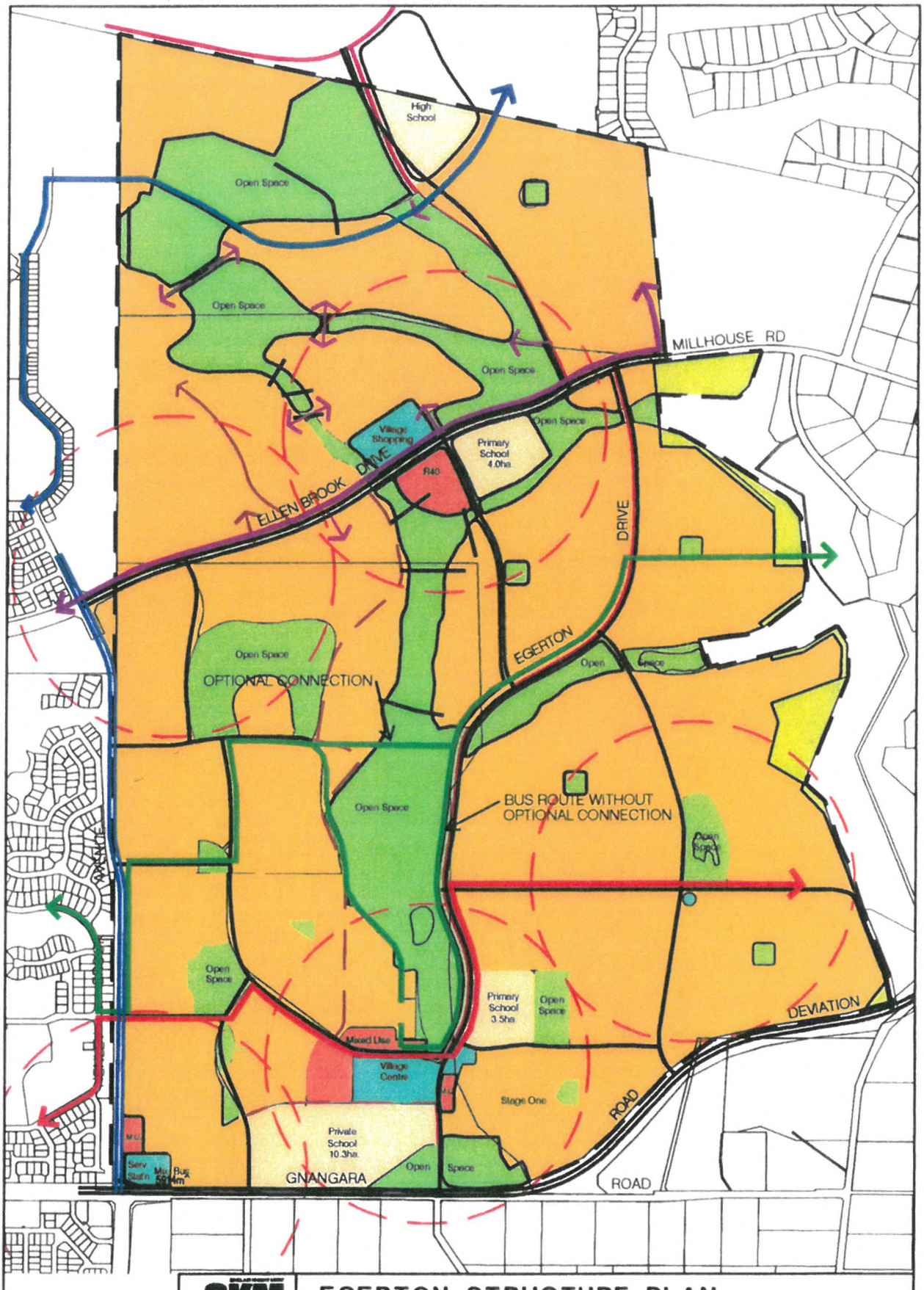
7. Public Transport

All Neighbourhood Connectors and District Distributor roads are wide enough to accommodate bus routes (ie pavement width of at least 7.4m or 3.7m for a one-lane carriageway). In addition, the use of staggered intersections in place of roundabout controlled four-way intersections is consistent with Transperth's performance criteria to restrict roundabouts. The horizontal deflection experienced while travelling around a roundabout can cause passenger discomfort; therefore Transperth prefers roundabouts to be installed at spacings of at least 1km.

Transperth bus route planners have identified potential routes within Egerton. These routes are shown in **Figure 3** and are most likely to travel on Neighbourhood Connectors.



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EGERTON STRUCTURE PLAN

PROPOSED BUS ROUTES

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FIGURE 3

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APPENDIX 3

Drainage & Nutrient Management Programme - Jim Davies & Associates

MULTIPLEX LIMITED

EGERTON
Development Plan One

DRAINAGE AND NUTRIENT MANAGEMENT PROGRAMME

September 2004

CONTENTS

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1. INTRODUCTION

1.1 Background

Egerton is situated adjacent to Ellen Brook in the City of Swan, approximately 22 kilometres north east of the Central Business District of Perth (Figure 1). The property extends over 588 hectares and is a rural estate and stud, breeding quality cattle, sheep and horses.

A Structure Plan for Egerton was developed in 1993 by Multiplex Constructions Pty Ltd (referred to in this document as "Multiplex"). The proposal to rezone the property from Urban Deferred to Urban in the Metropolitan Region Scheme was assessed by the Environmental Protection Authority (EPA) at the Consultative Environmental Review level (Alan Tingay & Associates, 1994a). In June 1994, the EPA released its report and recommendations on the rezoning proposal (Bulletin 743) and concluded that the proposal was environmentally acceptable (EPA,1994).

One of the principal areas of concern to the EPA was the future management of runoff water quality and quantity in terms of the protection of wetlands on the property, as well as receiving water bodies downstream including Ellen Brook and Henley Brook. The (then) Minister for the Environment list of conditions included Condition 3-2 requiring preparation of a Nutrient and Drainage Management Plan, to address management of groundwater and surface water following urban development.

To achieve those aims, Alan Tingay & Associates *et al.* (1995) prepared the Egerton DNMP (referred to in this document as the "1995 DNMP") which addressed:

- the effect of development on groundwater levels
- the effects of development on existing wetlands
- surface drainage volumes and flow rates following development
- expected nutrient loads to Ellen Brook and Henley Brook, tributaries of the Swan River
- the development of a monitoring programme for water levels and water quality.

The 1995 DNMP was based on the 1993 Structure Plan which was drafted in accordance with Water Sensitive Urban Design (WSUD) and Best Management Practices (BMP's) of that time, as described in the North East Corridor Drainage Management Strategy (DMS) which was being prepared at that time (GB Hill, 1995). The 1995 DNMP received Ministerial Approval in 1995.

In 2000 an Outline Development Plan (ODP) for Egerton was approved and conditional subdivision approval was given for the initial stages of development, with a drainage strategy based on the 1995 DNMP. Multiplex now plans to proceed with urban development of Egerton during 2004.

Since approval of the 1995 DNMP and 2000 ODP, there has been a significant change in urban stormwater management in Western Australia, with the Water and Rivers Commission (WRC) (now part of the Department of Environment) adopting a whole of catchment approach to urban water management. This shift places an emphasis on infiltration, source controls, and non structural water quality techniques. This contrasts with previous WSUD and BMP techniques which concentrated on the use of end of pipe techniques for water quality control.

Multiplex acknowledges these changes in urban stormwater management, and to this end has commissioned the preparation of this DNMP for the Egerton Development Plan One area (referred to in this document as the "DP1 DNMP"). This DP1 DNMP aims to maintain key agreed principles of the 1995 DNMP, while reflecting recent changes to WRC's principles and objectives for urban stormwater management. It also supplements and extends on the principles adopted in the Egerton Development Stage 1 DNMP.

1.2 Objectives

The key objectives of this DNMP for the Development Plan One area are:

- To provide a bridging document between the 1995 DNMP and WRC's new principles and objectives for urban stormwater management, prior to a review of drainage management being undertaken by Multiplex for future stages of development at Egerton.
- To propose responsibilities for drainage and water quality management for the Development Plan One area.
- To provide an opportunity for both state and local government to pilot the implementation of WRC's new principles and objectives for urban stormwater management in the North East Corridor.
- To provide an opportunity for state and local governments to assess the performance of catchment management and source control measures, with a view to providing data to refine approaches being established at a regional level (GHD, 2003).
- To enable the performance of the DP1 DNMP to be assessed. This provides flexibility for continual improvements in WSUD to be incorporated in the future Egerton planning and development process, subject to economic considerations.

2. HISTORICAL CONTEXT

2.1 The North East Corridor DMS

In 1995 the North East Corridor Drainage Management Strategy (DMS) was prepared (GB Hill, 1995).

It provided a regional drainage strategy based on the construction of Water Pollution Control Ponds (WPCP's) as the preferred method of trapping nutrients in the drainage system prior to discharge into receiving water bodies. This strategy represented the preferred approach by government agencies at that time to managing urban stormwater quality.

The North East Corridor DMS (GB Hill, 1995) proposed 3 WPCP's for Egerton (Figure 2).

2.2 The 1995 DNMP

The 1995 DNMP was prepared in response to Ministerial Condition 3-2 following rezoning of the Egerton property from 'Urban Deferred' to 'Urban' by the EPA in June 1994. The Condition was incorporated into the Minister for the Environment's approval of the rezoning over concern of the future management of runoff water quality and quantity in terms of protection of wetlands on the property, Ellen Brook, the Swan River and adjoining land.

The 1995 DNMP addressed management of groundwater and stormwater of the proposed development based on the 1993 Structure Plan consistent with the North East Corridor Drainage Management Strategy (GB Hill, 1995). It proposed a drainage scheme (Figure 3) managed by a network of wet detention basins in the mid to upper catchments, and by WPCP's at the outlet of the catchment to attenuate peak flows, and by WPCP's where discharge to an external water body occurred. No source control measures were proposed as part of the 1995 DNMP, with sole reliance on WPCP's for water quality management.

The 1995 DNMP proposed post development monitoring requirements and envisaged responsibility for implementation and monitoring would be between the (then) Water Authority WA, City of Swan and Multiplex, subject to negotiation.

The 1995 DNMP received Ministerial Approval in 1995. In 1995 the functions of the Water Authority were split between the Water Corporation (a utility) and Water & Rivers Commission, the water resource manager.

2.3 The North East Corridor TRC

The Ellenbrook Southern Catchment DNMP (Cossill & Webley et al 1994), located immediately west of Egerton, resulted in the creation of a Technical Review Committee (TRC) for Drainage and Nutrient Management in the North East Corridor.

The TRC has met at irregular intervals since 1995, and has focussed attention almost exclusively on the Ellenbrook landholding which commenced development in late 1994. The TRC did not comment on the 1995 DNMP in draft form, and has not discussed it since it's completion and approval.

The agenda for the most recent meeting of the TRC held on 28 November 2002 was titled "North East Corridor (Ellenbrook Southern Catchment) Technical Review Committee", indicating WRC considers the Committee role as limited to Ellenbrook Southern Catchment.

3. RECENT DEVELOPMENTS IN WSUD

3.1 WRC Objectives and Principles

WRC is the state government agency responsible for preparation of regional drainage management strategies in WA, to guide development and allow the planning and provision of sufficient infrastructure, particularly for water quality and quantity, to ensure land use change is environmentally sustainable.

Water Sensitive Urban Design (WSUD) for urban development was previously guided by WRC's "Manual for Managing Urban Stormwater Quality in Western Australia" (1998). Following further research and a paradigm shift to "at source controls", WRC is now reviewing this Manual. WRC's current position on Urban Stormwater Management in WA is outlined in their Interim Position Statement Principles and Objectives February 2003 (Appendix A). Principal objectives for managing urban water quality and quantity in WA are stated as :

- **Water Quality.** To maintain or improve the surface and groundwater quality within development areas relative to pre-development conditions.
- **Water Quantity.** To maintain the total water cycle balance within development areas relative to the pre-development conditions.

The following stormwater management hierarchy are then presented to achieve these objectives:

- **Retain and restore natural drainage systems.** Retain and restore existing valuable elements of the natural drainage system, including waterway, wetland, groundwater features and processes.
- **Implement non-structural source controls.** Minimise pollutant inputs principally via planning, organisational and behavioural techniques, to minimise the amount of pollution entering the drainage system
- **Minimise runoff.** Infiltrate or reuse rainfall as high in the catchment as possible. Install structural controls at or near the source to minimise pollutant inputs and the volume of stormwater
- **Use of 'in-system' management measures.** Includes vegetative measures, such as swales and riparian zones, and structural quality improvement devices such as gross pollutant traps

The Southern River/Forrestdale/Brookdale/Wungong Urban Water Management Strategy (UWMS) (JDA, 2002) represents the first regional drainage management strategy locally to adopt a source control approach to urban water management. The UWMS marked a shift of emphasis from attempts to trap or retard pollutant in their journey from land application to estuary discharge, to a more fundamental "Prevention is better than Cure" philosophy. The UWMS aims for a reduction in pollutant input with land use change compared with current broadscale agricultural activity and therefore a subsequently lower long term export to its receiving environment. The UWMS demonstrated application of traditional WSUD water quality measures such as WPCP and swales are not capable of providing this outcome.

3.2 Review of North East Corridor DMS

During 2002, WRC commissioned GHD to review the North East Corridor DMS (GB Hill 1995). According to WRC's project brief, the review was initiated by the Water Corporation's perceived high cost and poor performance of the Henley Brook WPCP, a condition of the Ellenbrook (South Catchment) DNMP.

A preliminary draft of the review report (GHD, 2003) was circulated in April 2003 to a Steering Committee comprising representatives of Water Corporation, WRC, DEP and UDIA. The Steering Committee met in April 2003, to discuss the draft document and provide feedback to WRC. It is understood this document is still in draft form, with expected completion late in 2003 (Peter Kata, WRC, pers comm).

? did it eventuate.

The current review of the North East Corridor Strategy is considered likely to adopt a catchment management (source control) methodology.

4. DEVELOPMENT PLAN ONE DNMP

4.1 Approach

The proposed approach in this DNMP provides details of a total water cycle management philosophy, both from a flood management (water quantity) and water quality perspective. It incorporates elements of the previously approved 1995 DNMP, with a focus toward including source controls and catchment management techniques to achieve water quality objectives, consistent with WRC's Interim Position Statement Principles and Objectives February 2003.

It proposes a drainage network designed for flood management purposes, with water quality managed by a series of 'at source' controls throughout the catchment, rather than end of line treatments.

This approach differs from the 1995 DMNP which relied fully on WPCP's at catchment outlets to achieve water quality objectives. This DP1 DNMP addresses both groundwater and surface water quality issues, whereas the 1995 DMNP dealt with surface water quality issues only.

The proposed drainage network will comprise a piped/swale system with a combination of swales and infiltration basins at the end of each sub-catchment. A detention storage designed for flood management purposes will be required in the south eastern corner of the Development Plan One area. It will be a permanent lined water body that temporarily stores and infiltrates flood water during storm events.

Figure 4 presents the proposed development plan for the DP1 DNMP catchment.

Water quality in the catchment will be managed by a treatment train of BMP's consistent with current WSUD principles, with particular emphasis on source controls. For each sub-catchment within the Development Plan One area, all stormwater will be retained and treated locally, particularly for the first flush event and frequently occurring storm events (<1 in 1 year ARI).

At source water quality controls will be incorporated into landuse planning (POS and landscape design), particularly during the detailed design phase, and will include vegetated swales, strategic plantings, street sweeping, stormwater pollutant traps, and community education.

It is suggested that the water management concepts outlined in this DP1 DNMP obtain design based approval, similar to the Egerton Development Stage 1 DNMP (JDA, 2003). That is, the DP1 DNMP supplements and extends the principles of Egerton Development Stage 1, without any requirement for retro fitting of structural controls, unless economically viable to the agencies. Should the source control methodology not perform as predicted, the contingency measure is to reinforce the source control methodology itself.

It is envisaged that with this approach being consistent with current stormwater principles and objectives of Water Corporation, WRC, and the City of Swan, if proven to be successful, will also be applied to the future stages of development in the remainder of Egerton.

4.2 Groundwater Management

4.2.1 WRC AAMGL Policy

WRC's Average Annual Maximum Ground Water Level (AAMGL) policy was developed in the 1990's, to prevent nutrient rich groundwater being discharged to downstream water bodies, with the aim of preventing the drying out of wetlands and associated vegetation and protecting downstream water bodies from nutrient enrichment. The AAMGL policy required new open drains, basin outlets and subsoil drains to be laid at an elevation at or above the AAMGL.

Prior to adoption of the AAMGL policy, in many areas of Perth the existing drainage system was installed below the AAMGL to allow control of the water table without the necessity of importing large quantities of fill material.

WRC supports the balance between environment and development and uses the AAMGL based on the most recent 25 years of data. Where man-made or open agricultural drains exist, AAMGL mapping is also allowed to consider the restriction in the rise of the water table due to the drain.

A more flexible approach was adopted in the Southern River/Forrestdale/Brookdale/Wungong Urban Water Management Strategy (JDA, 2002), where post development drain levels were discussed as potentially being set below AAMGL, provided it could be shown by a land developer that:

- Wetland groundwater levels would not be adversely affected
- Limiting peak seasonal groundwater levels does not significantly increase nutrient export
- The concentration of the nutrients exported does not lead to a risk of algal blooms

It is recommended this more flexible approach to AAMGL policy be adopted for this DP1 DNMP.

It is important to note that limiting the peak groundwater level rise does not effectively lower groundwater levels in an area over the whole year, but rather only limits the seasonal peak rise in groundwater level. For all times other than when the groundwater is at its peak, groundwater levels are unaffected by any setting of drainage below AAMGL.

4.2.2 Groundwater Levels

Following change in land use from native vegetation to urban development, a change in the general water hydrologic balance, particularly in groundwater levels is observed.

Preliminary modelling of the AAMGL pre and post development was included in the 1995 DNMP, based on groundwater data from regional monitoring bores. Based on monitoring recommendations contained in the 1995 DNMP, 28 shallow groundwater bores have since been installed at Egerton (Figure 5). These bores have been monitored monthly since 1995, with hydrographs for these bores shown in Figure 6.

JDA (2003) updated the pre-development AAMGL contours for the entire Egerton property based on this additional monitoring data as shown in Figure 7.

Post development groundwater levels are proposed to be maintained at pre-development levels. This will be achieved through the use of a subsoil drainage system as described in the next section.

4.2.3 Subsoil Drainage

Minimum building floor levels require compliance with standard requirements of a 1.2m clearance above the AAMGL. This separation will be achieved by a combination of filling and subsoil drainage if not available.

Subsoil drainage is to be installed to maintain the groundwater levels at the pre-development AAMGL This will protect against rises in water table due to any increase in recharge associated with development. It will also provide protection for any existing wetlands and groundwater dependent vegetation.

The subsoil drainage network will consist of perforated pipes surrounded by crushed rock bed, with inverts set approximately at the pre-development AAMGL. Flow collected in the subsoil drainage system will be discharged into downstream storages.

4.3 Water Quantity Management

4.3.1 Proposed System

The stormwater management system will be designed using the minor/major approach. The minor drainage system is defined as the system of swales, kerbs and underground pipes etc. designed to manage runoff generated by low frequency ARI storms, typically less than 5 year ARI. The major drainage system is defined as the arrangement of roads, drainage reserves and open space to manage stormwater runoff from extreme events which exceed the capacity of the minor system.

Under this approach, frequent minor flows are retained/detained at source by the pipe/swale system and/or on site detention. Rarer major floods including the 100 year Average Recurrence Interval (ARI) storm event will be conveyed by overland flow paths to safe disposal points further downstream, or stored and infiltrated on site where technically feasible.

Within each sub-catchment stormwater will be treated by infiltration. Infiltration basins will be designed to contain both the 10yr and 100yr storm events. The detention storage will also be designed to contain the 10yr and 100yr storm events and treat stormwater by infiltration above the liner.

4.3.2 Flood Modelling

Flood modelling will be performed to determine the sizing of infiltration basins and the detention storage based on post development stormwater runoff. Details of the design from the flood modelling results will be provided during detailed design.

