BYFORD TOWNSITE

DETAILED AREA PLAN

Prepared for the Shire of Serpentine – Jarrahdale

by

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Landform Research

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EXECUTIVE SUMMARY

Byford has been identified by the State Government as an area capable of supporting considerable population growth as the Perth Metropolitan area grows over the next few decades. The area has been zoned to accommodate this under the Metropolitan Region Scheme (MRS) since 1994.

The Local Authority is required to bring its Town Planning Scheme into conformity with the MRS, which it has done. This has created subdivision and development opportunities for the affected properties. These properties are included in the Byford Structure Plan (BSP), which sets out broad development parameters. The BSP sets out that detail area plans are required prior to subdivision.

Due to the fragmented land ownership in the area of Byford east of the railway line, which makes co-ordinated subdivision and development difficult, Council has decided to prepare a Detailed Area Plan (DAP).

This DAP has been developed in consultation with the community through two public meetings and an open day as well as a questionnaire and comment forms.

This DAP is divided into two parts:

Part A – Background
Part B – Future Directions

Part A identifies issues affecting the area including its physical features and servicing.

Part B recognises the residential, commercial and industrial components of the area and provides a vision and objectives for each, developed through the community consultation process. It then divides each of those components into "Character Areas", which acknowledge the differences in character between the areas both in their existing form and in the manner in which they will be developed. Subdivision and development guidelines are then provided for each Character Area.

Infrastructure doesn't necessarily follow the same boundaries as the Character Area, but without it subdivision and development cannot occur. The DAP describes the necessary infrastructure and how it will be applied.

Overall, the DAP is a document that acknowledges the existing character of Byford. It provides a mechanism to enable subdivision and development in a co-ordinated manner and, as much as possible, in the spirit and character identified by the local community as important to them. At the same time, it accepts Byfords responsibility for its share of the growth of metropolitan Perth. In order to be successfully implemented, it will require co-operation between landowners and the community.

PART A – BACKGROUND

1. INTRODUCTION

Byford has been identified by the State Government as an area capable of supporting considerable population growth as the Perth Metropolitan area grows in the next few decades. The area has been zoned Urban and Urban Deferred under the Metropolitan Region Scheme (MRS) since 1994.

In order to provide a broad basis for co-ordinated land development in the Urban zoned area of Byford, the Shire of Serpentine-Jarrahdale commissioned the preparation of the Byford Structure Plan (BSP). This set down broad parameters, and some degree of detail, for future subdivision and development. It recommended, inter alia, the preparation of Detailed Area Plans for individual precincts as a basis for:

"1. Considering formal subdivision applications; and

2. Determining precinct level infrastructure cost sharing arrangements".

The BSP was adopted by the Shire of Serpentine Jarrahdale in 2003 and is awaiting final adoption by the WAPC.

A copy of the BSP (Plan) is provided at Plan A.

Statewest Surveying and Planning were commissioned in 2003 to head a team of consultants to prepare the Detail Area Plan for the Byford Townsite. (Refer Plan B)

2. PURPOSE

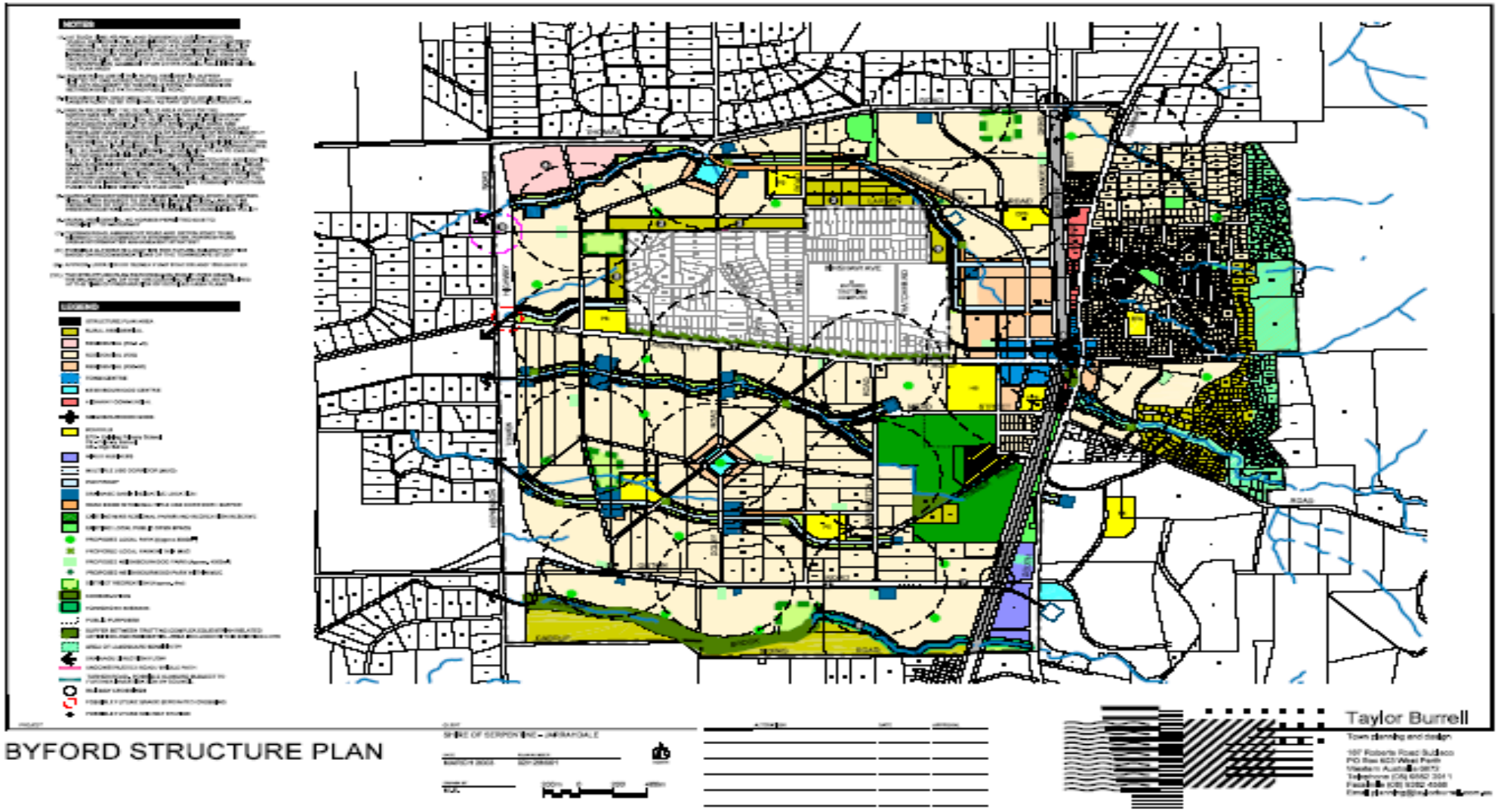
This Detailed Area Plan (DAP) will establish

a) guidelines for the subdivision of land;
b) guidelines for residential, commercial and light industrial development.

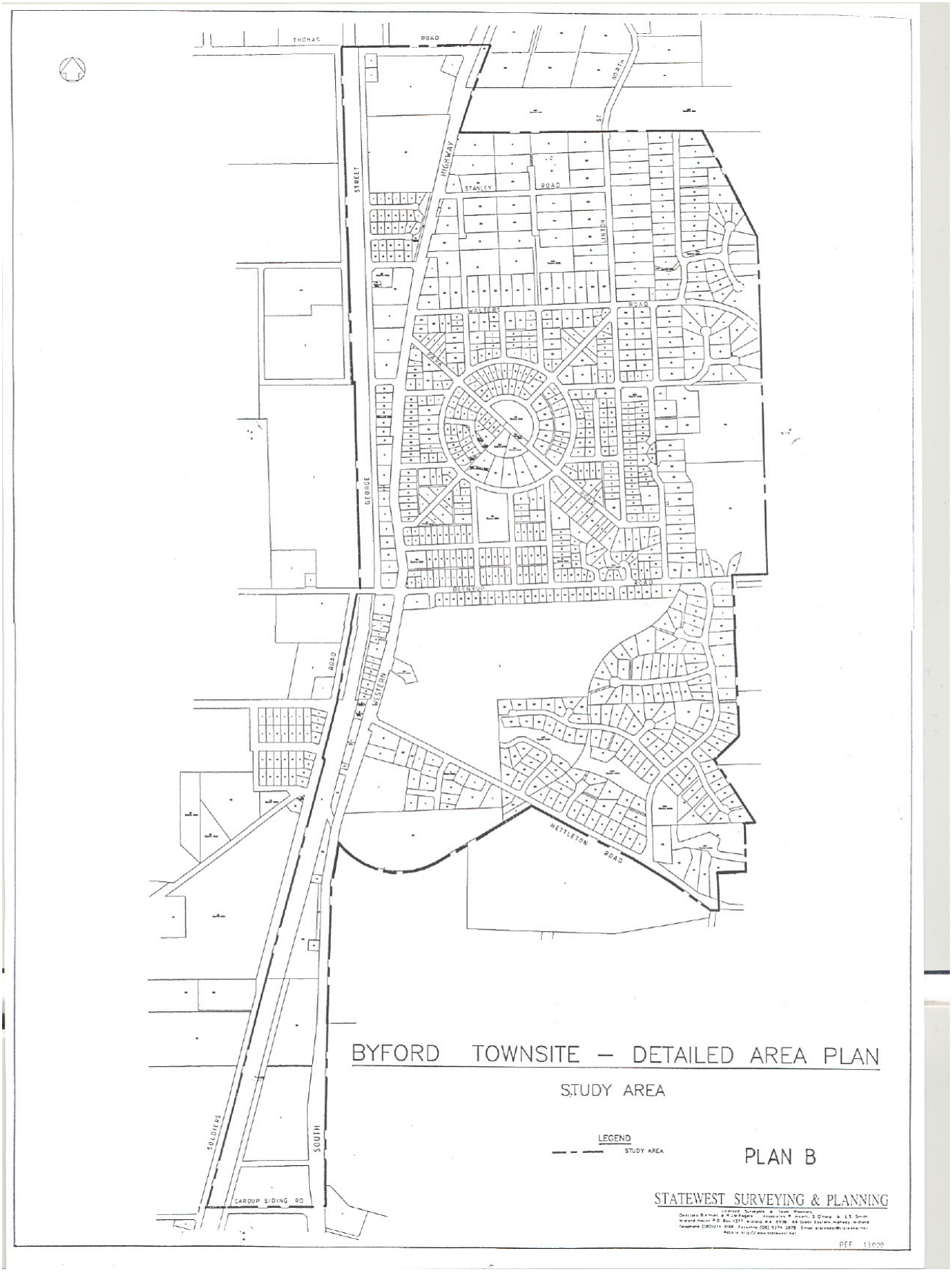
within that portion of the Byford Structure Plan area east of the railway line.

3. CONSULTATION

Consultation has taken place with both the community and the agencies servicing the area.



PLAN A


THOMAS
ROAD
NORTH
STREET
HIGHWAY
STANLEY
ROAD
UNION
WALTERS
ROAD
GEORGE
ROAD
ROAD
WESTERN
NETTLETON
ROAD
SOLDIERS
SOUTH
CARDUP SIDING RD
BYFORD TOWNSITE – DETAILED AREA PLAN
STUDY AREA
LEGEND
STUDY AREA
PLAN B
STATEWEST SURVEYING & PLANNING

Plan B

3.1. Community Consultation

Formal community consultation has been through a questionnaire sent out to all landowners within the study area and a community workshop held at the Byford and District Country Club on the 2nd March 2004.

The outcome from the questionnaire is collated at Appendix I. In addition to this, various landowners have contacted the consultants individually to express their views. Essentially these contacts have been to question the timing of subdivision and the form it will take.

Through undertaking this community consultation, it has been established that the residents of Byford are generally content with the lifestyle choice they have made. The feeling of a rural town with open spaces, peacefulness and natural features are positives. However, there is concern over the volume and nature of traffic on the South Western Highway, which separates the old townsite from the commercial area, poor drainage and lack of smaller properties to provide residents, particularly the elderly, with dwelling choice.

Further consultation occurred with a public meeting and open day in October 2004 where a draft DAP was discussed. The document was generally supported by the community with a number of suggestions incorporated in this document.

3.2. Service Agency Consultation

The project team consulted with Western Power, Water Corporation, Main Roads WA, Department for Planning and Infrastructure, Alinta Gas, Telstra and the Shire of Serpentine-Jarrahdale Council. The purpose of this consultation was to establish availability, access to, and standards of services to the DAP area.

In addition to this, specific questions were raised with Main Roads WA regarding the potential to reduce the traffic lanes on the South Western Highway through Byford townsite from 2 lanes each way to one lane each way. This was done in response to community concerns mentioned above and bearing in mind the extension of the Tonkin Highway (currently under construction to Thomas Road and planned thereafter to continue beyond the townsite). The response was non-committal, but didn't rule out the possibility. This is discussed later in this report.

The other service agencies advice on the availability of services is discussed in section 6.11 of this DAP. In essence, all services are available, although there will be some time delays in their provision to some properties due to the unco-ordinated development front that accompanies fragmented land ownership.

4. VISION

The Shire of Serpentine Jarrahdale has a vision, which states:

> "Our community values our rural character, diverse lifestyle, natural beauty and heritage and manages responsibly today for a better tomorrow".

The DAP area includes residential, commercial and industrial components. These areas will achieve their own vision, and this is discussed later in this DAP (Section 7). However, development within the DAP should also seek to achieve a broader vision that reflects the communities desires for this area and the changes that will occur in the future. These may be stated as follows:

> "Byford will be a distinctive community which celebrates its rural character, natural environment and lifestyle whilst providing sustainable recreational, commercial and lifestyle advantages for those who choose to live there."

5. OBJECTIVES

The directions taken out of this DAP need to be measured against the vision (above) and objectives. Listed below are General Objectives for the overall DAP. More detailed objectives relating the residential, commercial and industrial areas are provided later in this DAP (Section 7).

G1 To minimise the impact of subdivision and development on the existing character, natural environment and amenity of the area.

G2 To, as much as possible, enable individuals to subdivide and develop their land consistent with the principles of the Byford Structure Plan, with minimum reliance on other landowners.

G3 To ensure the provision of adequate infrastructure to each created lot.

G4 To create a sustainable community.

G5 To create a community where people feel safe and engage with each other.

G6 For subdivision and development in accordance with the Byford Structure Plan and the Byford Urban Stormwater Management Strategy to improve the visual quality of the area through good design, and protect and enhance the natural environment.

6. SITE DESCRIPTION & ANALYSIS

The study area comprises the eastern portion of the Byford Structure Plan area, as indicated on attached Plan B.

Existing characteristics of the site are as follows.

6.1 Climate

Current Situation

Climate consists of warm to hot dry summers and cool wet winters. Average summer maxima are near 31°C and winter minima are near 6°C. Rainfall average is near 975 mm, with 80% of the rain falling in the months May to September inclusive.

