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BERTRAM STRUCTURE PLAN

CHAPPELL LAMBERT EVERETT

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1.0 INTRODUCTION

1.1 Background

The Bertram Structure Plan is prepared pursuant to the Fourth Schedule of the Town of Kwinana Town Planning Scheme No. 2 where a Local Structure Plan is required over Residential Development Areas, prior to the commencement of subdivision or development. This report constitutes a Local Structure Plan.

The objectives of this Structure Plan are to:

1. Provide a framework for subdivision approvals within the Structure Plan area consistent with the Residential zoning.
2. Define a neighbourhood connector network reflecting and accommodating traffic priorities.
3. Define opportunities for medium density and higher density housing around the Kwinana station precinct.
4. Provide for a variety of lot types, sizes and housing choice.
5. Assess the value of and incorporate the wetland located within the south-west corner of the site within open space.
6. Provide an effective and efficient local open space network.
7. Provide for a sustainable land use design incorporating a modified grid street network, providing for high permeability and accessibility, particularly to the Kwinana station.
8. Encourage local employment around the station precinct.
9. Reflect current structure planning carried out by Government agencies with respect to the Kwinana Station and integrate these into the overall planning of this precinct.

The Bertram Structure Plan was approved by the Town of Kwinana on 23 February 2005. A subdivision application, allowing for the creation 503 residential lots within the Structure Plan area, was lodged on 2 August 2005 with the Department for Planning and Infrastructure, in accordance with the approved Structure Plan.

Discussions were held with the Department for Planning and Infrastructure during the subdivision approval process for this application. Department for Housing & Works proceeded with the redesign of the northern portion of the Structure Plan area surrounding the train station to reflect Transit Orientated Development Principles, in accordance with WAPC Policy DC 1.6 'Planning to Support Transit Use and Transit Orientated Development'.

Consequently the Western Australian Planning Commission approved the southern portion of the application area on 2 June 2006, allowing for the creation of 194 residential lots (WAPC Ref 129092).

A subdivision application has been lodged for the balance of the Structure Plan area, up to the Sulphur Road extension (WAPC Ref 132639), responding to the site's strategic location adjoining the future Kwinana train station. This application was approved on 16 August 2007.

The Structure Plan has been updated accordingly to reflect the subdivision approval, the most recent subdivision application, as well as relevant policy and planning changes that have occurred since the initial approval of the Structure Plan in early 2005. This report remains consistent with the key principles and implications of the approved Structure Plan, February 2005.

1.2 Land Ownership

There are two land owners (refer Figure 1):

- Department for Housing & Works (DHW), and;
- Crown (Reserves and/or unallocated Crown land).

The DHW own approximately two thirds of the Structure Plan area, the remaining being Crown Land.

Table One identifies the lots within the Structure Plan area, Certificate of Title details, area and land ownership.

Table One – Lots Within the Bertram Structure Plan Area (excluding Reserves)

Lot	Certificate of Title (Vol/ Folio)	Owner	Total Area
1201	P203629 (1837-945)	State Housing	35.8071
1202	P149883 (1837-946)	State Housing	14.3790
1216	P149883 (1837-947)	State Housing	12.9373
9004	P38463 (2227-32)	State Housing	2.2404
E6	P211642 (2156/758)	State Housing	4.5117

The DHW and Satterley Property Group Pty Ltd are operating as a Joint Venture for the New Kwinana projects, including the Bertram development. The New Kwinana projects aim to revitalise DHW residential properties and subdivide vacant DHW land to create high quality housing.

1.3 Site Description & Local Context

The Bertram Structure Plan covers 71.4 hectares in Bertram, within the Town of Kwinana (refer Figure 1).

The site is undulating in nature with elevations ranging from RL10m AHD to RL25m AHD. The gradient of the land is generally between 3% and 8%, and consequently is suitable for residential development.

Soils on the site are predominantly sands derived Tamala Limestone and are suitable for residential development. Groundwater over the site is estimated to be at a level of between RL8.0m AHD and RL11.0m AHD.

The suburbs of Parmelia and Orelia are situated to the west of the Structure Plan area. The Kwinana Townsite is approximately 2.4 kilometres west of the Structure Plan area, via Sulphur Road and Durrant Avenue.

The Bertram Private Estate, a residential subdivision currently being developed, is located to the south of the land.

Thomas Road is located immediately to the north of the Structure Plan area. The Spectacles, a Parks and Recreation Reserve under the Metropolitan Region Scheme, is situated to the north of Thomas Road.

Land subject to the Bush Forever Amendment to the Metropolitan Region Scheme and an existing 'Parks and Recreation Reserve' under the Metropolitan Region Scheme, are located immediately east of the Structure Plan area on the other side of the proposed South West Metropolitan Rail. Further east lies the Kwinana Freeway and rural residential activities.

The Structure Plan area adjoins Thomas Road, a key connector road which provides access to the Kwinana townsite to the west and the Kwinana Freeway to the east. The site is affected by the South West Metropolitan Rail with the Kwinana train station proposed in the northern portion of the Structure Plan area.

The site is generally covered by remnant vegetation, which is not identified as being regionally significant. Despite this a large area is being retained through a Bush Forever Amendment to the Metropolitan Region Scheme (Bush Forever Site No. 272). Large areas of vegetation have been cleared for access tracks and public utilities, including a high pressure gas main and the Peel Main Drain, which traverse the site.

There is a Resource Enhancement category dampland in the south western corner of the Structure Plan area. This dampland is being retained in the Structure Plan within local open space.

2.0 STATUTORY PLANNING CONTEXT

2.1 Metropolitan Region Scheme

The majority of the site is zoned 'Urban' under the Metropolitan Region Scheme (refer Figure 4). 'Railways' Reservation traverses the site accommodating the South West Metropolitan Rail and train station. The eastern, southern and northern areas of the site are reserved for 'Parks and Recreation'. Thomas Road immediately adjoins the site to the north and is reserved for 'Primary Regional Roads'.

2.2 Bush Forever MRS Amendment

As a result of a Negotiated Planning Solution the majority of the area adjoining the site's boundaries is classified as Bush Forever Site 272 and subject to the Bush Forever Amendment to the Metropolitan Region Scheme (refer Figure 4). This will reserve a large portion of the adjoining land for conservation purposes.

2.3 Town of Kwinana Town Planning Scheme No. 2

2.3.1 Zoning

The eastern portion of the Structure Plan area is zoned 'Residential R20' under the provisions of the Town of Kwinana Town Planning Scheme No. 2 (refer Figure 5). The subject site is included within 'Residential Development Area 1' under Town Planning Scheme No. 2 wherein a Structure Plan is required prior to subdivision or development. The Fourth Schedule of Town Planning Scheme No. 2 sets out adoption procedures for Structure Plans.

The area west portion of the Rail Reserves is zoned 'Residential R20' and 'R12.5/ R20'. Unzoned portions and reserves do not correspond to Bush Forever or existing Road Reserves. A future Town Planning Scheme Amendment is required for this area to amend road reserves, zonings and reservations.

A 'Railways Reserve' traverses the site, dissecting the 'Residential' zone. The Structure Plan area is generally bounded by land Reserved as either 'Parks and Recreation' or 'Parks, Recreation and Drainage' under Scheme No. 2.

The subject area is also covered by 'Policy Area No 22 – Bertram' which seeks to achieve co-ordinated urban development, taking into account regional, district and local servicing requirements.

A 'Landscape Protection Area' covers the southern portion of the site. Division 11 of Scheme No. 2, sets out matters to be considered when assessing development in landscape protection areas, including the overall impact of the proposed development on the landscape amenity of the locality. The 'Landscape Protection Area' largely coincides with the wetland and open space areas on the Structure Plan.

2.3.2 Town Planning Scheme Amendment No 93

Council initiated Town Planning Scheme Amendment No 93 to Town Planning Scheme No 2 on 22 March 2006.

The principal purpose of Amendment No.93 is to remove the existing R-Codings shown on Town Planning Scheme No.2 and allow for the densities to be set by the approved Structure Plan. The Amendment also extends 'Development Area 1' to cover the Bertram Structure Plan area west of the rail line.

In addition to this Amendment No.93 prescribes land use permissibility for the Neighbourhood Centre Zone as per the Commercial Zone.

2.4 Local Planning Strategy

Scheme No 2 is currently being reviewed by the Town of Kwinana and in doing this a Local Planning Strategy has been prepared.

The Bertram Structure Plan area is clearly intended for residential development under the Local Planning Strategy. The Strategy sets out broad residential, commercial and transport objectives for the Structure Plan area.

The Local Planning Strategy seeks to achieve a mix of residential lot sizes and housing over the Bertram Structure Plan area, which:

- Accords with sustainable development principles;
- Maintains amenity;
- Is affordable to all echelons of the community;
- Renews the urban fabric where appropriate;
- Complements existing development, and;
- Protects residential areas from encroachment of inappropriate uses.

A number of more specific goals relating to residential subdivision have also been provided for the Structure Plan area:

- The predominant use should be residential with a range of densities that focus around the station, neighbourhood centre and nodes;
- Subdivision should generally be in accordance with an approved Structure Plan, which should be consistent with the principles of the Liveable Neighbourhoods;

- Subdivision design and works associated with subdivisional development shall be carried out in such a manner as to ensure minimal destruction of existing vegetation considered by Council to be worthy of preservation;
- Subdivision works should retain the undulating landform;
- Development should not encroach into the midge buffer for both the Spectacles and Bollard Bullrush Swamp;
- The provision of Public Open Space should be in accordance with Council Policy;
- Subdivision for residential purposes should respond to water sensitive design criteria in accordance with principles of Catchment Management in recognition of the area's location within the Peel/Harvey Estuary Catchment and therefore subject to SPP. No. 2. This should include provision for a nutrient stripping detention basin/water feature in and adjacent to the Peel Main Drain, and;
- Council will support the use of agreements and co-operative mechanisms, to ensure the orderly development of the Policy Area.

The Local Planning Strategy also aims to facilitate the development of a combined railway station and Neighbourhood Centre as a focus for medium density residential development and local public transport use adjoining Thomas Road on the northern portion of the site. The Strategy allows for a Neighbourhood Centre of 900m^2 gross leaseable area adjoining the train station. This has been shown on the western side of the South West Metropolitan Rail adjoining the train station.

To facilitate the development of the Neighbourhood Centre the Strategy requires the preparation of Town Centre Design Guidelines. These guidelines will be prepared with future applications for subdivision approval and/or development.

With regard to transport in the Bertram Structure Plan area the following objectives were set out under the Strategy:

- To assist in spreading the traffic load from trips associated with the Freeway north across a number of Local Distributors Roads rather than concentrating the volumes on a limited number of roads, and;
- To incorporate a link between Johnson Road and Sulphur Road under the Local Town Planning Scheme as a Local Road Reserve.

The Johnson / Sulphur Road link has been shown on the Structure Plan to provide an alternate route to Thomas Road for residents of the Structure Plan area.

2.5 Casuarina Local Structure Plan

The Casuarina Local Structure Plan (refer Figure 6) applies over the land to the south and east of the subject site. The Casuarina Structure Plan has been amended on several occasions, the latest being 13 May 1998.

The Casuarina Local Structure Plan provides a rational for development of land within the Bertram locality, with particular focus on the Bertram Private Estate immediately south of the Structure Plan area, addressing the opportunities and constraints for urban development, including the location of residential, public open space, commercial and conservation land uses.

It shows indicative alignments of Neighbourhood Connector Roads and Major Access Streets through the subject site which are reflected in this Structure Plan.

2.6 Change in Purpose of Adjacent Reserves

All previous structure planning, including planning work done by State Government and the Town of Kwinana for the railway station, has identified the need for two neighbourhood connector links into the Structure Plan area from external roads traversing Crown land (Refer Figure 7).

The northernmost link joins Johnson Road (from Orton Road) across unallocated Crown Land and past the Kwinana Station to Sulphur Road. This is a key piece of infrastructure, the need for which has been largely generated by traffic demand related to the Station. It also provides subdivisional road access to the development area once the land for the railway is ceded to the Crown.

The second neighbourhood connector links the Bertram Estate to the south to this Structure Plan area. In structure planning done for the Bertram Estate two potential road linkages were identified through the Crown land, however, environmental assessment work done to identify the value of the southwest wetland has eliminated the potential for one of these alignment options (most westerly route). Fortunately a link on a modified alignment from the subdivisional area through to the local centre is still achievable and is shown on the Structure Plan.

The dedication of the relevant sections of this Crown Land as road reserve is a priority to gain access to the site. It is understood that the Town of Kwinana is currently progressing the creation of these road reserves.

2.7 South West Metropolitan Rail Line & Kwinana Train Station

2.7.1 Rail Alignment

The proposed South West Metropolitan Rail line passes through the site from the north east to the south west. The railway reserve width varies from 60 to 80 metres. There is one main vehicular crossing point over the Reserve within the Structure Plan area adjoining the train station.

Bush Forever land abuts the rail line on the western side and traditional lots, buffered by a road or open space, abut the eastern side.

2.7.2 Kwinana Train Station

The Kwinana Train Station occupies the northern portion of the site, adjoining the major east west connector road, between Sulphur Road and Johnson Road, providing efficient access to the station. The design of the train station and surrounding uses are consistent with designs adopted by the Department for Planning and Infrastructure and New Metropolitan Rail (refer Figure 8).

The station precinct includes 1200 car parking bays east and west of the rail line, providing both "park 'n' ride" and "kiss 'n' ride" facilities. Access to the car park is available from Thomas Road, however, this link does not extend through to the local road system which relies on the connection from Johnson Road.

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3.0 LAND USE SCHEDULE

Table Two sets out the Land Use Schedule for the Bertram Structure Plan area in accordance with Figure 9.