4.4 Water Quality Management

The 1995 DNMP originally proposed that stormwater runoff generated within the catchment would be treated by WPCP's. The WPCP's were designed in accordance with design guidelines at the time, to remove nutrients and pollution from stormwater prior to discharge into Henley and Ellen Brooks.

This DP1 DNMP adopts an integrated catchment management approach to water quality, building on the strengths of both the 1995 DNMP and Best Management Practices of WSUD as outlined in WRC's Manual for Managing Stormwater Quality in Western Australia (WRC, 1998). While infiltration opportunities will be maximised for high frequency and low intensity storms, this DP1 DNMP also provides a greater emphasis on strengthening source controls and catchment management measures to reduce nutrient and pollution input, rather than only attempting to treat nutrients and pollutants once applied to the catchment.

In developing a water quality management strategy for the Development Plan One area, the primary focus is on nutrient input and export as the most significant water quality issues.

The following sections provides an outline of existing (pre-development) and post development nutrient inputs, identify the relative cost and effectiveness of various in-transit and source control measures, and evaluate effective nutrient (and other pollutant) management options.

4.4.1 Existing Groundwater and Surface Water Quality

Groundwater and surface water quality (Nitrogen and Phosphorus) has been measured 3 monthly by JDA at Egerton since 1999, consistent with recommendations contained in the 1995 DNMP (Figure 5). The data forms pre-development baseline data to which post development water quality may be compared against. It is suggested that detailed analysis of this data be performed when the Monitoring Program is developed (see Section 4.5) to determine appropriate guidelines for comparison, in particular, with reference to the Swan Canning Cleanup Program (Swan River Trust, 1988) Ellen Brook 5 and 20 year targets.

4.4.2 Water Quality Management Options

Details of various structural water quality control measures applicable to the Development Plan One area are shown in Tables 1 and 2. These tables have been adapted from the Southern River/Forrestdale/Brookdale/Wungong Urban Water Management Strategy (JDA, 2002) and summarises the suitability of pollutant removal efficiencies, constraints and relative capital and operating costs.

Table 1 indicates that structural controls are only effective in removing gross pollutants and coarse sediment. They are ineffective in removing fine sediments and oil and grease, and in particular nutrients. They also have a moderate potential for allowing pollutants to be remobilised.

Table 2 also indicates that the majority of these structural controls are associated with a high ongoing/maintenance or capital cost. Consequently, they are considered to be inefficient in pollutant removal and should not be relied on for the majority of water quality management control within the Development Plan One area.

Table 1 : Pollutant Removal Efficiencies For Various Structural Controls

Treatment Measure	**Pollutant Removal Efficiency** **neg** : Negligible [0-10% removal] **L** : Low [10-50% removal] **M** :Moderate [50-75% removal] **H** : High [75-100% removal]									
	Litter and gross pollutants (>500 µm)	Coarse sediment (>200 µm)	Fine sediment & suspended solids (<200 µm)	Total phosphorus	Dissolved phosphorus	Total nitrogen	Dissolved nitrogen	Oil and grease	Oxygen demanding substances (BOD)	Potential for pollutant re-mobilisation
Litter baskets/ pits/ bags	H	L	Neg	neg	neg	neg	neg	neg	L	L
Litter / trash racks	M	L	Neg	neg	neg	neg	neg	neg	L	M
Gross Pollutant Traps	H	H	M	L	neg	L	neg	L	L	M
Detention torages	L	H	M	M	neg	L	Neg	neg	L	M
Vegetated swales	L	H	M	L	neg	L	neg	L	L	L
Bioretention systems	L	L	H	H	L	H	L	M	L	L

Adapted from JDA (2002).

Table 2 : Potential Constraints For Various Structural Controls

Treatment Measure	Potential Constraint ✱ : Constraint may preclude use • : Constraint may be overcome with appropriate design ✓ : Generally not a constraint								Indicative Relative Cost H : High M : Medium L : Low	
	Steep site/catchment slope	High water table	Limited land availability	Polluted groundwater	Covered treatment measure is required	High sediment input	Treatment measure requires pre-treatment	Hydraulic head loss limitation	Ongoing operation / maintenance costs	Capital cost
Litter baskets/ pits/ bags	✓	✓	✓	✓	✓	•	✓	•	H	L
Litter / trash racks	✓	✓	✓	✓	•	•	✓	✱	H	L
Gross Pollutant Traps	✓	✓	•	✓	•	•	•	✱	H	M
Detention storages	•	•	✱	•	✱	✱	✓	•	L	M
Vegetated swales	✱	✱	✱	✓	✱	✓	✓	✓	L	L
Bioretention systems	✱	✱	✱	✓	✱	✱	✓	✓	M	M

Adapted from JDA (2002).

With non-structural source controls, it is more difficult to predict their effectiveness on pollutant removal efficiencies. Presented in Figure 8 is a concept summary of the relative costs for reducing phosphorus input based on source controls compared to end of pipe controls (extract from JDA, 2002). It clearly shows that there are smaller costs and greater efficiencies associated with preventing nutrient application, compared to incorporating more expensive end of pipe infrastructure (structural controls).

Based on this concept and the fact that the structural controls discussed earlier are less efficient in pollutant removal, it is recommended that the water quality management program developed for the Development Plan One area largely reflect non-structural source controls rather than the end of pipe structural controls. For this DP1 DNMP, the following source controls are proposed where possible:

- **Landuse Planning**
  Inclusion of water quality considerations in land use planning decisions – land zonings and layout, and POS design and location.

- **Education Campaigns**
  Distribution of leaflets, posters and newsletters (topics include but not limited to drains to rivers – Henley and Ellen Brook, fertilising habits, composting, car washing detergents and practices, lawn and garden cutting disposal, techniques for minimising stormwater runoff pollutants), drain stencilling and plaques, erection of informative signs in public areas, newspaper articles etc.

- **Refinement of Management and Maintenance Activities**
  Education of staff and regular review of work practices, refinement of street sweeping programmes and practices, landscaping, and enforcement through infringement and pollution control regulation.

- **Balanced Planting Regime**
  Retention of existing, and landscaping with native vegetation in POS areas, and encouragement of native plantings in residential lots where possible.

- **Street Sweeping**
  Undertaking of co-ordinated street cleaning programs to remove sediment build up, particularly during development and housing construction phase.

4.4.3 Modelled Nutrient Input from NiDSS

NiDSS (Nutrient Input Decision Support System) is a tool developed by JDA Consultant Hydrologists to assist in landuse management planning, by allowing quantitative estimation of nutrient input rates and the potential reduction in nutrient input for various combinations of WSUD management measures. It focuses on the adoption of an integrated catchment approach to water quality management, including measures to minimise nutrient inputs at source, and provides a logical framework for the evaluation of the effectiveness of various best management practices for nutrient input management.

It calculates the total expected nutrient input for a particular development proposal based on aggregating individual nutrient inputs from different land uses (housing lots, POS, road reserves, conservation areas etc.) prior to implementation of stormwater management measures. The impact of individual source and in-transit controls on nutrient input can then be determined by either turning on/off individual controls or varying the effectiveness of these measures. The results present information on:

- Estimates of total phosphorus (TP) and total nitrogen (TN) application to an area
- Estimates of reductions due to source control measures (education, street sweeping)
- Estimates of reductions due to in-transit controls (Stormwater Pollutant Traps, WPCP's)
- Estimates of the cost of removal (in PV terms) for a selected WSUD program.

NiDSS modelling was applied to the Development Plan One area to model the proposed land use nutrient input rates. The nutrient application rates were adopted from Southern River/Forrestdale/Brookdale/Wungong UWMS (JDA, 2002), which based application rates on a nutrient input survey conducted by JDA of medium density residential areas and on previous work of Gerritse et al (1991, 1992).

Following urban development, there is the potential for an increase in nutrient input. For the Development Plan One area, estimates of post-development nutrient input rates from NiDSS are shown in Table 3. These estimates are based on residential development with a R15 zoning (670m^2 lots). Estimates of current nutrient input from the pine plantation and surrounding natural vegetation are unknown.

Table 3: Post Development Nutrient Input Analysis (using NiDSS Model)

	Post Development (without WSUD)	Post Development (with WSUD Example 1)	Post Development (with WSUD Example 2)
Total Phosphorus Input (t/yr)	6.7	1.7	2.8
Total Nitrogen Input (t/yr)	28.4	10.8	12.2

Through the application of various water management options, the potential for increased nutrient input can be managed. Furthermore a combination of these options can be used to develop an effective water quality management program to effectively reduce the post development even further inputs. Presented in Tables 3 and 4 are two examples on how an effective water quality management program, based on source controls can reduce post development Total Nitrogen and Total Phosphorus inputs. In these examples, it assumes an education effectiveness of 25% and 33% respectively, that is, 1 in 4 or 1 in 3 people will adopt the WSUD principles as listed. These effectiveness percentages are not considered to be unrealistic.

Note that these management options shown in Table 4 represent effective example programs only. There are many other various combinations of management options available that can also be used to achieve a similar result. For this Development Plan One catchment, it is recommended that a specific water management program be developed by Multiplex in consultation with the relevant agencies.

Table 4 : Management Options Adopted in Example WSUD Programs

NiDSS WSUD Parameter	WSUD Example 1	WSUD Example 2	Description of WSUD Parameter
Street Sweeping	100%	0%	% of area street sweeping applies to
Education Effectiveness	25%	33%	% of people adopting WSUD principles
(i.e. number of people that adopt WSUD listed below)	*1 in 4*	*1 in 3*	
Community Education on Fertiliser Use	✓	✓	Fertiliser application as per manufacturers recommendations
Community Education on Pet Waste	✓	✓	Proper disposal of waste in rubbish bins
Balanced Planting Regime[1] (from Exotic gardens)	100%	50%	% of exotic garden replaced with a balanced planting regime
Balanced Plating Regime[1] (from Lawn area)	40%	50%	& of lawn area replaced with a balanced planting regime

1. Balanced Planting Regime also includes native plants.

If the water quality management program developed is ineffective and nutrient inputs increase as shown in Table 3, there will be a long term impact on groundwater quality as all stormwater is infiltrated. However, if the proposed source control methodology adopted is as effective as modelled in NiDSS (WSUD Example 1), the total phosphorus load into the groundwater is reduced by 75% and nitrogen reduced by 60% (Table 3).

4.5 Monitoring

4.5.1 Monitoring Program

A monitoring program will be designed for the Development Plan One area to allow quantitative assessment of hydrological impacts of the proposed development. In particular the Program will include the monitoring of surface water discharge from the development via the detention storage, and monitoring of groundwater levels and quality (Nitrogen and Phosphorus), in addition to the existing groundwater monitoring program.

The Program will build on existing groundwater level and quality data and will continue for 10 years to allow for time lag for full impacts of development on the receiving environment if any to occur. The Program will be periodically reviewed, and modified (if necessary) as monitoring data is collected to ensure the Program's suitability and practicality.

It is suggested that the process for developing the details of the Monitoring Program (water quality parameters, locations, frequency and reporting) be similar to that adopted for Stage 1 of the Egerton development. That is, details of the Monitoring Program are to be designed separately from this DNMP by Multiplex, City of Swan, Department of Environment and JDA Consultant Hydrologists jointly.

4.6 Implementation

4.6.1 Operation and Maintenance

Design and construction of the local drainage system will be the responsibility of the developer (Multiplex Limited), and handed over to local government (City of Swan) at Practical Completion.

It is considered that the following operating and maintenance practices will be implemented periodically by the relative agencies as outlined in Table 5:

- Removal of debris to prevent blockages
- Street sweeping to reduce particulate build up on road surfaces and gutters
- Stripping and removal of vegetation from the detention storage
- Cleaning of sediment build up and litter layer on the bottom of infiltration basins and the detention storage
- Mowing of grassed open channel sections monthly and grass clippings removed
- Undertake education campaigns regarding source control practices to minimise pollutant runoff into the stormwater drainage system
- Conduct regular operational and maintenance activity reviews with regard to assessing activity impact on water quality

4.6.2 Roles and Responsibility

Key roles and responsibilities for various agencies for implementing the DP1 DNMP are shown in Table 5.

This DNMP proposes the management of water quality by predominantly non-structural source controls within the catchment.

As a demonstration project of urban water management source controls, it is proposed that the monitoring of performance of each element will be given prominence. At present the ability of source controls measures to ensure post-development water quality will be as good as, or better than, pre-development water quality, has not been established.

Discussions with government agencies suggests that it is not a responsibility of any arm of government to collect such information to allow more rational decisions to be made in future. With this situation in mind it is proposed that the Development Plan One area be established on "design based" water quality methods, rather than "performance based". That is, we propose that the data to be collected on the performance of the different source control measures will be made generally available to the government and land development industry.

It is further proposed that no liability is incurred by any participating agency, Multiplex included, should the source control measures proposed not result in the desired water quantity and quality outcomes. The contingency measure in this circumstance would be to reinforce the source control methodology, to improve implementation in this and subsequent stages of the urban development of this catchment.

The information obtained from monitoring will be documented in annual reports by Multiplex, so that progress can be assessed and future land development at Egerton, and elsewhere in Perth, benefit from it.

TABLE 5: EGERTON DEVELOPMENT PLAN ONE DNMP IMPLEMENTATION SCHEDULE

Management Issue	Responsibility	Commitments
1. Non structural source control compliance with DP1 DNMP		
a) *Development of agreed source control program*	Multiplex for the life of the project	❑ Display board in the Sales Office
	Multiplex	❑ Settlement "Welcome Kits" providing information on species to plant (packet of seeds), appropriate watering and fertilising programs, weed control etc (together with North East Catchment Committee) ❑ Front landscaping incentive to include voucher for plants at a water wise nursery
	Multiplex and other parties for 3 years, until the local community group is established	❑ Annual gardening seminars, co-ordinated by Multiplex and run by local catchment groups, Water Corporation, local nurseries on water-wise programs and best environmental practices.
	Multiplex for the life of the project	❑ A section within the marketing/community newsletter which will be distributed quarterly reinforcing appropriate gardening/environment practices
	Multiplex and other parties for 3 years, until the local community group is established	❑ Formation of 'Friends of Vale' (community group) with an active environment interest group. Projects may involve fish stencilling, garden design programs, fertiliser application education (in association with the North East Catchment Committee)
	Multiplex and other parties for 3 years, until the local community group is established	❑ Links to active local environment groups (eg North East Catchment Committee) to establish ongoing monitoring, education and implementation of environmental management strategies outlined above. Local catchment groups will also have a strong involvement with local schools in the development of other environmental programs associated with the conservation zones, water bodies and flora and fauna management
	Multiplex and other parties for 3 years, until the local community group is established	❑ Engage with local schools – co-ordinated by Multiplex in consultation with the Water Corporation, to provide programmes associated with Water Wise practices such as plant species, irrigation, water regimes, fertilisers, water quality
	Multiplex for 5 years, until the local community group is established	❑ Annual survey of residents to determine the effectiveness of environmental strategies

TABLE 5: EGERTON DEVELOPMENT PLAN ONE DNMP IMPLEMENTATION SCHEDULE (CONTINUED.....)

Management Issue	Responsibility	Commitments
	Multiplex	❑ Composting kits and fertiliser application kits made available by Multiplex to new residents ❑ Demonstration leadership in public planting regimes
b) *Balanced planting regime*	Multiplex and other parties for 3 years, until the local community group is established	❑ Linkages with local nurseries to recommend appropriate information to Vale residents on plant selection, water usage minimisation techniques and fertiliser application education
	Multiplex	❑ Incorporate a balance between exotic and native planting for proposed use in each POS area with consideration of Council's maintenance regimes
c) *Street sweeping*	City of Swan	Street-sweeping to be undertaken bi-annually
3. Structural source control compliance (maintenance of all drainage structures)	City of Swan for maintenance after practical completion, Multiplex for defects only (12 months)	All SEP's, SPT's, pits and pipe structures to be cleaned bi-annually and monitored regularly to ensure build-up of debris does not affect the performance of the structures
4. Groundwater level and quality monitoring	Multiplex for 10 years	Monitoring will be carried out on a monthly basis and will include: ❑ Groundwater Levels ❑ pH and Salinity ❑ Nutrients (nitrogen & phosphorus)
5. Detention storage inflow quality monitoring	Multiplex for 10 years	Monitoring will be carried out monthly during periods of rainfall at the inflow to the detention storage.
6. Preparation of Annual Monitoring Reports	Multiplex for 10 years	Annual reports outlining data collected from Items 4 & 5 above will be prepared by Multiplex and forwarded to City of Swan, DoE and Water Corporation (as required).
7. Assessment of performance of catchment management and source control measures from Annual Monitoring Reports	Multiplex, City of Swan, DoE, Water Corporation (as required) Who is lead Agency?	Annual reports will be reviewed by all parties, followed by a meeting to determine effectiveness of current practices and determination of strategies to improve the efficiency of the existing and proposed systems
8. Strategic Planning for future stages of Egerton and review of drainage planning, including flexibility for continual improvements in WSUD	Multiplex, City of Swan, DoE, Water Corporation (as required)	As per Item 7 above
9. Refinement of regional strategic drainage planning, based on monitoring outcomes.	Dept of Environment	Ongoing refinement of strategic water sensitive urban design principles, objectives and strategies.

monitoring & knowledge

5. CONCLUSIONS

- Since approval of the 1995 DNMP and 2000 ODP, there has been a significant change in urban stormwater management in WA, with WRC adopting a whole of catchment approach to urban water management. This shift places an emphasis on infiltration, source controls, and non structural water quality techniques. This compliments with previous WSUD and BMP techniques which concentrated on the use of end of pipe techniques for water quality control.

- Multiplex acknowledges these changes in urban stormwater management, and to this end has commissioned preparation of a DNMP for the Development Plan One area. It aims to maintain key agreed principles of the approved 1995 DNMP, with a focus to including source controls and catchment management techniques to achieve improved water quality outcomes. It supplements and extends on the principles of the Egerton Development Stage 1 DNMP.

- This DP1 DNMP provides a bridging document between the 1995 DNMP and WRC's Interim Position Statement Principles and Objectives (February 2003), prior to a review of drainage planning being undertaken by Multiplex for future stages of development at Egerton.

- The drainage network will comprise a piped/swale system with infiltration basins and a detention storage. The network will be designed for retention and treatment of stormwater locally, particularly for the first flush event and frequently occurring storm events.

- The primary focus for the water quality management strategy for the Development Plan One area is nutrient input and export as the most significant issue. Water quality will be managed by a treatment train of BMP's consistent with current WSUD principles. Stormwater for frequently occurring storm events will be retained and infiltrated on site. At source controls will be incorporated into landuse planning (POS and landscape design) and will include strategic plantings, street sweeping, stormwater pollutant traps, and community education.

- This water quality approach differs from the 1995 DMNP which relied fully on WPCP's at catchment outlets to achieve surface water quality objectives. The DP1 DNMP approach now addresses both groundwater and surface water quality issues, rather than surface water quality issues only.

- The DP1 DNMP provides an opportunity for both state and local government to pilot the implementation of WRC's new principles and objectives for urban stormwater management in the North East Corridor in a demonstration project. It also enables the performance of the DP1 DNMP to be assessed, prior to application in subsequent later stages of Egerton. This provides flexibility for continual improvements in WSUD to be incorporated in Egerton planning and development.

- Multiplex is committed to Egerton being an industry leader in the application of Water Sensitive Urban Design. In the context of a demonstration project, this DNMP proposes the Development Plan One area to be implemented on "design based" water quality methods, rather than "performance based".

- It is recommended that no liability is incurred by any participating agency, Multiplex included, should source control measures proposed not result in desired water quality outcomes. The contingency measure in this circumstance would be to reinforce the source control methodology, to improve implementation in this and subsequent stages of the urban development of this catchment.

- The information obtained from monitoring will be documented in annual reports, so that the effectiveness of source controls locally can be assessed, and future stages of land development at Egerton, and elsewhere in Perth, benefit from this approach.