Winds are the main local impact. The closest recording station for wind is Perth Airport, which, although in a similar geomorphological location, is further from the Scarp than the study area. At Perth Airport summer prevailing winds at 9.00 am are easterly for 57% of the time. At 3.00 pm, winds are westerly to south westerly for 64% of the time. In winter the winds are lighter and more variable in direction.

Of local significance are the katabatic winds that blow from the Scarp on summer mornings. At Kelmscott the katabatic winds blow from midnight to midday, with the strongest winds between 4.00 and 6.00 am. Katabatic winds are strong and are commonly over 20 kph but can exceed 50 kph at Guildford (Mitchell 1979). Similar winds can be expected at Byford, based on local experience.

Accordingly the study area is characterised by hot dry summers with strong easterly winds in summer. The DAP should take this into consideration, particularly in the following ways.

Future Situation and Requirements

- Encourage insulation and energy efficient design to minimise impacts of the summers.
- Encourage non polluting and energy efficient winter heating.

6.2 Geomorphology

Current Situation

The area covered by the Byford Detailed Area Plan includes the foot of the Darling Scarp, where the Scarp begins to spread out through colluvial processes to form the Swan Coastal Plain.

The land surface therefore drops quickly from an elevation of 120 metres along the eastern edge of the study area to 80 metres at Linton Street and then gradually down to 55 to 60 metres at South West Highway.

Although the study area only contains the foot of the Darling Scarp, the Scarp itself provides a dominant and enduring visual backdrop.

Design and characteristics of the DAP should be cognisant of this, as follows.

Future Situation and Requirements

- Encourage any development on the Darling Scarp to be sympathetic to visual impact from size, form, light overspill and construction materials.

6.3 Geology

Current Situation

The study site straddles the faulted interface between sediments of the Perth Basin and the granite based Western Gneiss Terrane of the Darling Plateau. This interface was formed by the Darling Fault, which is the major geologic eastern edge of the rifted Perth Basin. In this location the depth of the north south fault together and sediments within the Perth Basin is in the order of 10 000 metres. The line of the Darling Fault has been plotted by geophysical methods as running almost through the centre of the study site.

The Darling Fault Zone commenced activity at least 2 600 million years ago (Wilde and Nelson 2001). At that time the land to the east that forms the Darling Plateau formed a mountain belt and the land to the west a deepening sedimentary basin. Sediments infilled the basin with the most locally significant being the Cardup Group of shales and sandstones, thought to be 550 to 735 million years old (Wilde and Nelson 2001). These shales and sandstones that now occur as a westwards dipping remnant on the east of the study area were mined for a source of brickmaking shale in the early part of the twentieth century.

Marine sediments of Mesozoic Age filled the Perth Basin up until about 70 million years ago when most activity stopped. These flat marine sediments formed the Swan Coastal Plain. From that time, clays and sands shed from the Darling Scarp were washed onto the edge of the Swan Coastal Plain forming the sandy clays of the Guildford Formation that form the sediments of the eastern Swan Coastal Plain. Piled along the eastern edge of the Swan Coastal Plain are sands of the Yogannup Formation, which forms the Ridge Hill Shelf and represent a coastal edge of a marine transgression during the last million years. These sediments contain bands of heavy titanium minerals.

In places, the Yogannup sands and other later coastal dune sands of the Bassendean Formation formed sand sheets and minor dunes.

During the Tertiary Period, and in more recent times, laterite developed across the landscape adding gravel and duricrust to the soil profiles.

Three holes have been drilled just outside the study area by the Water Corporation. One to the north, SW 54, which intersected 2 metres of gravely clay over 25.3 metres of silt. Two southern holes, SW 81 and SE 287, have been drilled outside the southern tip of the area. SE 287 intersected 9 metres of silt over 12 metres of clayey sand to a depth of 21 metres and then cut through sand to a depth of 29 metres. SW 81, just on the eastern side of South Western Highway at Cardup Brook, intersected 1.5 metres of gravel over 2 metres of clay and then silt and clay to 22 metres with sand between 22 and 30 metres, (Jordan 1986).

The geology of the site, together with the soils, will largely dictate stormwater management, vegetation and landscaping within the DAP, particularly in the following ways.

Future Situation and Requirements

- The geology influences the built environment in terms of stormwater management and soakage areas.

- Confined groundwater at depth is separated by silts and clays that provide good control against pollution risk.

- Brickmaking is part of the heritage of the area. The old shale pits at the base of the Scarp have heritage and conservation value. Management of these pits should consider the safety risks that may be present.

6.4 Soils

Current Situation

The soils of the study area are generally related to the Yogannup Formation on which they are developed, overprinted and influenced by colluvial and alluvial activity, which has brought weathered materials from the Darling Scarp (Refer Plan C).

The dominant soil types are gravely yellow clay sands, which occur across the majority of the site. Along the steeper eastern edge are brown gravely loam soils developed on the weathered granite basement. These gravels have been washed across the gravely clayey sands in the east at the base of the Scarp. Thin leached and grey to white surface sand forms thin localised sheets over the yellow clayey sand, for example around North and South Crescents.

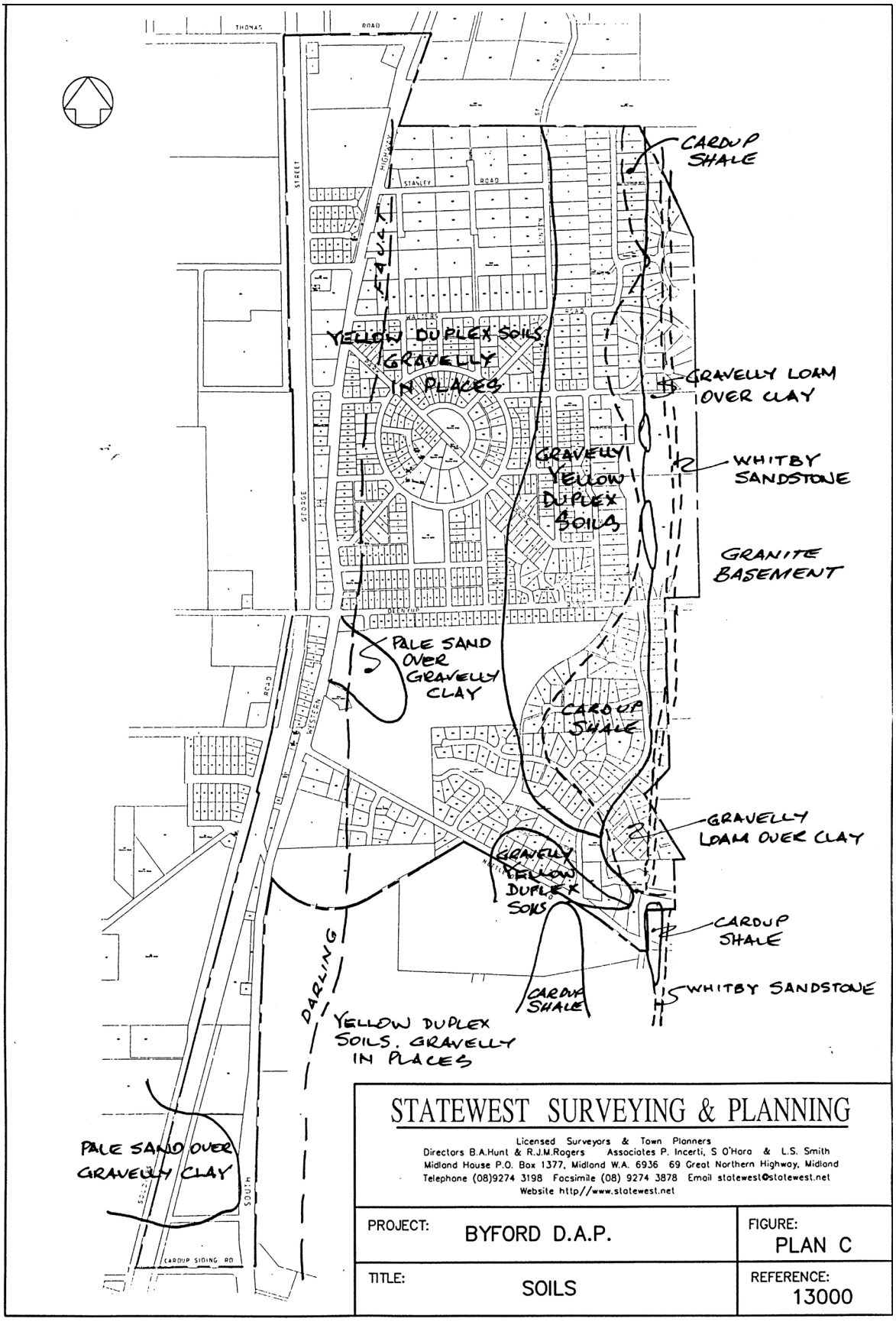
These soils are classified as F2b, Ridge Hill Shelf, "moderately deep to deep, gravely acidic yellow duplex soils and rare laterite" (Van Gool 1990). They are yellow and more sandy and gravely in the surface horizons, but more clayey at depth. In earlier times these soils have been excavated as a local source of gravel, such as in the south, to the west of South West Highway.

The eastern edge of the study area consists of gravely brown loam soils over lighter yellow brown and yellow clayey subsoils. Similar soils exist across the shales as a result of colluvial activity. These soils are moderate to steeply sloping.

To the south, along the eastern side of South West Highway there are patches of less well drained soils.

Soils of the Pinjarra Plain just touch the study area in the lower lying land south of Beenyup and Nettleton Roads and in the south, west of South West Highway.

These soils are Pinjarra Plain, P1e "shallow pale sand to sandy loam over gravely clay: moderately well drained" (Van Gool 1990). In part these soils have a small area that is poorly drained.


CARDUP SHALE
YELLOW DUPLEX SOILS GRAVELLY IN PLACES
GRAVELLY LOAM OVER CLAY
WHITBY SANDSTONE
GRAVELLY YELLOW DUPLEX SOILS
GRANITE BASEMENT
PALE SAND OVER GRAVELLY CLAY
CARDUP SHALE
GRAVELLY LOAM OVER CLAY
GRAVELLY YELLOW DUPLEX SOILS
CARDUP SHALE
WHITBY SANDSTONE
CARDUP SHALE
YELLOW DUPLEX SOILS, GRAVELLY IN PLACES
PALE SAND OVER GRAVELLY CLAY
THOMAS ROAD
STANLEY ROAD
GEORGE STREET
SOUTH WESTERN HIGHWAY
DARLING
CARDUP SIDING RD
STATEWEST SURVEYING & PLANNING
Licensed Surveyors & Town Planners
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PROJECT: BYFORD D.A.P.
FIGURE: PLAN C
TITLE: SOILS
REFERENCE: 13000

PLAN C

Surface water collects to form seasonally wet soils in several low areas east and west of South Western Highway in the south. Wet surface conditions can also occur on small locally less well drained sites south of Beenyup Road.

The soils of the site influence, vegetation and building within the DAP area and will need to be taken into account particularly as follows.

Future Situation and Requirements

- Soils influence the vegetation communities that naturally occur.
- Some soils are clayey with locally perched surface water in winter. The nature of these soils should be taken into account when undertaking earthworks and drainage.

6.5 Hydrology

Current Situation

- *Surface Water*

A number of small creeks drain across the site from the Scarp, petering out in sands on the Swan Coastal Plan. The most significant of these is Cardup Brook that touches the southern edge of the site. Beenyup Brook drains through the central south, and two small creeklines drain across northern parts.

Creek through northern section of DAP area.

Each of these creeks has an incised bed that is cut up to several metres below the surrounding land surface.

Generally, flows in the creeks only occur in winter and following response to storm events. At the time of the site inspection, all creeks were flowing following rain. Salinity levels in the creeks at the end of winter were low at 220 - 275 mg/L, which is fresh water.

Beenyup and Cardup Brooks have linkages to the west through constructed drains. These watercourses eventually end up in the Serpentine River System which links to the Peel

Harvey Estuary. The Peel Harvey Estuary has been subject to the development of summer algal blooms due to heavy inputs of phosphate.

A number of documents relate to the management of nutrients entering the Peel Harvey Estuary. Department of Environment protection policy – "Peel Harvey Estuary" and Department of Planning and Infrastructure Statement of Planning Policy 2.1 - "The Peel-Harvey Coastal Plain Catchment" were developed to limit the flow of phosphorous and other nutrients to the Estuary. Whilst nutrients have historically come from superphosphate and other fertiliser applications on leached sands of the catchment, there is potential for nutrients from gardens to eventually find their way into watercourses from stormwater runoff.

The soils on site are earthy sands and clays with inherently high phosphate retaining characteristics. However stormwater that does not access or provide sufficient contact time with the soils may not have all the phosphate stripped from the water. Nitrates, although less of a potential problem to waterbodies, can influence the development of algal blooms. These are normally denitrified under anoxic conditions within soils during slow overland flow or adsorption into soils.

The "Byford Urban Stormwater Management Strategy", produced by Parsons Brinckerhoff, seeks to maintain post development stormwater volumes and nutrient levels of predevelopment levels. This can be undertaken by stormwater management design that utilises shallow detention basins, filter strips, vegetated wetlands and channels. The aim therefore is to retain stormwater on site for as along as possible to enable denitrification and adsorption of phosphate. The best means of achieving this is through shallow detention basins. The scope for these measures may be limited in some cases by the incised nature of the watercourses and a lack of suitable areas for detention basins and other water management features as the proportion of built up area increases. The Rainforest area in the 'Old Quarter' is a good example of an established water sensitive design treatment.

Normally as an area is developed and the proportion of hard surface increases, the stormwater runoff increases. On the other hand, as lots become smaller and the proportion of pasture, lawn and garden decreases, the potential for nutrient input reduces. The increased stormwater runoff also leads to dilution and reductions in the overall concentration of nutrients.

The presence of compacted and clay soils reduces the potential for infiltration of surface water and it currently congregates in some areas. The land capability of these areas can be improved through the use of correctly designed drainage, which incorporates surface water detention facilities.

Surface water collects in several low areas east and west of South Western Highway in the south and a small dam lies near the rail line. Local perching of surface water occurs following heavy rainfall events in these lower lying localised areas.

The two old quarries at the foot of the Scarp are filled with water and provide conservation value.

- *Groundwater*

The presence of silt and clay at depth under the site, as intersected by the three drill holes described in 6.3, is likely to reduce the potential for groundwater, although the sand intersected in the southern holes at depths of 21 and 22 metres will form an aquifer. Water quality is not known but is likely to be suitable for gardens.

Depth to groundwater varies from 1 metre in SW 54 in the north to 4 metres in SE 287 and SW 81 in the south. Taylor Burrell - Kinhill, (2003) quoted Water Authority data as varying between 1 metre to 5.4 metres near Beenyup Brook.