Table No. 2 - Bertram Structure Plan Land Use Schedule

Gross Area (GA)		**74.66ha**
Non Residential Land Uses (NRLU)		
Train Station/ Car Park	6.75ha	
Wetland Core (P8)	3.86ha	
Bush Forever (P9)	0.34ha	
Total NRLU		**10.95ha**
GROSS RESIDENTIAL AREA (GRA)		**63.71ha**
Public Open Space required @ 10% of GRA		**6.371ha**
Public Open Space Provided		
P1	0.54ha	
P2 (excluding unconstructed Road Reserve)	1.95ha	
P3	0.35ha	
P4	0.49ha	
P5	0.50ha	
P6	2.21ha	
P7 (Wetland Buffer @ 50% credit)	1.15ha	
Total Public Open Space Provided		**7.19ha**
Therefore POS % of GRA		**11.29%**

4.0 HOUSING STRATEGY

4.1 Housing Principles

The Structure Plan provides a range of housing product to meet market demand, provide compatible land uses and protect land form integrity.

The housing principles for Bertram are:

- Provide diversity in housing choice and lot sizes;
- Higher density within 800 metres of the Kwinana Train Station incorporating Transit Orientated Development Principles;
- Promoting mixed use development around and within the Train Station, including home based business;ousing layout and urban form to respond public open space, and;
- Environmentally sustainable design approaches in terms of solar orientation of lots.

4.2 Transit Orientated Development

It is important for the urban development adjoining the future rail station to reflect appropriate medium to high densities and be of robust design, allowing for intensification and changing urban uses over time, consistent with the WAPC Policy DC 1.6 'Planning to Support Transit Use and Transit Orientated Development' and Liveable Neighbourhoods.

Consistent with WAPC DC Policy 1.6 and Liveable Neighbourhoods the following design objectives apply to the Transit Orientated Development (TOD) Precinct surrounding the train station:

- Street pattern designed to encourage walkability and facilitate pedestrian and cyclist access to transit facilities;
- A diversity of lot sizes matched with a robust street layout allowing for changing uses and intensification;
- Maximising residential densities within the precinct, while also providing a marketable product, and;
- Streetscapes, landscaping and the public domain to encourage public transport use, including the provision of footpaths.

4.3 Residential Densities

The Structure Plan sets out Residential Densities, in accordance with the principles outlined above (refer Figure 10). Residential Density Codings have been applied to ensure that a range of lot types can be provided, while also allowing flexibility to minimise minor R-coding modifications. R-codings reflect a logical transition of residential densities from the existing residential densities to the west and south to the higher density Residential R80 surrounding the Kwinana Train Station.

The following densities apply over the Structure Plan area:

4.3.1 Residential R30

Residential R30 applies to the southern portion of the Structure Plan area, furtherest from the Kwinana Train Station as well as to the west adjoining Sulphur Road and Durrant Avenue. Residential R30 provides a transition to lower densities within the Orelia and Parmelia suburbs as well as the Bertram Private Estate, while also reflecting the proximity to the Kwinana Train Station.

Residential R30 allows for the provision of traditional lots (ranging from 450m^2 to 600 m^2), as well as cottage lots (ranging from 280 m^2 to 350 m^2) located to enhance passive surveillance of public spaces and use of open space. The Residential R30 coding allows for both traditional lots (which would have previously been coded R20) as well as cottage lots, creating flexibility in the R-coding and avoiding the need for minor R Code modifications and 'spot codings' at a higher density for cottage lots.

Detailed Area Plans will be prepared for all R30 lots to ensure an integrated built form which creates a high amenity streetscape.

4.3.2 Residential R40

Residential R40 is located central to the Structure Plan area, providing a transition from R30 to the higher densities surrounding the Kwinana Train Station. R40 is located so as to maximise access and use of services and facilities, such as the neighbourhood centre and Kwinana Train Station. R40 is also located to enhance passive surveillance of public spaces.

Detailed Area Plans will be prepared for all R40 lots to ensure an integrated built form which creates a high amenity streetscape.

4.3.3 Residential R60 – R80

In accordance with the principles of WAPC Policy DC 1.6 and Liveable Neighbourhoods higher density Residential R60 to R80 has been located immediately surrounding the Kwinana Train Station, maximising use and access to the public transport and neighbourhood centre facilities. Comprehensive Detailed Area Plans and developer implemented Design Guidelines will ensure an integrated built form, contributing to high quality public spaces.

Residential R80 has been located surrounding the Kwinana Train Station at the request of the Town of Kwinana when Amendment No 93 was initiated. The Structure Plan has been modified to ensure an appropriate transition of density, in keeping with Council's decision and Transit Orientated Development Principles.

4.4 Detailed Area Plans

Detailed Area Plans will be prepared for lots within Structure Plan area as identified in this section to expand or elaborate on the Structure Plan and specify variations to the Residential Design Codes that constitute Acceptable Development, pursuant to Clause 6.17.6 of Town Planning Scheme No.2. Detailed Area Plans will include such information as prescribed in Clause 6.17.6.3 of Town Planning Scheme No.2.

Detailed Area Plans shall be prepared for the following lots:

- Lots adjacent to the train station;
- Lots within the neighbourhood centre;
- Lots serviced by a rear laneway;
- Grouped housing sites;
- Lots with an area less than 350m²;
- Lots abutting public open space (including the Peel Main Drain);
- Lots where it is important to control vehicular access and egress; and
- Any other lots as identified by the proponent, Town of Kwinana or Department for Planning & Infrastructure.

4.5 Lot Types and Lot Yield Estimates

Lot type profiles for the Bertram Structure Plan area have been developed based on the site's proximity to the Kwinana Train Station, and reflect the principles of Transit Orientated Development. Figure 11 sets out the expected lot type profiles for single lots in the Bertram Structure Plan area, including typical dimensions and areas, setbacks, site cover and desirable R-Code variations. R-Code variations will be dealt with through the preparation of Detailed Area Plans at subdivision stage. Grouped housing sites have been located in close proximity to the Train Station.

The lot type profiles are consistent with the lodged subdivision plan (refer Figure 12, WAPC Ref 132639).

Lot yield estimates have been prepared based on the subdivision plan (WAPC Ref 132639), and the Residential Densities Plan (refer Figure 10 and Table Three below).

The subdivision application area (WAPC Ref 132639) achieves a dwelling unit yield of approximately 33 dwelling units per site hectare, exceeding the requirements of Liveable Neighbourhoods which sets out a target of 30 dwelling units per site hectare surrounding a Train Station.

Table Three: Lot Yield Estimates (refer Figure 13)

Residential Density	Single Lot Yield	Duplex Lots	Duplex Dwelling Units	Grouped Sites	Grouped Sites Dwelling Units	Total Dwelling Units
Yield Precinct One						
R30	190	21	42	Nil	Nil	232
R40	253	10	20	12	62	335
R60	43	3	6	1	18	67
R80	-	-		3	60	60
Subtotal	**486**	**34**	**68**	**16**	**140**	**694**
Yield Precinct Two						
R30	95			-	-	95
R40	120			-	-	120
R80	-			2	139	139
Subtotal	**215**			**2**	**139**	**354**
TOTAL	**701**	**34**	**68**	**18**	**279**	**1048**

Lot Yield Notes/Assumptions:

- Lot yields within Precinct One are in accordance with the approved subdivision plans.
- Lot yield estimates for grouped sites and areas outside subdivision plan WAPC Ref 132639 are based on a mathematical calculation and will change following detailed design.
- Residential R40 grouped site dwelling unit estimates assume an average lot size of 240m^2.
- Residential R60 grouped site dwelling unit estimates assume an average lot size of 200m^2.
- Residential R80 grouped site dwelling unit estimates assume an average lot size of 180 m^2.
- Lot yield estimates for grouped sites are based on 30% of the net residential area being road.

5.0 PUBLIC OPEN SPACE

5.1 Public Open Space Principles

It is the intent of the Structure Plan to ensure the provision of a wide range of well located open space types, diverse recreational opportunities, vegetation preservation and the sharing of facilities and spaces. Key objectives are;

- Provide for a diversity of active and passive open spaces;
- Locate open space to enhance walkability;
- Protect vegetation within POS and other spaces wherever desirable and practical;
- Integrate informal kick about areas and opportunities for active open space where possible;
- Provide a range of passive open neighbourhood parks with a high amenity focus;
- Integrate with the surrounding Bush Forever;
- Provide good connectivity between these spaces;
- Ensure no resident is more than 250 metres from an open space, in accordance with Town of Kwinana Public Open Space Policy 4.3.3, and;
- Fully integrate drainage into the open space to promote best practice water sensitive urban design.

5.2 Public Open Space Schedule

Table Four sets out the Public Open Space Schedule for the Bertram Structure Plan area, based on the public open space credits approved by Council with the Structure Plan in February 2005. The Bertram Structure Plan exceeds the minimum 10% Public Open Space requirement.

Table Four: Public Open Space Schedule

Open Space Type	Open Space Area (refer Fig 9)	Gross Area (Hectares)	Credit Applied	Credit Area (Hectares)
Local Open Space	P1	0.54	100%	0.54
	P2	1.95		1.95
	P3	0.35		0.35
	P4	0.49		0.49
	P5	0.50		0.50
	P6	2.21		2.21
Wetland Buffer	P7	2.30	50%	1.15
Wetland Core	P8	3.87	Nil	Nil
Bush Forever	P9	0.34	Nil	Nil
TOTAL		**12.55**		**7.19**
Open Space as a % GRA 63.71 (ha)		**19.7%**		**11.3%**

5.3 Public Open Space Types

The key design principles, utility and functions for each category of open space included within the Structure Plan Open Space Strategy are summarised below.

5.3.1 Local Open Space

Local open space areas will provide an informal grassed active open space areas, as well as opportunities for passive recreation. There may be opportunities for playground equipment to be installed in these parks.

Park 1

Park 1 will service the medium to high density development surrounding the train station, as well as providing a landscaped area adjoining the Sulphur Road/Johnson Road link, improving amenity and streetscape. There are opportunities for the adjoining lots, which are rear loaded, to address and survey this open space, improving safety and amenity.

Park 2

Park 2, approximately 1.95 ha, is located west of the rail line and north of the Bush Forever site, providing a transition to the Bush Forever area. It is understood that a portion of Park 2 was previously a Town of Kwinana Rubbish Tip site. As a result of its previous use all native vegetation has been cleared and there is now poor vegetation cover and consequent weed infestation. It was not considered worthwhile to be included within the Bush Forever Amendment. Park 2 will be vested with the Town of Kwinana as Local Open Space and will include drainage swales totalling approximately 0.25ha.

Consistent with previous agreements reached as part of the Negotiated Planning Solution for Bush Forever Site No. 272 the old tip site will be grassed and used as a local open space with a full credit applicable. It should be noted that the Town has advised that it is unwilling to accept vesting of this open space until responsibility for remediation of contamination is resolved to the satisfaction of the Department of Environment and remediation has been undertaken or plans put in place to do so.

Parks 3 & 5

Open space areas 3 & 5 provide opportunities for local passive recreation and improved amenity as well as drainage swales. Shallow landscaped swales will form part of these open space areas, incorporating water sensitive urban design principles.

Park 4

Park 4 is located central to the Structure Plan area. This park will provide grassed active and passive areas to suit a range of age groups. Park 4 is located adjoining the key north south connector road and has road frontage on all sides. Local streets feed into the roads surrounding the open space, allowing direct access. Surrounding lots will address and survey this open space.

Park 6

Park 6 is outside the wetland buffer area and provides opportunities for passive recreation and drainage, integrated with the wetland and Bush Forever area.

5.3.2 Wetlands

There is a Resource Enhancement Category Wetland located in the south west corner of the study area. The Wetland has been retained as local open space and is treated as a deduction from the Gross Residential Area. The wetland buffer, 2.3 hectares, has been credited toward open space at 50%.

The central portion of this wetland has been long cleared as a result of human activities, including vehicle access and dumping of rubbish. The remainder of the vegetation is in very good condition. A 30m buffer has been maintained, as agreed with Department of Environment and Conservation. This provides recreational opportunities and drainage swales.

The buffer area will be able to be used for passive recreational pursuits such as walking and informal play, as well as drainage. There may be opportunities for seating and other facilities to be provided in this area. This will form part of more detailed landscaping plans to be prepared at a later stage.

A Wetland Management Plan is being prepared for the Resource Enhancement Wetland, as required by the conditions of subdivision approval (WAPC Ref 129092).

A Conservation Category Wetland and a Multiple Use Wetland are located immediately east of the Drain within Lot 1205 (Crown Land) is located. Both Wetlands and their buffers are contained entirely within the Crown Reserve. All boundaries reflect current Department of Environment Wetland classifications and mapping as confirmed by ATA Environmental.

5.3.3 Bush Forever

The Structure Plan area adjoins Bush Forever Site 272 to the west, east and north, providing 84.6ha of Regional Open Space adjoining the Structure Plan area. These spaces provide recreational and amenity opportunities for residents of the Structure Plan area. The Bertram Structure Plan assumes that the Bush Forever Metropolitan Region Scheme Amendment 1028/33 is adopted in its current form, as advertised. This is most likely given the site is based upon a Negotiated Planning Solution.

Park 9 is part of Bush Forever and will be integrated appropriately with adjoining development.

5.3.4 Nature Trail

The Tramway Nature Trail runs through Bush Forever Site No. 272 with a connection through the Structure Plan area west of the train station. Given that this area is an urban environment, based upon its proximity to the rail station, this social link will be provided through a combination of hard and soft landscaping and will be appropriately sign posted. This social link will provide a connection for users of the path as well as improving public awareness about this link. Planting and landscaping will provide an ecological linkage as generally depicted on this Plan.

6.0 NEIGHBOURHOOD CENTRES

The Local Planning Strategy allows for a 900m² gross leaseable area Neighbourhood Centre adjoining the Kwinana train station. The Neighbourhood Centre is located west of the rail line, adjoining the station and the Sulphur/Johnson Road connection. This allows the Neighbourhood Centre to be integrated with the train station, in keeping with the principles of Transit Orientated Development. The Neighbourhood Centre is likely to include convenience type uses such as deli/supermarket, pharmacy and newsagent as well as other Mixed Uses.