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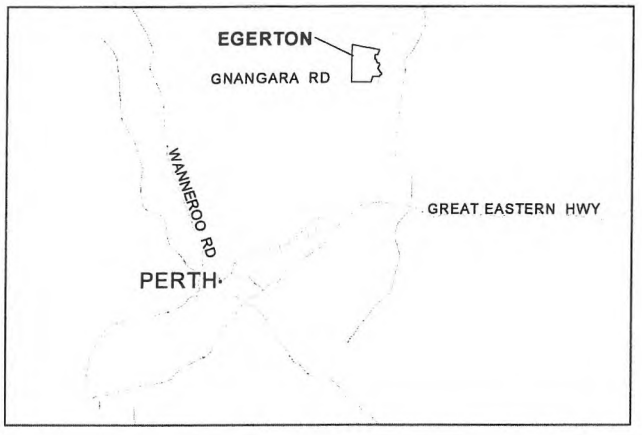
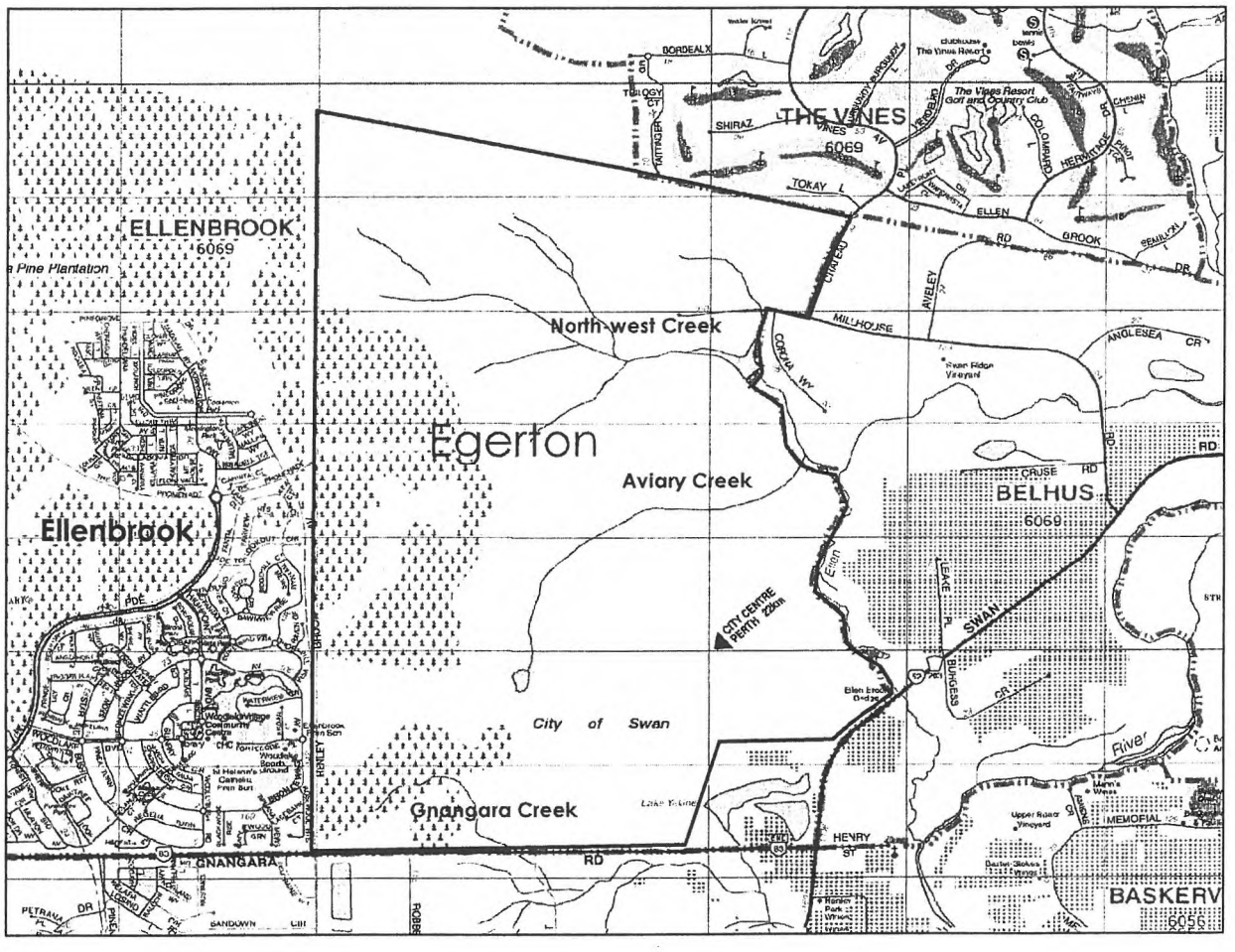
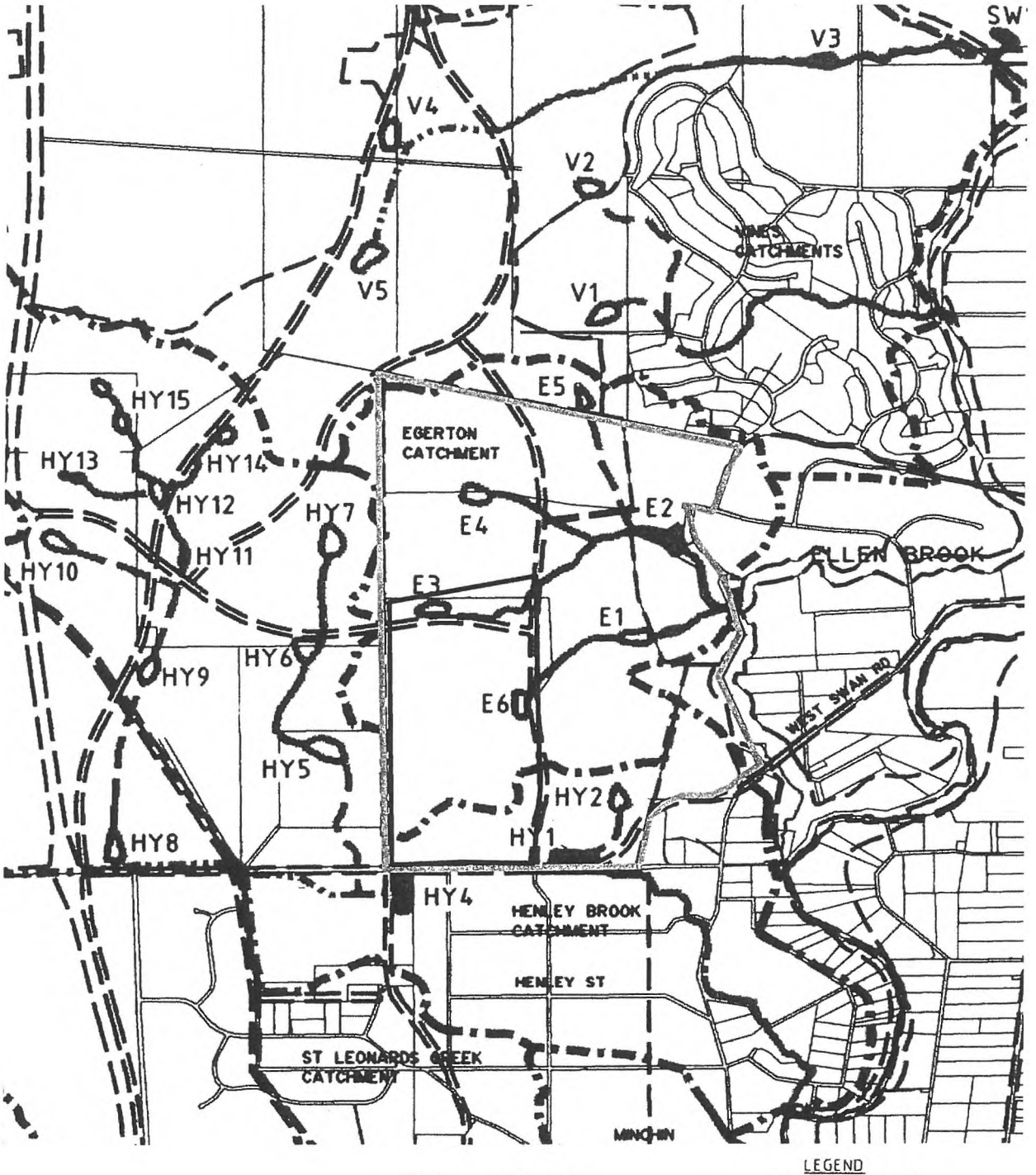
Water & Rivers Commission (2003) *Urban Stormwater Management in WA – Interim Position Statement*, February 2003.





Source: StreetSmart Digital Street Directory 2002

JDA Consultant Hydrologists	Job No. J3217 Scale 1 : 30000	Multiplex Limited Egerton - Development Plan One DNMP **Figure 1: Location Map**

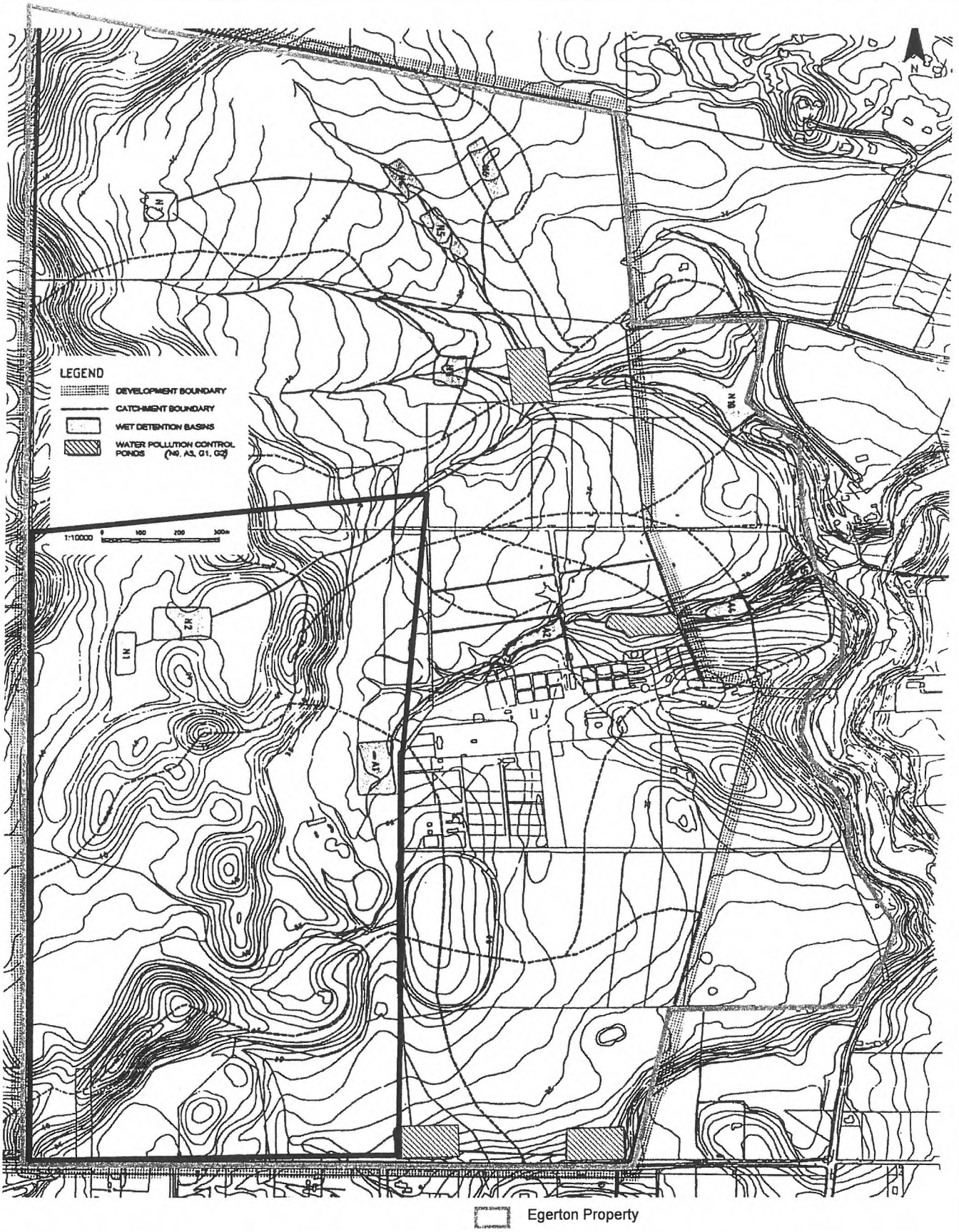


Source: GB Hill (1995) (Figure 4B)

JDA Consultant Hydrologists

Job No. J3127
Scale 1 : 37500

Multiplex Limited
Egerton - Development Plan One DNMP
Figure 2: Regional Drainage Strategy



Source: Alan Tiingay & Associates *et. al.* (1995)

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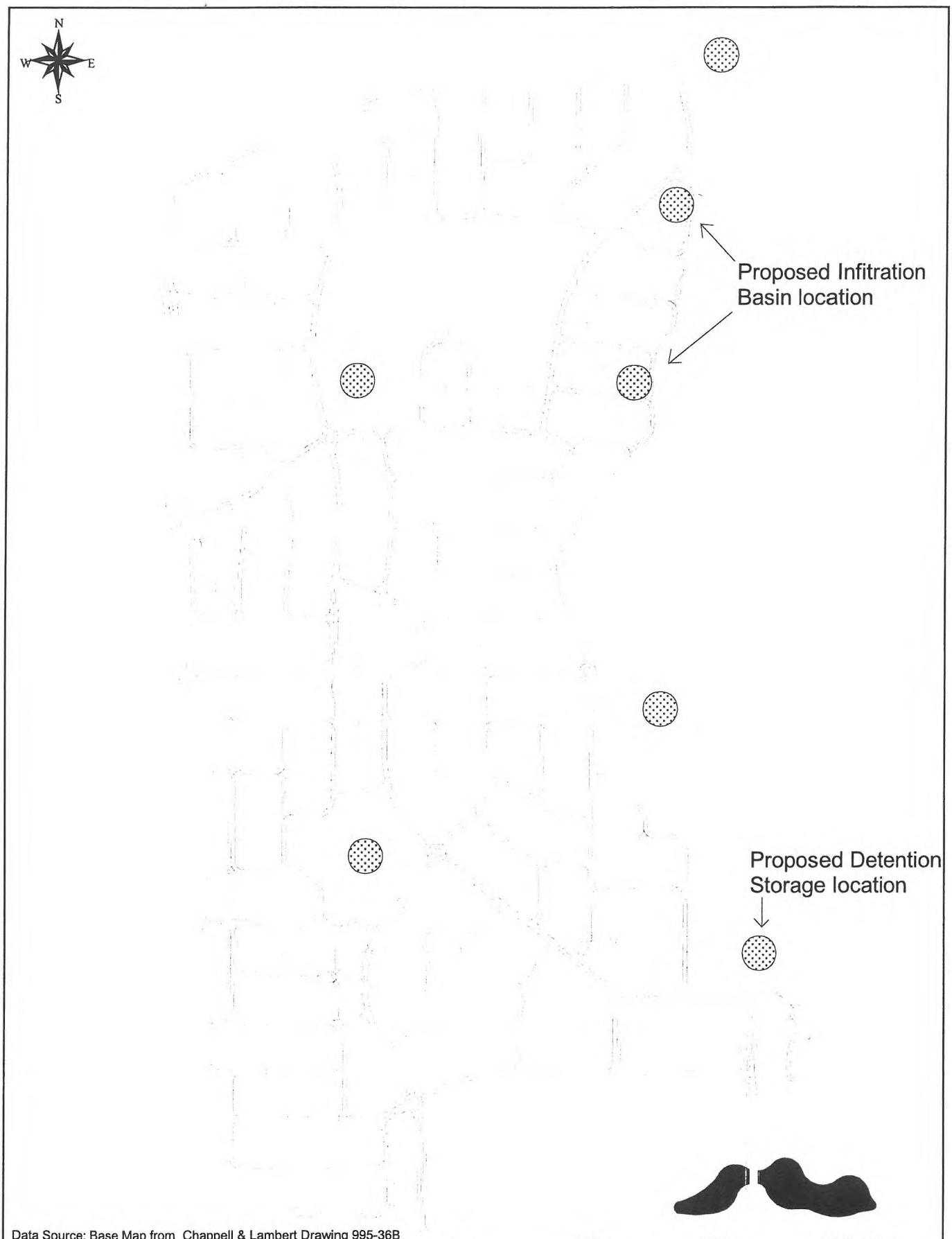
Job No. J3127