It is not known whether these levels represent hydraulic heads, but based on the degree of incision by the creeks the water is likely to have some hydraulic head.

The sediments of the Ridge Hill Shelf, Guildford Formation and the upper Mesozoic sediments of the Perth Basin have high proportions of silts and clays, which provide for reduced vertical infiltration rates. Separations of over 20 metres to the regional groundwater system will provide very effective protection to the confined aquifers. The risk of pollution of these confined aquifers is therefore low.

There is infiltration and vertical leakage of surface water to the west of the DAP area on the eastern edge of the Swan Coastal Plain. As this infiltration originates as surface water, the main management required within the study area is management of the surface water systems as follows.

Future Situation and Requirements

- Design of urban stormwater systems should be to the guidelines produced in the following documents.

  - *Byford Urban Stormwater Management Strategy,* Parsons Brinkerhoff, 2003 and associated guidelines adopted by Council.

  - *Stormwater Management Manual for Western Australia*, Department of Environment WA, 2004.

  - *Guidelines for Groundwater Protection in Australia*, ARMCANZ, ANZECC, September 1995.

  - Environmental Protection Authority Victoria/Melbourne Water, undated, *Urban Stormwater, Best Practice Environmental Management Guidelines.*

  - EPA Guidance Number 26, *Management of Surface Runoff from Industrial and Commercial Sites* (draft) 1999.

  - Engineers Australia 2003, *Australian Runoff Quality*, National Committee on Water Engineering.

  Where possible, this should include the use of grass filter strips, shallow detention basins, vegetated banks of watercourses and sediment and floating traps at commercial facilities and carparks.

- Public education on the use of fertilisers on gardens and lawns, combined with education on the need to minimise the risk of landholder disposal of water pollutants such as oils and solvents, is recommended.

6.6 Vegetation

Current Situation

The study site lies on the Ridge Hill Shelf. The width of the shelf and the unique soils mean that the indigenous vegetation communities that occur on the shelf are not common. In addition, most of the Shelf has been cleared and therefore any remaining remnant vegetation is highly significant. The vegetation complexes consist of a narrow band of Darling Scarp Complex along the eastern edge on the steeper slopes. On the yellow duplex soils is the Forrestfield Complex and on the heavier clay soils to the west and south is the Guildford Complex. Both the Forrestfield and Guildford Complexes are poorly reserved (refer plan D)

This vegetation is typified by that contained in the adjoining Brickwood Reserve that abuts the south western edge of the site. The Brickwood Reserve vegetation is listed as Bush Forever Site 321. Similar vegetation extends onto the study site between South Western Highway and the rail line, north of Cardup Brook, although some of this land is covered by pasture. The northern portion of this is now proposed to be listed as Bush Forever Site 350.

Brickwood Reserve was assessed by Keighery and Keighery (undated). It was found to contain a total of 309 taxa of which ninety two taxa were considered to be of special significance and five were Priority taxa. Brickwood Reserve is listed on the register of National Estate and is subject to protection under the Commonwealth Environment Protection and Biodiversity Act 1999.

Cardup Remnant Vegetation ("Cardup Nature Reserve"), in a similar geomorphological position to the south, was also assessed by Keighery and Keighery (undated). It contained 294 native taxa of which 58 were regarded as significant and included 4 Priority taxa. This is classified as Bush Forever Sites 271 and 352.

There is a former Rifle Range site and Regional Open Space on the northern edge of the DAP area. There is a walk trail across this land from the South-Western Highway to an observation area on the scarp. The POS east of Linton St, North is well vegetated and could provide a wildlife linkage to the old Rifle Range and the South-Western Highway. To complete this link, the old Rifle Range, which is largely pasture, would need to be rehabilitated.

A search of the CALM and WA Herbarium databases revealed that a total of 9 Priority species and 3 Declared Rare species listed below, occur in the general area. Most of these species are associated with wetlands and are most likely to occur in, or adjacent, to Brickwood Reserve outside of the study area. However, it is possible for some species, and even currently unrecorded species, to occur in other areas within the study area such as the John Crescent remnant.

Listed Declared Rare and Priority Species:

-	*Drosera occidentalis* subsp *occidentalis*	P4	
-	*Lambertia multiflora* var *darlingensis*		P3
-	*Schoenus pennisetis*		P1
-	*Thelymitra stellata*		R
-	*Trichocline* sp Treeton (BJ Keighery & N Gibson 564)		P2
-	*Acacia oncinophylla*		P2
-	*Aotus cordifolia*	P3	
-	*Centrolepis caespitosa*		R
-	*Dryandra kippistiana*		P3
-	*Johnsonia pubescens* subsp *cygnorum*		P2
-	*Synaphea odocoileops*		P1
-	*Verticordia plumosa* var *pleiobotrya*		R

The main remnant vegetation in the study area is between South Western Highway and the rail line in the south and around John Crescent in the centre of the site. In both areas the soils and vegetation have similarities to Brickwood Reserve.

- *Darling Scarp*

The Darling Scarp vegetation is typified by *Eucalyptus calophylla*

- *E. wandoo* Woodland to Forest.

The condition varies from Degraded to Excellent, depending on the level of past clearing. This vegetation is Darling Scarp Complex (Department of Conservation and Environment 1980).

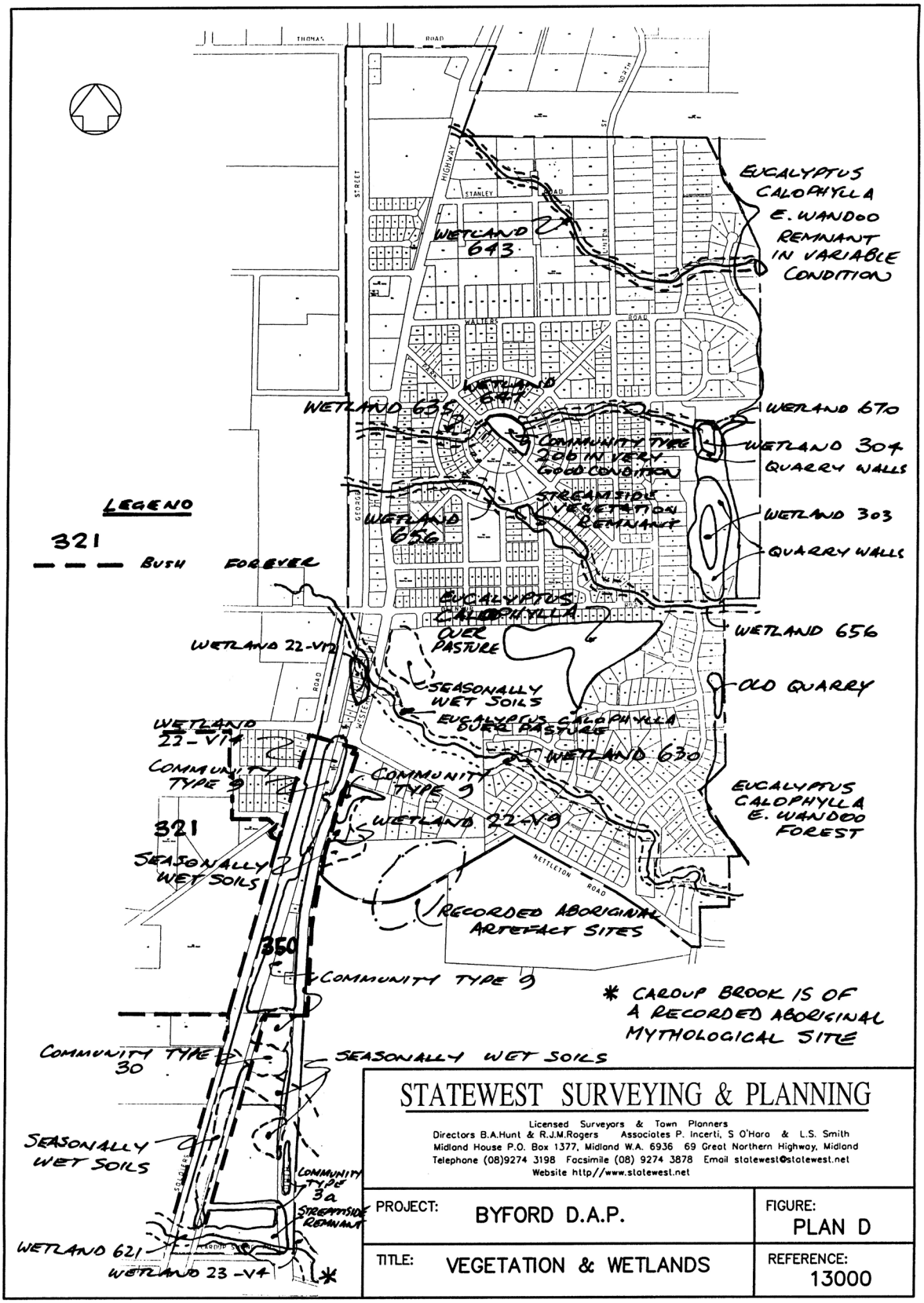
Weeds are present in some areas as edge effects and from garden escapes. Management of these areas should be to encourage the maintenance of local vegetation and trees whilst recognising the need for effective fire management.

Overall, the vegetation along the base of the Darling Scarp is in variable condition and is directly related to the length of settlement time and proximity to dwellings. The vegetation condition along the base of the Scarp in the north is of a lower quality than the vegetation in the south. The main means of improving vegetation quality in these areas is to encourage revegetation of cleared areas by local species to help crowd out and control weeds.

- *John Crescent*

The John Crescent remnant contains both a small sandy area and area of yellow duplex soils, which locally increase the diversity of the vegetation. The vegetation is dominated by *Eucalyptus calophylla* with some *Eucalyptus marginata* var *thalassica*, over a shrub layer containing *Acacia pulchella, Grevillea wilsonii, Allocasuarina humilis, Hibbertia hypericoides, Hypocalymma robustum, Hakea trifurcata, Bossiaea eriocarpa, Xanthorrhoea gracilis, Acacia lasiocarpa, Beckea camphorosmae, Eremaea pauciflora, Hakea ruscifolia, Hakea undulata, Petrophile striata* and *Hakea stenoptera.*

This vegetation is Community Type 20b, Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands. Community Type 20b is listed as Endangered (WAPC 2000).


THOMAS ROAD
HIGHWAY
STANLEY ROAD
WETLAND 643
EUCALYPTUS CALOPHYLLA E. WANDOO REMNANT IN VARIABLE CONDITION
WALTERS ROAD
WETLAND 644
WETLAND 635
WETLAND 670
COMMUNITY TYPE 3 206 M VERY GOOD CONDITION
WETLAND 304
QUARRY WALLS
LEGEND
321
BUSH FOREVER
STREAMSIDE VEGETATION REMNANT
WETLAND 656
WETLAND 303
QUARRY WALLS
EUCALYPTUS CALOPHYLLA OVER PASTURE
WETLAND 656
WETLAND 22-V12
SEASONALLY WET SOILS
OLD QUARRY
WETLAND 22-V14
COMMUNITY TYPE 3
EUCALYPTUS CALOPHYLLA OVER PASTURE
WETLAND 630
COMMUNITY TYPE 3
321
WETLAND 22-V9
EUCALYPTUS CALOPHYLLA E. WANDOO FOREST
SEASONALLY WET SOILS
NETTLETON ROAD
RECORDED ABORIGINAL ARTEFACT SITES
350
COMMUNITY TYPE 3
* CAROUP BROOK IS OF A RECORDED ABORIGINAL MYTHOLOGICAL SITE
COMMUNITY TYPE 30
SEASONALLY WET SOILS
SEASONALLY WET SOILS
COMMUNITY TYPE 3a
STREAMSIDE REMNANT
WETLAND 621
WETLAND 23 -V4
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Website http//www.statewest.net
PROJECT: BYFORD D.A.P.
FIGURE: PLAN D
TITLE: VEGETATION & WETLANDS
REFERENCE: 13000

PLAN D

The vegetation is in generally good condition but is subject to weed edge effects. Rehabilitation of the edges with local provenance species and weed control will assist in maintaining this remnant. Whilst some tracks are defined, there are several uncontrolled tracks that provide access for further damage to the vegetation and for the introduction of weeds. The eastern portion of the site is in degraded condition and is subject to significant weed load, and would benefit from rehabilitation.

This area contains the "Rainforest" which is a re-vegetated wetland environment established by the local community. It is an example of water sensitive design with 13,000 indigenous plants having been replanted over the last 10 years.

- *Cardup Brook*

The vegetation adjoining Cardup Brook is *Eucalyptus calophylla* woodland with understorey similar to parts of Brickwood Reserve and John Crescent and the water courses, but including *Kingia australis*, *Dryandra lindleyana* and *Nuytsia floribunda* of Community Type 3a.

The vegetation condition along Cardup Brook varies from fair, with a significant ground cover of pasture species in some areas, to good. More degraded areas could benefit from spray and replanting programs to crowd out undesirable species and provide better filtration effects and improvements as a vegetation corridor.

- *Adjacent to Brickwood Reserve.*

The vegetation adjacent to Brickwood Reserve is *Eucalyptus calophylla* woodland with some regrowth over an old gravel pit. Added in particular is *Melaleuca viminea*, which occurs in low areas and along the road reserve to the south. Wetland species increase to the west towards the rail reserve. The floristic community is 3a, *Eucalyptus calophylla - Kingia australis* woodlands on heavy soils. Community Type 3a is listed as Critically Endangered (WAPC 2000). Community Type 9 occurs on the wetter areas. Community Type 9 is the most northern representation of this vegetation and is therefore significant (WAPC 2000).

Whist the taxa were not assessed, it was noted that they were similar to those of the Brickwood Reserve.

This vegetation in the north lies on Vacant Crown Land and Reserve 23558. It will therefore most likely be retained within some type of conservation reservation. The vegetation area to the south lies on private land and has been predominantly cleared. Weed load is dependant on previous impacts and disturbance. For example Watsonia is common and is the dominant vegetation on some old gravel pits.

As the vegetation is similar to Brickwood Reserve, Bush Forever Site 321, it should be rehabilitated and maintained in a manner to protect and maintain the biodiversity values. The use of local provenance species is recommended with control being undertaken for weeds. Degraded and cleared areas such as the old gravel pit will benefit from deep

ripping and revegetation. The introduction of topsoil to assist this process is not recommended because of the probable weed load that will be introduced.

- *Water Courses*

The watercourses and banks of the creeklines are largely cleared and incorporated into gardens, including the planting of exotic species. However, in some small areas some of the indigenous trees and vegetation remain. This consists largely of *Eucalyptus calophylla* and *E. wandoo* on the upper slopes over taller shrubs of *Hakea trifurcata, Viminaria juncea, Darwin citriodora, Trymalium globulosum*, and *Acacia extensa*. Further west *Eucalyptus patens* and *Eucalyptus rudis* are added to the vegetation, but there becomes an absence of understorey. Further west the dominant tree species is *Eucalyptus calophylla*.