Town Planning Scheme Amendment No 93 includes provisions relating to land use permissibility for the Neighbourhood Centre. Under Amendment No. 93 land uses permissibility for the area designated as Neighbourhood Centre will be as per the 'Commercial' zone.

A further detailed design exercise will be carried out for the Neighbourhood Centre and the area surrounding the Train Station, including the preparation of Detailed Area Plans.

There is a future neighbourhood centre of 3700m² nla of retail to the south of the Structure Plan area within the Bertram Private Estate which will service the southern portion of the Structure Plan area.

7.0 COMMUNITY FACILITIES

7.1 Community Facilities Site

As requested by the Town of Kwinana, a Community Facilities Site could be provided within the mixed use precinct adjoining the train station. The form of this Community Facilities Site will be determined based on further discussions with the Town of Kwinana. Given that a public open space surplus has already been provided, the Joint Venture will liaise with the Town of Kwinana regarding compensation for the provision of this site.

7.2 Primary School Sites

There are two Primary Schools directly adjoining the Structure Plan area. There is no requirement for a Primary School within the Structure Plan area.

The existing North Parmelia Primary School adjoins the north western boundary of the site, servicing Parmelia, Orelia and potentially the Structure Plan area. There is a second future Primary School site shown to the south of the Structure Plan area within the Bertram Private Estate.

8.0 STAGING OF SUBDIVISION

Development of the land will commence in the south east corner near the Bertram Estate, covered by subdivision approval (WAPC Ref 129092), and then extend northward. Road access via the Sulphiar Road extension and through the Bush Forever is critical for the timing of the development.

At this time it is estimated the estate will generate sales of around 150 - 200 lots per year.

9.0 ENGINEERING REPORT – SERVICING STRATEGY

9.1 Introduction

This section has been prepared by Cossill & Webley Engineers and it summarises the results of an assessment of the engineering services which will be constructed as part of the subdivision.

9.2 Siteworks

It will be necessary to carry out clearing and earthworks over part of the site for two reasons:

1. It is necessary to construct the bridge over the rail line just south of the proposed Kwinana Transit Station at a level well above existing ground level. As a result it will be necessary to place a considerable amount of fill each side of the rail corridor south of the bridge to enable the ground levels to be blended into those associated with the bridge itself. Furthermore, the fill needs to be at a fairly flat gradient (2% or less) so that it can support small lot subdivision around the train station.
2. Filling of low-lying land to the east of the site to elevate it above the water table. Natural high and low points will be retained where possible, although a considerable amount of cut and fill will be required.

Appendix One outlines the Bulk Earthwork Strategy.

9.3 Roads

The Structure Plan provides a system of local distributor roads that have been designed to discourage speed through the use of roundabouts and appropriate curvature.

Access ways, access places and access lanes have been laid out in accordance with current Department for Planning & Infrastructure policies and Town of Kwinana standards. The detailed design of these facilities should enable systems to be developed which are feasible from an engineering point of view, cost-effective, enhance the amenity and safety of the future residents and best achieve the planning objectives for the area.

It is envisaged that the roads within the development could incorporate varied pavement treatments (red asphalt, pressed concrete, brick paving, etc), special kerbing, landscaping and street furniture to facilitate the creation of attractive streetscapes. Road access from the south and east is not available and needs to be secured to provide good access to the site.

9.4 Drainage

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

Both the underground and overland flow systems will be designed to discharge to disposal areas comprising landscaped swales in public open space and adjoining road reserves.

9.5 Water Resources Statement of Planning Policy 2.9

The State Water Strategy for Water Australia presents a range of major initiatives designed to achieve more sustainable water use outcomes. At this level many of these key initiatives involve government commitments to strategic infrastructure, financial incentive packages and other initiatives.

At the more local level and relevant specifically to land development, the Western Australian Planning Commission Water Resources Statement of Planning Policy 2.9 outlines best practice approaches for achieving total water cycle management. A range of Policy measures are outlined to ensure a more sustainable approach to the utilisation of water resources covering;

- Nutrient Management
- Groundwater and surface water management
- Impacts on Natural systems (Wetlands etc)
- Total Water Cycle Management

At this broad structure plan level the structure plan recognises these initiatives by providing for;

- Disposal of drainage in landscaped swales close to source
- Integrating open space with drainage
- Stripping of nutrients in the swale
- Excluding direct discharge to wetland areas
- Protecting and enhancing wetlands

A key requirement of this Structure Plan is the need for the preparation of an Integrated Water Management Plan which includes a Stormwater Drainage Management Plan and a Wetland Management Plan to demonstrate and explain the strategies to be implemented as part of the development of the land to fulfil the policies and objectives of the S.P.P.

9.6 Sewerage Reticulation

Existing deep sewerage crosses the northern portion of the site and runs parallel and adjacent to the eastern and southern boundaries of the site. As such the site can be readily serviced with sewerage reticulation.

9.7 Water Reticulation

There are no water mains in the area capable of providing adequate water supply to the Structure Plan area. It will be necessary to upgrade mains to the west of the site and lay a main from the proposed Medina Reservoir to the site. These mains will also supplement the current system which services land in Bertram to the south. The mains have been planned by the Water Corporation for many years and will ultimately service a catchment extending southwards to Miller Road.

The Water Corporation has confirmed that the subdivision can be fully serviced by current infrastructure and is not reliant on the future construction of the Orelia Reservoir.

9.8 Underground Power, Telephone and Gas

There is sufficient capacity within existing infrastructure in close proximity to the site to ensure the project is provided with power, gas and telephone services.

10.0 MOVEMENT NETWORKS & TRAFFIC

10.1 Introduction

This section has been prepared by BSD Consultants and it reviews the proposed road network and usage patterns as well as examining usage patterns of the proposed bridge over the rail line. All plans related to this section are included in the Appendix.

10.2 Train Station Precinct Car Parking

The main attractor within the precinct is the future Kwinana Park and Ride Station. Car parks are proposed on both the western and eastern side of the railway line. Initially, only the western car park will be developed, current details indicate that a total of 603 parking bays will be provided at this location. Parking numbers pertaining to the eastern car park are subject to more detailed design, however it is estimated that an additional 500-600 bays could be provided.

Direct access and egress to the western car park will be provided via a new signalised intersection on Thomas Road, west of the railway line. The car parks can also be accessed locally via Sulphur Road to the west of the bridge and via a new road to the east of the bridge.

10.3 Road Network

In a regional context the precinct is serviced well by the surrounding external road network. Good linkages to both west-east and north-south Primary Distributors routes are in place. Thomas Road immediately to the north of the precinct, accessed via Johnson Road, runs in a west-east direction. This east-west route provides access to other Primary Distributor roads such as the:

- Kwinana Freeway some 200-300m east;
- The future Tonkin Highway to the east;
- Further east to the existing South Western Highway; and
- To the west Rockingham Road.

In a local context the precinct is linked to the Kwinana Town Centre via road network connections to the west, south and east of the precinct. These are:

- New Neighbourhood connector to the west linking to Sulphur Road;
- Moombaki Avenue and Price Pky to the south, linking to Bertram Road/Challenger Avenue; and
- Johnson Road to the east also linking to Bertram Road/Challenger Avenue.
- The east side of the precinct will rely on the new railway bridge road in order to access Sulphur Road. It should also be noted that the proposed Perth-Mandurah railway line will cross Challenger Avenue. The Casuarina Local Structure Plan indicates that a road bridge will be provided to maintain this link into the Town Centre.

Within the precinct two new roads will function as neighbourhood connectors and/or distributor roads. One runs in a west-east direction linking Sulphur Road to Johnson Road which will include the new bridge over the future South West Metropolitan Rail. The second of these roads runs in a north-south direction linking the above west-east road in the north to Moombaki Road in the south.

10.4 Traffic Modelling

In 2001/2 the Town of Kwinana commissioned the development of a comprehensive traffic model of the Town's future (short, medium and long term) road network. The main goal of the model was to assist the Town of Kwinana in planning for a local and district road network that would provide the community with convenient access to the regional road network without attracting unacceptable levels of through-traffic in the urban area.

For this purpose an EMME/2 traffic model was developed. This EMME/2 model was sourced from the Town of Kwinana and has been modified accordingly to model the Kwinana Station Precinct road network. The 2021 time horizon was used for the analysis.

In summary modifications to the model involved the following:

- Creation of new development zones representing the proposed development and Kwinana Station;
- Estimation of trip generation from new zones;
- Creation of the Precinct road network, in particular the proposed bridge link over railway line;
- Trip Distribution within the Precinct and surrounding region, and;
- Trip Assignment within the Precinct and surrounding region.

Drawing T454-02 shows diagrammatically the traffic volumes predicted using the EMME/2 traffic model. These volumes are for a typical weekday in the year 2021. Generally all roads within the precinct are predicted to carry less than 6,000 vehicles per day with the exception of the previously identified west-east neighbourhood connector link.

It has been estimated that the Kwinana Park and Ride Station will generate approximately 5,300 vehicle trips per weekday. While the new development on the east side of the Precinct is estimated to generate approximately 5,793 trips per weekday in the year 2021.

10.5 Road Network

The traffic modelling data for the Kwinana Station Precinct road network was used for the following purposes:

- Road Hierarchy;
- Road Capacity; and
- Road Reserve.

10.5.1 Road Hierarchy

The Main Roads WA document "Perth Metropolitan Functional Road Hierarchy Map Series" defines five classes of roads. The classes of roads are defined by their function which is also reflected by indicative traffic volumes.

Access roads typically carry up to a maximum of 3,000 vehicles per day (vpd) while Local Distributor roads are expected to carry up to 6,000 vpd. Based on this criteria, it is expected that all the roads within the Precinct with the exception of the two Neighbourhood connectors previously defined in Section 2.2 would be defined as Access roads.

The new north-south Neighbourhood Connector linking to Moombaki Avenue is predicted to carry up to 3,700 vpd and as such would be classified at the lower end of a Local Distributor Road. The new west-east link from Sulphur Road to Johnson Road is predicted to carry between 5,500 vpd west of Sicklemore Road and 8,700 vpd east of Sicklemore Road to Johnson Road. Based on these traffic volumes the west-east Neighbourhood connector could be considered to be either a Local Distributor Road or District Distributor (B) which carry more than 6,000 vpd. Traffic volumes on the eastern section of this new Neighbourhood connector increase to slightly above the desirable 6,000 vpd for a Local Distributor road due to the proposed Kwinana Park and Ride Station. At this stage it is still considered appropriate to classify this road as a Local Distributor.

10.5.2 Road Capacity

The number of traffic lanes required is dependent on the volume of traffic. Generally, a two lane undivided road has the capacity to function with up to 12,000 vehicles per day (vpd). A four lane undivided carriageway standard typically caters for between 8,000 vpd and 29,000 vpd. Hence where traffic volumes exceed 8,000 vpd an assessment on the requirement to upgrade the road standard needs to be undertaken.

The traffic modelling volume predictions were sourced for the assessment road standard with respect to road capacity. All volumes on the precinct roads were less than 8,000 vpd with the exception of the proposed neighbourhood connector road link between Sulphur Road and Johnson Road. This road is expected to cater up to 8,700 vpd. Predicted traffic volumes on this road near Sulphur Road are 5,500 vpd while at the proposed bridge adjacent to the rail station they are a maximum of 8,700 vpd and near Johnson Road they are 8,400 vpd. The higher traffic flow in comparison to other Precinct roads is a result of the Kwinana Park and Ride Station which has access via this new road. For this reason it is not considered appropriate or necessary to upgrade the road to a four lane undivided standard. Upgrading the road has the potential to increase the speed of traffic along the road which would not be desirable considering the adjacent residential areas, frequent turning movement to/from the Station during peak periods and increased bus movements associated with the Station.

10.5.3 Road Reserve Widths

"Liveable Neighbourhoods" provides guidelines for road cross section with respect to traffic volume, bus routes, paths, frontage land use and traffic speed. In general there are six distinct road reserve widths. These are 14m and 16m road reserve for Access Streets, a 17m and 20m road reserve for Neighbourhood Connectors without a median and a 22m and 25m road reserve for Neighbourhood Connectors where a median is proposed.

Table No. 5 below summarises the suggested road widths based on traffic volumes.

Table No.5 – Road Reserve Widths

Road Reserve Widths	Traffic Volume	Comments
Access – 14m	<1,000vpd	Minimum (refer LA)
Access – 16m	<3,000vpd	Allows on street parking or more traffic
Neighbourhood – 17m	<3,000vpd	Allows embayed parking
Neighbourhood – 22m	<3,000vpd	Allows embayed parking. Median for pedestrians.
Neighbourhood – 20m	<5,000vpd	Allows embayed parking. Shared cycling/ parking
Neighbourhood – 25m	<7,000vpd	Median for right turns

The traffic modelling data confirmed that all roads within the Precinct were predicted to carry less than 3000vpd with the exception of the previously identified Neighbourhood connectors. The west-east neighbourhood connector was predicted to carry between 5,500vpd and 8,700vpd. The north-south neighbourhood connector was predicted to carry up to 3,700vpd.

It is recommended that all access roads be designed with 16m road reserve widths. This width should only be reduced to the minimum 14m if considered necessary due for optimum subdivisional design reasons and approved by the Town of Kwinana.

The new west-east Neighbourhood Connector is recommended to be designed with a 25m road reserve. This road reserve width allows for provision of a central median and boulevard treatment. As previously mentioned the volume of traffic expected on this road can be somewhat attributed to the Park and Ride Station. The Station is anticipated to generate approximately 5,300 vehicle trips per day. Of these up to 75% (i.e. 4,000 trips) are expected to access/egress the Station via this new road link. It will be advantageous to provide some median refuge to separate turning movements from the through traffic. In this instance turning pockets should only be provided where necessary for storage and not deceleration. This will assist in maintaining a low speed environment and not making the road the preferred route to access Thomas Road from the suburbs Orelia and Parmelia.

Retail/commercial land uses are also proposed along this west-east neighbourhood connector. A 25m road reserve width also allows for the provision of on street parking embayments that can service these land uses. Additionally, on road cycle lanes combined with the parking lanes can also be accommodated.