Multiplex Limited

Egerton - Development Plan One DNMP

Figure 3: 1995 DNMP Drainage Scheme



Data Source: Base Map from Chappell & Lambert Drawing 995-36B

JDA Consultant Hydrologists

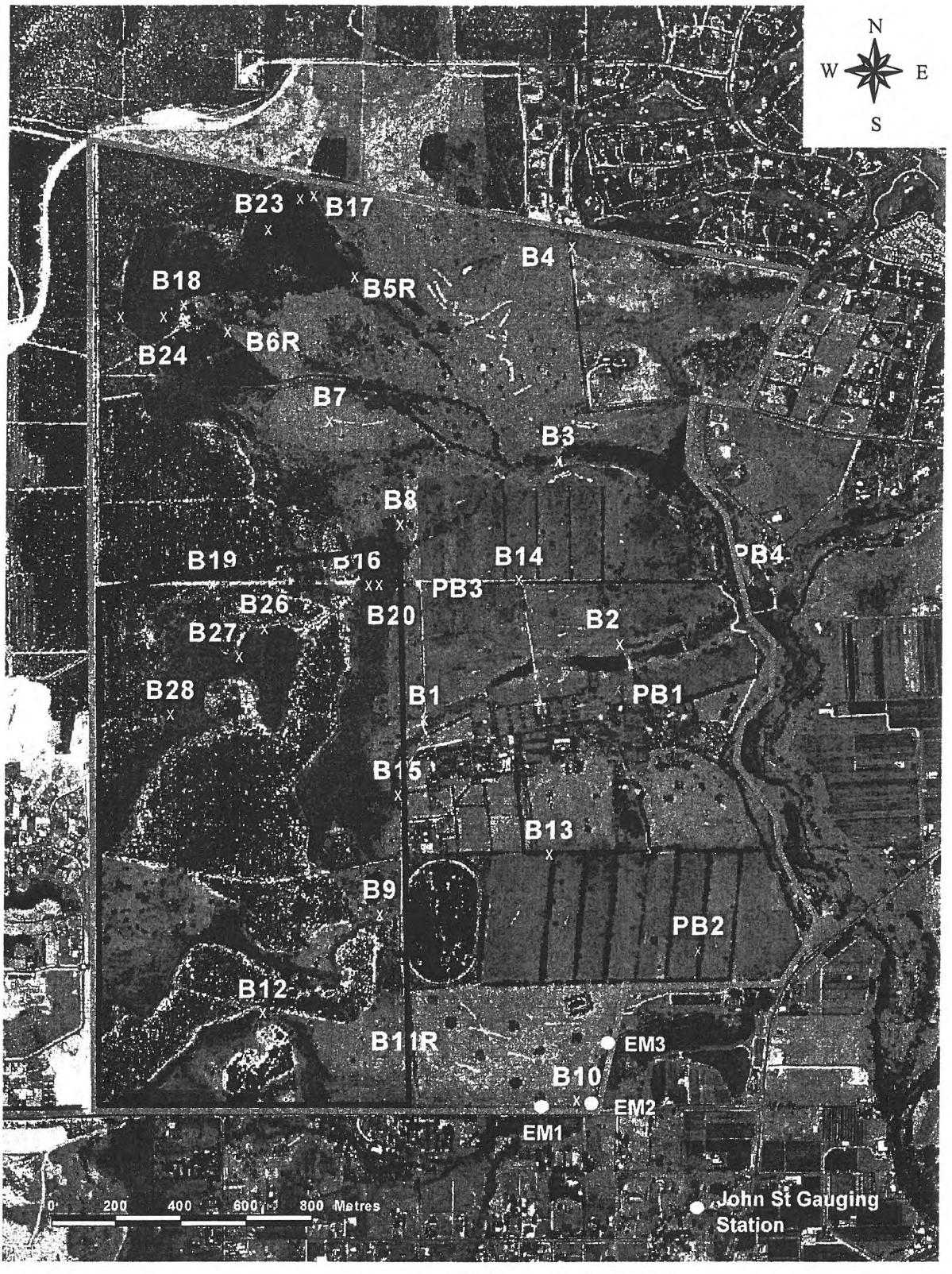
Job No. J3127

Scale 1:8000

Mulitplex Limited

Egerton - Development Plan One DNMP

Figure 4: Development Plan One Concept Plan



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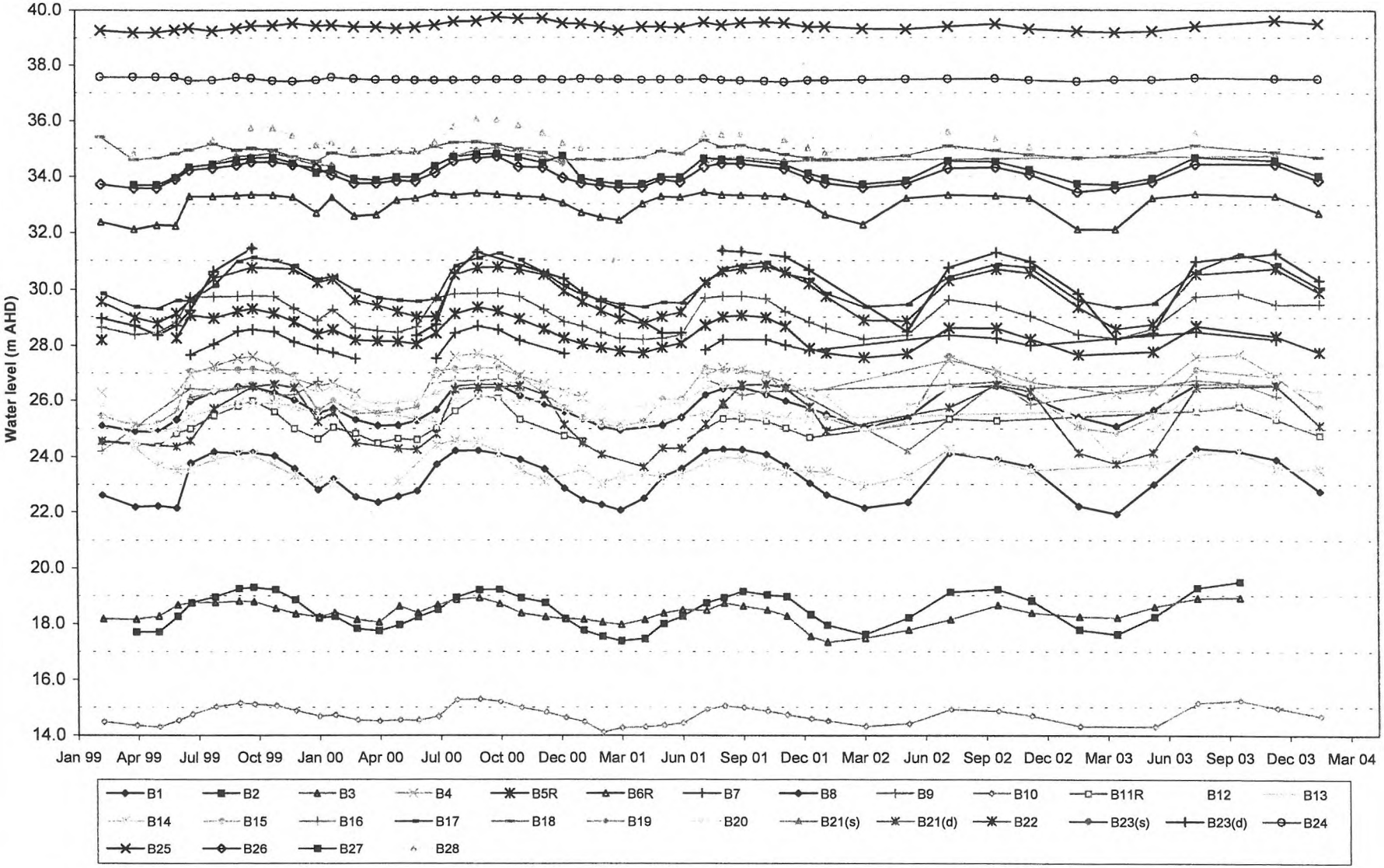
Job No. J3127

Multiplex Limited

Egerton - Development Plan One DNMP

Figure 5: Groundwater Monitoring Bore Locations



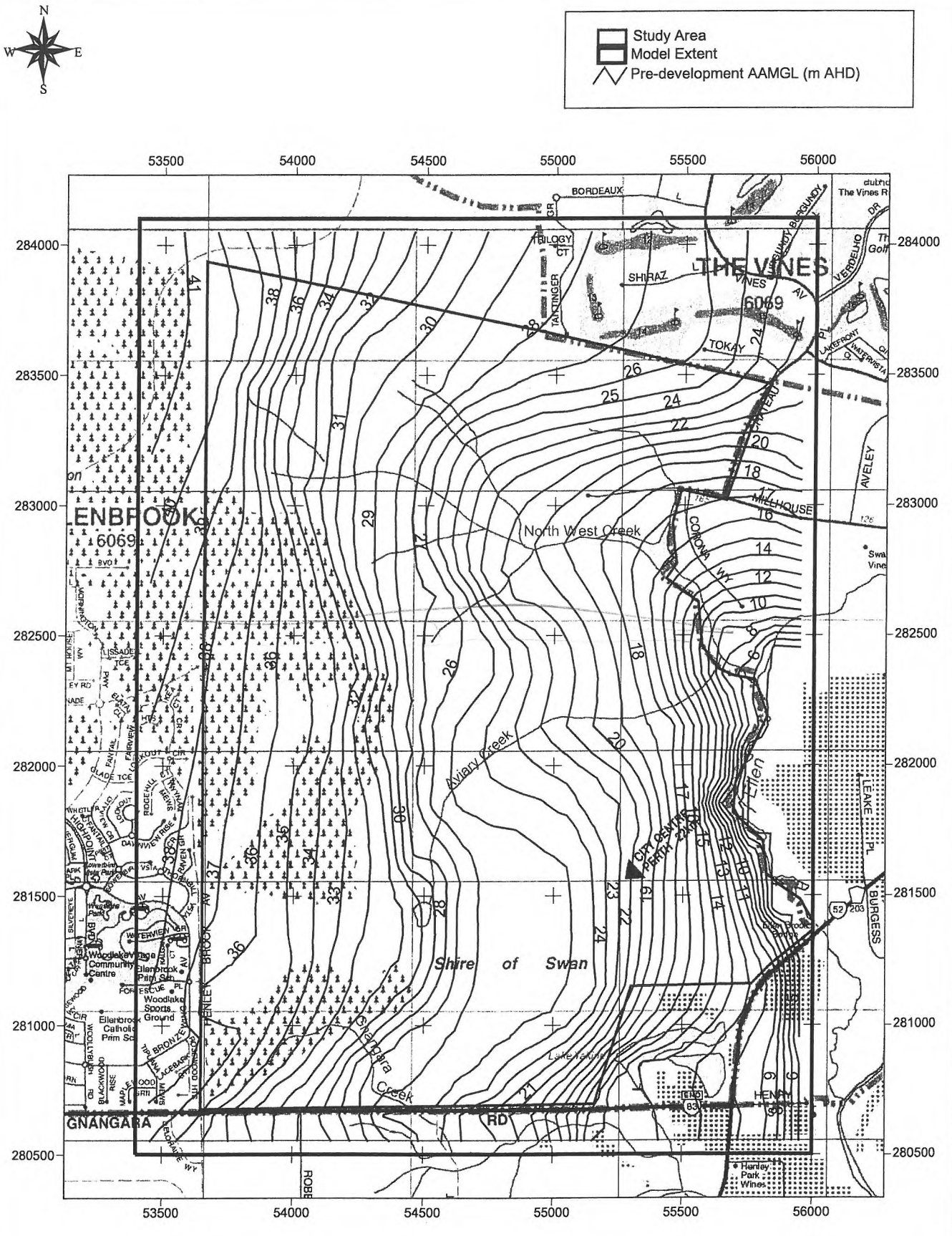
JDA Consultant Hydrologists

Job No. J3127

Multiplex Limited

Egerton - Development Plan One DNMP

Figure 6: Groundwater Monitoring Bore Hydrographs



Data Source: Reproduced from JDA (2003) Figure 5

JDA Consultant Hydrologists

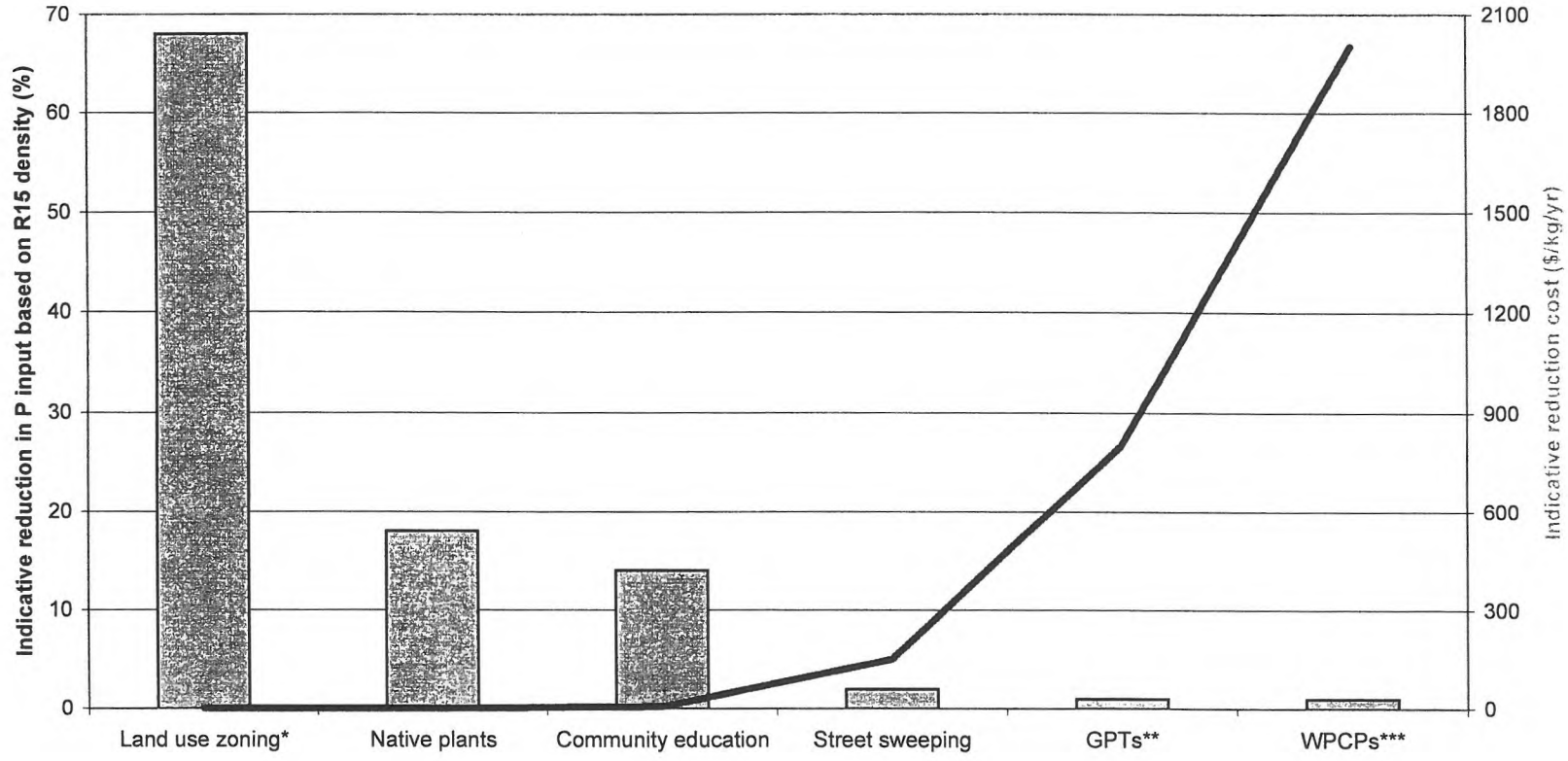
Job No. J3127

Scale 1:20000

Multiplex Constructions Pty Ltd

Egerton Development, Gnangara Creek DNMP

Figure 7: Egerton Pre-development AAMGL



Note:

* Land use zoning reduction based on change in residential density from R15 to R35

** GPT = Gross Pollutant Trap

*** WPCP = Water Pollution Control Pond

Data Source: Southern River/Forrestdale/Brookdale/Wungong Structure Plan - UWMS (JDA, 2002).

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Egerton - Development Plan One DNMP

Figure 8: Concept of Cost of Nutrient Removal for Various Management Measures

APPENDIX 4

Preliminary Landscape Concept Plans – McNally Newton Landscape Architects

BLUE TANG (WA) PTY LTD as trustee for The Reef Unit Trust ABN 44 656 153 170 trading as McNally • Newton Landscape Architects

AUSTRALIAN INSTITUTE of LANDSCAPE ARCHITECTS

mcnally • newton
LANDSCAPE ARCHITECTS

62 Aberdeen Street
Northbridge, WA 6003

PO Box 341
Northbridge WA 6865

p : 08 9228 4511
f : 08 9228 4577
e : admin @ mnla.com.au
w : www.mnla.com.au

24 May 2004

Tracy McQue
City of Swan
2 Midland Square
Midland WA

Re: VALE – POS LANDSCAPE STRATEGY

Dear Tracy,

Further to our meeting last week please refer enclosed for 3 x draft A4 landscape strategies for each public open space area as identified in the Development Plan area. As discussed please pass a copy on to Mark Denning at the City. As indicated, elements of this strategy may alter over time in response to unknown development growth patterns or uses.

In addition as requested, we have included a street tree strategy and road hierarchy plan and a typical cross section indicating the interface between the residential lots and the large conservation area 1. As agreed this will consist of a small capacity discontinuous road system to enable lot access but restrict through traffic, limit maintainable area and act as a fire break.

As indicated previously we plan on submitting the final information inclusive of any of the Cities comments from this draft on the 2 June 2004.

We trust this information is sufficient to enable the satisfaction of the relevant conditions as discussed. If you require any further information or wish to discuss this please do not hesitate to contact me at anytime.

Yours sincerely,
McNALLY NEWTON Landscape Architects.

CHRIS NEWTON B.L. Arch AAILA
DIRECTOR

Cc Anthony Rowbottam – Multiplex
Ron Lyster – Multiplex
Ian Everett – Chappell and Lambert
Avril Dique – Cossill and Webley
Paul van der Mosel – ATA Environmental

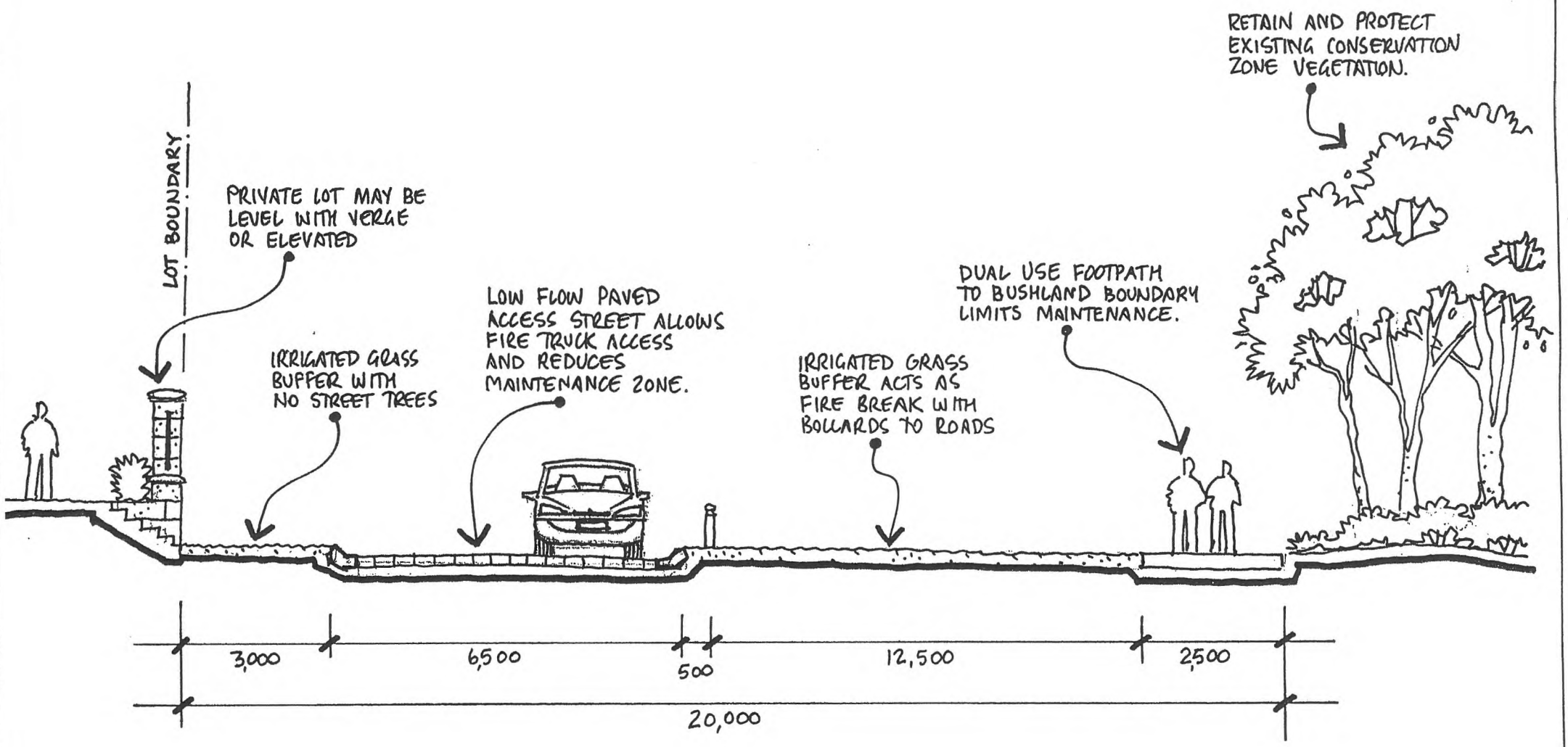
LEGEND

Indicative Street Tree Species List

Intergrator / Arterial

Araucaria heterophylla - Norfolk Island Pine
Platanus acerifolia - London Plane
Platanus orientalis - Oriental Plane
Populus deltoides x nigra - Cottonwood
Quercus palustris - Pin Oak
Quercus robur - English Oak
Salix chrysocoma - Weeping Golden Willow

VALE STREET TREE SPECIES MASTERPLAN



VALE CONSERVATION ZONE TYPICAL BOUNDRY

NCEPT PLAN NOT TO SCALE

DISCLAIMER :

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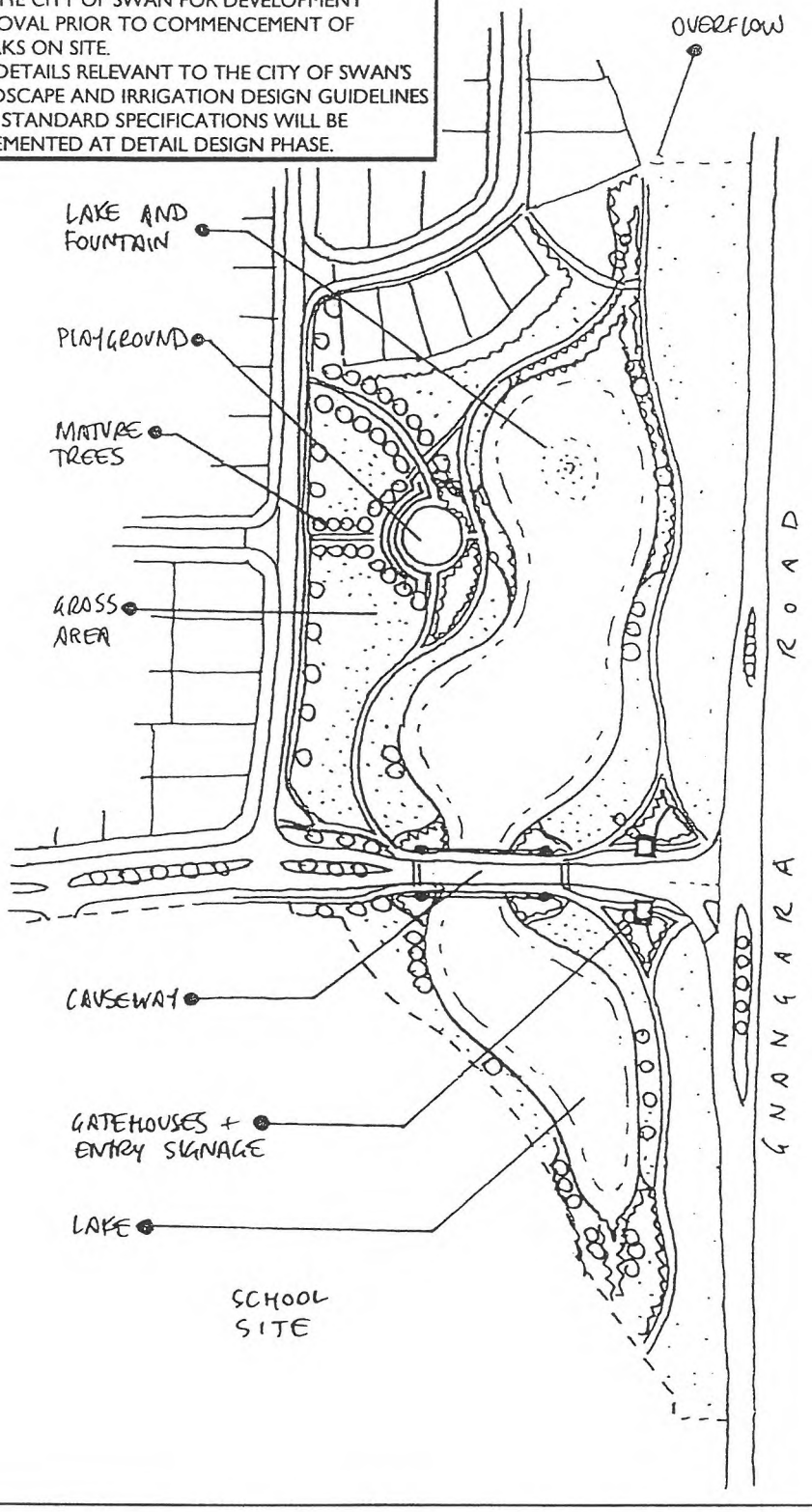
- ALL DETAILS RELEVANT TO THE CITY OF SWAN'S LANDSCAPE AND IRRIGATION DESIGN GUIDELINES AND STANDARD SPECIFICATIONS WILL BE IMPLEMENTED AT DETAIL DESIGN PHASE.