Creek through private property

The best riverine vegetation in the study area is south of South Crescent and along Cardup Brook in the south. This is listed in Bush Forever Site 271 and partially listed as an EPP Wetland.

Vegetation along Beenyup Brook is mainly restricted to scattered trees of *Eucalyptus calophylla.*

The degraded areas of stream side vegetation should be rehabilitated with local provenance species to enhance their surface water filtering capacity and their ability to act as wildlife corridors.

- *Wetlands*

The main wetlands in the study are the water courses which are listed by Hill et al 1996 as sites 643, 647, 635, 22-V12 and 630 (refer plan D).

Sites 22-V9 and 22-V14 are associated with wetland vegetation south of Nettleton Road next to South Western Highway. Wetlands 62 and 23-V1 are associated with Cardup Brook. Whilst these vegetated sites are classified as Conservation Category wetlands, they are coincident with the remnant vegetation.

Wetland 22-V9 refers to a small piece of remnant vegetation between the industrial land and South Western Highway. It appears to have developed as a result of restricted drainage and changes to surface water flows that have resulted in increases in the natural germination of wet site species in recent years. The site has low significance as a wetland, but may be able to be incorporated into some form of stormwater management.

The wetlands of the Swan Coastal Plain have now been reassessed during mapping for the Draft Environmental Protection (Swan Coastal Plain Wetlands) Policy and Regulations, EPA, 2004. This mapping has identified that only Wetlands 22-V12, 22-V14, 23-V2 and 23-V4 are worthy of being classified as wetlands under EPP 2004.

These wetlands are associated with the vegetation to the east of Bush Forever Sites 321, proposed Site 350 and Cardup Brook in the south, Site 271.

The vegetation of the majority of the watercourses is listed above under Watercourses. Vegetation in the south is typified by *Melaleuca viminea* and *Viminaria juncea*.

The two old shale quarries on the base of the Scarp carry permanent water and have some conservation value but are not now listed as wetlands under the EPP Policy. Management of these quarries will largely depend on the landholders because they are on private land.

- *Weeds*

The incidence of weeds is discussed above under individual sites. The most common source of weeds is from garden rubbish dumped in adjoining or nearby vegetation.

As a rule no plant, soil or fill material should be introduced to a revegetation site unless it is weed free. Illegal dumping of rubbish should be controlled and any rubbish noticed should be removed promptly.

Any Declared or Environmental weeds should be treated promptly no matter how few there are, working from the least weed affected areas to the most weed affected.

The method of weed control will depend on the type of weed and could consist of grubbing out or spraying in a program developed for each site and species.

Ongoing weed monitoring and management is recommended for all parts of the DAP, currently, during development and in the future.

- *Dieback Disease*

Dieback refers to both *Phytophthora* and other plant diseases that could impact on the remnant vegetation. It can be expected that disturbed areas will have a high chance of being affected by *Phytophthora* even if symptoms are not readily obvious. Dieback diseases commonly spread through the movement of plant spores on earth moving equipment and from garden contamination through the movement of soil. One of the most common methods of spread is from garden clippings.

This is another reason why topsoils and other materials are not recommended to be introduced to the vegetation and wetlands to the east of Bush Forever Site 321 in the south.

Public education is one of the few management options available, and as a last resort treatment by Phosphorous acid. This method of treatment is appropriate for vegetation of high conservation value such as at John Crescent and adjacent to Bush Forever Site 321. Treatment should be conducted in liaison with CALM, which has expertise and experience in these treatments.

As a normal rule, no plant or soil materials that could be infected by dieback disease should be brought onto vegetated sites. In addition, vehicles and equipment to be used during land movement and reinstatement, should be clean and weed free. Any that might come from a dieback infected area will be washed down prior to leaving the infected site, using the procedures in CALM Guidelines for Dieback Management.

Monitoring and management of Dieback disease is recommended for the study area, with particular emphasis on the vegetation near Bush Forever Site 321 in the south, John Crescent and the base of the Darling Scarp.

The flora, vegetation communities and wetlands in the DAP area lie on part of the Ridge Hill Shelf land system. This system has been subjected to widespread clearing and, therefore, the remaining vegetation has high conservation value. The DAP can provide part of the framework to assist in preservation and restoration of the conservation values of the remaining Ridge Hill Vegetation contained on site, in the following ways in particular.

Future Situation and Requirements

- Vegetation of the Darling Scarp is in variable condition. In the north, the vegetation is in greater need of management by encouraging revegetation of cleared areas to local species. This should include weed control and the planting of local species to help crowd out and control weeds.

- The edges of the vegetation at John Crescent require weed control. Tracks through the vegetation should be closed and a boardwalk installed to allow viewing of wildflowers and the degraded eastern portion should be revegetated. Local provenance species should be planted combined with weed monitoring and control.

- Degraded areas of stream side vegetation should be rehabilitated with local provenance species.

- Degraded areas of wetlands should be rehabilitated with local provenance species. Weed monitoring and control should be maintained, particularly for Watsonia. Topsoil should not be introduced for rehabilitation unless weed free.

- Only the wetlands in the south and on Cardup Brook have been identified as worthy of classification under DEP's 'Swan Coastal Plains Wetlands'.

- Public education is required on the use of fertilisers on gardens and lawns, combined with education on the need to minimise the risk of landholder disposal of garden soils and plants.

- Ongoing monitoring for dieback diseases in remnant vegetation should occur and a control program should be designed and implemented if dieback diseases are detected. This particularly applies to the Bush Forever Site 321 in the south, John Crescent and the base of the Darling Scarp.

6.7 Fauna

Current Situation

A number of fauna surveys have been conducted in the local area and provide a good insight into the fauna that could be expected to occur. The surveys included vegetation immediately south west of the study area and extending into the DAP itself, fauna surveys for the Cardup Nature Reserve and Norman Road Bushland to the south west, and fauna studies associated with hard rock quarries on the Scarp two kilometres to the south. All these studies cover larger areas than the remnant vegetation on site and provide a better indication of the potential fauna than studies that might be undertaken within the DAP area.

A structured survey of the Brickwood Reserve, which adjoins the study area to the south west, by Harvey et al 1997 and Friend 1996, is quoted in WAPC 2000. These two studies revealed 28 species of bird, which included 1 category 1, 1 category 3 and 4 category 4 species including the Painted Button Quail. Other fauna identified were 2 native mammal species, one of which was the Quenda, 12 reptile species, and 5 species of amphibians.

At Cardup Reserve 1 km to the south west of the study area, 37 species of bird were recorded, 1 native mammal, 14 reptiles and 4 amphibians. The native mammal was the Quenda, a significant species. The nearby Norman Road Bushland when surveyed by Harvey et al 1997 (quoted in Bush Forever 2000), identified 20 species of bird, 3 native mammals, 11 reptile species and 4 amphibians. The native mammals included the significant Pygmy Possum and Mardo.

The local community advises that the old Rifle Range on the northern edge of the DAP is home to a mob of kangaroos and provides nesting for eagles. It appears no formal fauna study of this area has been carried out.

Fauna studies have been conducted for nearby hills quarries, eg Bowman Bishaw Gorham 1992 on a site on the Darling Scarp 3 kilometres to the south. Bowman Bishaw Gorham 1992, recorded 39 bird species, 6 native mammal species including the Brushtailed Possum, Echidna, Western Grey Kangaroo, two species of bat and the significant Quenda. They recorded 14 reptile species and 5 frog species. Similar numbers of mammals, retiles and amphibians were recorded at the site in 1998 by Crypto Environmental Consultants (unpublished report to WA Bluemetal), but only 24 species of bird were recorded possibly due to reduced observation time.

Several significant bird species including the Red Tailed Black Cockatoo, Carnaby's Cockatoo and Baudin's Cockatoo were observed in the studies. These and other bird species, including nesting eagles noted by residents of the area, can be expected to be itinerant visitors to the DAP study area.

It can be expected that the remnant vegetation habitats on site would carry less species but there is potential for significant species, particularly in the mammals such as the

Western Grey Kangaroo which is commonly seen. The Brushtail Possum and Echidna will occur on the base of the Scarp and possibly in the DAP area and the Quenda will most likely occur across the study area.

Provided the remnant vegetation habitats are preserved the impact on fauna through development of the area will probably be minimal, although additional pressure can be expected from the presence of dogs and cats.

The larger Western Grey Kangaroos that occur to the north of Nettleton Road will be displaced by development. As development proceeds they will be displaced to the Darling Scarp. This will be one of the unavoidable impacts of increased density of dwellings and urbanisation of current pasture land.

Accordingly the DAP should take the following into account.

Future Situation and Requirements

- Vegetation along the base of the Darling Scarp will be in greater need of management so as to protect fauna. This should occur by encouraging revegetation combined with weed control on cleared areas to local species.

- Maintenance and enhancement of remnant vegetation at John Crescent will assist fauna that occur.

- Fauna will benefit from revegetation of degraded areas of stream side vegetation which will act as east west corridor links.

- Rehabilitation and management of degraded areas will assist the maintenance of existing fauna.

- Staged development of pasture land to the north of Nettleton Road will assist in the Western Grey Kangaroos being able to relocate to the Darling Scarp.

- Public education on the need to restrain cats and dogs combined with education to make gardens bird, reptile and amphibian friendly would assist fauna in the DAP area. Quenda Bats and Brushtail Possums are likely to access larger gardens within the DAP area.

- Engage Serpentine Jarrahdale Land Care Centre and existing community groups in Byford in designing and implementing public education programmes.

6.8 Development and the Built Environment

Current Situation

The study area includes :

- retail, civic and commercial areas, which are predominantly located north of Abernethy Road/Beenyup Road, and which lie mostly to the west of South Western Highway;
- other scattered and mixed commercial, residential uses and vacant land to the north and south of this core, and located between the railway and the Highway;
- the industrial area south-east of the intersection of the Highway and Nettleton Road; and
- large areas of residential land – some still vacant – to the east of the Highway and bounded by the scarp lying to the east of the townsite.

The retail, civic and commercial areas contain an eclectic mix of low scale, low density development of varying age and building styles, with open areas of ground-level car parking surrounding most buildings. There is no distinctive Byford character or "theme" exhibited in the non-residential development, however, verandahs are a common element within the town centre.

The core commercial area contains the more intensive retail activities. Most development is located on the western side of the Highway, however, there is a small retail/commercial centre located on the opposite side of the Highway on the corner of Beenyup Road. To the north of, and immediately adjacent to, this centre, is a small "community focus" area centred on the existing hall, public toilets and park, known as the Byford Town Square.

The general commercial areas located to the north and south of the central core area contain less intensive commercial, and mostly non-retail uses, such as offices, consulting rooms, doctors' surgeries, showrooms etc. Some lots and premises are vacant. This area includes the area to the south of the tavern, and north of the Byford Hall/George Street, extending up to Larsen Road.

The residential built form character within the Byford townsite varies greatly, but can readily be segregated into the following definable areas :

(i) the old, established area to the east and north-east of the town's commercial centre, where lots are smaller and rear laneways are common;
(ii) the larger lots (most yet to be developed) north of Walters Road;
(iii) the existing dwellings and undeveloped residential land located on the west side of South Western Highway north of Larsen Road;
(iv) the hillside lots – mostly already developed - to the east of the townsite;
(v) the larger residential lots set in a new subdivision with a curvilinear road pattern located to the south-east of the town's commercial centre; and
(vi) the undeveloped land lying between area (v) and South Western Highway.

Most housing is modest, and single storey in character. However, where lots are larger and/or where blocks are elevated and views are available, dwellings tend to be newer, larger, and sometimes have two, and occasionally three, storeys/levels.

The original, simple dwellings in the central parts of the townsite contrast with the modern, larger dwellings having a more "suburban" character, which are being erected throughout the surrounding residential areas.

The town's built form elements are set in a landscape, which is semi-rural, with a strong treed character throughout, and a backdrop to the east created by the Darling Scarp.

Future Situation & Requirements

Central Retail Core Area

The retail core area has some expansion capacity available, and requires specific development and design guidelines aimed at providing :

- clear urban design principles;
- improved visual cohesion;
- less advertising signage clutter;
- improved pedestrian amenity, safety and security;
- improved vehicular access efficiency and safety;
- an improved visual aspect to George Street;
- opportunities for re-orientating some development to George Street in the future; and
- new dimensions to the critical mass of the town centre.

Other Commercial & Non-Residential Areas

These areas are presently underdeveloped, or yet to be developed, and also require development guidelines to assist in the formulation of appropriate new buildings and spaces, with safe and efficient access, and high visual quality.

Community Focus Area (Town Square)

The community focus area has traditionally provided a community facility for the Byford residents, and has been retained and enhanced through the development of a concept development plan based upon the recommendations of the Byford Townscape Study (2000).

The future use of the Byford Hall needs further consideration by Council.

Residentially-Zoned Areas

Development and design guidance is required for all new subdivisions and development of residentially-zoned land, aimed at reinforcing the strong sense of community that prevails amongst the town's inhabitants.

All new residential development in Byford should contribute positively to its existing semi-rural character, while at the same time acknowledge the community's aspirations to more contemporary built forms in appropriate areas.

All new residential development should :

- be visually compatible with its neighbours;
- contribute positively to the streetscape in which it sits;

- foster legibility, local identity and character;
- provide diversity, choice and variety in appropriate areas;
- be robust and flexible;
- incorporate passive energy conservation and building sustainability measures in design and construction;
- be sensitive to the land form and natural setting of the town, and respond appropriately to environmental features to reinforce the 'sense of place'; and
- be designed for surveillance and safety.

6.9 Public Open Space (POS)

Existing Public Open Space

Apart from the Darling Range Regional Park along the eastern edge of the site, accessible by a walk trail from Beenyup Road and another across the old Rifle Range just outside the northern edge of the DAP, there are several areas of existing POS within the townsite. The quality and context of these areas varies, with most having some open, roughly mown, grass, some play equipment and seating as well as retained or planted trees to provide shade. More description of these spaces follows.

Darling Range Regional Park

- *The 'Rain Forest'*

An interesting feature is the area known as the 'Rain-Forest'. This area is within part of the John Crescent POS reserve, which is referred to later in this section. It's uniqueness warrants its separate identification.

The 'Rain Forest'

This area was developed as part of a stormwater management programme by the Shire and the local community and comprises small constructed wetlands and associated planting, as well as pathways and bridges and solar lighting to those pathways.

- *Bowyer Place POS.*

This is a small public open space, partially hidden in a cul-de-sac and otherwise surrounded by residential properties. Although there are a number of fences demarking the private and public areas of land, there are also areas of indistinct boundaries between the two.

Bowyer Place POS

A creek runs through the place and, in winter, the ground adjacent to the creek is saturated. The creek can be seen emerging and running through private properties downstream.

The vegetation comprises mostly Marri and Jarrah with some other trees. Some planting has taken place of a few more trees, but this appears to have been unsuccessful. The site is mostly infested with weed grasses, which are maintained by slashing.

There are no facilities such as benches or other furniture.