The new north-south Neighbourhood Connector is recommended to be designed with a 22m road reserve. This road reserve width allows for provision of a central median and boulevard treatment should the developer choose this option. The boulevard type treatment will assist in creating a low speed traffic environment. Medium density housing is proposed to front the northern section of this road link. This type of housing often requires on street parking. A 22m road reserve width will allow the provision of parking embayments where required, particularly adjoining the central public open space. Should parking embayments not be considered necessary an on road cycle lane could be provided within the reserve width.

10.6 Bridge Link

This proposed bridge is an important element of both the development of the Precinct and the surrounding region. It assists in creating a permeable road network enabling convenient accessibility to the local community both within and surrounding the precinct.

10.6.1 Traffic Flows

The traffic modelling exercise indicated that the new road bridge over the railway south of the Kwinana Park and Ride Station is likely to carry approximately 8,700 vehicles per day on a typical weekday (vpd AAWT). It is expected that approximately 1,200 of these trips are from the new development on the east side of the Precinct. This represents only 14% (1,200/8,700) of the total bridge traffic. The remaining 7,500 trips are from the wider community.

These results from the traffic model clearly demonstrate that the bridge is of benefit to the entire community. A percentage of the remaining trips would be from the Park and Ride Station. It is estimated that approximately 75% (i.e. 4,000 trips) of the trips generated by the Park and Ride would access the site from the south however, not all of these Park and Ride trips are expected to cross the bridge.

The remaining vehicle trips across the bridge are likely to originate from the western suburbs of Orelia and Parmelia whose destination is east along Thomas Road. Residential traffic from these suburbs may elect to use the new bridge and Johnson Road to access Thomas Road.

10.6.2 Bridge Cross Section

The Austroads Bridge Design Code states that bridge carriageway widths should be based on providing a consistent level of service along a section of road to ensure that safety is not prejudiced and funds not expended unnecessarily.

It has already been determined that the new west-east link on which the bridge is to be constructed will only be required to be constructed to a 2 lane standard. Additionally, it is recommended that a central median be installed along this road link. This purpose of the central median is to allow storage and refuge of vehicles turning right into/out of the Kwinana Park and Ride Station in order to minimise disruption to through traffic.

The length of the bridge has previously been estimated by others to be approximately 11.4m. The Austroad code recommends that where the bridge length is less than 15m and traffic volumes exceed 5,000vpd, the bridge width shall have sufficient width to carry the full width of shoulders (i.e. cycle lanes) and pavement including auxiliary lanes where provided. The proposed bridge fits this category. As such on road cycle lanes and central median should be maintained over the bridge.

It is suggested that the above recommendation has been made as it is possible not considered safe to significantly alter the bridge cross section from the road cross section for such small lengths. For this reason it is recommended that the bridge cross section be maintained as close as possible to that of the approaching road cross section. It is suggested that traffic lane widths be maintained however the central median width could be tapered to 2.0 m over the bridge. This width will allow the installation of signage within the median which will more than likely be required for to direct traffic to the Kwinana Park and Ride Station.

The Kwinana Station is to provide pedestrian access from ground level i.e. car park level to a central concourse which can be used to access either side of the Station. Station bound pedestrians will therefore cross the rail using the concourse and will not need to use the new bridge for this purpose. Pedestrians using the new bridge will not have originated and/or be destined for the Station.

Current detailed drawings on the proposed western car park of the Station indicate that bicycle lockers will be provided. It is assumed that similar facilities will be provided as part of the eastern car park also. This will mean that cyclists using the Station will not be required to use the bridge. In the interim while only the western car park is built it is assumed that cyclists will be able to access the bicycle lockers via the upper concourse level. Cyclists using the new bridge will not have originated from and/or be destined for the Station.

Pedestrians and cyclists using the new bridge are likely to have origins and destination south of the new bridge. It is therefore proposed that as a minimum a shared path be provided on the southern side of the bridge.

The proposed cross section of the bridge is as follows:

- 2.5m shared path of the southern side of the bridge
- 1.0m on road cycle lane
- 3.5m traffic lane
- 2.0m central median
- 3.5m traffic lane
- 1.5m on road cycle lane

This is a total width of 14.5m excluding the necessary clearances for the installation of balustrades as required over a railway bridge.

10.7 Bus Routes

The proposed layout of the Kwinana Station precinct is such that the north-south Neighbourhood Connector runs centrally through the eastern section of the Precinct. The distance from this Neighbourhood Connector to the outer access roads is up to 400m. This distance (400m) is approximately a 5 minute walk. This is considered an acceptable distance to a bus stop. As such it is likely that future bus routes to service the Precinct will only be required to include this Neighbourhood Connector as part of the bus route and not the adjacent access roads. The recommended road reserve width of 22m for this north-south Neighbourhood Connector will be adequate to accommodate buses. Additionally, the proposed road hierarchy of Local Distributor also supports the function of a bus route.

Without a doubt, the new west-east Neighbourhood connector which provides access into the Kwinana Station will form part of numerous bus routes. Once again the road reserve width of 25m suggested will accommodate buses and its function as a Local Distributor will support bus routes.

10.8 Pedestrian Routes

Road reserve widths based on "Liveable Neighbourhoods" allow for the provision of shared paths. A review of the Local Government bike plan and their policies with respect to the provision of paths should be undertaken to establish if shared paths are required on all roads within the precinct.

It is suggested that as a minimum shared paths should be provided on the two Neighbourhood Connectors. The provision of a central median along these roads also creates the opportunity to provide safe median refuge for pedestrians.

10.9 Railway - Acoustic Considerations

The Western Edge of the Structure Plan abuts the new Perth to Mandurah Rail Reserve, which is presently being earth-worked. To determine impacts on surrounding land uses and development and the required construction response, New Metro Rail are presently preparing a Noise and Vibration Management Plan for the length of the railway.

Construction initiatives will need to reflect the development potentials and or existing land use scenarios for the adjacent lands. Where the Rail, for example, passes through Urban zoned land of the Kwinana Town site, special construction techniques will need to be adopted to minimise impacts. These will include:

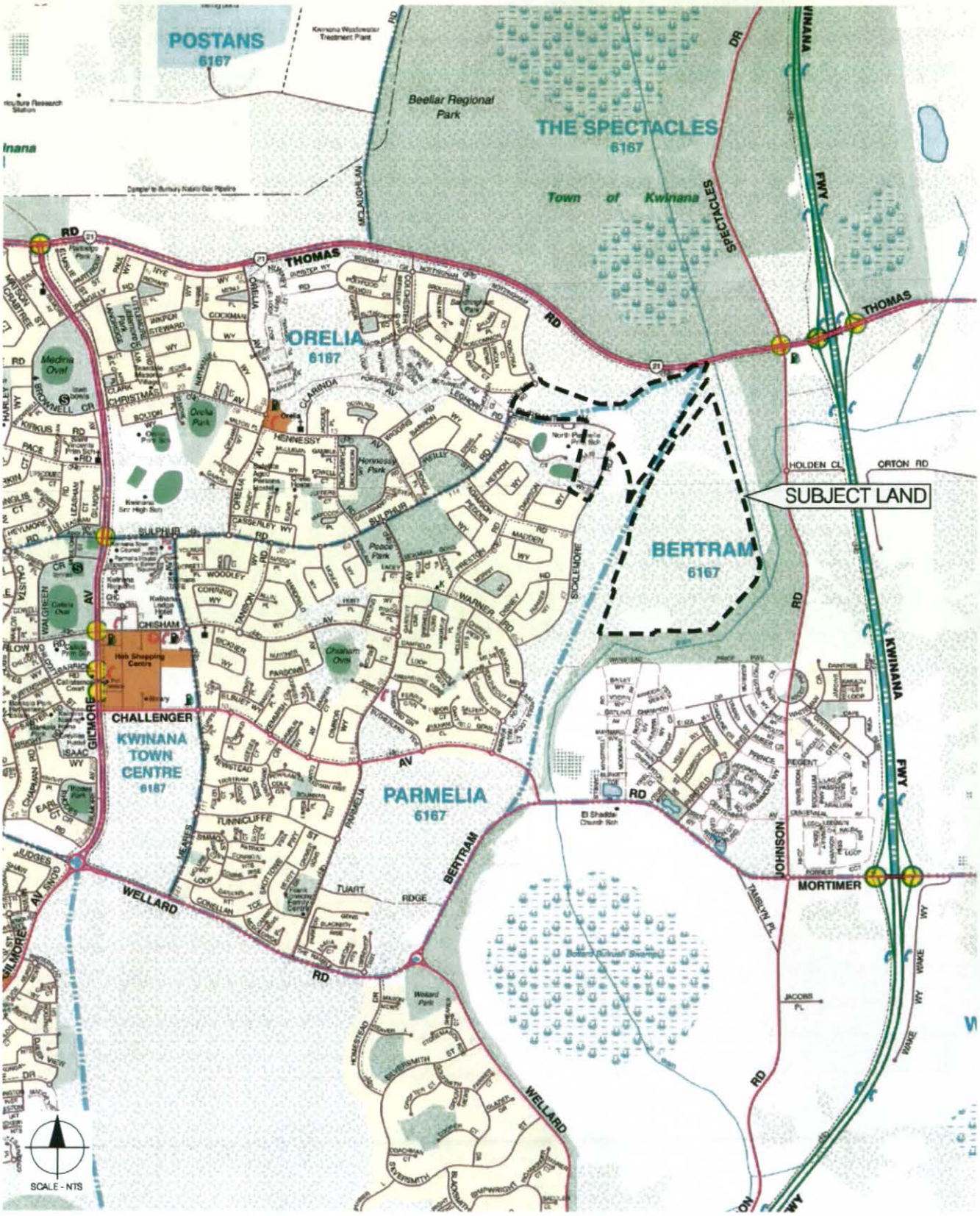
- Vibration Isolation Treatments
- Speed Controls
- Bunding and Walls

All impacts should be contained within the Reserve it self and the onus is on New Metro Rail to ensure this occurs through the selective application of the above techniques. It should be noted that ongoing consultation between Landstart, Acoustic Consultants (Lloyd Acoustics) and New Metro Rail is occurring as part of the preparation of the Noise and Vibration Management Plan.

Clearly an appropriate development response for land use abutting the Reserve is also required. The Structure Plan itself has been modified to eliminate any lots backing on to the Rail through the extension of Public Road Reserves adjoining the Railway Reserve. This provides both separation surveillance and a more suitable amenity response.

Lots within the vicinity of the railway reserve will be made aware of potential noise and vibration impacts through a Notification on Title, in accordance with subdivision approval WAPC Ref 129092.