CONCEPT

PROVIDE FOR REQUIRED WATER STORAGE FLOW AND VOLUMES FROM LOCAL DEVELOPMENT CATCHMENT WITHIN AN AESTHETIC ENVIRONMENT TO THE FRONT DOOR OF THE ESTATE. FEATURE ELEMENTS AND MATERIALS ON THE CAUSEWAY AND ELSEWHERE INDICATE THE CHARACTER OF THE DISTRICT AND ESTATE UP TO GNANGARA DRIVE, AND ALLOW FOR FUTURE WIDENING.

FACILITIES / MATERIALS

FACILITIES TO BE PROVIDED TO THE PUBLIC INCLUDE;

* PASSIVE REC, PICNIC, VIEWING OF LAKE,
* ACTIVE PLAYGROUND AND SEATING,
* ACTIVE KICKABOUT GRASS AREA,
* ROCK WORK TO PART LAKE EDGES
* METAL AND STONE GATEHOUSES
* CONCRETE WALKING PATHS,
* TREE AND SHRUB PLANTING,
* MATURE TRANSPLANT TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

DRAINAGE SCHEDULE

CATCHMENT AREA 17.600 Ha

STATIC LAKE LEVEL RL 22.00

1:1 VOLUME 4,300 m3 AT RL 22.20
1:5 VOLUME 7,800 m3 AT RL 22.45
1:10 VOLUME 8,700 m3 AT RL 22.53
1:100 VOLUME 11,600 m3 AT RL 22 70

OVERFLOW INTO OUTLET PIPE TO HENLEY BROOK.

PLANT STRATEGY

USE EXOTIC FEATURE TREES IN DEFINED LOCATIONS AND AVENUES TO CHARACTERISE THE SWAN VALLEYS CULTURAL PLANTING HERITAGE. SHRUBS TO BE MOSTLY NATIVE ENDEMIC VEGETATION WITH EXOTIC SHRUB HIGHLIGHTS. TURF TO BE KIKUYU

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

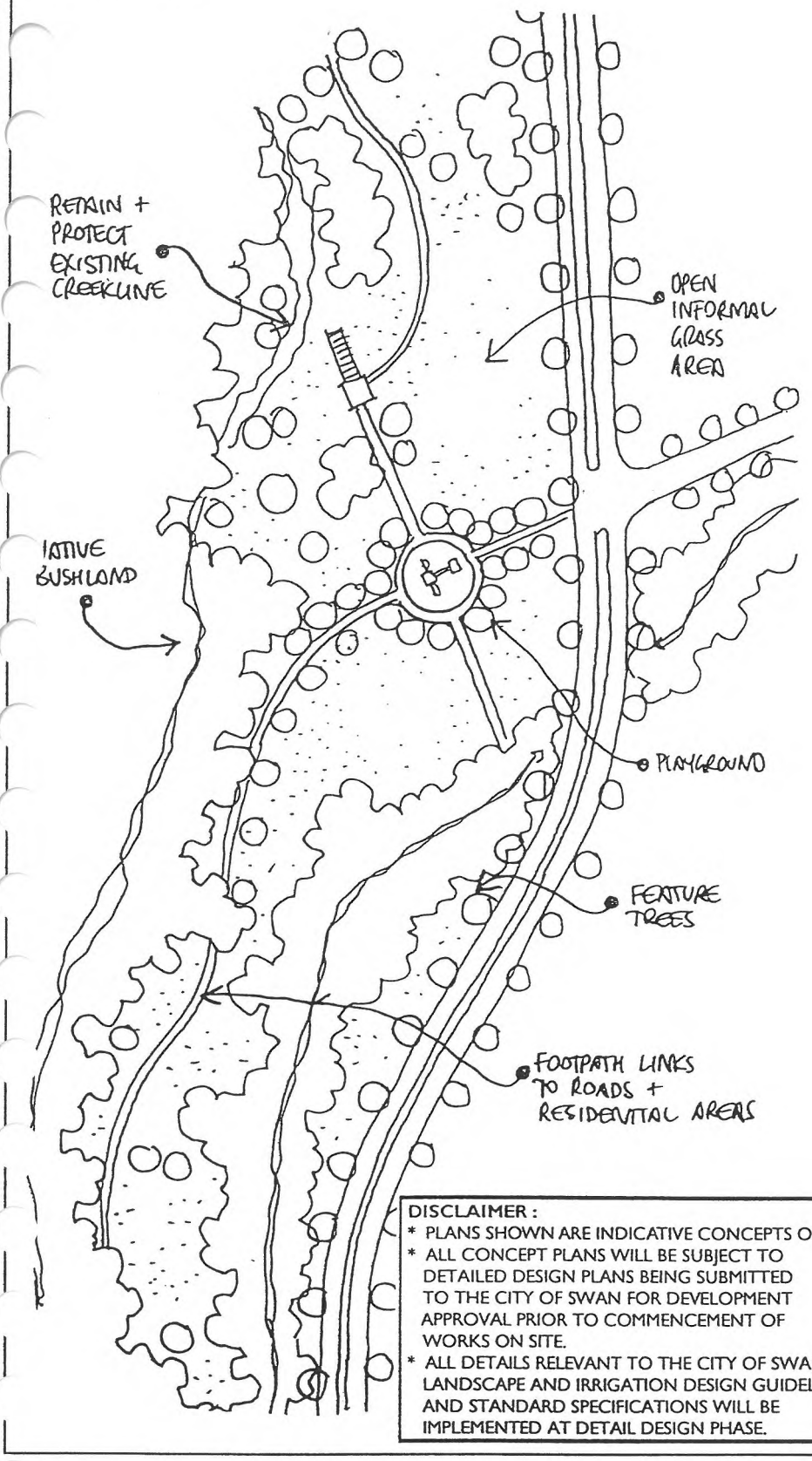
* PRESERVATION OF GOOD WATER QUALITY TO DISCHARGE AS OVERFLOW INTO LAKE AND SUBSEQUENTLY HENLEY BROOK OR FOR USE ON IRRIGATED AREAS.
* CONTROLLED FERTILISER REGIME.
* MECHANICAL AND AERATION INFRASTRUCTURE TO LAKE
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS

AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE OCT 2004 - HANDOVER OCT 2009

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 5 RATE	YR 5 COST	HANDOVER
RDWORKS	7,527	sq m	$2.30	$17,312	MULTIPLEX	25%	$4,328	5yrs from PC - Swan
OFTWORKS	15,923	sq m	$2.30	$36,622	MULTIPLEX	25%	$9,155	5yrs from PC - Swan
IRRIGATION	15,923	sq m	$0.52	$8,280	MULTIPLEX	40%	$3,312	5yrs from PC - Swan
AKE	15,000	sq m	$1.15	$17,250	MULTIPLEX	60%	$10,350	at PC - WaterCorp
			TOTAL	$79,464		TOTAL	$27,145	

VALE MULTI USE CORRIDOR 1 & 2 (38,450m2)

ONCEPT PLAN NOT TO SCALE



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CONCEPT

PROVIDE FOR REQUIRED WATER STORAGE FLOW AND VOLUMES FROM LOCAL DEVELOPMENT CATCHMENT WITHIN AN AESTHETIC ENVIRONMENT FEATURE ELEMENTS AND MATERIALS TO MATCH OTHER POS AREAS. PROVIDE HABITAT AND ACCESS LINKAGES

FACILITIES / MATERIALS

FACILITIES TO BE PROVIDED TO THE PUBLIC INCLUDE:

* PASSIVE REC, PICNIC, VIEWING OF LAKE,
* ACTIVE PLAYGROUND AND SEATING,
* CONCRETE WALKING PATHS,
* TREE AND SHRUB PLANTING,
* MATURE TRANSPLANT TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

DRAINAGE SCHEDULE

ACCEPTS NO STORMWATER DRAINAGE

PLANT STRATEGY

RETAIN PART EXISTING VEGETATION AND SUPPLEMENT WITH NEW NATIVE VEGETATION. USE EXOTIC FEATURE TREES IN DEFINED LOCATIONS. SHRUBS TO BE MOSTLY NATIVE ENDEMIC VEGETATION WITH EXOTIC SHRUB HIGHLIGHTS. TURF TO BE KIKUYU

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

* PRESERVATION OF GOOD WATER QUALITY TO DISCHARGE AS OVERFLOW INTO LAKE AND SUBSEQUENTLY HENLEY BROOK OR FOR USE ON IRRIGATED AREAS.
* PART SITE VEGETATION TO BE RETAINED.
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS

IAINTENANCE SCHEDULE - CONSTRUCTION COMPLETE JUL 2007 - HANDOVER JUL 2012

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
IARDWORKS	2,500	sq m	$2.30	$5,750	MULTIPLEX	25%	$1,437	5yrs from PC - Swan
SOFTWORKS	8,000	sq m	$2.30	$18,400	MULTIPLEX	25%	$4,600	5yrs from PC - Swan
• EXISTING BUSH	15,900	sq m	$0.50	$7,950	MULTIPLEX	100%	$7,950	5yrs from PC - Swan
- IRRIGATION	10,000	sq m	$0.52	$5,200	MULTIPLEX	60%	$3,120	5yrs from PC - Swan
			TOTAL	$37,300		TOTAL	$17,107	

VALE MULTI USE CORRIDOR 3 (26,400)

NCEPT PLAN NOT TO SCALE

DISCLAIMER :

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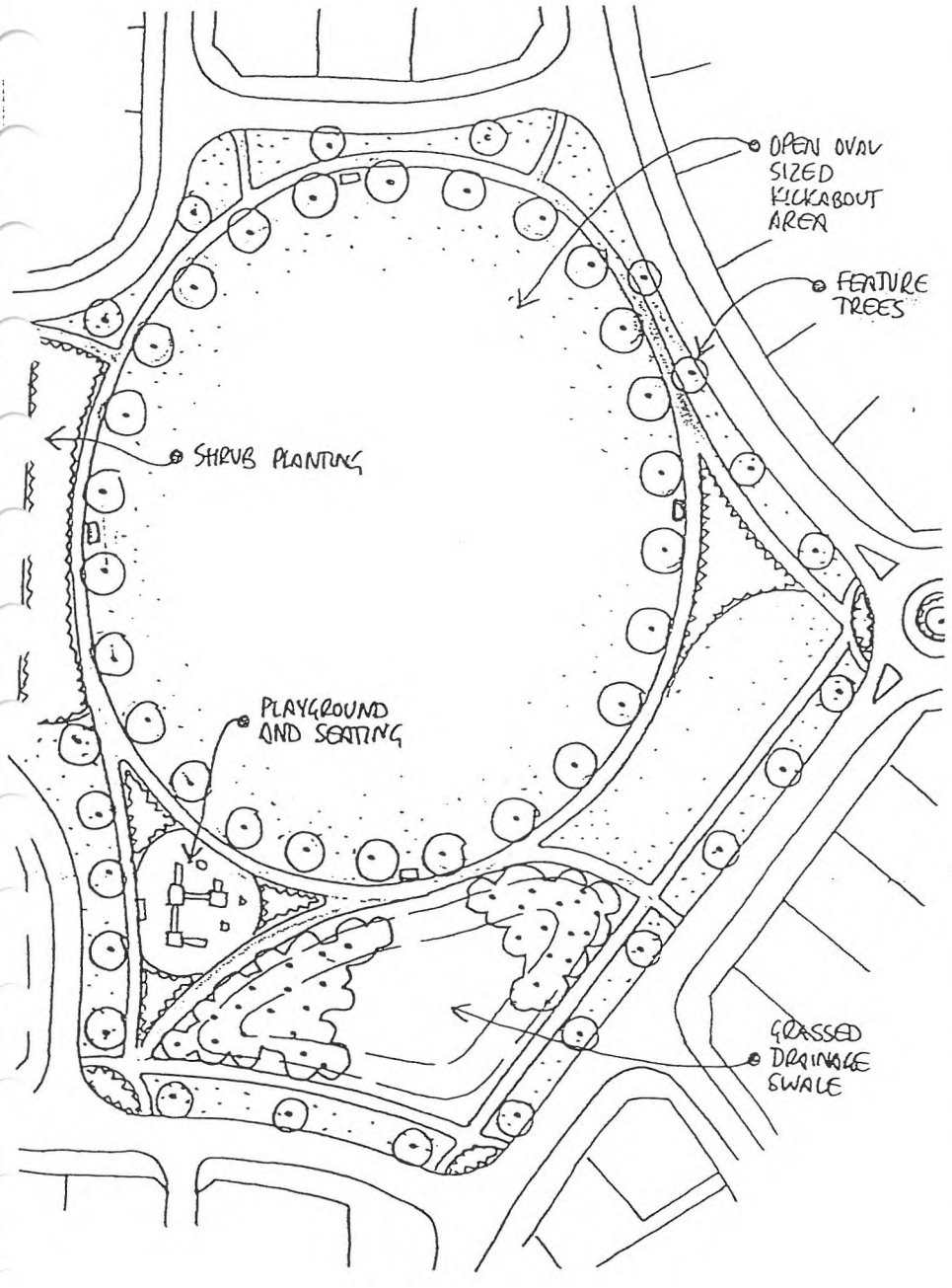

CONCEPT

PROVIDE FOR ACTIVE RECREATION USES TO INFORMAL LARGE OVAL SPACE. PROVIDE PUBLIC FACILITIES VISIBLE FROM THE ROADS AND LOTS. PROVIDE SHADE AND INTEREST USING MATERIALS AND ELEMENTS TYPICAL OF OTHER POS AREAS. INCORPORATE DRAINAGE IN SWALES FOR THE REQUIRED CAPACITY

FACILITIES / MATERIALS

FACILITIES TO BE PROVIDED TO THE PUBLIC INCLUDE;

* ACTIVE PLAYGROUND AND SEATING,
* ACTIVE LARGE KICKABOUT GRASS AREA,
* CONCRETE WALKING PATHS,
* METAL POLE TOP LIGHTS
* SHADE TREE AND SHRUB PLANTING,
* MATURE TRANSPLANT TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

PLANT STRATEGY

PLANT SPECIES SELECTED TO CONSIST OF CLUMPS OF NATIVE TREES WITH AVENUES OF EXOTIC SHADE TREES AND FEATURE TREES

SHRUB PLANTING TO BE A MIX OF NATIVE AND HARDY EXOTIC SPECIES. TURF TO BE KIKUYU. EXACT SPECIES TO BE AGREED ON FINAL APPROVAL

DRAINAGE SCHEDULE

CATCHMENT AREA 16 Ha

1:0.2 VOLUME 2,800m3
1:1 VOLUME 3,900m3
1:5 VOLUME 7,100m3
1:10 VOLUME 7,700m3

SWALE INFILTRATION INTO GROUNDWATER

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

* PRESERVATION OF GOOD WATER QUALITY TO INFILTRATE INTO GROUNDWATER USING A CONTROLLED FERTILISER REGIME
* NO EXISTING VEGETATION TO BE RETAINED.
* STORMWATER TO BE CONTAINED IN SWALES FOR 1:1, 1:10 EVENTS.
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS.

AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE MAR 2006 - HANDOVER MAR 2008

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
RDWORKS	3,000	sq m	$2.30	$6,300	MULTIPLEX	25%	$1,575	2yrs from PC - Swan
FTWORKS	22,200	sq m	$2.30	$51,060	MULTIPLEX	25%	$12,765	2yrs from PC - Swan
IRRIGATION	22,200	sq m	$0.52	$11,544	MULTIPLEX	40%	$4,617	2yrs from PC - Swan
			TOTAL	$68,904		TOTAL	$18,957	

VALE LARGE PARK 1 (25,200m2)

ONCEPT PLAN NOT TO SCALE

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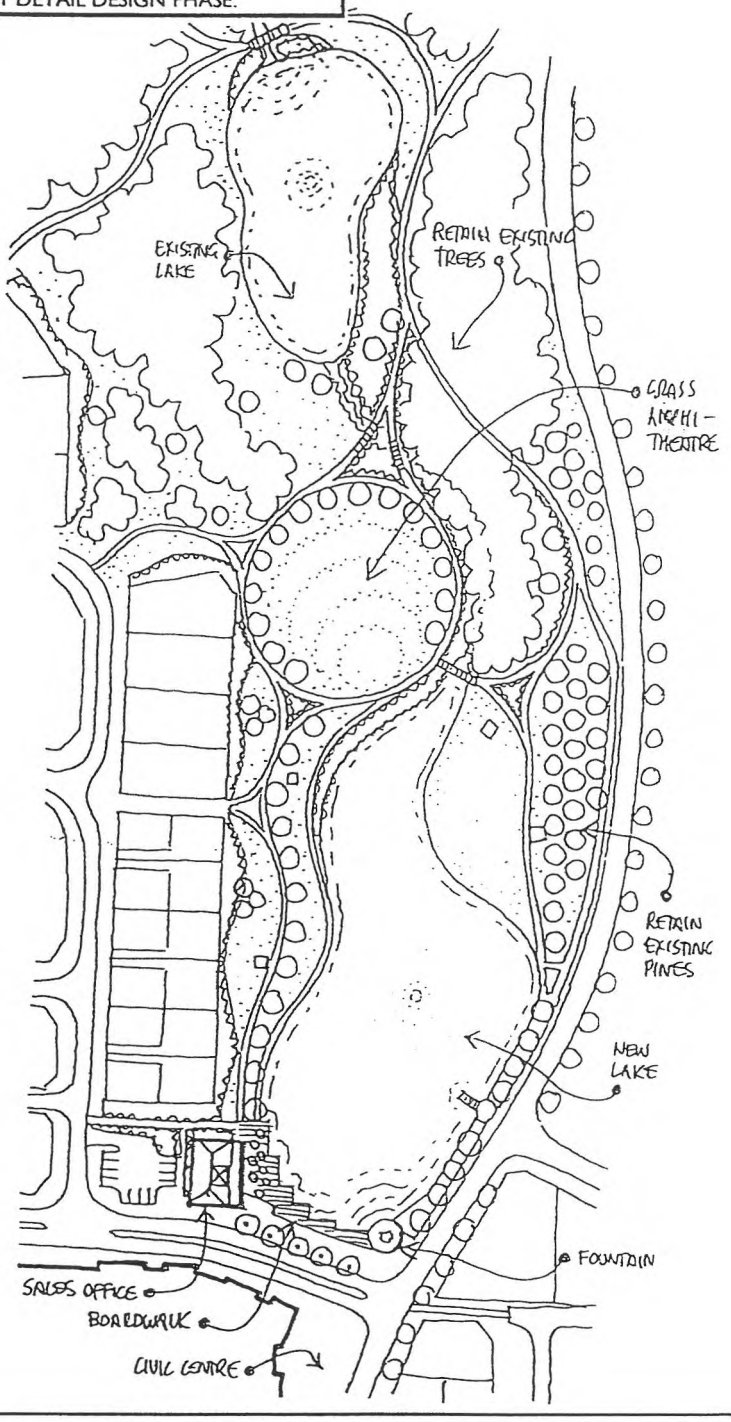

CONCEPT

PROVIDE FOR REQUIRED WATER STORAGE VOLUMES FROM LOCAL DEVELOPMENT CATCHMENT WITHIN AN AESTHETIC ENVIRONMENT TO THE ESTATE TOWN CENTRE
PROVIDE FOR ACTIVE RECREATION USES
PROVIDE PUBLIC FACILITIES VISIBLE FROM THE ROADS AND LOTS. PROVIDE SHADE AND INTEREST USING MATERIALS AND ELEMENTS TYPICAL OF OTHER POS AREAS.