The site is not really used for recreation purposes as it does not have an effective hinterland. This site should be developed as a wetland habitat.

- *Brown/Linton Streets and Stevenson Place POS*

This park is split in two by a deep channelled creek which has an earth/rock dam for detention purposes. There is a footbridge across the creek at the end of Linton Street (south), which is cul-de-sac.

Brown/Linton Streets & Stevenson Place POS – Footpath across the creek.

The park is edged by large logs laid on their side and between large Marri and other (non local) gums.

There are several bench seats in the park and, off the Linton Street side of the park, treated pine play equipment, some of which is in poor repair. There are steps from an adjacent garden onto the reserve. The section of the reserve off Linton Street is irrigated from mains supply, which due to water restrictions, is not being used at present. The reserve is comprised mostly of slashed grass.

Brown/Linton Streets and Stevenson Place POS

The stream has trees and shrubs on the steep embankments.

With the future redevelopment of Byford, this park could become an important area. It is not a large park, but refining and upgrading of the facilities would lend itself to more intensive use as surrounding residential density increases. The stream profile and edging would have to be addressed, as would the interface with adjacent properties.

- *John Crescent POS*

This is in the centre of the old Byford townsite and comprises a more comprehensive range of settings than do the other parks.

There is a natural bush remnant, some play equipment in a rough grass area and some sealed tennis courts alongside a rough gravel car park area adjacent to a childcare centre.

The play equipment is mostly treated pine, but there is some more recent 'off the shelf' equipment also incorporated. The area in which the play equipment sits is unirrigated grass with some tree cover.

The area of the 'Rain Forest', mentioned in the aforegoing, is adjacent to this POS. There are concrete pathways through the bush areas, extending into the 'Rain Forest' area and linking to adjacent surrounding paths. There are a number of other casual tracks through the bush area.

It is important that the integrity of the small bush reserve is maintained and enhanced, particularly as there is likely to be more pressure on it as surrounding housing densities increase. This can be achieved through the development of a comprehensive management plan of the area. This may include a programme involving local people in the development, management and upkeep of the bush setting inclusive of the 'Rain Forest', and of adjacent facilities.

A management plan should include control of access through landscape design, a weed management programme and information signage to enhance user and resident awareness of the qualities of the area.

- *Old Brickworks Road POS*

Extending from the eastern edge of the DAP area to the western end of Lazenby Drive, this POS contains Beenyup Brook and is comprised of mainly cleared land with some tree cover. It contains a walkway and an historic railway bridge at the end of Millbrace Glen.

- *Other Public Open Space Areas in Existing Byford*

Aside from the areas discussed in the aforegoing, there are other areas that can be construed as areas of public open space, but are not designated as such. Amongst these can be included the primary school site which contains a large oval or kick-about area and some peripherally placed exercise equipment (fitness circuit) in treated pine, underneath trees on the perimeter of the site.

The school oval is open to the public at present. This may change as development infill occurs and it should not therefore be regarded as potential public open space in the future, other than for visual purposes.

There is also a passive recreation area adjacent to the town hall at the corner of South-Western Highway and Clifton Street. It contains a memorial feature, grass, sand pit and childrens play equipment with mature indigenous trees.

Future Public Open Space Development and Requirements

As a general rule or principle, the development of Public Open Spaces must contribute to greater bio-diversity, habitat protection and enhancement to air and water quality.

All development proposals for POS are to be accompanied by a Landscape Plan prepared by a qualified and suitably experienced landscape architect. This is to include an arborist's report on existing trees and demonstrate how proposed landscaping will contribute to ecological sustainability. Management of construction impacts should also be addressed.

A key element of public open space in any new subdivision within the DAP should be the development of Multiple Use Corridors (MUC's). These will form the core from which most recreation and visual public space will evolve.

Constructed wetlands and associated drainage streams will be an integral part of the landscape fabric of the new subdivision developments and basically form the open space component of the new subdivisions.

The open space system will contain passive recreation components inclusive of lighting, seats, play equipment, pathways as well as some open grass areas for ball kicking and the like. These facilities may or may not be directly linked to wetland areas. If they are, there must be adequate physical protection of the wetland areas from invasion by weeds.

These MUC's, and associated areas, should have the following attributes:

- House elements of water sensitive urban design, including wetlands (basins, channels and flats).

- Habitat corridors linking the Darling Scarp to the greater Swan Coastal Plain.

- Public recreational and educational facilities and experiences.

6.10 Traffic

Current Traffic Regime

The main distributor road currently serving the area is the South Western Highway, traversing the study area in a north south direction.

From South Western Highway, the main connecting roads include, from north to south, Thomas, Stanley, Walters, Abernethy, Beenyup and Nettleton Roads with local access roads running off these.

The current condition of these roads is summarised below.

- Thomas Road reserve is 30m wide with an approximately 6.2 m wide pavement in relatively good condition with no kerb and open drains. The intersection with the South Western Highway consists of a short left turn slip lane and splitter island and an overtaking widening on South Western Highway for right turning movements into Thomas Road. This road width is narrow considering that the estimated traffic volume is greater than 3000 vehicles per day. Even with the current traffic volumes, this road should be upgraded to Neighbourhood Collector standard.

  There has been a degree of Council and community support for a round-a-bout at the intersection of Thomas Road and the South-Western Highway. MRWA have indicated to the Council that they do not feel this is a suitable intersection treatment. This should be re-visited after the Tonkin Highway/Orton Road extension has been resolved.

- Stanley Road reserve is 20m wide with an approximately 5m wide pavement in relatively poor condition. The intersection with the South Western Highway consists of a left turn slip lane into Stanley Road with a widening on the South Western Highway for a right hand turn into Stanley Road. The traffic volumes are estimated to be currently well under 3000 vehicles per day and therefore the road pavement width is currently adequate. Improved egress from Stanley Road onto the South-Western Highway should be addressed if the Highway remains dual carriageway and the Tonkin Highway extension to Orton Street does not occur.

- Walters Road reserve is 20m wide with an approximately 7m wide pavement in relatively good condition. The intersection with the South Western Highway consists of a left turn slip lane into Walters Road, with no other turning treatment other than an intersection median on Walters Road. The majority of the road is kerbed with an open drain on its north side. The traffic volumes are estimated to be currently under 3000 vehicles per day and therefore this road pavement width is currently adequate. Walters Road has t-junction deviations at the intersection of Williams and Lionel Streets which act to control the traffic speeds through these intersections and improve traffic safety. Improved egress form Walters Road onto

the South-Western Highway should be addressed if the Highway remains dual carriageway and the Tonkin Highway extension to Orton Street does not occur.

"T" intersection at Walters Road

- Abernethy Road reserve is 20m wide with an approximately 6m wide pavement in average condition. The intersection with the South Western Highway consists of a right turn slip lane from the South Western Highway into Abernethy Road and no left turn treatment from Abernethy Road. With the estimated existing traffic volumes of 3000 vehicles per day or under this road pavement width is currently adequate.

- Beenyup Road reserve is 20m wide with an approximately 6.5m wide pavement in relatively good condition. The intersection with the South Western Highway consists of a right turn slip lane from the South Western Highway into Beenyup Road and no other treatment other than the intersection median on Beenyup Road. The road is kerbed with piped drains from Bowyer Place to the South Western Highway. The remainder of the road is partially kerbed with open drains on both sides. Current traffic volumes are estimated to be under 3000 vehicles per day and therefore the road pavement width of 6.5m is currently adequate. Beeyup Road has raised platforms at the intersection of Mary Street, east of Catherine Street and east of Bradshaw Road. These act to control traffic speeds and improve traffic safety.

Beenyup Road looking west

- Nettleton Road reserve is 20m wide with an approximately 6m wide pavement in good condition. The intersection with the South Western Highway consists of a left turn slip lane with no other intersection treatment. The road is kerbed on the south side with open drains on both sides of the road. Current traffic volumes are estimated to be under 3000 vehicles per day and therefore the road pavement width of 6.5m is currently adequate.

Nettleton Road

Future Traffic Regime & Requirements

Tonkin Highway is to be extended from Albany Highway southward, and to the west of the study area along Hopkinson Road to eventually join South Western Highway immediately south of Jarrahdale Road. Refer to Main Roads Concept Plan on next page (Plan E).

PLAN E

Main Roads WA is currently extending the Tonkin Highway from Albany Highway to Thomas Road. This is expected to be completed in 2006. The timing for the remainder of the extension is yet to be confirmed.

Future links from Tonkin Highway to South Western Highway, as it traverses the site, are Thomas and Orton Roads (Orton Road will be extended from Warrington Road to meet the South Western Highway). Refer to Byford Structure Plan at Plan A.

Current and projected traffic data from Main Roads WA for the South Western Highway and the proposed Tonkin Highway is summarised as follows:

Road Name	**Location**	**Current traffic volume (as at 1998 in vpd)**		**Projected traffic volume (as at 2031 in vpd)**	
		Northbound	**Southbound**	**Northbound**	**Southbound**
South Western Highway	South of Thomas Road, Byford	6,638	6,900	12,300	12,900
South Western Highway	Mundijong Subway (rail bridge), Mundijong	3,810	3,790	2,900	3,200
Tonkin Highway	South of Thomas Road, Byford	N/A	N/A	11,500	11,100
Tonkin Highway	Adjacent Mundijong Subway (rail bridge), Mundijong	N/A	N/A	6,400	6,300

Note:

1. Figures are in vehicles per day (vpd)
2. More recent traffic data (from 2001) was available for the South Western Highway. However the southbound data south of Thomas Road was missing. The 2001 measured northbound traffic volumes were approximately 200 vpd less than the measured 1998 northbound traffic volumes on average.

This data indicates that the traffic volumes are likely to increase along the South Western Highway through the Byford Townsite, despite the future Tonkin Highway sharing the north and south bound traffic past the Byford Townsite. This reflects Main Roads WA's expectations of the future increase in the population of Byford.

However projected traffic volumes along the South Western Highway south of the Byford Townsite and north of the future Tonkin Highway intersection are likely to decrease as the Tonkin Highway will provide a bypass for the current Byford Townsite through traffic.

The data also illustrates that substantial traffic northbound and southbound is dissipated in the Byford area. The northbound through-traffic is almost half of the northbound traffic approaching the Byford area. The southbound through-traffic is approximately four times less than the southbound traffic approaching the Byford area.

As development occurs towards the ultimate development capacity of the study area the existing connecting roads to the South Western Highway and the proposed links from the Tonkin Highway to the South Western Highway and Byford Townsite, will need to be upgraded to Neighbourhood Collector standard to cater for any new access roads and the increased traffic volumes. These roads from north to south are Thomas, Abernethy,

Beenyup, Nettleton and Orton Roads. Stanley and Walters Roads, whilst not proposed Neighbourhood Connectors, will become major access roads from the South Western Highway. Suitable intersection treatments will be influenced by the future design of the South-Western Highway.

The standard of future road upgrades are to be based on the Shire of Serpentine Jarrahdale's "Engineering Guideline for Subdivisional Development" which refers to "Liveable Neighbourhoods Edition 2". In line with this standard, the proposed Neighbourhood Connector road pavements are to be widened to 8.0m to incorporate street parking and on street bike lanes.

All road reserves are to be a minimum of 20m other than for the following specific requirements for wider road reserves.

- The Thomas Road road reserve is to be widened by 60m to allow for the construction of the proposed stormwater works.

- The Orton Road road reserve is to be created at 40m wide to allow for the construction of the proposed stormwater drainage works.

South Western Highway Intersections:

In order to improve traffic safety whilst meeting the additional traffic demands from the population increases east of the South-Western Highway, consideration will need to be given to intersection treatments. This is discussed in detail in Section 8.

Intersections on neighbourhood connectors & major access roads:

Within the study area Walters, Beenyup and Nettleton Roads will have a number of access roads intersecting with them as subdivision proceeds. When these intersecting access roads are constructed traffic management measures will need to be put in place along Walters, Beenyup and Nettleton Road to maintain traffic safety at these intersections. Detailed design will need to be carried out for each intersection and landscaping is to be incorporated into these designs. These are discussed in more detail in Section 8.

Subject to access from Abernethy Road being provided onto the Tonkin Highway and suitable intersection treatments being provided to cater for ultimate development traffic, the South-Western Highway through Byford should become:

- Single lane with the existing kerbside lane becoming on-street kerb-side parking.
- Restricted to a 50 km/h speed limit.

With regard to suitable intersection treatments, consideration should be given to round-a-bouts, particularly at the Beenyup/Abernethy/South-Western Highway intersection, to calm traffic, maintain traffic flow and reduce queuing back to the railway crossing.

6.11 Services

- ***Water***

Current Water Regime

Scheme water is currently available to the majority of the study area as shown in Plan F.

The gravity area (area supplied with scheme water by a gravity system) as shown in plan F is supplied via a 300 diameter main from a pressure reducing valve, near the intersection of the South Western Highway and Mitchell Street to the north of the study area. The high level area shown (area to high in level to be fed by the gravity system supplied with scheme water by a water tank) in plan F is supplied via a 2 Megalitre water tank at the end of Walters Road which is fed by a pump station near the intersection of Larsen Road and the South Western Highway.

Future Water Regime and Requirements

Whilst the water reticulation is sufficient to cope with current demands, further development will require the upgrade of the Water Corporation's infrastructure.

The Water Corporation has long term plans to upgrade its water infrastructure in order to cope with ultimate development within the Byford Detailed Area Plan.