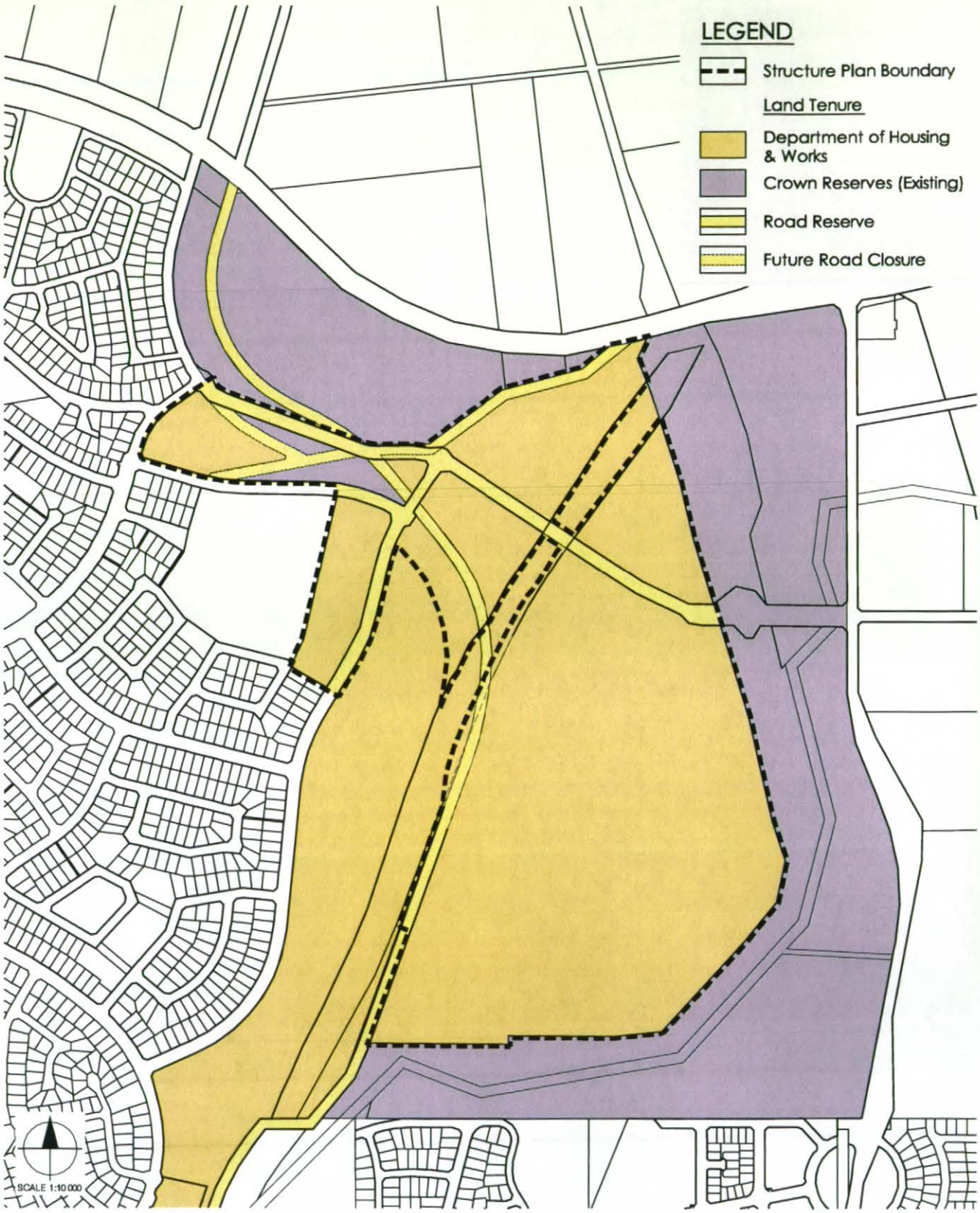
FIGURES



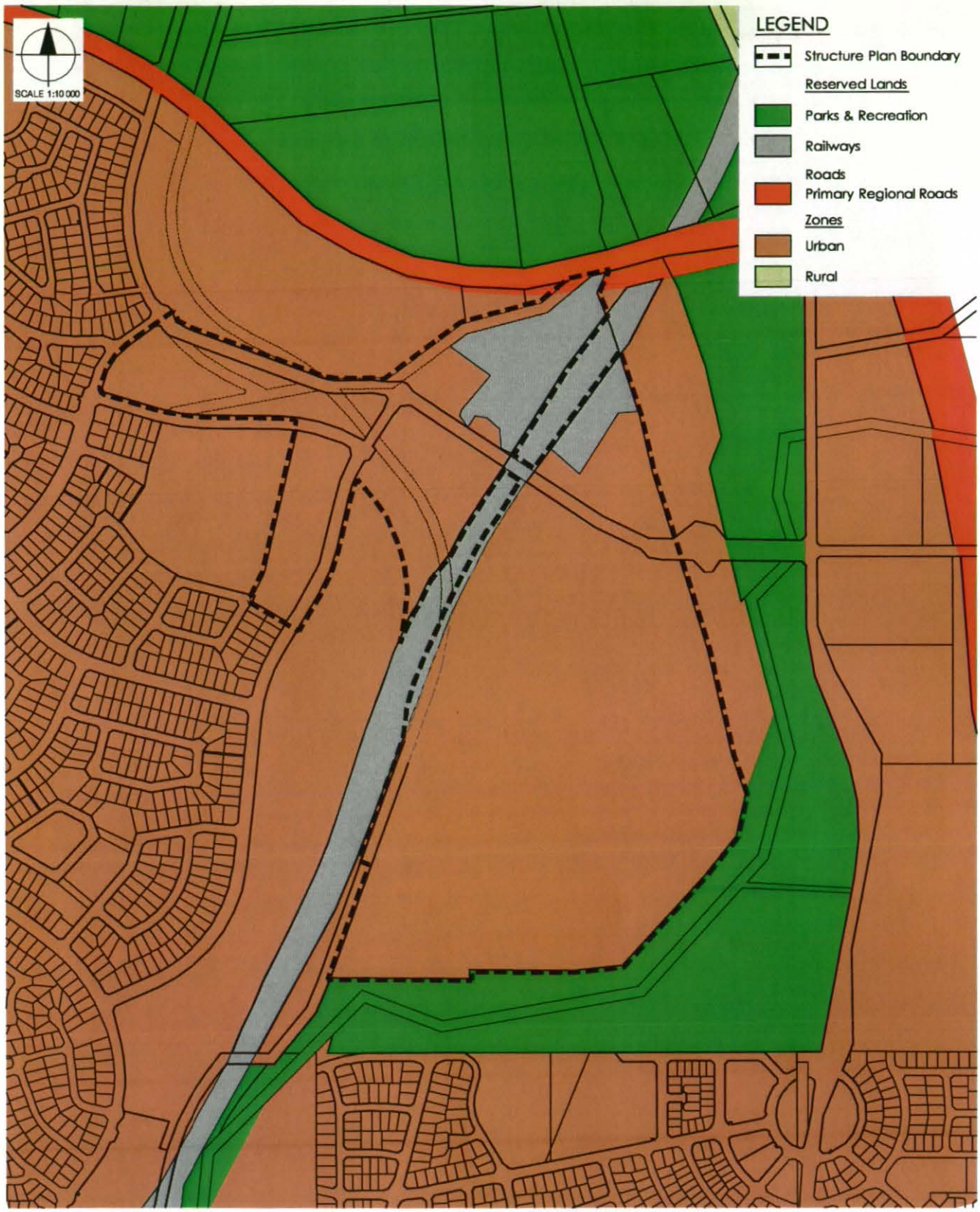
LOCATION PLAN

SOURCE: Street Smart (572-113a, 28.08.08)

FIGURE 1



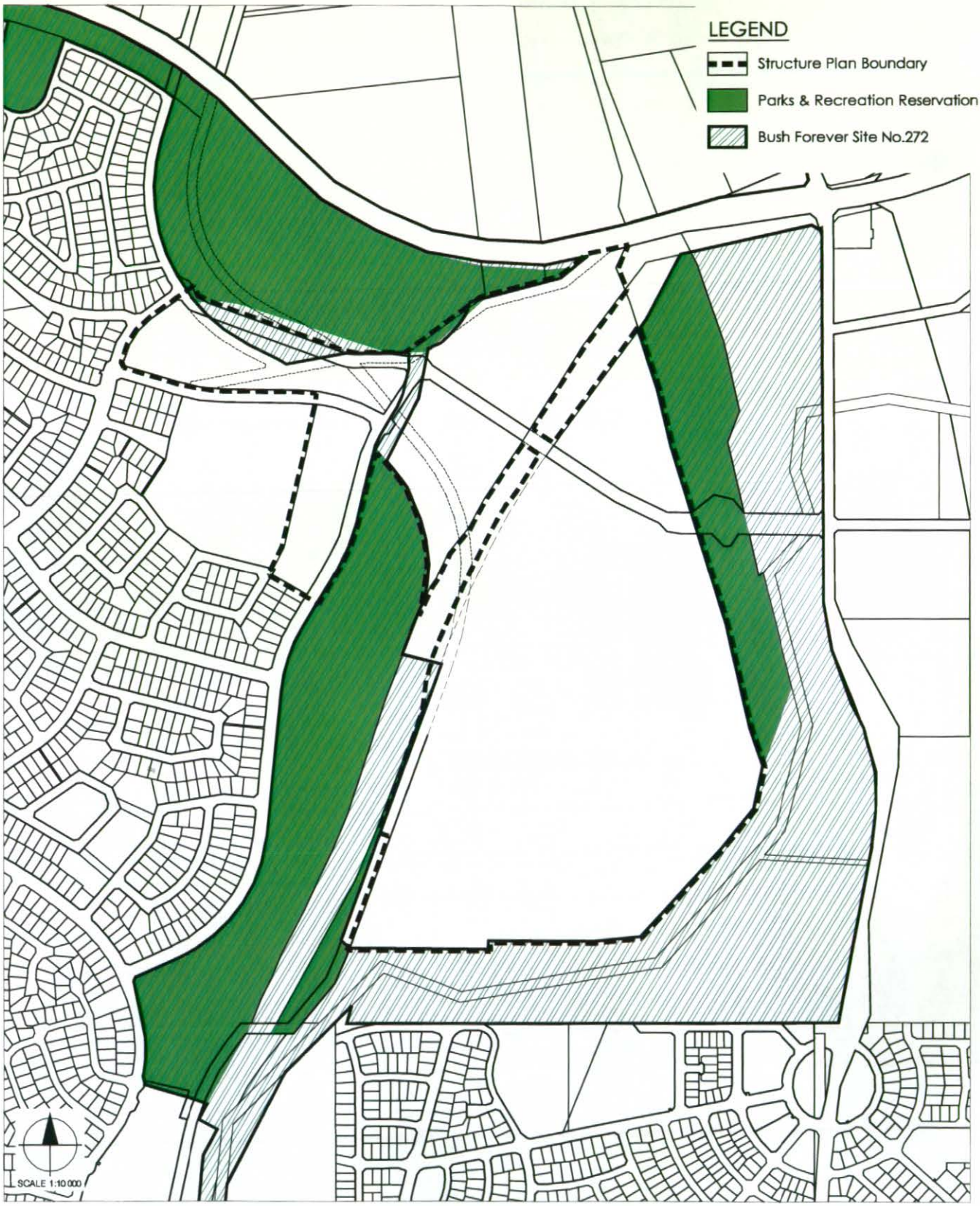
LAND OWNERSHIP PLAN



METROPOLITAN REGION SCHEME ZONING

SOURCE: DP1 (572-115b, 28.08.08)

FIGURE 3



BUSHFOREVER SITE No. 272

SOURCE: DPI (572-116b, 28.08.08)

FIGURE 4

LEGEND

STRUCTURE PLAN BOUNDARY

METROPOLITAN REGION SCHEME

- PARKS AND RECREATION
- RAILWAYS
- PORT INSTALLATIONS
- STATE FORESTS
- WATER CATCHMENTS
- CIVIC AND CULTURAL
- WATERWAYS
- PRIMARY REGIONAL ROADS
- PUBLIC PURPOSES

LOCAL SCHEME RESERVES

- PARK RECREATION & DRAINAGE
- PARK RECREATION & DRAINAGE
- PUBLIC PURPOSES
- PUBLIC PURPOSES
- PUBLIC PURPOSES

ZONES

- RESIDENTIAL
- SPECIAL RESIDENTIAL
- COMMERCIAL
- KWINANA TOWN CENTRE
- MIXED BUSINESS 1
- SERVICE COMMERCIAL
- SPECIAL USE
- SPECIAL USE
- SPECIAL USE
- GENERAL INDUSTRY
- LIGHT INDUSTRY
- CLUSTER/COMMUNAL RURAL SETTLEMENT
- RURAL A
- RURAL S
- RURAL WATER RESOURCE
- SPECIAL RURAL

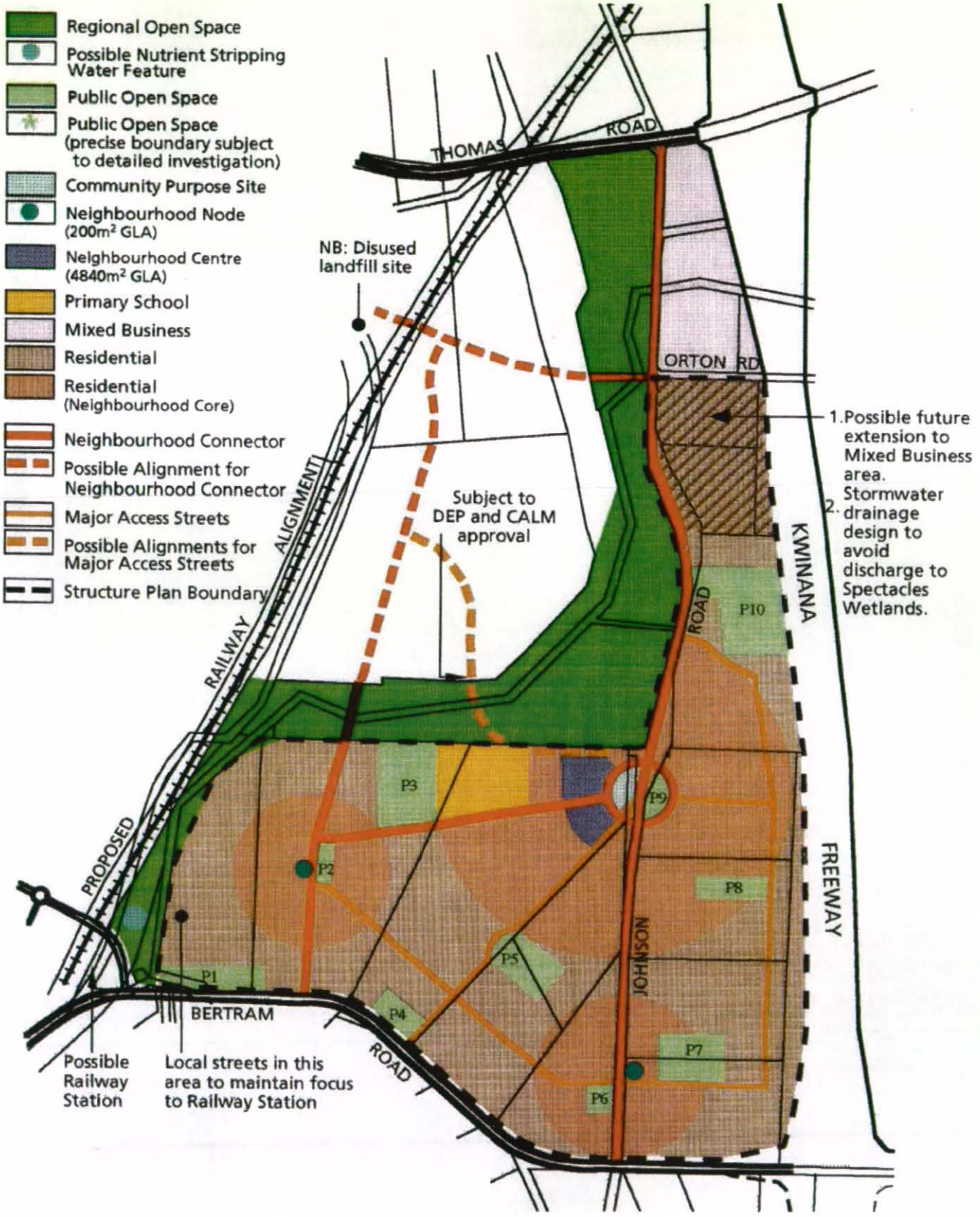
OTHER

- R CODES
- ADDITIONAL USES
- SCHEME BOUNDARY
- LOCAL GOVERNMENT BOUNDARY
- AREA OF LANDSCAPE PROTECTION
- POLICY AREAS (SEE SCHEME TEXT)
- DRAINAGE CATCHMENT MANAGEMENT
- SPECIAL RURAL AREA (SEE SCHEME TEXT)
- SPECIAL RESIDENTIAL AREA (SEE SCHEME TEXT)
- DEVELOPMENT AREA (SEE SCHEME TEXT)
- DEVELOPMENT CONTRIBUTION AREA (SEE SCHEME TEXT)

TOWN OF KWINANA - TOWN PLANNING SCHEME No. 2

SOURCE: Town of Kwinana (572-117b)