FACILITIES / MATERIALS

FACILITIES TO BE PROVIDED TO THE PUBLIC INCLUDE;

* PASSIVE REC, PICNIC, VIEWING OF LAKE,
* ACTIVE PLAYGROUND AND SEATING,
* ACTIVE KICKABOUT GRASS AREA,
* CONCRETE WALKING PATHS,
* METAL AND STONE ENTRY GATEHOUSES,
* ROCK WORK TO LAKE EDGE,
* TREE AND SHRUB PLANTING,
* MATURE TRANSPLANT TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

PLANT STRATEGY

PLANT SPECIES SELECTED TO CONSIST OF CLUMPS OF NATIVE TREES WITH AVENUES OF EXOTIC SHADE TREES AND FEATURE TREES

SHRUB PLANTING TO BE A MIX OF NATIVE AND HARDY EXOTIC SPECIES. TURF TO BE KIKUYU. EXACT SPECIES TO BE AGREED ON FINAL APPROVAL

DRAINAGE SCHEDULE

CATCHMENT AREA 0.8Ha

1:0.2 VOLUME 200m3
1:1 VOLUME 200m3
1:5 VOLUME 400m3
1:10 VOLUME 400m3

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

*PRESERVATION OF GOOD WATER QUALITY TO DISCHARGE AS OVERFLOW INTO HENLEY BROOK OR FOR USE ON IRRIGATED AREAS.
* PART EXISTING SITE VEGETATION TO BE RETAINED.
* STORMWATER TO BE CONTAINED FOR 1:1, 1:10, 1:100 EVENTS.
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS.

AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE JUL 2007 - HANDOVER JUL 2012

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
ARDWORKS	10,000	sq m	$2.30	$23,000	MULTIPLEX	25%	$5,750	2yrs from PC - Swan
OFTWORKS	30,000	sq m	$2.30	$69,000	MULTIPLEX	25%	$17,250	2yrs from PC - Swan
IRRIGATION	30,000	sq m	$0.52	$15,600	MULTIPLEX	40%	$6,240	2yrs from PC - Swan
AKE	20,000	sq m	$1.15	$23,000	MULTIPLEX	60%	$13,800	2yrs from PC - Swan
			TOTAL	$130,600		TOTAL	$43,040	

VALE LARGE PARK 2 (60,000m2)

NCEPT PLAN NOT TO SCALE

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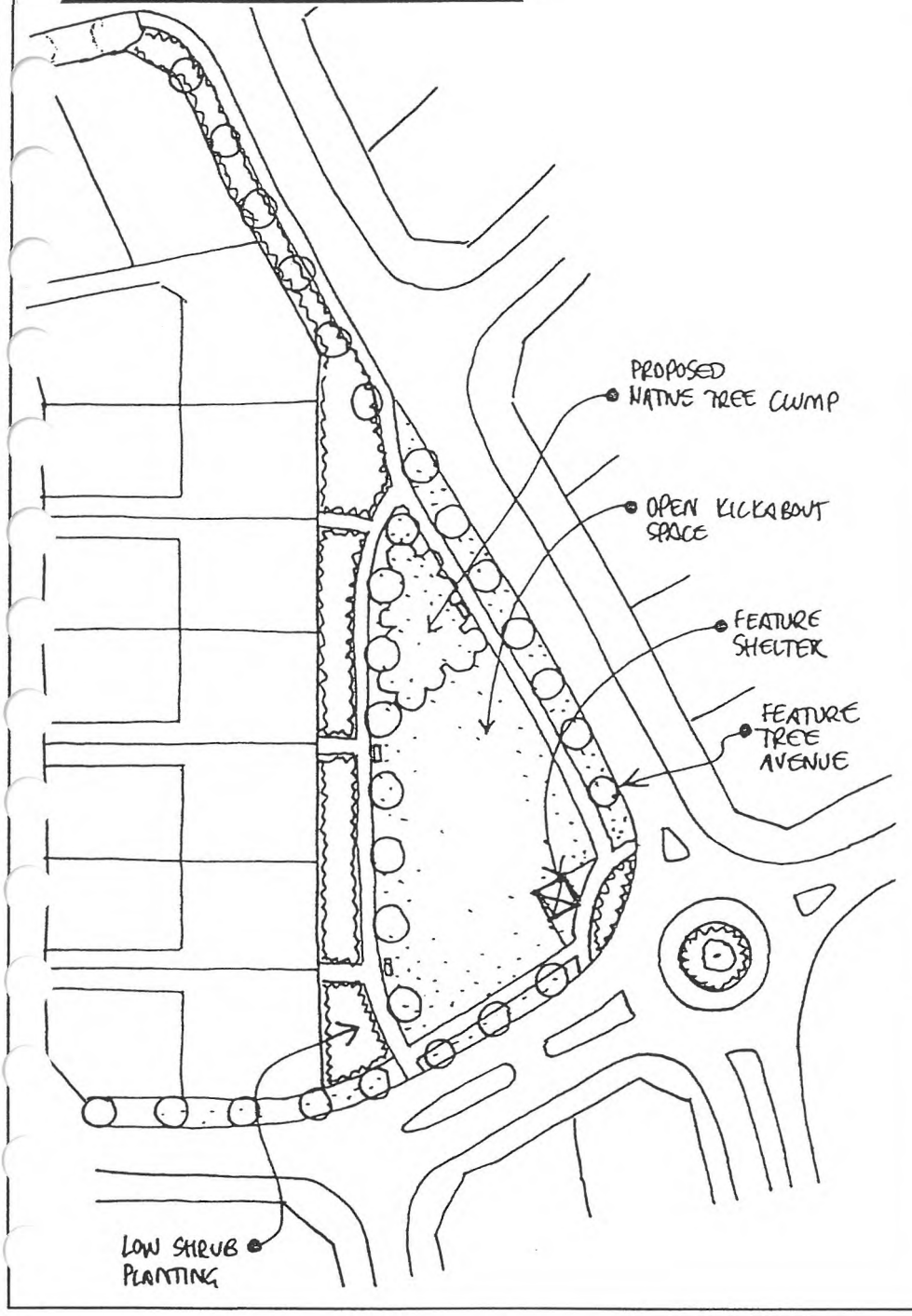

CONCEPT

PROVIDE FOR USABLE OPEN SPACE BACKING ONTO HIGHER DENSITY HOUSING TYPES. PROVISION OF SEATING AND LIGHTING ADDS PUBLIC FACILITIES. FEATURE ELEMENTS AND MATERIALS TO MATCH THOSE USED ELSEWHERE THAT INDICATE CHARACTER OF THE ESTATE

FACILITIES / MATERIALS

FACILITIES FOR THE PUBLIC INCLUDE

* PASSIVE REC, PICNIC, AND SEATING
* ACTIVE KICKABOUT GRASS AREA,
* CONCRETE WALKING PATHS,
* METAL POLE TOP LIGHTING
* TREE AND SHRUB PLANTING,
* NEW SHADE TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

PLANT SPECIES

EXOTIC CULTURAL TREE SPECIES PROPOSED TO LINE MAJOR STREETSCAPE AND PATH SYSTEM. TURF TO BE KIKUYU.

SHRUB PLANTING TO CONSIST OF MOSTLY NATIVE WITH SOME HIGHLIGHT EXOTIC SPECIES.

DRAINAGE SCHEDULE

ACCEPTS NO STORMWATER DRAINAGE

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

* PRESERVATION OF GOOD WATER QUALITY TO INFILTRATE INTO THE GROUNDWATER THROUGH CONTROLLED FERTILISER REGIME
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS.

AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE JUL 2006 - HANDOVER JUL 2008

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
ARDWORKS	300	sq m	$2.30	$690	MULTIPLEX	25%	$172	2yrs from PC - Swan
OFTWORKS	2,700	sq m	$2.30	$6,210	MULTIPLEX	25%	$1,552	2yrs from PC - Swan
IRRIGATION	2,700	sq m	$0.52	$1,404	MULTIPLEX	40%	$560	2yrs from PC - Swan
			TOTAL	$8,304		TOTAL	$2,284	

VALE POCKET PARK 1 (3,000m2)

C..NCEPT PLAN NOT TO SCALE

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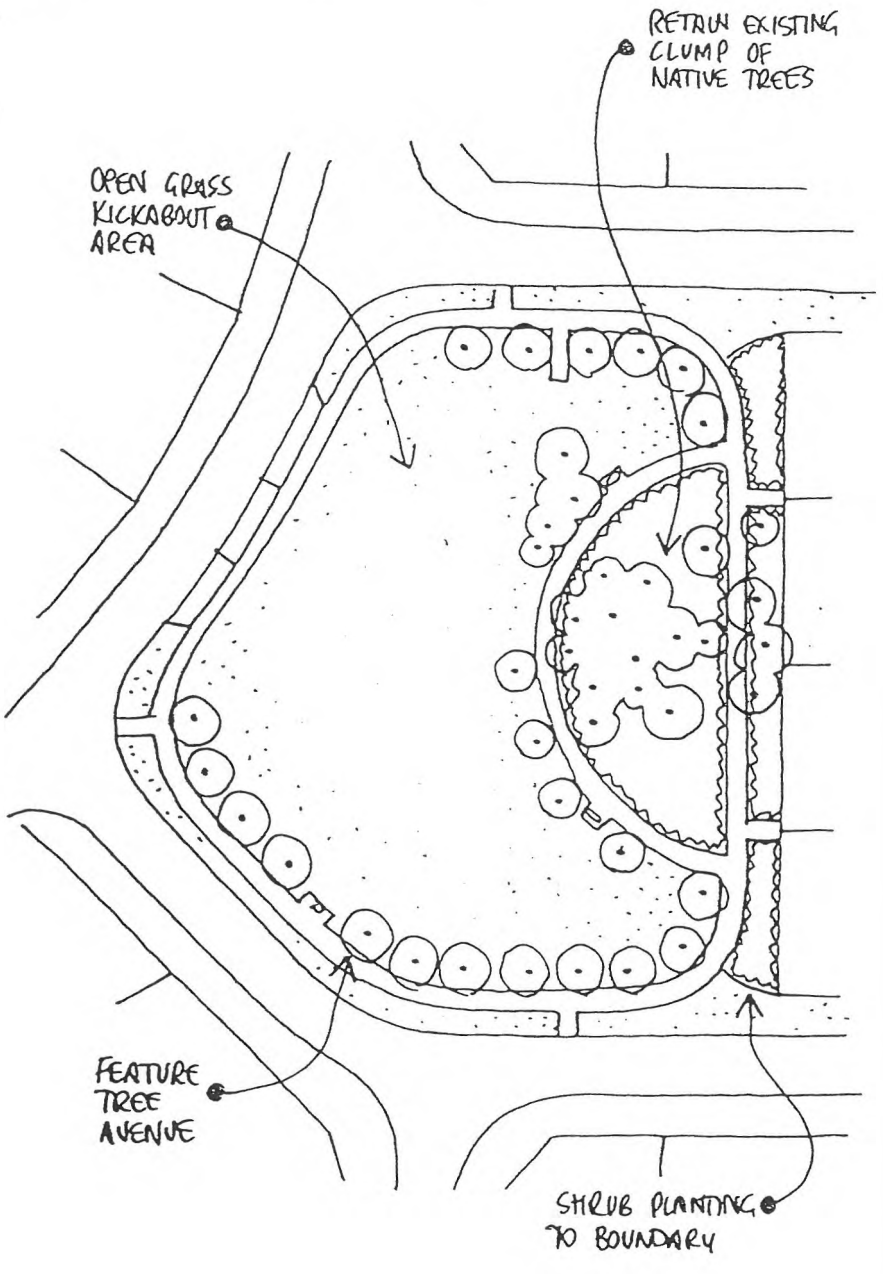


CONCEPT

PROVIDE FOR USABLE OPEN SPACE BACKING ONTO HIGHER DENSITY HOUSING TYPES. PROVISION OF SEATING AND LIGHTING ADDS PUBLIC FACILITIES. RETENTION OF EXISTING CLUMP OF NATIVE TREES IS PROPOSED WITH MULCHING UNDERNEATH TO MINIMISE MAINTENANCE.
FEATURE ELEMENTS AND MATERIALS TO MATCH THOSE USED ELSEWHERE THAT INDICATE CHARACTER OF THE ESTATE

FACILITIES / MATERIALS

FACILITIES FOR THE PUBLIC INCLUDE

* PASSIVE REC, PICNIC, AND SEATING
* ACTIVE KICKABOUT GRASS AREA,
* CONCRETE WALKING PATHS,
* METAL POLE TOP LIGHTING
* TREE AND SHRUB PLANTING,
* NEW SHADE TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

PLANT SPECIES

SPECIES SELECTED TO COMPLIMENT RETAINED EUCALYPT CLUMP. EXOTIC CULTURAL TREE SPECIES PROPOSED TO LINE STREETSCAPE AND PATH SYSTEM. TURF TO BE KIKUYU.

SHRUB PLANTING TO CONSIST OF MOSTLY NATIVE WITH SOME HIGHLIGHT EXOTIC SPECIES.

DRAINAGE SCHEDULE

ACCEPTS NO STORMWATER DRAINAGE

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

*PRESERVATION OF GOOD WATER QUALITY TO INFILTRATE INTO THE GROUNDWATER THROUGH CONTROLLED FERTILISER REGIME
* RETAIN EXISTING NATIVE VEGETATION CLUMP
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS.

..AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE OCT 2004 - HANDOVER OCT 2006

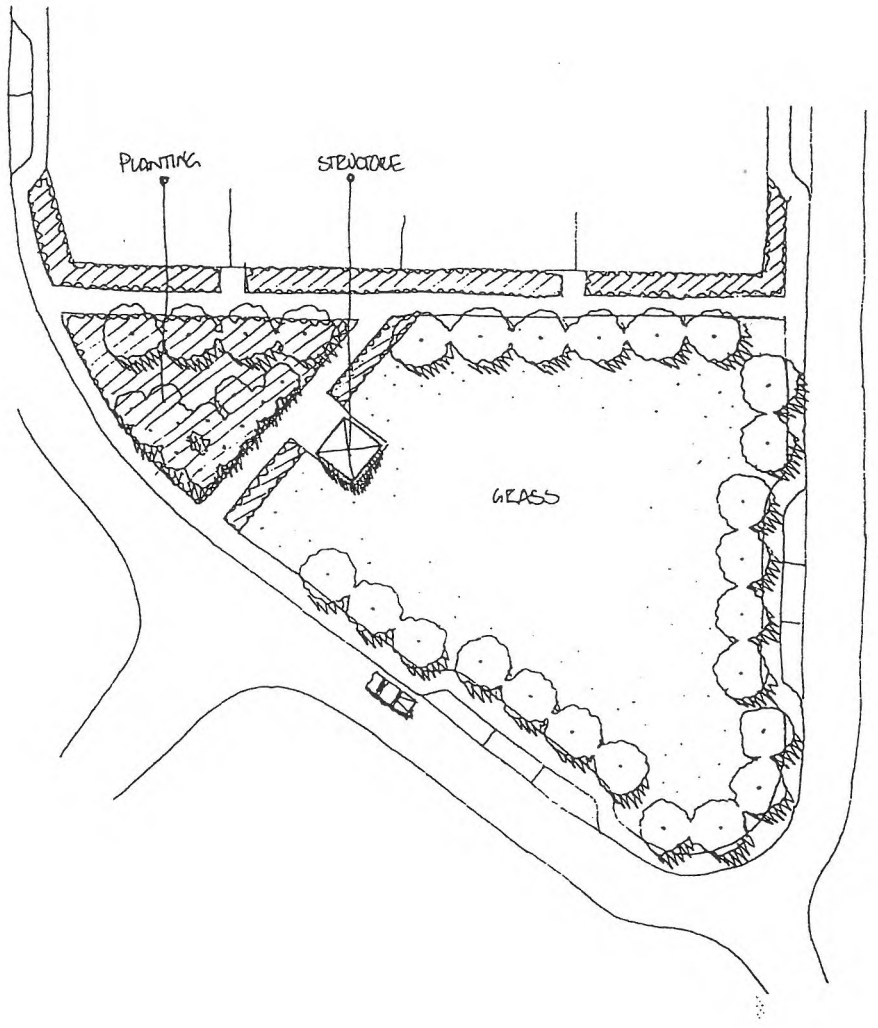
ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
..ARDWORKS	300	sq m	$2.30	$690	MULTIPLEX	25%	$172	2yrs from PC - Swan
• SOFTWORKS	3,700	sq m	$2.30	$8,510	MULTIPLEX	25%	$2,127	2yrs from PC - Swan
• IRRIGATION	3,700	sq m	$0.52	$1,924	MULTIPLEX	40%	$770	2yrs from PC - Swan
			TOTAL	$11,125		TOTAL	$3,069	

VALE POCKET PARK 2 (4,000m2)

NCEPT PLAN NOT TO SCALE

DISCLAIMER :

- PLANS SHOWN ARE INDICATIVE CONCEPTS ONLY. LL CONCEPT PLANS WILL BE SUBJECT TO DETAILED DESIGN PLANS BEING SUBMITTED TO THE CITY OF SWAN FOR DEVELOPMENT APPROVAL PRIOR TO COMMENCEMENT OF VORKS ON SITE.
- ALL DETAILS RELEVANT TO THE CITY OF SWAN'S LANDSCAPE AND IRRIGATION DESIGN GUIDELINES AND STANDARD SPECIFICATIONS WILL BE IPLEMENTED AT DETAIL DESIGN PHASE.



CONCEPT

PROVIDE FOR USABLE OPEN SPACE BACKING ONTO HIGHER DENSITY HOUSING TYPES. PROVISION OF SEATING AND LIGHTING ADDS PUBLIC FACILITIES. FEATURE ELEMENTS AND MATERIALS TO MATCH THOSE USED ELSEWHERE THAT INDICATE CHARACTER OF THE ESTATE

FACILITIES / MATERIALS

FACILITIES FOR THE PUBLIC INCLUDE

* PASSIVE REC, PICNIC, AND SEATING
* ACTIVE KICKABOUT GRASS AREA,
* CONCRETE WALKING PATHS,
* METAL POLE TOP LIGHTING
* TREE AND SHRUB PLANTING,
* NEW SHADE TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

PLANT SPECIES

SPECIES SELECTED EXOTIC CULTURAL TREE SPECIES PROPOSED TO LINE STREETSCAPE AND PATH SYSTEM. TURF TO BE KIKUYU.