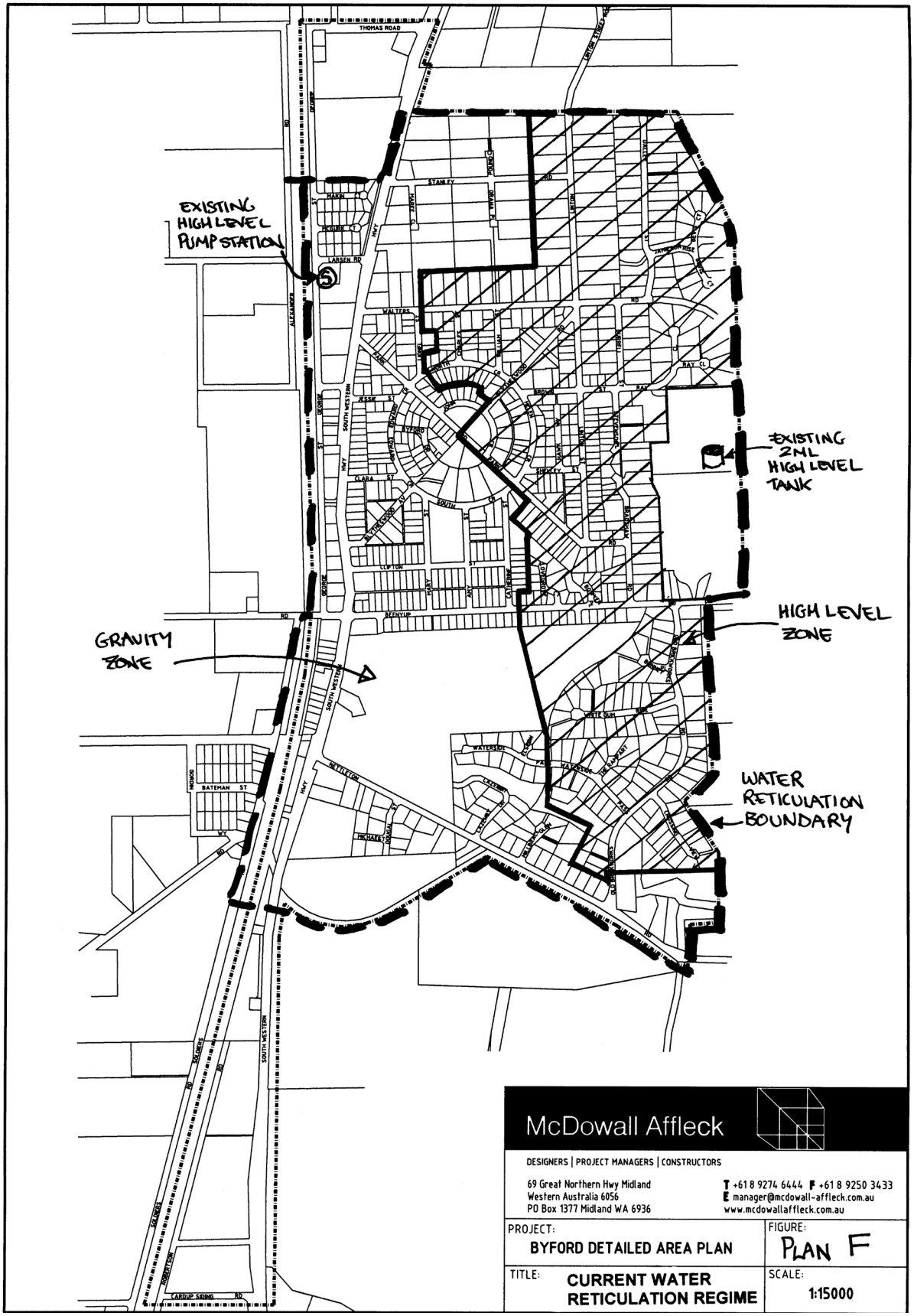
The proposed upgrades to cope with ultimate development, as shown on plan G, include:

- A new 7 Megalitre high level tank at the end of Walters Road
- A 18 Megalitre tank on Nettleton Road
- A Link Main Pump Station along the South Western Highway, near Cardup Siding Road
- Control valves adjacent to the South Western Highway, near Thomas Road
- Upgrade of water mains sizes.

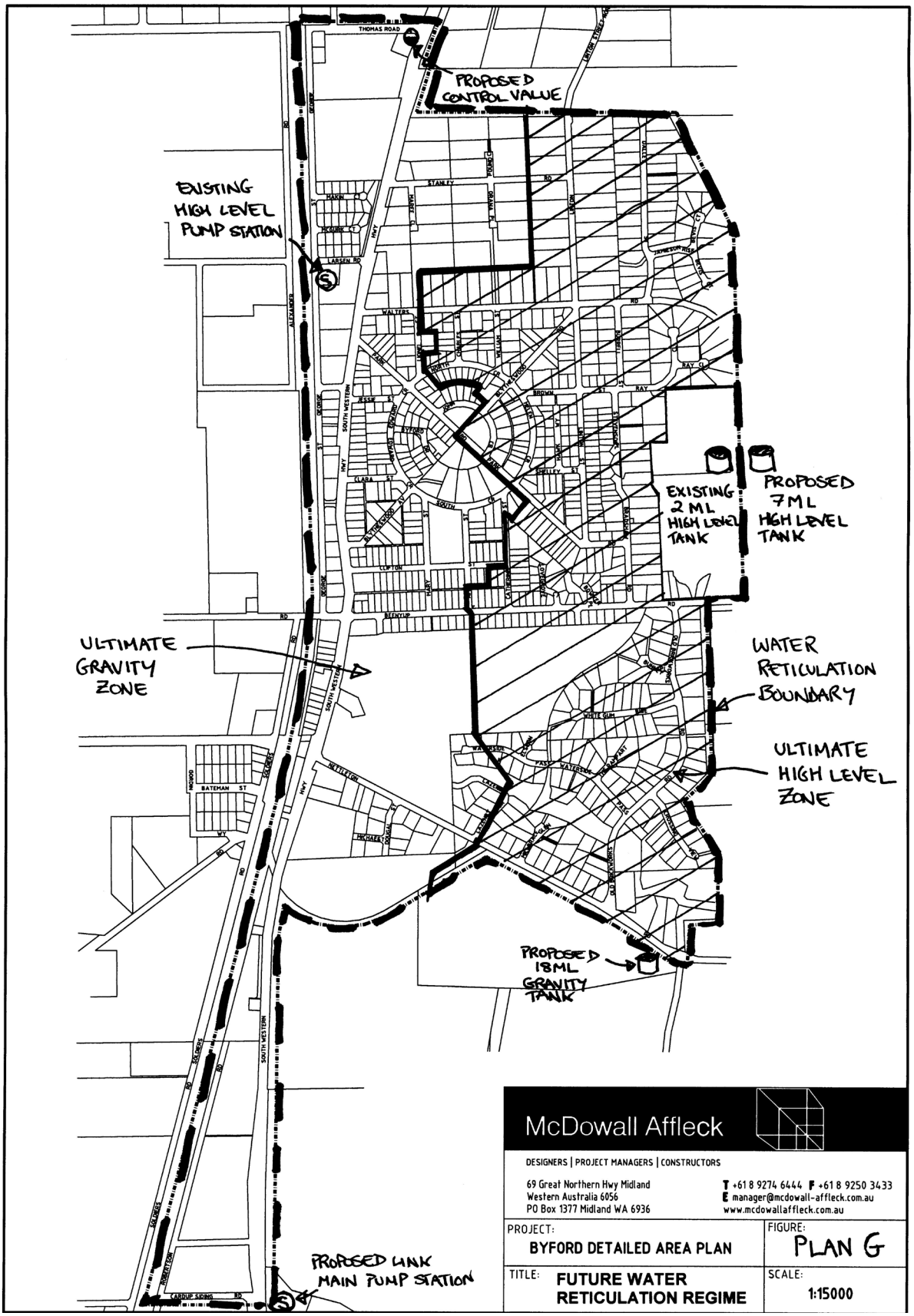
Note: The Water Corporation should be encouraged to ensure these developments do not detract from the visual and landscape amenity of the area.

Whilst the Water Corporation has these long term plans, it generally only reacts to applications for development so as to keep up with the "development front".

The current and ultimate water reticulation system is shown in the Future Services Plan at Appendix II


EXISTING HIGH LEVEL PUMP STATION
EXISTING 2ML HIGH LEVEL TANK
HIGH LEVEL ZONE
GRAVITY ZONE
WATER RETICULATION BOUNDARY
McDowall Affleck
DESIGNERS | PROJECT MANAGERS | CONSTRUCTORS
69 Great Northern Hwy Midland
Western Australia 6056
PO Box 1377 Midland WA 6936
T +61 8 9274 6444 F +61 8 9250 3433
E manager@mcdowall-affleck.com.au
www.mcdowallaffleck.com.au
PROJECT:
BYFORD DETAILED AREA PLAN
FIGURE:
PLAN F
TITLE:
CURRENT WATER RETICULATION REGIME
SCALE:
1:15000

PLAN F


PROPOSED CONTROL VALUE
EXISTING HIGH LEVEL PUMP STATION
EXISTING 2 ML HIGH LEVEL TANK
PROPOSED 7ML HIGH LEVEL TANK
ULTIMATE GRAVITY ZONE
WATER RETICULATION BOUNDARY
ULTIMATE HIGH LEVEL ZONE
PROPOSED 18ML GRAVITY TANK
PROPOSED LINK MAIN PUMP STATION
McDowall Affleck
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E manager@mcdowall-affleck.com.au
www.mcdowallaffleck.com.au
PROJECT: BYFORD DETAILED AREA PLAN
FIGURE: PLAN G
TITLE: FUTURE WATER RETICULATION REGIME
SCALE: 1:15000

PLAN G

- ***Sewer***

Current Sewer Regime

Approximately half of the study area is currently reticulated with gravity sewer. Refer to plan H.

Currently sewer serving the study area outfalls to the west across the railway line via a 225 diameter main which runs along Larsen Road and into an interim pump station near the future Tonkin Highway alignment.

Dormant sewer infrastructure exists in the western portion of the subdivision north of Nettleton Road. That is, this sewer has no outfall and is not in operation.

Future Sewer Regime & Requirements

The Water Corporation has long term plans to upgrade its sewer infrastructure in order to cope with ultimate development within the study area.

The Water Corporation's long term planning indicates that:

- The existing 225 diameter sewer outfall will need to be upgraded in size.
- Four additional mains will need to be constructed from the study area to the west across the railway line (this includes the catchment within which the dormant sewer is constructed).
- A permanent pump station is proposed adjacent to the future Tonkin Highway extension and south of Abernethy Road.

The current and ultimate sewer reticulation system is shown in Plan I.

- ***Stormwater***

Current Stormwater Regime

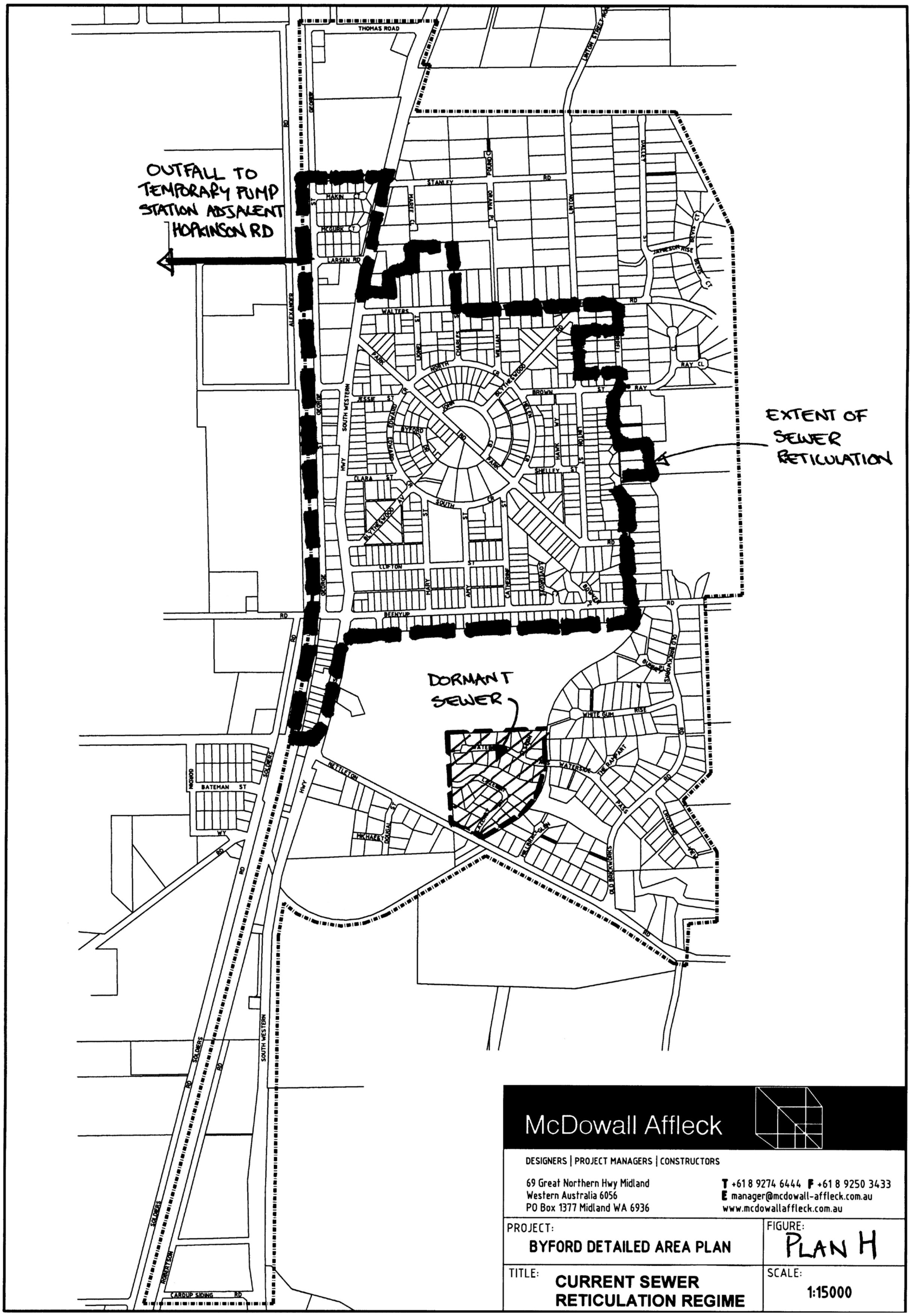
Currently the stormwater within the project area is primarily conveyed by eight (8) drainage channels generally falling from east to west as shown in Plan J.

These drainage channels are predominantly open drains, with culvert crossings under roads, although a portion of the three channels (approx. between Edward Crescent and the South Western Highway) in the existing townsite are piped in easements on the side boundary of lots. The Shire's engineering department are not able to advise of any significant stormwater drainage issues relating to the capacity of the existing system in the project area.