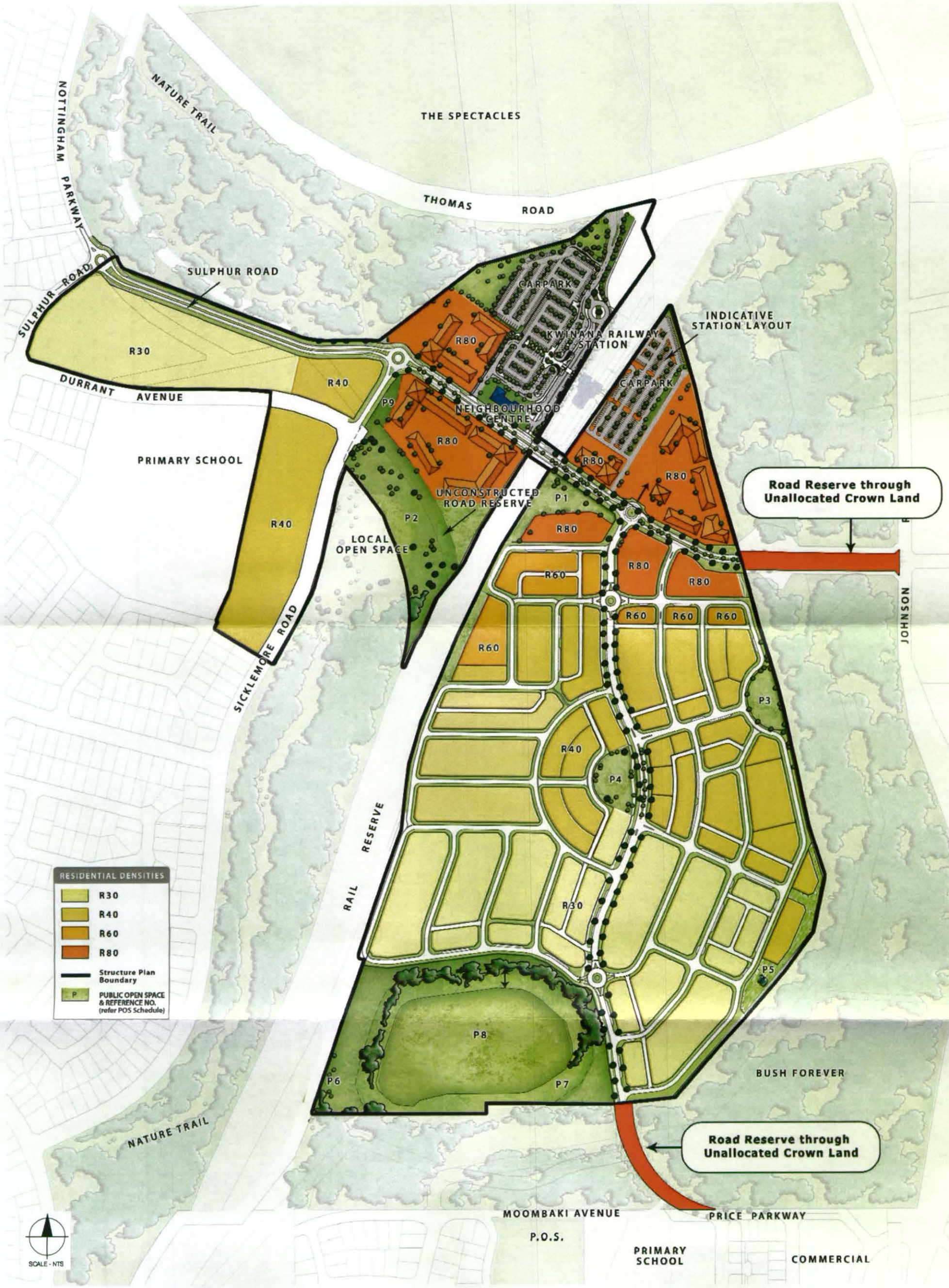
FIGURE 5



CASUARINA LOCAL STRUCTURE PLAN

SOURCE: Town of Kwinana (572-118)

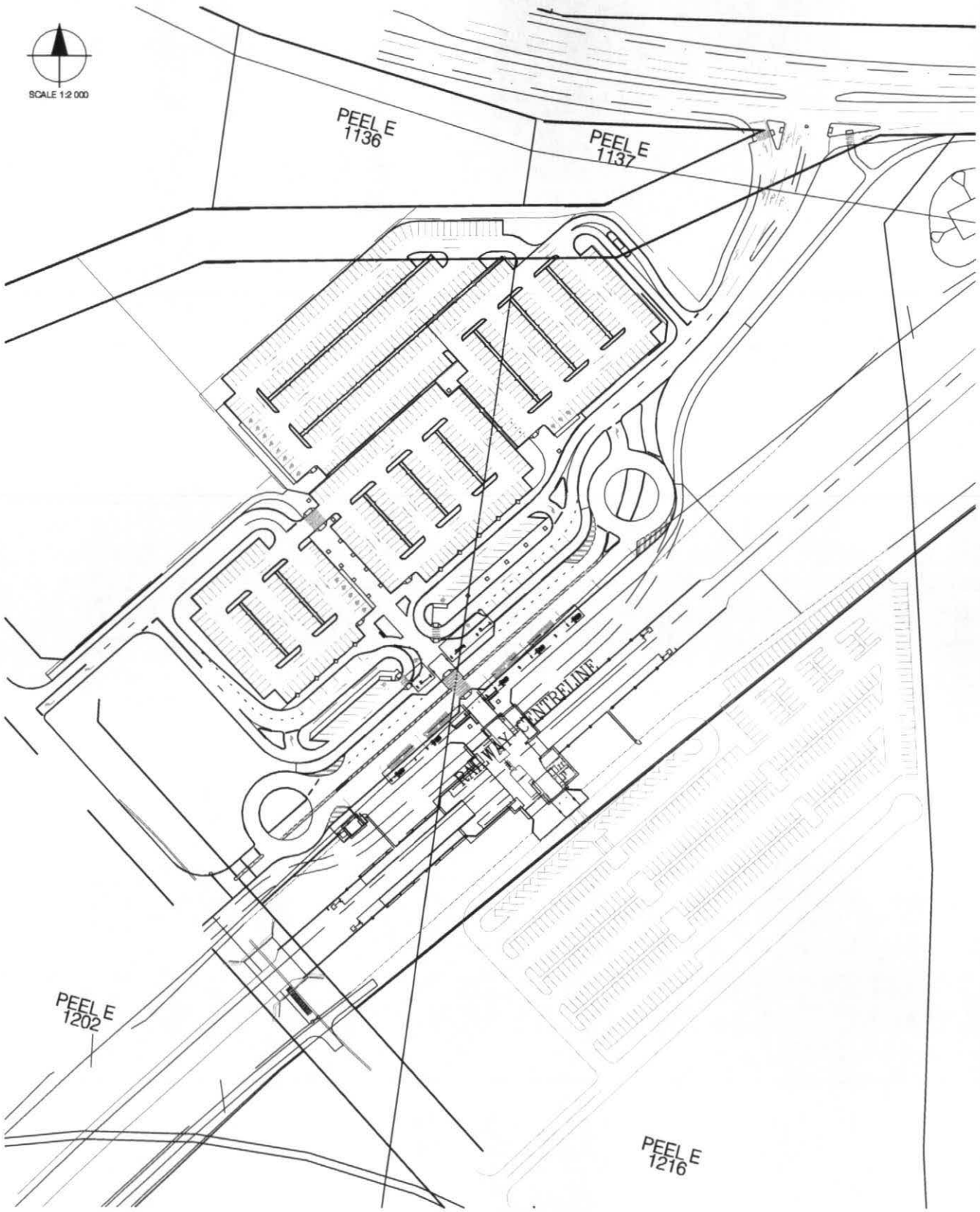
FIGURE 6



DEDICATION OF ROAD RESERVES

SOURCE: 572-112d, (28.08.08)

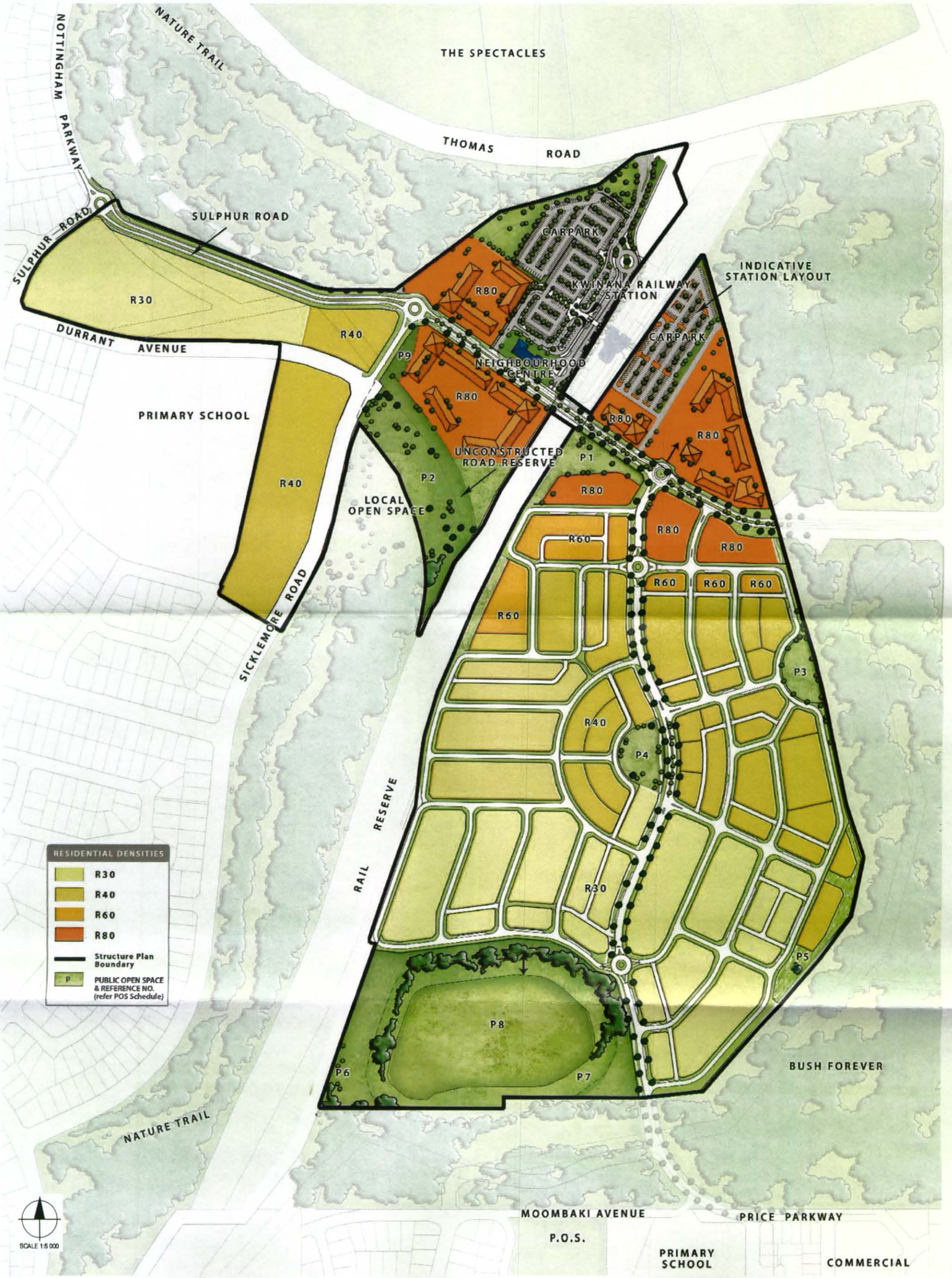
FIGURE 7



INDICATIVE THOMAS ROAD TRAIN STATION DESIGN

SOURCE: 572-119

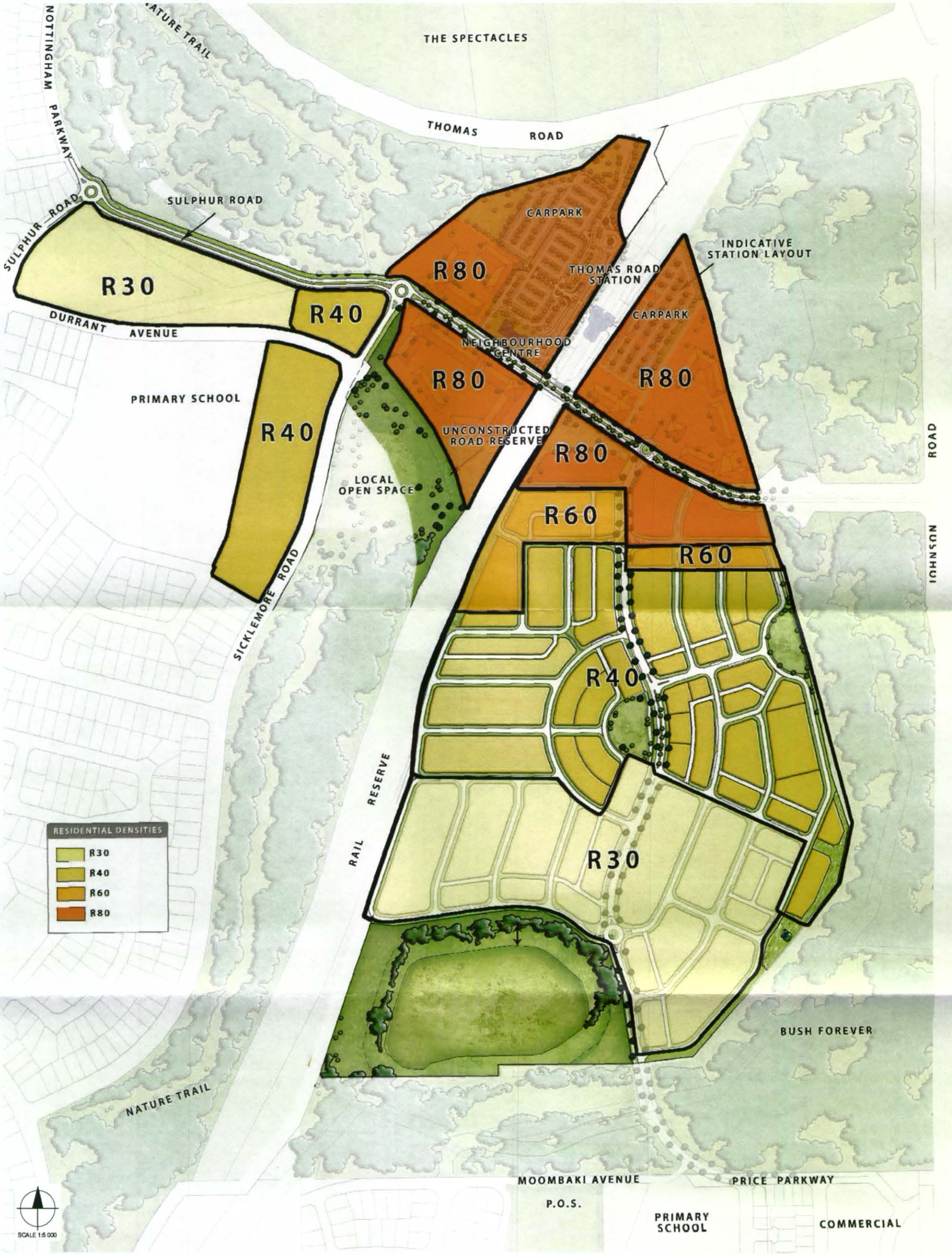
FIGURE 8



BERTRAM STRUCTURE PLAN

SOURCE: 572-109h (28.08.08)