SHRUB PLANTING TO CONSIST OF MOSTLY NATIVE WITH SOME HIGHLIGHT EXOTIC SPECIES.

DRAINAGE SCHEDULE

ACCEPTS NO STORMWATER DRAINAGE

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

*PRESERVATION OF GOOD WATER QUALITY TO INFILTRATE INTO THE GROUNDWATER THROUGH CONTROLLED FERTILISER REGIME
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS.

AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE MAR 2006 - HANDOVER MAR 2008

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
ARDWORKS	300	sq m	$2.30	$690	MULTIPLEX	25%	$172	2yrs from PC - Swan
SOFTWORKS	2,700	sq m	$2.30	$6,210	MULTIPLEX	25%	$1,552	2yrs from PC - Swan
• IRRIGATION	2,700	sq m	$0.52	$1,404	MULTIPLEX	40%	$308	2yrs from PC - Swan
			TOTAL	$8,304		TOTAL	$2,032	

VALE POCKET PARK 3 (3,000m2)

ONCEPT PLAN NOT TO SCALE

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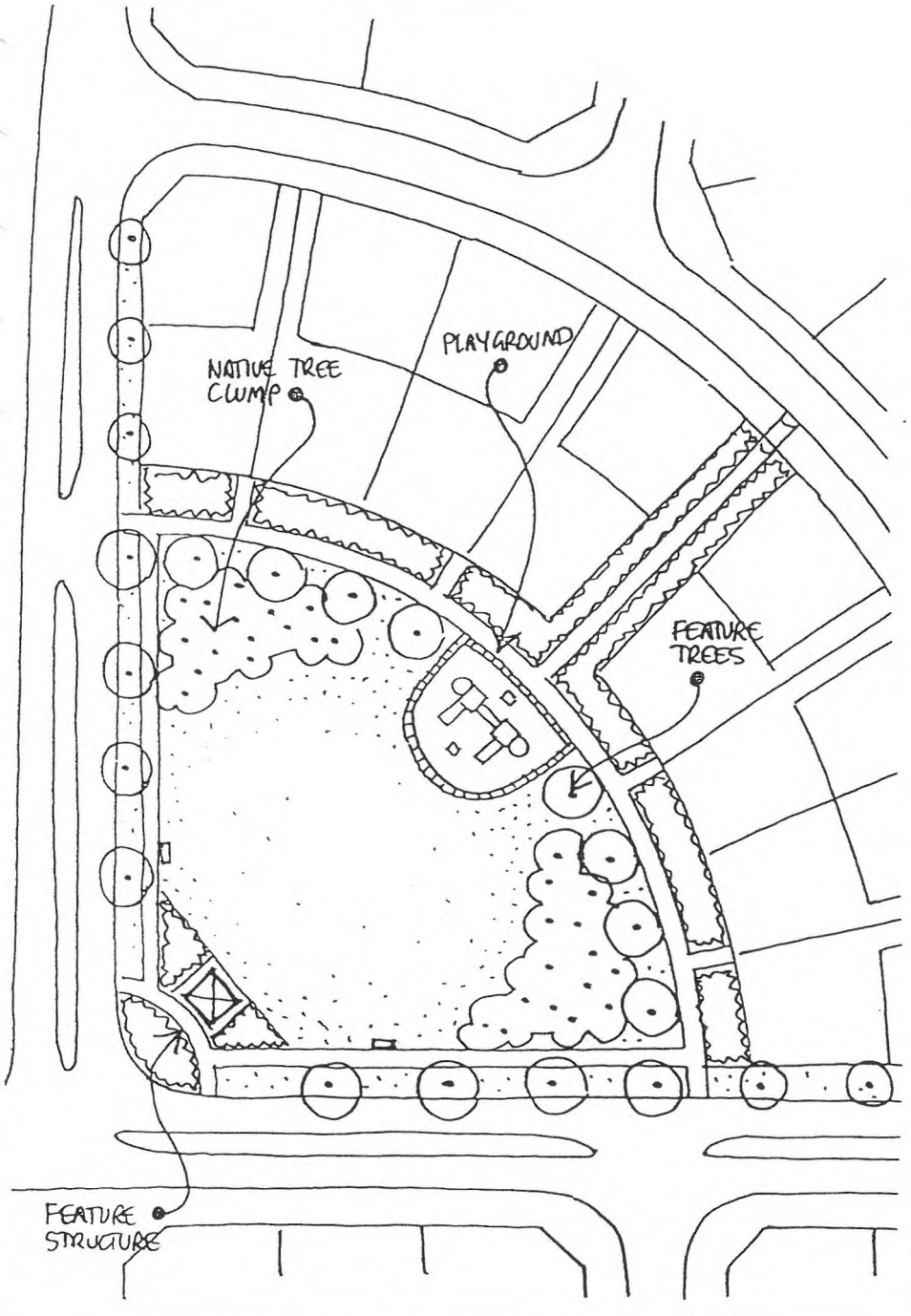

CONCEPT

PROVIDE FOR USABLE OPEN SPACE BACKING ONTO HIGHER DENSITY HOUSING TYPES. PROVISION OF PLAYGROUND, SEATING AND LIGHTING ADDS PUBLIC FACILITIES. FEATURE ELEMENTS AND MATERIALS TO MATCH THOSE USED ELSEWHERE THAT INDICATE CHARACTER OF THE ESTATE

FACILITIES / MATERIALS

FACILITIES FOR THE PUBLIC INCLUDE

* PASSIVE REC, PICNIC, AND SEATING
* ACTIVE KICKABOUT GRASS AREA,
* PLAYGROUND AND SURROUNDS
* CONCRETE WALKING PATHS,
* METAL POLE TOP LIGHTING
* TREE AND SHRUB PLANTING,
* NEW SHADE TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

PLANT SPECIES

EXOTIC CULTURAL TREE SPECIES PROPOSED TO LINE STREETSCAPE AND SHADE PLAYGROUND AND PATH SYSTEM. TURF TO BE KIKUYU.

SHRUB PLANTING TO CONSIST OF MOSTLY NATIVE WITH SOME HIGHLIGHT EXOTIC SPECIES.

DRAINAGE SCHEDULE

ACCEPTS NO STORMWATER DRAINAGE

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

* PRESERVATION OF GOOD WATER QUALITY TO INFILTRATE INTO THE GROUNDWATER THROUGH CONTROLLED FERTILISER REGIME
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS.

MAINTENANCE SCHEDULE - CONSTRUCTION COMPLETE FEB 2007 - HANDOVER FEB 2009

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
HARDWORKS	600	sq m	$2.30	$1,380	MULTIPLEX	25%	$345	2yrs from PC - Swan
SOFTWORKS	4,900	sq m	$2.30	$11,270	MULTIPLEX	25%	$2,818	2yrs from PC - Swan
IRRIGATION	4,900	sq m	$0.52	$1,960	MULTIPLEX	40%	$785	2yrs from PC - Swan
			TOTAL	$14,610		TOTAL	$3,948	

VALE POCKET PARK 4 (5,500m2)

NCEPT PLAN NOT TO SCALE

DISCLAIMER :

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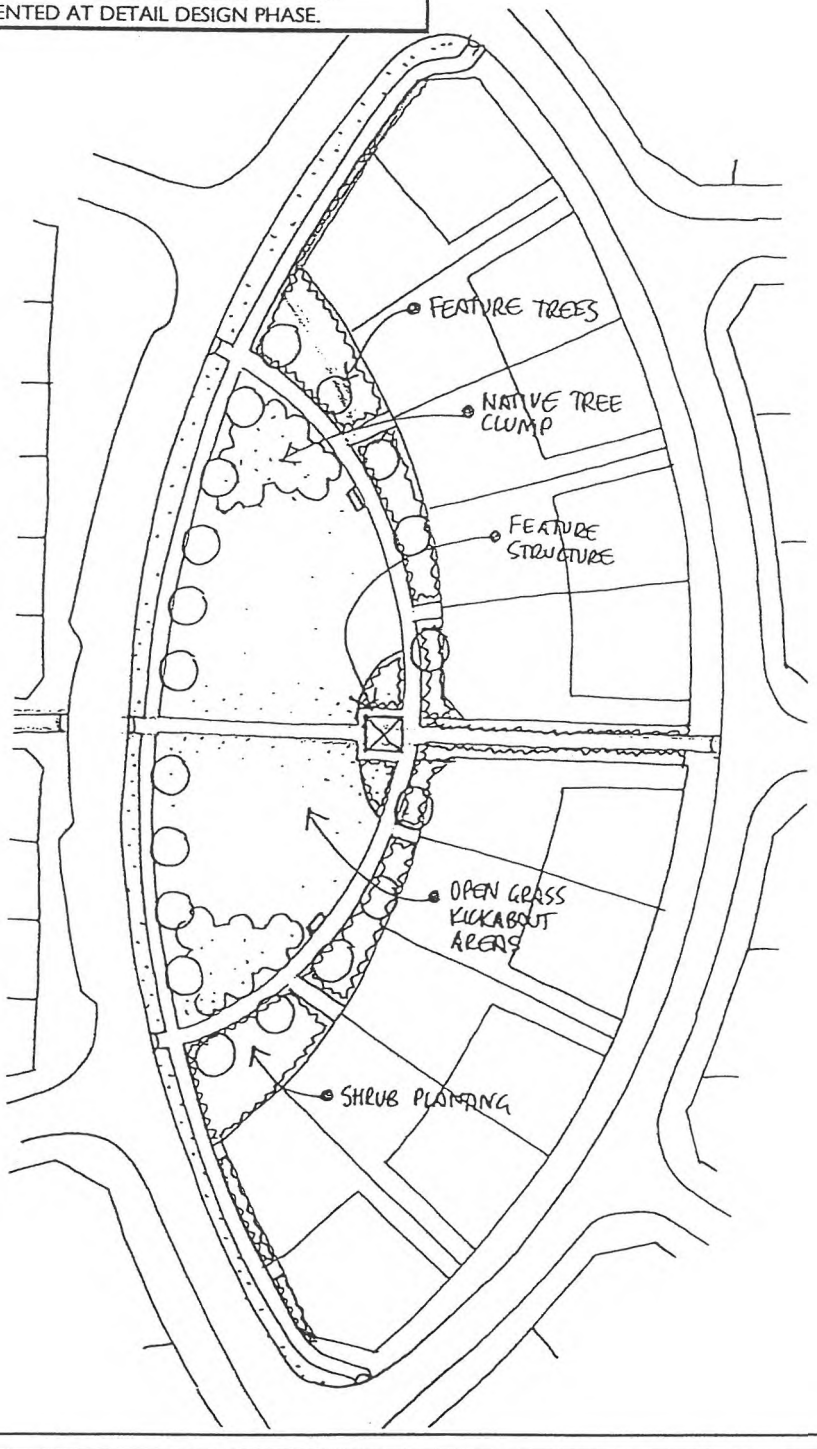

CONCEPT

PROVIDE FOR USABLE OPEN SPACE BACKING ONTO HIGHER DENSITY HOUSING TYPES. PROVISION OF PLAYGROUND, SEATING AND LIGHTING WITH PATH LINKS TO STREETS ADDS PUBLIC FACILITIES.
FEATURE ELEMENTS AND MATERIALS TO MATCH THOSE USED ELSEWHERE THAT INDICATE CHARACTER OF THE ESTATE

FACILITIES / MATERIALS

FACILITIES FOR THE PUBLIC INCLUDE

* PASSIVE REC, PICNIC, AND SEATING
* ACTIVE KICKABOUT GRASS AREA,
* CONCRETE WALKING PATHS,
* PLAYGROUND AND SURROUNDS
* METAL POLE TOP LIGHTING
* TREE AND SHRUB PLANTING,
* NEW SHADE TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

PLANT SPECIES

SPECIES SELECTED EXOTIC CULTURAL TREE SPECIES PROPOSED TO LINE STREETSCAPE AND PATH SYSTEM. TURF TO BE KIKUYU.

SHRUB PLANTING TO CONSIST OF MOSTLY NATIVE WITH SOME HIGHLIGHT EXOTIC SPECIES.

DRAINAGE SCHEDULE

ACCEPTS NO STORMWATER DRAINAGE

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

*PRESERVATION OF GOOD WATER QUALITY TO INFILTRATE INTO THE GROUNDWATER THROUGH CONTROLLED FERTILISER REGIME
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS.

AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE JUL 2006 - HANDOVER JUL 2008

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
RDWORKS	800	sq m	$2.30	$1,840	MULTIPLEX	25%	$172	2yrs from PC - Swan
• SOFTWORKS	3,500	sq m	$2.30	$8,050	MULTIPLEX	25%	$2,012	2yrs from PC - Swan
• IRRIGATION	3,500	sq m	$0.52	$1,820	MULTIPLEX	40%	$728	2yrs from PC - Swan
			TOTAL	$11,710		TOTAL	$2,912	

VALE POCKET PARK 5 (4,300m2)

NCEPT PLAN NOT TO SCALE

DISCLAIMER :

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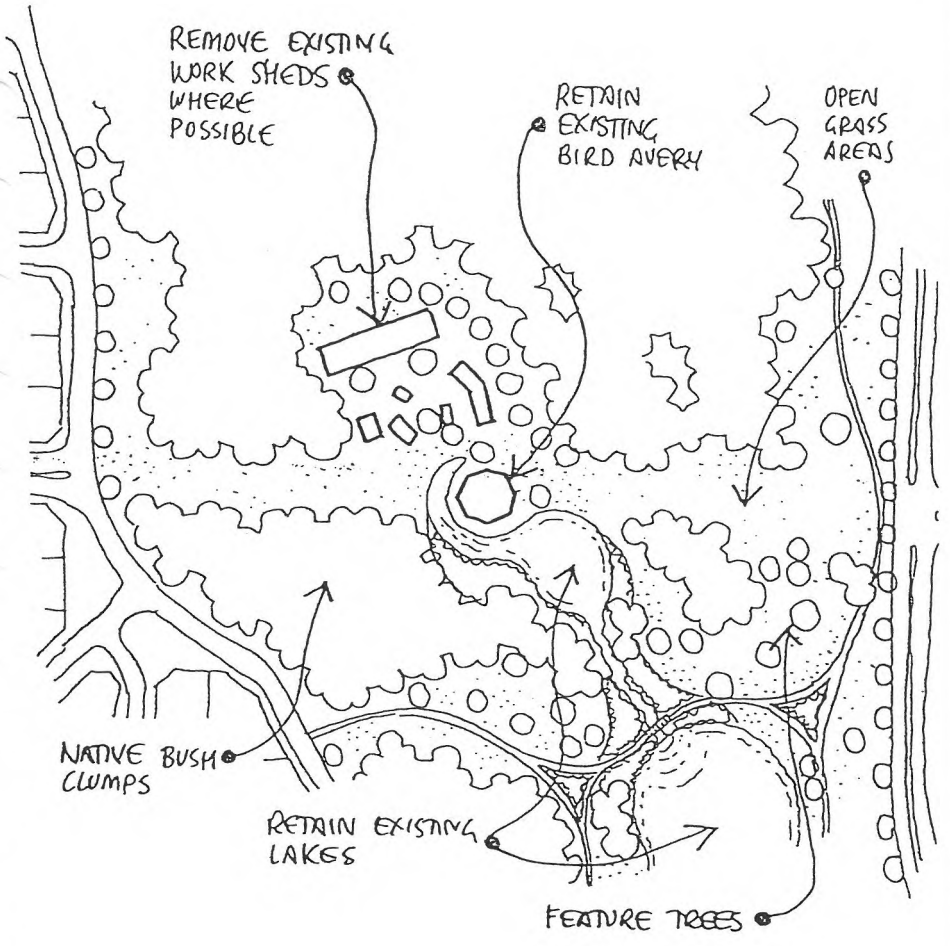

NOTE :

RETENTION, OPERATION AND MAINTENANCE OF AVIARY SUBJECT TO SEPARATE AGREEMENT BETWEEN MULTIPLEX DEVELOPMENTS (WA) PTY LTD AND THE CITY OF SWAN.

CONCEPT

PROVIDE A PARKLAND SETTING AS AN INTERFACE BETWEEN THE FORMAL LARGE PARK AND THE CONSERVATION ZONE. RETENTION OF THE EXISTING LAKE AND AVIARY ADD PUBLIC AMENITY AND FOCUS, RETAINING MOST EXISTING TREES ON SITE. PEDESTRIAN ACCESS LINKS TO BE PROVIDED THROUGH THE PARK TO LINK FUTURE STAGES.

FACILITIES / MATERIALS

FACILITIES TO BE PROVIDED TO THE PUBLIC INCLUDE;

* PASSIVE REC, PICNIC, VIEWING OF LAKE,
* RETENTON OF BIRD AVERY AND BUILDINGS
* ACTIVE PLAYGROUND AND SEATING,
* ACTIVE KICKABOUT GRASS AREA,
* CONCRETE WALKING PATHS,
* TREE AND SHRUB PLANTING,
* MATURE TRANSPLANT TREES.
* IRRIGATED FROM LAKE WITH BORE TOP UP.