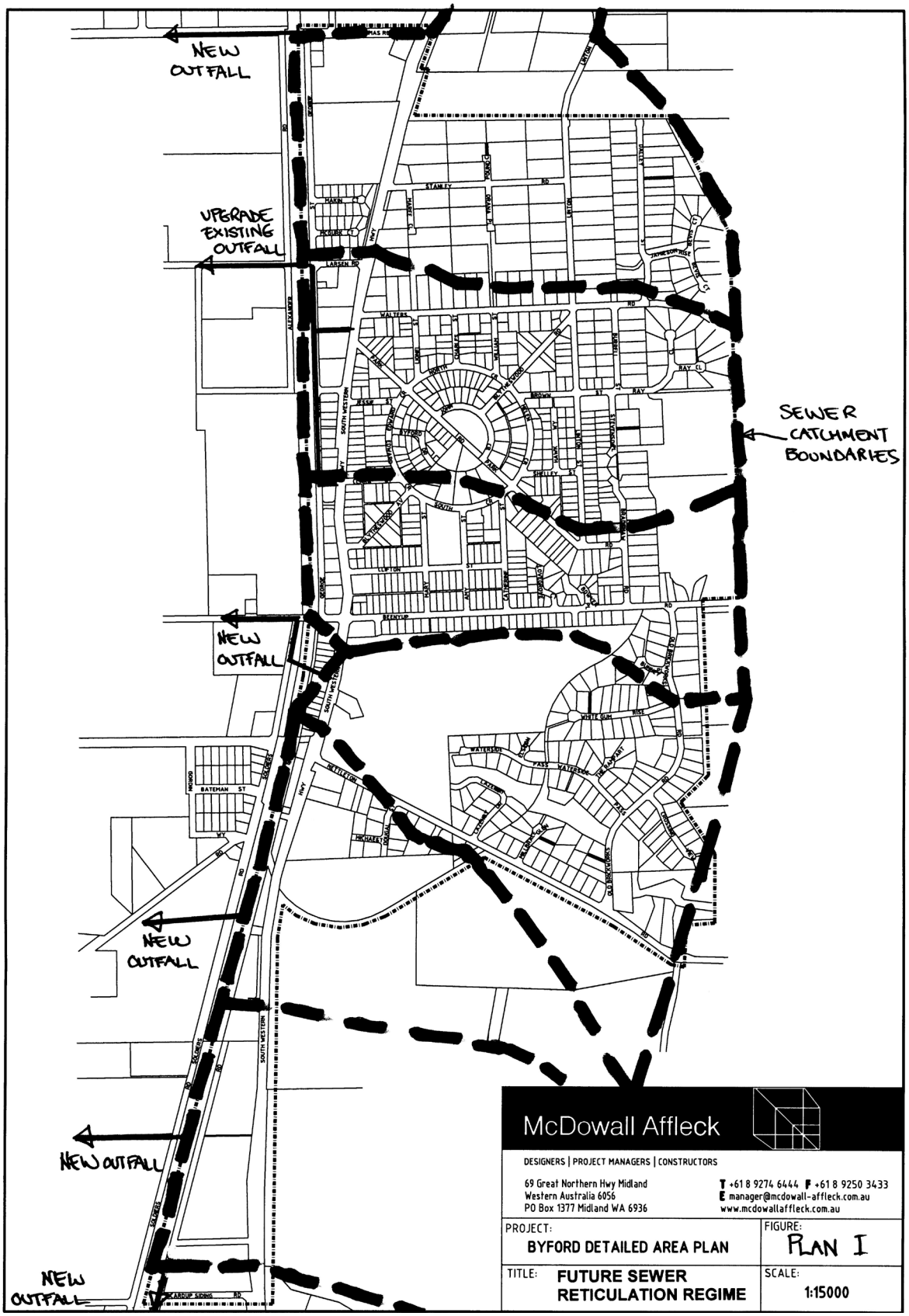
The open drains within the existing town site (catchments 2F1, 3F2 & 3F3 – see Plan J as well as Beenyup Brook in catchment 9D, are well vegetated. This assists in maintaining/improving water quality in these drains.

The other drainage channels (catchment 3, 5, 6, 8 & 9), whilst grassed, are not as densely vegetated and do not have the same ability to maintain water quality. As a result potential

exists for best management practices in line with the "Byford Urban Stormwater


OUTFALL TO TEMPORARY PUMP STATION ADJACENT HOPKINSON RD
EXTENT OF SEWER RETICULATION
DORMANT SEWER
McDowall Affleck
DESIGNERS | PROJECT MANAGERS | CONSTRUCTORS
69 Great Northern Hwy Midland
Western Australia 6056
PO Box 1377 Midland WA 6936
T +61 8 9274 6444 F +61 8 9250 3433
E manager@mcdowall-affleck.com.au
www.mcdowallaffleck.com.au
PROJECT: BYFORD DETAILED AREA PLAN
FIGURE: PLAN H
TITLE: CURRENT SEWER RETICULATION REGIME
SCALE: 1:15000

PLAN H


NEW OUTFALL
UPGRADE EXISTING OUTFALL
SEWER CATCHMENT BOUNDARIES
NEW OUTFALL
NEW OUTFALL
NEW OUTFALL
NEW OUTFALL
McDowall Affleck
DESIGNERS | PROJECT MANAGERS | CONSTRUCTORS
69 Great Northern Hwy Midland
Western Australia 6056
PO Box 1377 Midland WA 6936
T +61 8 9274 6444 F +61 8 9250 3433
E manager@mcdowall-affleck.com.au
www.mcdowallaffleck.com.au
PROJECT:
BYFORD DETAILED AREA PLAN
FIGURE:
PLAN I
TITLE:
FUTURE SEWER RETICULATION REGIME
SCALE:
1:15000

PLAN I

Management Strategy" to be implemented in these catchments in order to maintain stormwater quality with future development.

Future Stormwater Regime and Requirements

As further development occurs, the existing stormwater drains will no longer be adequate to cater for the increased housing density and the water quality will be compromised if not addressed in future stormwater design.

The future stormwater regime is to be consistent with the "Byford Urban Stormwater Management Strategy" produced by Parsons Brinckerhoff and adopted by the Shire of Serpentine Jarrahdale. This report recommends the stormwater measures required to cater for ultimate development.

Water Quantity

Refer to the Future Services Plan at Appendix II and the Landscape Master Plan at Appendix III for the proposed stormwater infrastructure, catchment areas and works. Stormwater details in relation to subdivision and development are discussed in Section 8.

Water Quality

Water Quality is to be addressed by using the best management practices in the design of stormwater drains and detention basins.

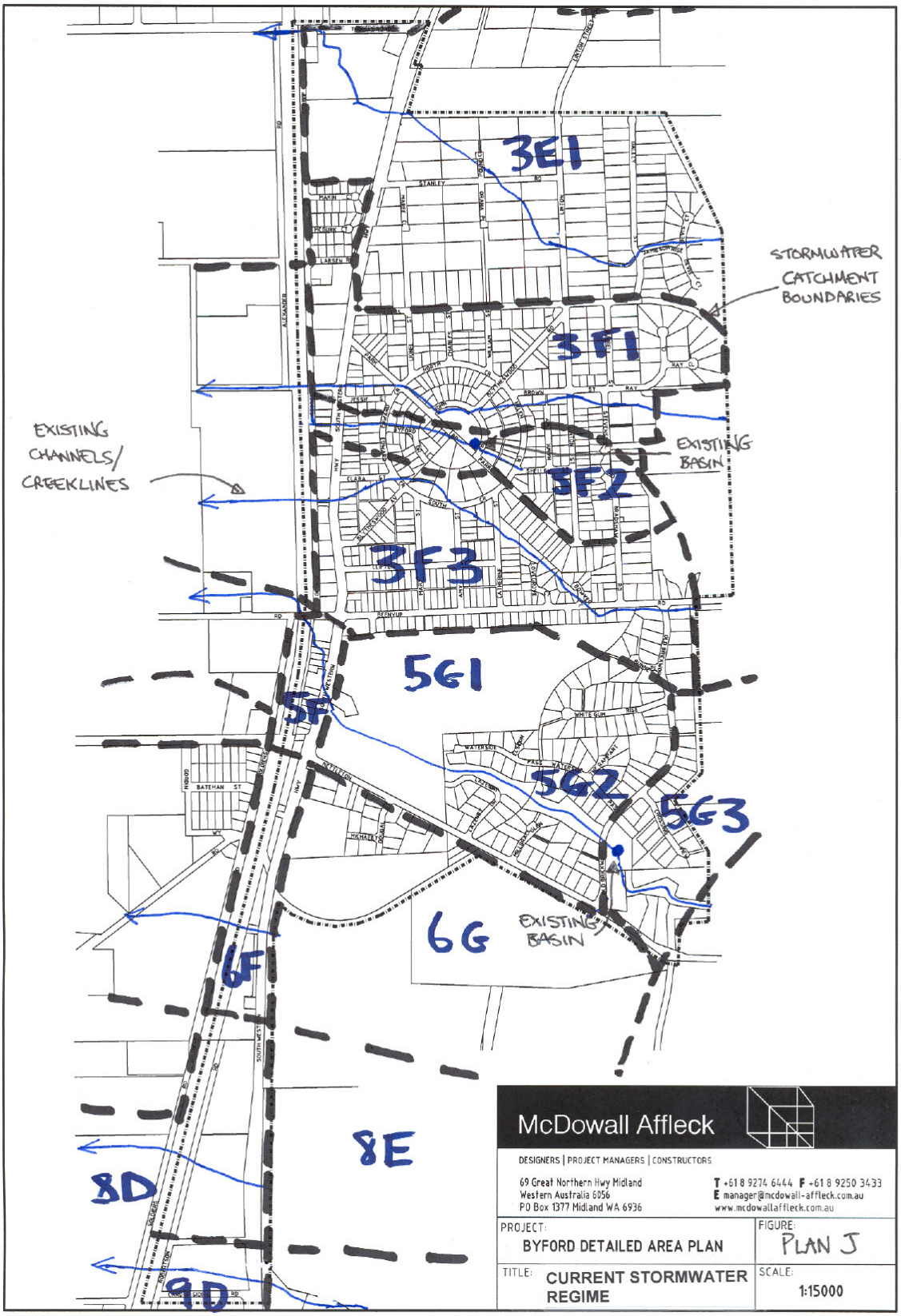
- ***Gas***

Current Gas Regime

The study area is currently reticulated with gas by Alinta's gas network, via a high pressure gas main running north south along the western side of the railway line and into a medium pressure main across the railway line along Abernethy Road. Refer to Plan K.

Alinta Gas does not have any long term planning information relating to upgrading and extending it's current infrastructure. As and when further subdivision occurs, Alinta Gas will upgrade it's assets as required.

Currently Alinta Gas supplies and lays the gas reticulation required for subdivisions free of charge to developers. Alinta Gas's current policy requires developers to provide an open trench.


3E1
3F1
3F2
3F3
5G1
5F
5G2
5G3
6G
EXISTING BASIN
6F
8E
8D
9D
STORMWATER CATCHMENT BOUNDARIES
EXISTING CHANNELS/ CREEKLINES
EXISTING BASIN
McDowall Affleck
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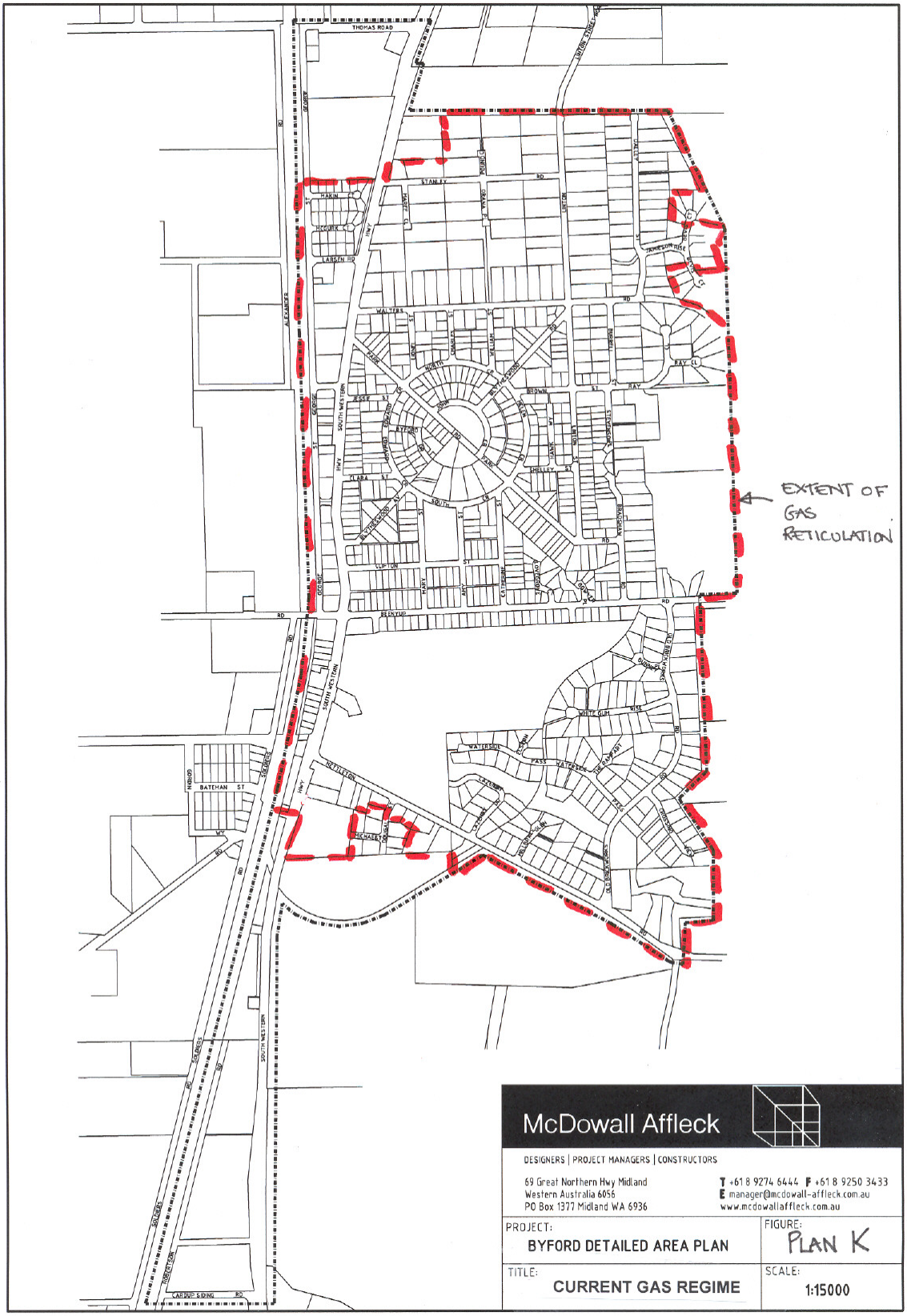
PROJECT: BYFORD DETAILED AREA PLAN
FIGURE: PLAN J
TITLE: CURRENT STORMWATER REGIME
SCALE: 1:15000

PLAN J


EXTENT OF GAS RETICULATION
McDowall Affleck
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E manager@mcdowall-affleck.com.au
www.mcdowallaffleck.com.au
PROJECT:
BYFORD DETAILED AREA PLAN
FIGURE:
PLAN K
TITLE:
CURRENT GAS REGIME
SCALE:
1:15000

PLAN K

Future Gas Regime

Where the infrastructure requires to be upgraded or extended to the subdivision boundary, Alinta Gas may give the developer the option of providing a trench to the subdivision boundary or paying a headworks charge to Alinta Gas to upgrade or extend to the subdivision boundary.

Alinta Gas has advised that it is currently reviewing it's policy and in the future the developer may be required to pay for laying of the gas mains, even within the subdivision boundary.