FIGURE 9



RESIDENTIAL DENSITY CODINGS

SOURCE: 572-120d, (28.08.08)

FIGURE 10

STANDARD LOT TYPE PROFILES

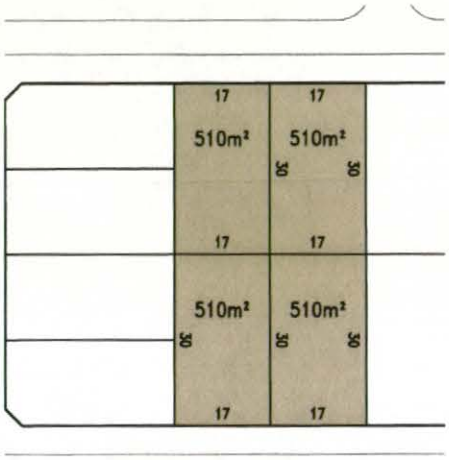
TRADITIONAL FAMILY (R30)

CHAPPELL LAMBERT EVERETT

TYPICAL LOT DIMENSIONS		
Width (m)	Depth (m)	Area (m^2)
16-17	30-32	480-544

R-CODE SETBACKS AT R30		
Primary (m)	Secondary (m)	Other (m)
4.0*	1.5	-
* Min. front setback for du of 2m with averaging.		

Standard Site Cover at R30	55%
Site Hectare Density	18du/ha
MAIN DESIRABLE R-CODE VARIATIONS	None



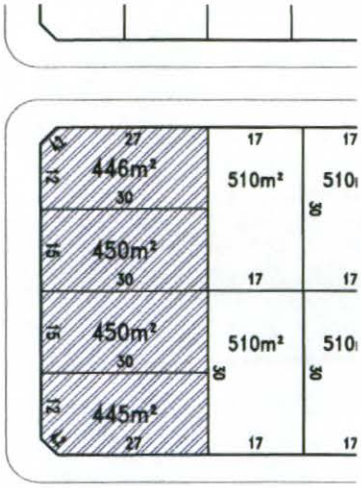
CONTEMPORARY LIFESTYLE (R30/R40)

CHAPPELL LAMBERT EVERETT

TYPICAL LOT DIMENSIONS		
Width (m)	Depth (m)	Area (m^2)
14-15	30-32	420-480*
* There are some duplex lots (over 440m^2 at R40 and over 600m^2 at R30)		

R-CODE SETBACKS AT R30/R40		
Primary (m)	Secondary (m)	Other (m)
4.0*	1.5	-
* Min. front setback for du of 2m with averaging.		

Standard Site Cover at R30/R40	55%
Site Hectare Density	21du/ha
MAIN DESIRABLE R-CODE VARIATIONS	None



NON LANEWAY BASED SMALL LOTS

VICTORIAN COTTAGE (R30/R40)

CHAPPELL LAMBERT EVERETT

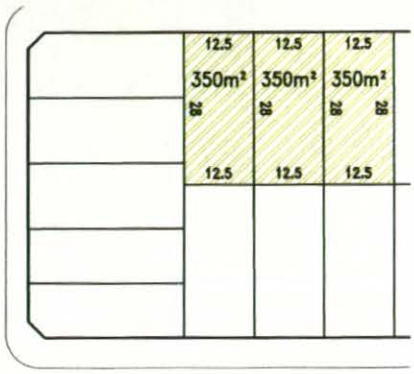
TYPICAL LOT DIMENSIONS		
Width (m)	Depth (m)	Area (m^2)
12-13	24-28	288-364*

* There are some duplex lots (over 440m^2 at R40 and over 600m^2 at R30)

STANDARD R-CODE SETBACKS AT R30/R40		
Primary (m)	Secondary (m)	Other (m)
4.0*	1.0/1.5	-

* Min. front setback of 2.0m for du with averaging.

Standard Site Cover at R30/R40	55%
Site Hectare Density	30du/ha



MAIN DESIRABLE R-CODE VARIATIONS

SETBACKS TO PRIMARY STREET		
	Min. (m)	Max. (m)
Dwelling	2.0	4.0
Verandah	1.5	3.0

SITE COVER INCREASE
70%

BOUNDARY WALLS		
	Max. Height	Max. Length
Single	3.5m	None
Double	6.5m	12m

LANEWAY BASED SMALL LOTS

STANDARD COTTAGE (R30/R40)

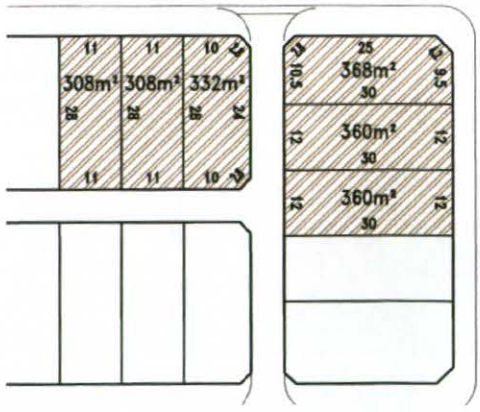
CHAPPELL LAMBERT EVERETT

TYPICAL LOT DIMENSIONS		
Width (m)	Depth (m)	Area (m^2)
11-12	28-32	336-400

STANDARD R-CODE SETBACKS AT R30/R40		
Primary (m)	Secondary (m)	Other (m)
4.0*	1.5	-

*Min. front setback of 2.0m for du with averaging.

Standard Site Cover at R30/R40	55%
Site Hectare Density	27.5du/ha



MAIN DESIRABLE R-CODE VARIATIONS

SETBACKS TO PRIMARY ST.	
Min. (m)	Max.(m)
1.5	3.0

SITE COVER INCREASE
70%
Solar Performance Based

LANEWAY BASED SMALL LOTS

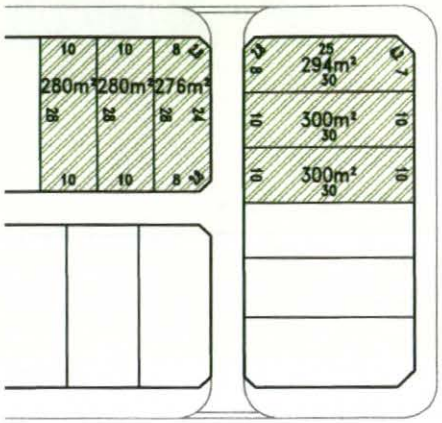
SMALL COTTAGE (R30/R40)

CHAPPELL LAMBERT EVERETT

TYPICAL LOT DIMENSIONS		
Width (m)	Depth (m)	Area (m^2)
10-11	28-30	280-330

STANDARD R-CODE SETBACKS AT R30/R40		
Primary (m)	Secondary (m)	Other (m)
4.0*	1.0/1.5	-
*Min. front setback of 2.0m for du with averaging.		

Standard Site Cover at R30/R40	55%
Site Hectare Density	35du/ha



MAIN DESIRABLE R-CODE VARIATIONS

SETBACKS TO PRIMARY ST.	
Min. (m)	Max. (m)
1.5	3.0

SITE COVER INCREASE
70%
Solar Performance Based

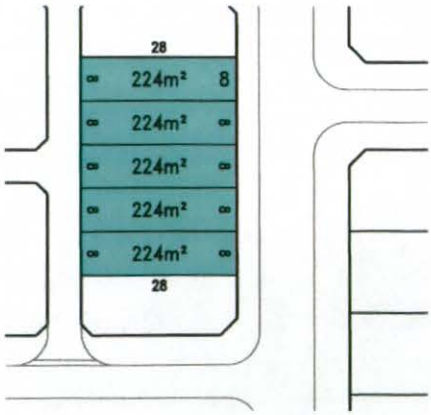
TERRACE (R40/R60)

CHAPPELL LAMBERT EVERETT

TYPICAL LOT DIMENSIONS		
Width (m)	Depth (m)	Area (m^2)
8 - 9	26-28	208-252

STANDARD R-CODE SETBACKS AT R40/R60		
Primary (m)	Secondary (m)	Other (m)
4.0*	1.0	-
*Min. front setback of 2.0m for du with averaging.		

Standard Site Cover at R40/R60	55%
Site Hectare Density	43du/ha



MAIN DESIRABLE R-CODE VARIATIONS

SETBACKS TO PRIMARY ST.		
	Min. (m)	Max. (m)
Dwelling	2.0	4.0
Verandah	1.5	3.0

SITE COVER INCREASE
75%

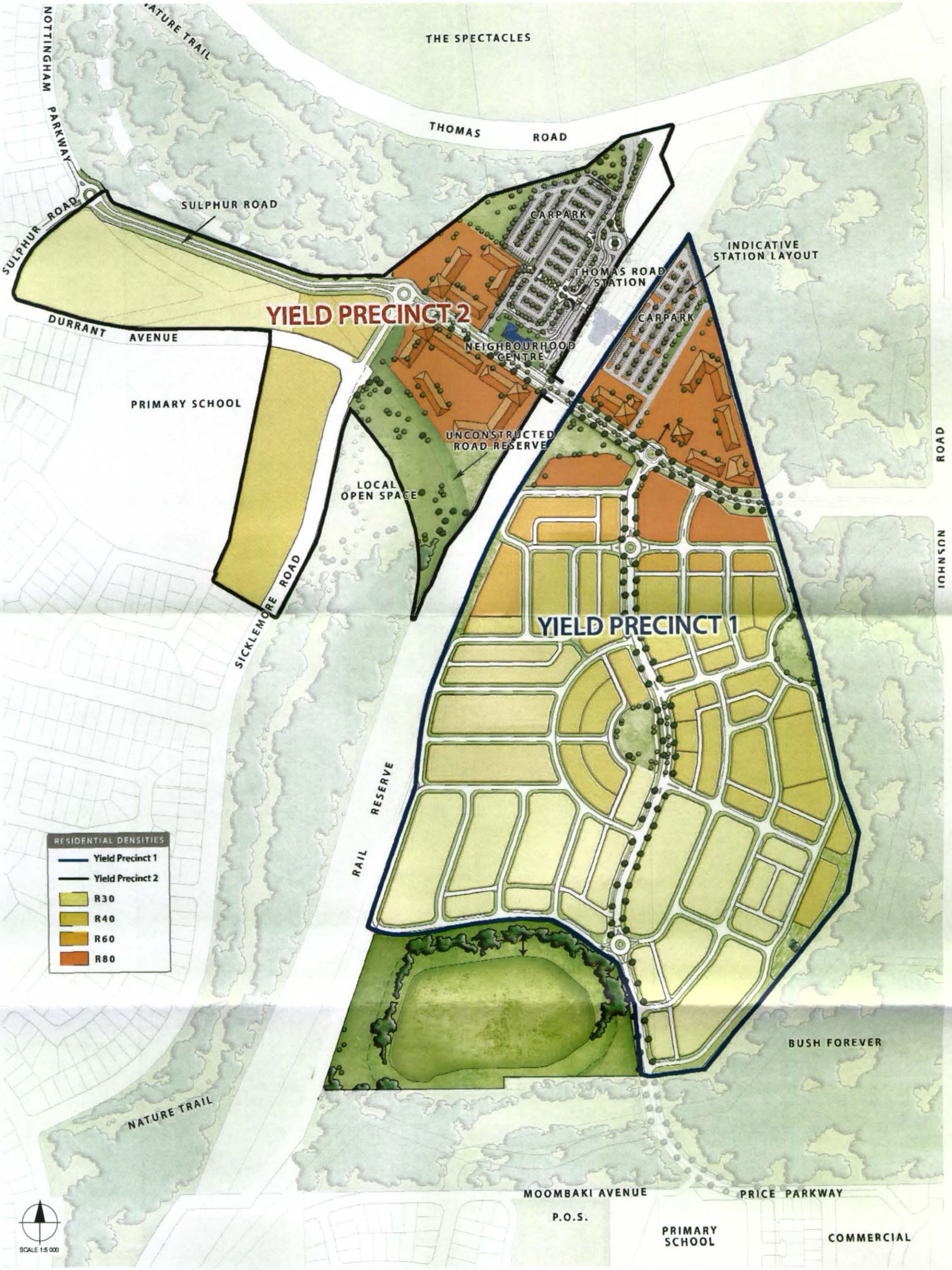
BOUNDARY WALLS TO BOTH SIDES		
	Max. Height	Max. Length
Single	3.5m	None
Double	6.5m	12m