PLANT SPECIES

RETENTION OF MOST EXISTING TREES WITH SUPPLEMENTARY PLANTING OF NATIVE TREES. EXOTIC FEATURE SHADE TREES USES IN AVENUES. SHRUB PLANTING TO BE MINIMAL AND MOSTLY ENDEMIC NATIVE FRONTING THE CONSERVATION ZONE ADJACENT FINAL SPECIES TO BE APPROVED IN FUTURE

DRAINAGE SCHEDULE

CATCHMENT AREA 8.1 Ha

1:0.2 VOLUME 1,400m3
1:1 VOLUME 2,000m3
1:5 VOLUME 3,600m3
1:10 VOLUME 3,900m3

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

* PRESERVATION OF GOOD WATER QUALITY TO DISCHARGE AS OVERFLOW INTO LAKE AND HENLEY BROOK OR FOR USE AS IRRIGATION.
* PART SITE VEGETATION TO BE RETAINED.
* CLAY SOIL TO BE MADE SUITABLE FOR PLANTS.
* INTERFACE WITH CONSERVATION AREA ONE MAY BE SUBJECT TO REHABILITATION AND WEED MANAGEMENT. REFER TO *VALE - WETLAND OPEN SPACE MANAGEMENT PLAN* (Aug 2004 - ATA ENVIRONMENTAL)

AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE DEC 2007 - HANDOVER DEC 2009

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
ARDWORKS	3,000	sq m	$2.30	$6,900	MULTIPLEX	25%	$1,725	2yrs from PC - Swan
OFTWORKS	16,700	sq m	$2.30	$38,410	MULTIPLEX	25%	$9,600	2yrs from PC - Swan
•EXISTING AVERY	1,500	sq m	$15.00	$22,500	MULTIPLEX	100%	$22,500	2yrs from PC - Swan
•IRRIGATION	16,700	sq m	$0.52	$8,684	MULTIPLEX	40%	$2,745	2yrs from PC - Swan
ISTING LAKE	5,600	sq m	$0.70	$3,920	MULTIPLEX	60%	$3,920	2yrs from PC - Swan
			TOTAL	$82,932		TOTAL	$42,000	

VALE PASSIVE RECREATION 1 (26,800m2)

NCEPT PLAN NOT TO SCALE

DISCLAIMER :

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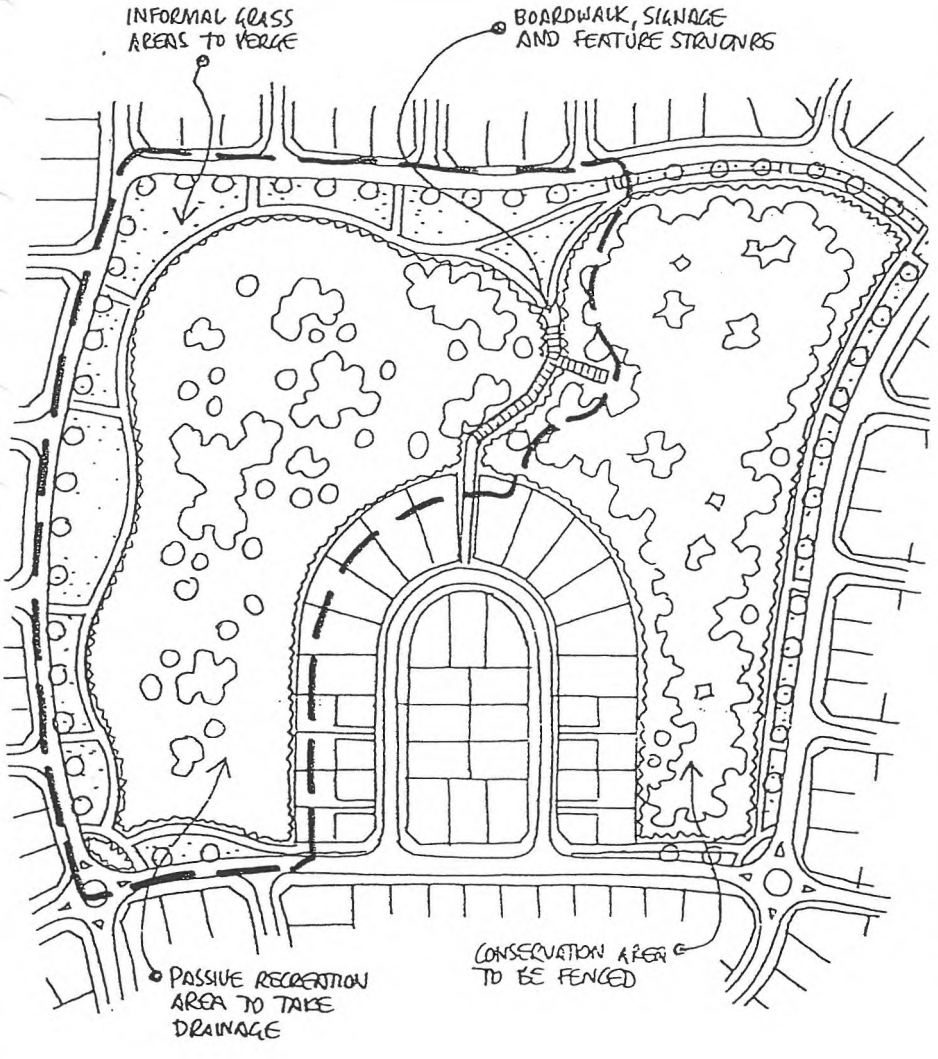

OTES :

ADEQUATE FIRE SEPERATION AND EMERGENCY ACCESS WILL BE SUPPLIED BETWEEN DWELLINGS ND VEGETATION VIA ROAD RESERVE AND ASHPALT VEMENT IN ACCORDANCE WITH *VALE - FIRE MANAGEMENT PLAN* (FIREPLAN WA - FEB 2005)

CONCEPT

PROVIDE RETAINED WETLAND ECOLOGY ADJACENT TO INFORMAL PASSIVE RECREATION USES SUCH AS WALKING, VIEWING, SIGNAGE, EDUCATION, HABITAT. SMALL GRASS AREAS ALLOW ACCESS, VIEWS AND INFORMAL SMALL SCALE USES. A PREDOMINANT NATURAL THEME TO BE PROVIDED.

FACILITIES / MATERIALS

FACILITIES TO BE PROVIDED TO THE PUBLIC INCLUDE;

* PASSIVE REC, PICNIC, VIEWING OF WETLAND.
* SEATING.
* CONCRETE WALKING PATHS,
* ALL GALVANISED METAL BOARDWALKS.
* ALL GALVANISED METAL CONSERVATION FENCES
* INTERPRETIVE SIGNAGE.
* METAL POLE TOP LIGHTING.
* NATIVE TREE AND SHRUB PLANTING.
* TURF IRRIGATED FROM LAKE / BORE TOP UP.

PLANT SPECIES

SPECIES SHALL BE WEST AUSTRALIAN NATIVE WETLAND SPECIES PREDOMINANTLY SHRUBS, SEDGES AND REED PLANTING WITH LIMITED TURF AND NO EXOTIC SPECIES PROPOSED. WHERE TURF EXISTS A BARRIER SHALL BE CONSTRUCTED TO MINIMISE MAINTENANCE.

DRAINAGE SCHEDULE

CATCHMENT AREA 8.7 Ha

1:0.2 VOLUME 1,600 m3
1:1 VOLUME 2,000 m3
1:5 VOLUME 3,900 m3
1:10 VOLUME 4,200 m3

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

* PRESERVATION OF GOOD WATER QUALITY TO DISCHARGE AS OVERFLOW INTO HENLEY BROOK OR FOR USE ON IRRIGATED AREAS.
* RETAIN SITE VEGETATION TO WETLAND AREA
* SUPPLEMENT WITH LOCAL WETLAND SPECIES.
* STORMWATER TO BE CONTAINED FOR 1:1, 1:10, 1:100 EVENTS.
* ALL LANDSCAPE REQUIREMENTS IDENTIFIED WITHIN THE *VALE - WETLAND OPEN SPACE MANAGEMENT PLAN* (ATA ENVIRONMENTAL - AUG 2004) TO BE IMPLEMENTED AT DETAIL DESIGN PHASE.
* ALL LANDSCAPE REQUIREMENTS IDENTIFIED WITHIN THE *WETLAND MANAGEMENT STRATEGY* (ATA ENVIRONMENTAL - 1995) TO BE IMPLEMENTED AT DETAIL DESIGN PHASE.

AINTENANCE SCHEDULE - CONSTRUCTION COMPLETE FEB 2008 - HANDOVER FEB 2010

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
\RDWORKS	3,000	sq m	$2.30	$6,900	MULTIPLEX	25%	$1,725	2yrs from PC - Swan
,FTWORKS	16,700	sq m	$2.30	$38,410	MULTIPLEX	25%	$9,600	2yrs from PC - Swan
•WETLAND	36,800	sq m	$0.20	$7,360	MULTIPLEX	100%	$7,360	2yrs from PC - Swan
•IRRIGATION	16,700	sq m	$0.52	$8,684	MULTIPLEX	60%	$5,210	2yrs from PC - Swan
			TOTAL	$61,350		TOTAL	$23,895	

VALE PASSIVE RECREATION 2 (56,500m2)

CONCEPT PLAN NOT TO SCALE

DISCLAIMER :

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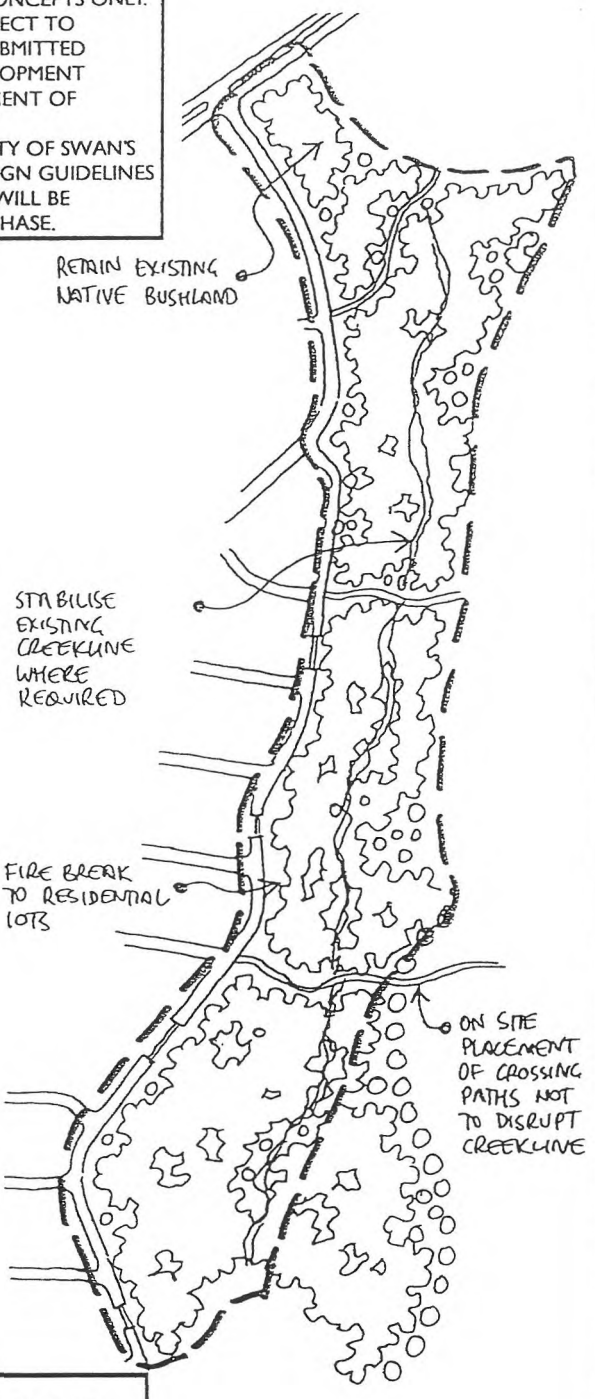

NOTES :

* ADEQUATE FIRE SEPERATION AND EMERGENCY ACCESS WILL BE SUPPLIED BETWEEN DWELLINGS AND VEGETATION VIA ROAD RESERVE AND ASHPALT PAVEMENT IN ACCORDANCE WITH *VALE - FIRE MANAGEMENT PLAN* (FIREPLAN WA - FEB 2005)
* REMOVAL OR UPGRADE OF EXISTING BOARDWALKS TO BE CONSIDERED AT DETAIL DESIGN PHASE.
* REMOVAL EXISTING CAGES.

CONCEPT

PROVISION OF A NATURAL GREEN BELT RUNNING THROUGH THE ESTATE WHICH RETAINS EXISTING VEGETATION, DRAINAGE LINES AND HABITAT. THE INCLUSION OF A PEDESTRIAN PATH SYSTEM ALLOWS ACCESS ALONG AND ACROSS THE GREEN BELT. INCLUSION OF INTERPRETIVE SIGNAGE AND STABILISATION OF THE CREEK LINE TO BE INCLUDED.

FACILITIES / MATERIALS

FACILITIES TO BE PROVIDED TO THE PUBLIC INCLUDE;

* PASSIVE RECREATION
* ACTIVE PLAYGROUND AND SEATING,
* CONCRETE WALKING PATHS,
* METAL POLE TOP LIGHTING
* NATIVE TREE AND SHRUB PLANTING,
* NO IRRIGATION PROPOSED
* CONTROLLED ACCESS POINTS
* ALL GALVANISED METAL CONTROL FENCING
* ALL GALVANISED METAL BOARDWALKS

PLANT SPECIES

ENDEMIC NATIVE VEGETATION PROPOSED ONLY, INCLUDING TREES, SHRUBS AND GROUND COVERS TO DENUDED OR DEGRADED AREAS.

NO TURF OR EXOTIC SPECIES PROPOSED

DRAINAGE SCHEDULE

ACCEPTS NO STORMWATER DRAINAGE

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

* PRESERVATION OF GOOD WATER QUALITY TO DISCHARGE AS OVERFLOW INTO HENLEY BROOK OR FOR USE ON IRRIGATED AREAS.
* ALL EXISTING VEGETATION TO BE RETAINED.
* CREEK LINE TO BE STABILISED AS REQUIRED.
* FIRE CONTROL PROCEDURES TO DEVELOPED IN ACCORDANCE WITH THE *VALE - FIRE MANAGEMENT PLAN* (FIREPLAN WA - FEB 2005).
* EASY MAINTENANCE EDGE TO BOUNDARY.
* ALL LANDSCAPE REQUIREMENTS IDENTIFIED WITHIN THE *VALE - WETLAND OPEN SPACE MANAGEMENT PLAN* (ATA ENVIRONMENTAL - AUG 2004) TO BE IMPLEMENTED AT DETAIL DESIGN PHASE.
* ALL LANDSCAPE REQUIREMENTS IDENTIFIED WITHIN THE *WETLAND MANAGEMENT STRATEGY* (ATA ENVIRONMENTAL - 1995) TO BE IMPLEMENTED AT DETAIL DESIGN PHASE.

MAINTENANCE SCHEDULE - CONSTRUCTION COMPLETE FEB 2009 - HANDOVER FEB 2014

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
RDWORKS	7,000	sq m	$2.30	$16,100	MULTIPLEX	25%	$4,025	5yrs from PC - Swan
• RETAIN BUSH	155,000	sq m	$0.10	$15,500	MULTIPLEX	100%	$15,500	5yrs from PC - Swan
• WEED REMOVAL	155,000	sq m	$0.10	$15,500	MULTIPLEX	100%	$15,500	5yrs from PC - Swan
			TOTAL	$47,100		TOTAL	$35,025	

VALE CONSERVATION ZONE 1 (162,000m2)

ISCLAIMER :

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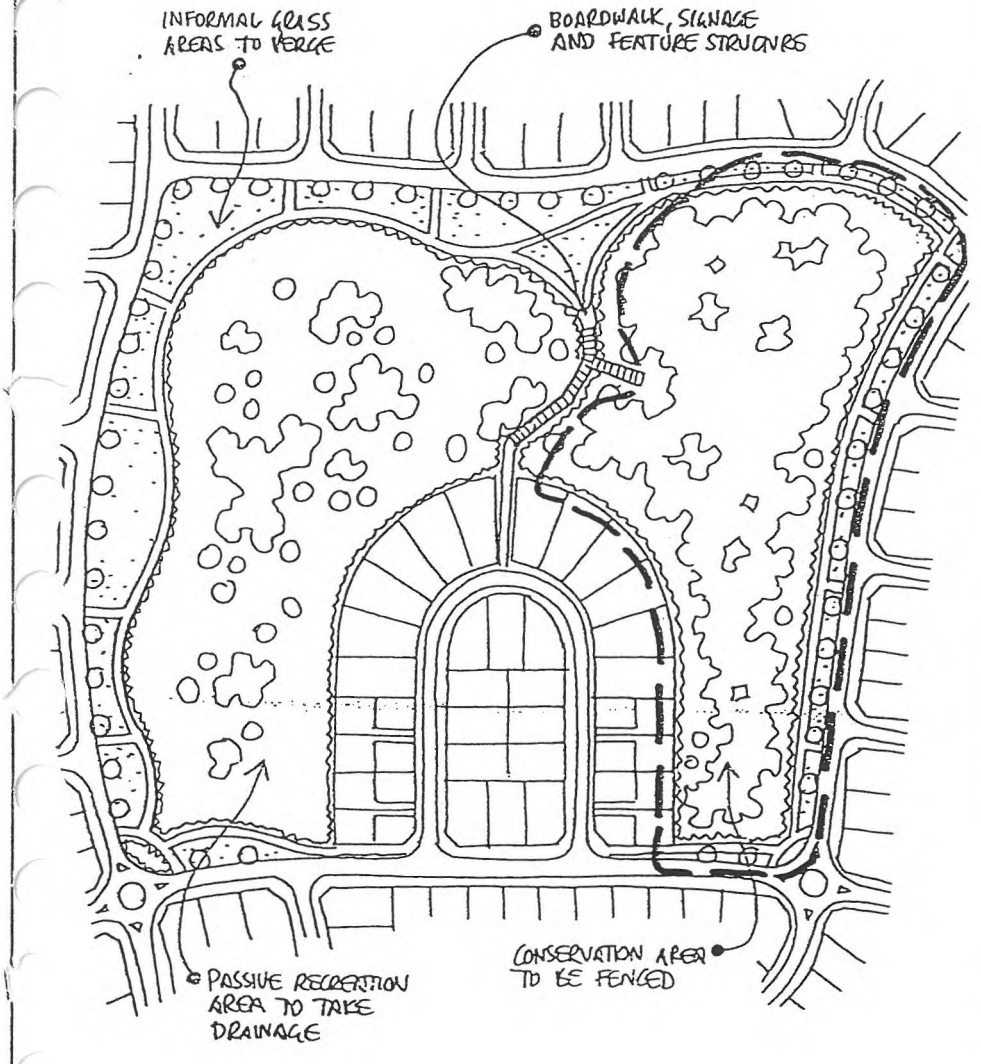
ALL DETAILS RELEVANT TO THE CITY OF SWAN'S LANDSCAPE AND IRRIGATION DESIGN GUIDELINES AND STANDARD SPECIFICATIONS WILL BE IMPLEMENTED AT DETAIL DESIGN PHASE.



NOTES :

EQUATE FIRE SEPERATION AND EMERGENCY ACCESS WILL BE SUPPLIED BETWEEN DWELLINGS AND VEGETATION VIA ROAD RESERVE AND ASHPALT EMENT IN ACCORDANCE WITH *VALE - FIRE NAGEMENT PLAN* (FIREPLAN WA - FEB 2005)

CONCEPT

RETAIN THE EXISTING WETLAND ECOLOGY AND REMEDIATE AREAS OF WEED INFESTATION AND DISTURBANCE. CONTROL ACCESS TO THE PERIMETER IN AN AESTHETIC FASHION AND PROVIDE PUBLIC FACILITIES INCLUDING INTERPRETIVE SIGNAGE, CONTROLLED LOOKOUT DECKS.

FACILITIES / MATERIALS

FACILITIES TO BE PROVIDED TO THE PUBLIC INCLUDE;

* PASSIVE REC VIEWING OF WETLAND,
* CONCRETE WALKING PATHS TO EDGE,
* WETLAND PLANTING,
* INTERPRETIVE SIGNAGE
* ALL GALVANISED METAL BOARDWALKS
* ALL GALVANISED METAL LOOKOUTS
* ALL GALVANISED METAL CONTROL FENCING
* NO IRRIGATION PROPOSED

PLANT SPECIES

ALL PLANT SPECIES TO BE ENDEMIC NATIVES. SUPPLEMENTARY PLANTING OF WETLAND SPECIES TO OCCUR TO DISTURBED AREAS. NO GRASS OR EXOTIC SPECIES PROPOSED. SPECIES TO BE APPROVED.

DRAINAGE SCHEDULE

ACCEPTS NO STORMWATER DRAINAGE

ENVIRONMENTAL RESPONSE

ENVIRONMENTAL ISSUES TO THIS POS INCLUDE

* PRESERVATION OF GOOD WATER QUALITY TO DISCHARGE AS OVERFLOW INTO HENLEY BROOK OR INFILTRATE.
* ALL NATIVE SITE VEGETATION TO BE RETAINED.
* STORMWATER TO BE CONTAINED FOR 1:1, 1:10 EVENTS.
* CONTROLLED PEDESTRIAN ACCESS ONLY.
* ALL LANDSCAPE REQUIREMENTS IDENTIFIED WITHIN THE *VALE - WETLAND OPEN SPACE MANAGEMENT PLAN* (ATA ENVIRONMENTAL - AUG 2004) TO BE IMPLEMENTED AT DETAIL DESIGN PHASE.
* ALL LANDSCAPE REQUIREMENTS IDENTIFIED WITHIN THE *WETLAND MANAGEMENT STRATEGY* (ATA ENVIRONMENTAL - 1995) TO BE IMPLEMENTED AT DETAIL DESIGN PHASE.

INTENANCE SCHEDULE - CONSTRUCTION COMPLETE FEB 2008 - HANDOVER FEB 2010

ITEM	QTY	UNIT	YR 1 RATE	YR 1 COST	RESPONSIBILITY	YR 3 RATE	YR 3 COST	HANDOVER
RDWORKS	3,200	sq m	$2.30	$7,360	MULTIPLEX	25%	$1,840	2yrs from PC - Swan
FTWORKS	2,000	sq m	$2.30	$4,600	MULTIPLEX	25%	$1,150	2yrs from PC - Swan
• RETAINED BUSH	51,300	sq m	$0.20	$10,260	MULTIPLEX	100%	$10,260	2yrs from PC - Swan
•								
			TOTAL	$22,220		TOTAL	$13,250	

VALE CONSERVATION ZONE 3 (34,500m2)