LAND USE SCHEDULE		
	Lot Yield	Area (Ha)
Station Superlots	3	12.6775
Rail Reserve	N/A	3.0703
R80 Superlots	3	1.5305
R60 Superlot	1	0.4020
R40 Gouped Housing	11	2.0497
Residential	317	N/A
TOTAL LOT YIELD	335	
P.O.S	N/A	1.6578

SOURCE: 572-126e

PROPOSED PLAN OF SUBDIVISION (WAPC: 132639)
LOTS 1201, 1202 & 1216 BERTRAM

FIGURE 12



YIELD PRECINCT PLAN

SOURCE: 572-121c (28.08.08)

FIGURE 13

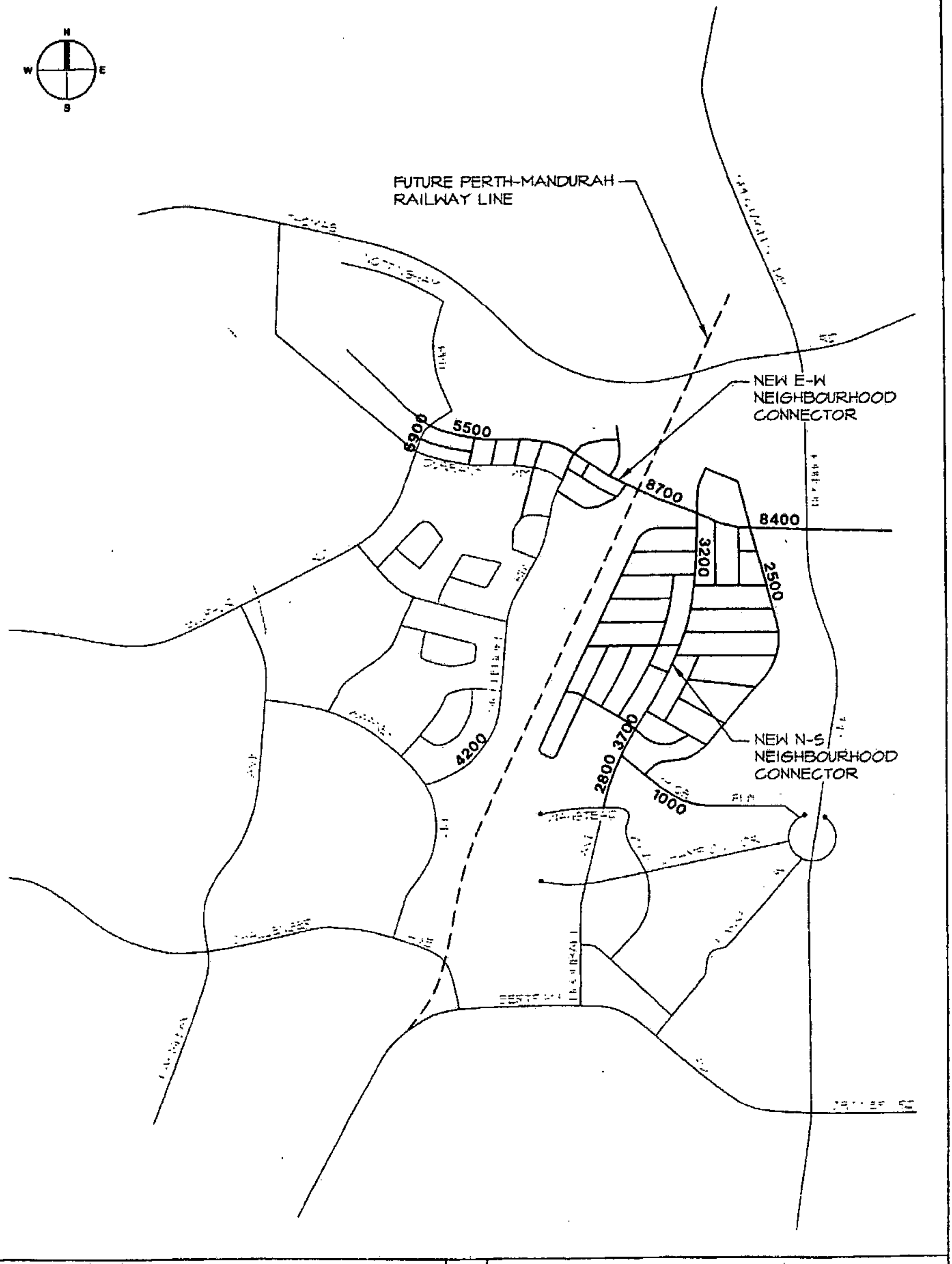
APPENDICES

APPENDIX ONE

Drainage & Bulk Earthworks Strategy

APPENDIX TWO

Transport Planning Report Appendices



ORIGINAL A4

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PROJECT: THOMAS ROAD RAILWAY STATION PRECINCT TRAFFIC IMPACT STUDY

DRAWING TITLE: PREDICTED TRAFFIC VOLUMES (2021 AANT) EMME/2

PRINCIPAL: SATTERLY REAL ESTATE

BSD CONSULTANTS

CONSULTING ENGINEERS
TOWN PLANNERS
PROJECT MANAGERS
ENVIRONMENTAL CONSULTANTS

Date 08.08.03		Scale	N.T.S.
Designed		Checked	
Drawn SP		Approved	
Local Authority TOWN OF KWINANA		Sheet	Of
Project Number T03006	Drawing Number T454-02		Revision

APPENDIX THREE

Ethnographic Search

Department of Indigenous Affairs
Government of Western Australia

REGISTER OF ABORIGINAL SITES

Reference No: RPGSR 170927

Search Criteria
Local Government Area: KWINANA

Disclaimer

Aboriginal sites exist that are not recorded on the Sites Register, and some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA protects all Aboriginal sites in Western Australia whether or not they are registered.

Legend

Restriction	Status	Access
N No Restriction	I Interim Register	C Closed
M Male Access Only	P Permanent Register	O Open
F Female Access Only	S Stored Data	V Vulnerable

Index coordinates are indicative locations and may not necessarily represent the centre of sites, especially for sites with an access code "closed" or "vulnerable". Map coordinates (Lat/Long) and (Easting/Northing) are based on the GDA 94 datum. The Easting / Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '5000000:Z50' means Easting=5000000, Zone=50.

Reliable – The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.
Unreliable – The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
3427	I	O	N	MANDOGALUP SWAMP/SPECTACLES.	Mythological	Hunting Place, Water Source	*Registered Informant names available from DIA.	-32.2014 S / 115.8486 E, 391479mE 6436664mN Zone 50 [Unreliable]	S02729
3534	P	O	N	SLOANS RESERVE ARTEFACTS.	Artefacts / Scatter	(Archeological Deposit), [Other: ?]	*Registered Informant names available from DIA.	-32.2588 S / 115.8021 E, 387164mE 6430249mN Zone 50 [Reliable]	S02546
3554	S	O	N	WOOLCOOT ROAD SWAMP.	Artefacts / Scatter	(Camp), [Other: ?]		-32.2658 S / 115.8574 E, 392389mE 6429529mN Zone 50 [Reliable]	S02437
3555	S	O	N	TREEBY ROAD LAKE.	Artefacts / Scatter	(Camp), [Other: ?]		-32.2222 S / 115.8547 E, 392075mE 6434365mN Zone 50 [Reliable]	S02438

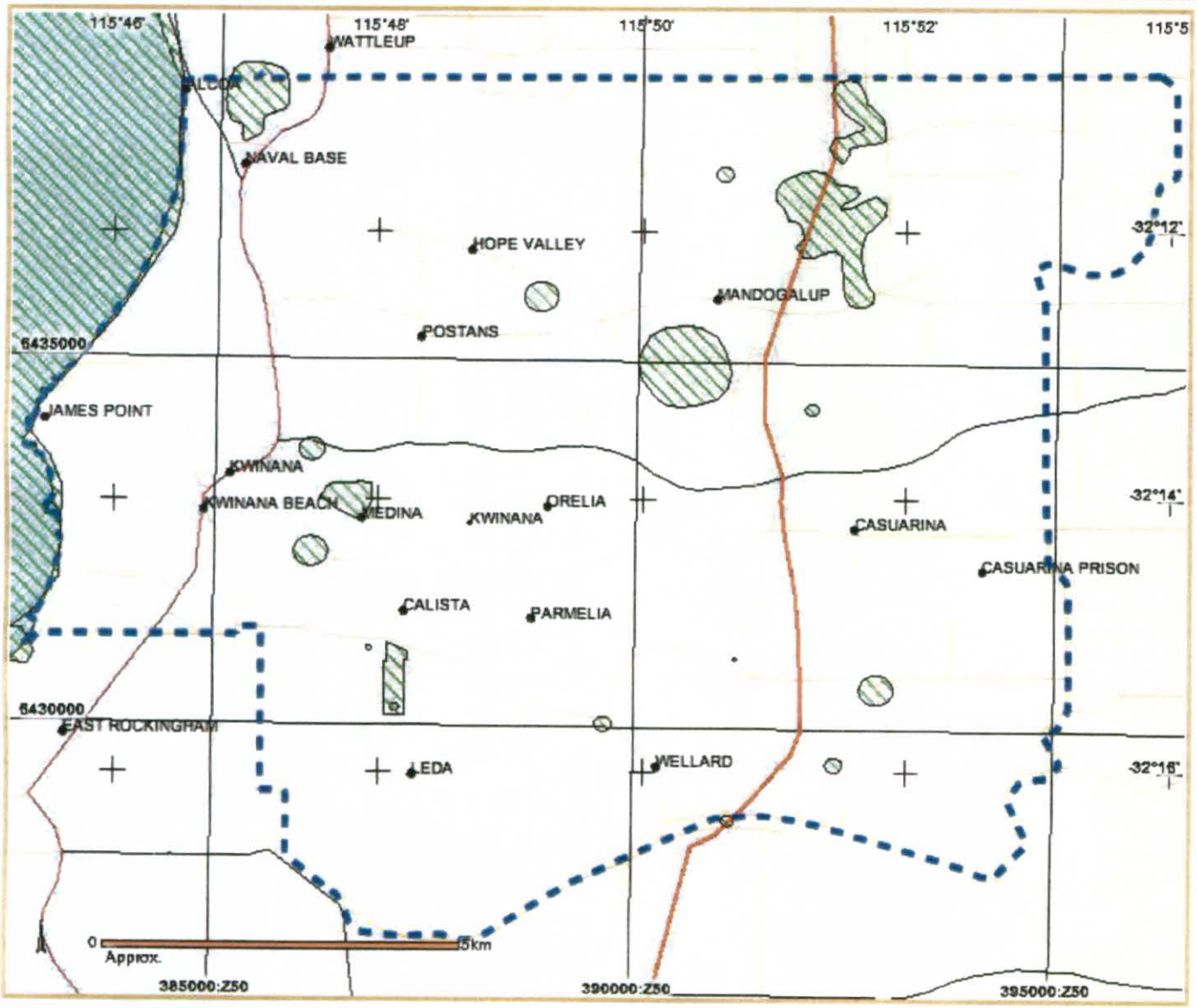
Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
3568	P	O	N	WALLY'S CAMP.		Camp		-32.2727 S / 115.8441 E, 391139mE 6428749mN Zone 50 [Reliable]	S02491
3627	S	O	N	MORTIMER/WOOLCOOT, WELLARD	Artefacts / Scatter			-32.2566 S / 115.8629 E, 392889mE 6430549mN Zone 50 [Reliable]	S02306
3646	I	O	N	BELLWAY SAND QUARRY,WELLARD	Artefacts / Scatter			-32.2529 S / 115.8449 E, 391196mE 6430948mN Zone 50 [Unreliable]	S02327
3698	S	O	N	CHALK HILL CAMPS.		Camp	*Registered Informant names available from DIA.	-32.2397 S / 115.7914 E, 386139mE 6432349mN Zone 50 [Reliable]	S02260
3710	P	O	N	THOMAS OVAL.		Camp	*Registered Informant names available from DIA.	-32.2335 S / 115.7959 E, 386555mE 6433050mN Zone 50 [Reliable]	S02210
3711	S	O	N	SLOANS RESERVE.		Camp, Hunting Place	*Registered Informant names available from DIA.	-32.2554 S / 115.8022 E, 387172mE 6430624mN Zone 50 [Reliable]	S02211
3776	S	O	N	INDIAN OCEAN	Mythological		*Registered Informant names available from DIA.	-32.12 S / 115.6511 E, 372747mE 6445465mN Zone 50 [Reliable]	S02169
4148	S	O	N	NATGAS 127	Artefacts / Scatter			-32.2271 S / 115.7916 E, 386139mE 6433749mN Zone 50 [Reliable]	S01266

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
4350	I	O	N	WELLARD/BERTRAM ROADS	Artefacts / Scatter			-32.2608 S / 115.8283 E, 389639mE 6430049mN Zone 50 [Unreliable]	S00760
4360	S	O	N	NORKETT ROAD	Artefacts / Scatter			-32.1929 S / 115.8435 E, 390989mE 6437599mN Zone 50 [Reliable]	S00772
17582	I	O	N	HOPE VALLEY TREES 1-12		[Other: SCARRED TREES?]		-32.2082 S / 115.8204 E, 388829mE 6435879mN Zone 50 [Reliable]	
20865	I	O	N	Mount Brown	Mythological		*Registered Informant names available from DIA.	-32.1839 S / 115.7846 E, 385421mE 6438536mN Zone 50 [Reliable]	
21148	I	O	N	Leda Isolated Finds		[Other: Isolated Artefacts]	*Registered Informant names available from DIA.	-32.2515 S / 115.7988 E, 386850mE 6431050mN Zone 50 [Unreliable]	

Department of Indigenous Affairs
Government of Western Australia

REGISTER OF ABORIGINAL SITES
SITE SEARCH MAP

WALIS



Legend

- Selected Site
- Town
- Map Area
- Search Area

17 Aboriginal Heritage Sites found in Local Government Area of KWINANA