- ***Power***

Current Power Regime

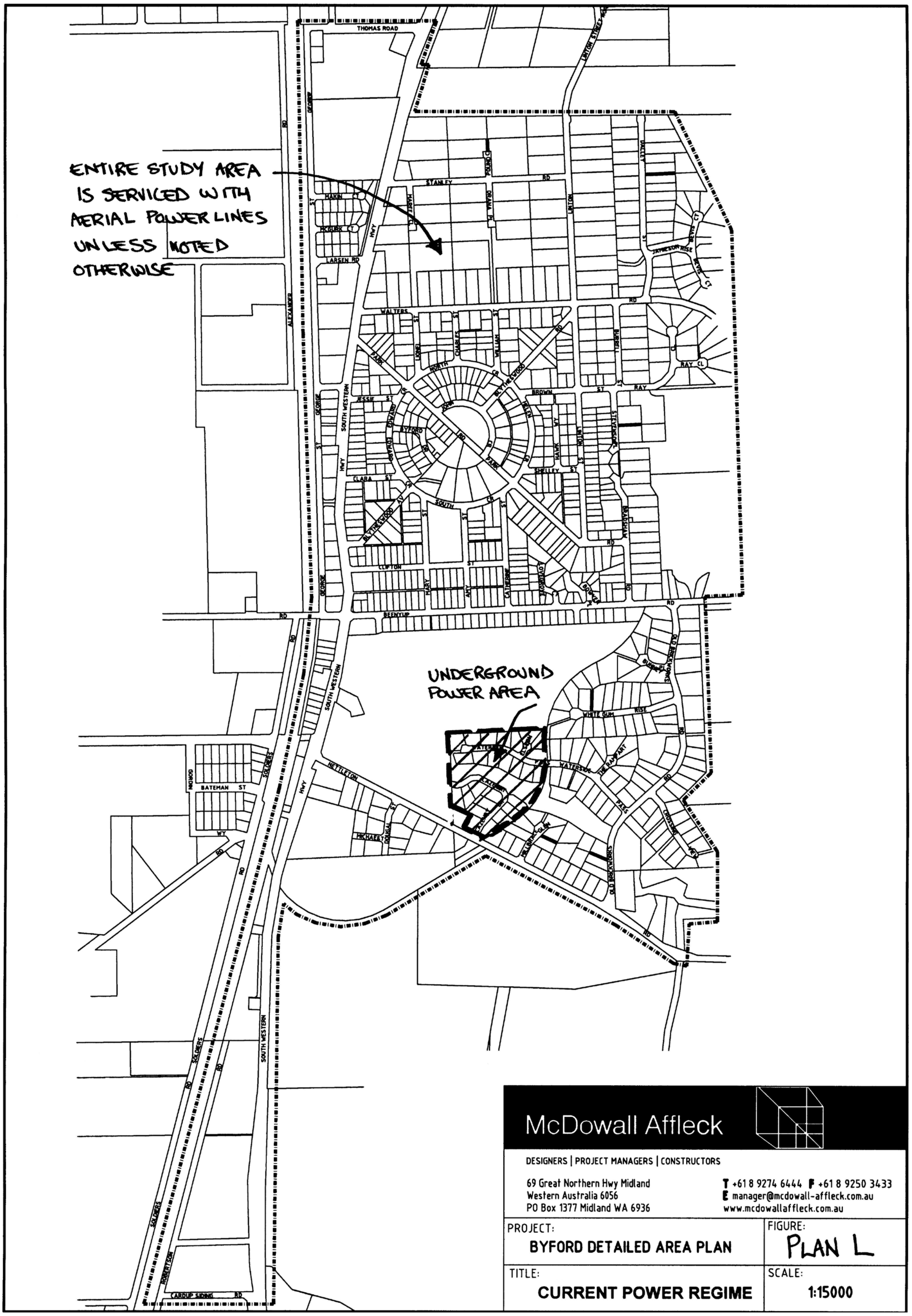
The study area is currently predominantly serviced by overhead power lines. The western portion of the "Old Brickworks Road" subdivision north of Nettleton Road is serviced by underground power. There are other areas with underground cables (eg west side of South Western Highway south of Abernethy Road and east side of George Street north of Abernethy Road) however this cabling only supplies power to streetlights. Refer to Plan L.

Future Power Regime

Western Power has no long term plans for its infrastructure. As and when subdivision applications are made Western Power will look to upgrade their infrastructure. Western Power's current policy enforced by the WA Planning Commission states that when subdivision occurs all affected lots require underground power connections.

In areas where only two or three lot subdivisions are possible and overhead power lines service the area, for example the existing Byford Townsite, undergrounding of power will simply require the developer to pay Western Power for the cost of undergrounding the power from the nearest power pole to a pillars within the new lots. Council will encourage Western Power to effect the undergrounding of power in these areas as a matter of priority.

In areas where a greater number of lots result from subdivision the developers will need to have the underground power reticulation designed by an engineer and approved by Western Power. Western Power's current policy requires that developers pay for the supply and installation of all low voltage infrastructure required to service the subdivision. Where high voltage cable is required, Western Power will impose a charge for the cost of the portion of the high voltage infrastructure used directly by the subdivision.


ENTIRE STUDY AREA IS SERVICED WITH AERIAL POWER LINES UNLESS NOTED OTHERWISE
UNDERGROUND POWER AREA
THOMAS ROAD
STANLEY
WALTERS
BEENYUP
CLIFTON
SOUTH WESTERN HWY
ALEXANDER RD
BATEMAN ST
NETTLETON
McDowall Affleck
DESIGNERS | PROJECT MANAGERS | CONSTRUCTORS
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Western Australia 6056
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www.mcdowallaffleck.com.au
PROJECT:
BYFORD DETAILED AREA PLAN
FIGURE:
PLAN L
TITLE:
CURRENT POWER REGIME
SCALE:
1:15000

PLAN L

- ***Telstra***

Current Telstra Regime

Telstra service is currently available throughout the study area.

Future Telstra Regime

Telstra does not have long term planning in place for upgrading infrastructure within the study area. Telstra will upgrade it's infrastructure as and when required by subdivision.

Provision of Telstra services to future subdivisions will require underground cabling, usually in a common trench with underground power cables.

Telstra's "New Estate's" Policy requires that the developer provides a trench to Telstra within the subdivision boundary for underground cabling. Telstra supplies and lays the cabling at their cost.

Any trenching, supply and laying of cabling outside the subdivision is completed at Telstra's cost.

As per the aforegoing, the issues of climate, geomorphology, geology, soils, hydrology, vegetation, fauna, development and the built environment, public open space, traffic and services characterise and affect the study area. Accordingly, the DAP is to be developed in a responsive way to these issues.

The approach to the DAP is discussed in the following section.

PART B – FUTURE DIRECTIONS

7. CHARACTER AREAS

The DAP area comprises residential, commercial and industrial development areas. Each of the former two can be divided into areas which reflect their individual character. Future subdivision and development should respond to these differences.

Plan M identifies each of these Character Areas.

7.1. Residential Character Areas

As discussed above, the DAP has a residential component. This includes the established "old townsite" area, the future residential subdivision areas to the north and south of the old townsite, the hillside area and the special residential (2000m^2 lots) subdivision south-east of the old townsite. A specific vision and objectives for this broader residential area is provided below.

A summary of the characteristics of each specific Character Area is also provided below. Subdivision and development within each Character Area will be guided by the applicable Subdivision and Development Guidelines at 7.1.9. These Guidelines will enhance desirable existing characteristics and help create new characteristics responding to the general and residential objectives listed at Section 5 and 7.1.2 of this report.

7.2. Residential Development Vision

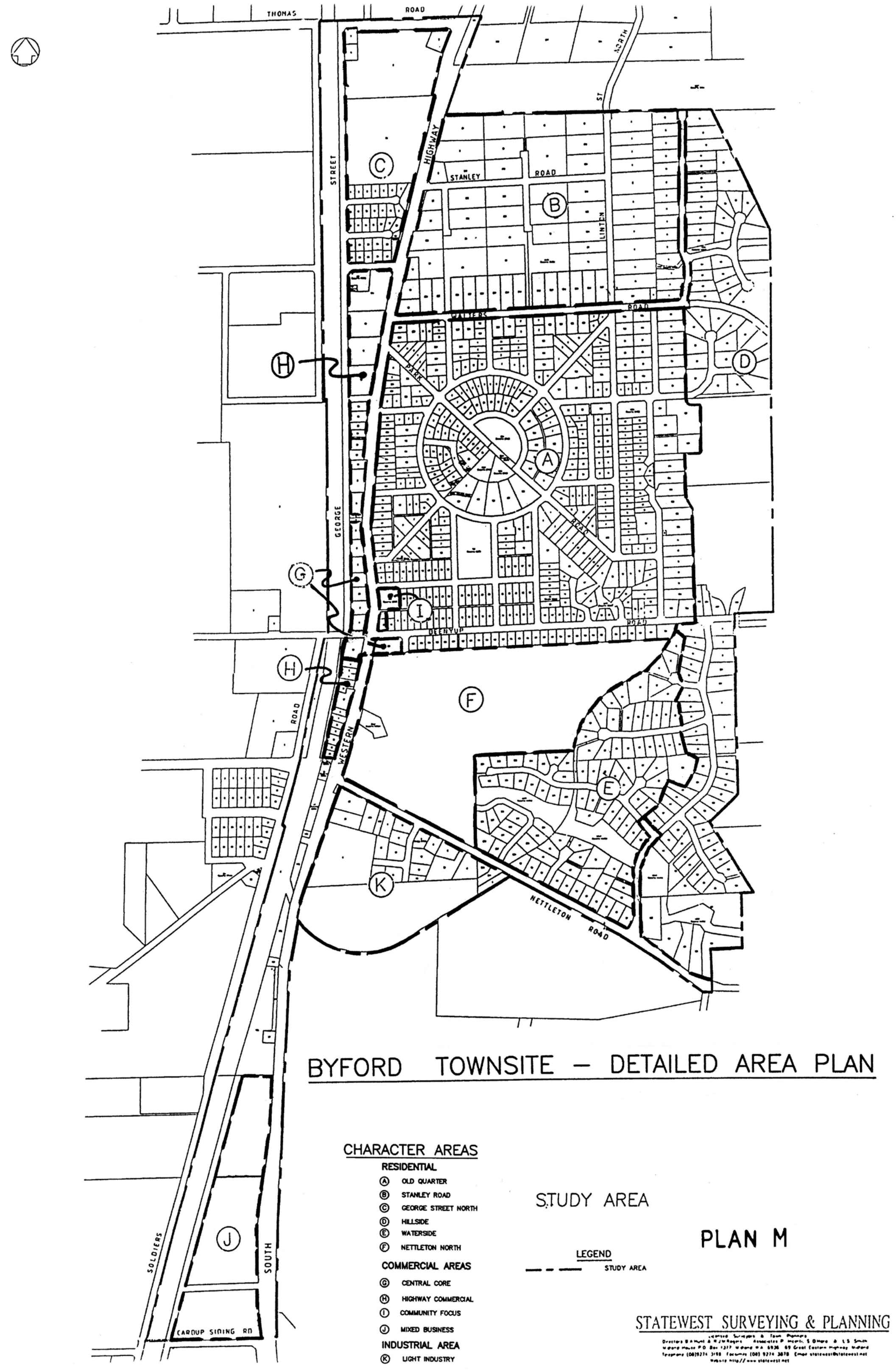
Through the process of public submissions, the following vision for the residential area has been developed, which compliments the Shire's vision and the overall DAP vision.

> "Our community will live in a peaceful and sustainable environment that acknowledges its heritage and manages its future responsibly, for residents of all ages."

7.3. Residential Objectives

As well as the general objectives for the whole of the DAP provided at Section 5, specific objectives for residential development can be used to measure and assess the actual form of subdivision and land development.

R1 To create a range of lot sizes and accommodation to suit residents of varying ages and family types.


THOMAS ROAD
GEORGE STREET
HIGHWAY
STANLEY ROAD
LINTON
NORTH ST
WATER PARK ROAD
GLENVUP ROAD
WESTERN
ROAD
NETTLETON ROAD
SOLDIERS
SOUTH
CARDUP SIDING RD
A
B
C
D
E
F
G
H
I
J
K
BYFORD TOWNSITE – DETAILED AREA PLAN
CHARACTER AREAS
RESIDENTIAL
(A) OLD QUARTER
(B) STANLEY ROAD
(C) GEORGE STREET NORTH
(D) HILLSIDE
(E) WATERSIDE
(F) NETTLETON NORTH
COMMERCIAL AREAS
(G) CENTRAL CORE
(H) HIGHWAY COMMERCIAL
(I) COMMUNITY FOCUS
(J) MIXED BUSINESS
INDUSTRIAL AREA
(K) LIGHT INDUSTRY
STUDY AREA
LEGEND
STUDY AREA
PLAN M
STATEWEST SURVEYING & PLANNING

PLAN M

R2 To ensure environmentally responsive housing is constructed.

R3 To maximise the use of rear laneways.

R4 To facilitate subdivision and development that retains and enhances as much as possible, the existing character of the site and streetscape.

R5 To foster legibility, local identity and character.

R6 Be sensitive to the landform and natural setting of the town.

R7 Be designed for surveillance and safety.

R8 To maintain the integrity of the Darling Range backdrop, especially the treed skyline.

R9 To utilise environmentally responsive subdivision design and implementation measures, especially in relation to the management of stormwater and solar access.

7.4. **Character Area A – Old Quarter**

Plan M shows the Area which comprises approximately 100ha.

Area Characteristics (2004)

- The area rises gently from west to east at a rate of 4-5%.
- Modest, single storey dwellings are common, constructed of face brick, weatherboard and/or fibro, with tile or corrugated iron roofing.
- Some new dwellings, with the majority being in the order of 40 years old or more.
- Dwellings commonly have a front porch, verandah or window awnings.
- Roof pitch is approximately 25 degrees or more.
- Dwellings are set well back from the road with trees in the front and rear yards.

"Old Quarter" Housing

-- Generally rectangular lot shapes in the order of 1000m^2, although the historic central circular road pattern with four radiating roads creates some triangular lots.

- Road reserves are generally 20m wide and through routes.

- Open drains are common and of varying depths/widths.

- Two watercourses traverse the Area, but these have been highly disturbed due to the historic subdivision and development. Some portions remain evident.

- There is little Public Open Space other than the "Rainforest" between John Crescent and Byford Drive. The total of 3.5815 ha, of which 2.8527 ha is the Rainforest/Tennis court site, is well below the standard 10% (approx 10 ha) requirement for residential subdivisions.

- This Area has a good tree canopy including street trees, trees on private properties, and within the Public Open Spaces.

Applicable Guidelines (Sect. 7.10) – (i), (iv), (viii), (xi), (xii), (xv), (xviii), (xix), (xxii),(xxiii), (xxiv), (xxvi), (xxviii), (xxix), (xxx), (xxxi), (xxxii), (xxxiii), (xxxv)

7.5. Character Area B – Stanley Road

Plan M shows the Area which is all generally located north of Walters Road, west of Dalley Street and east of the South Western Highway. It is approximately 50ha in area.

Area Characteristics (2004)

- The area rises gently from west to east at a grade of 4-5%.
- Lots are generally in the order of 6,000m^2 to 1 ha and rectangular in shape.
- Dwellings exist on most of the lots, and are generally modest single storey homes.
- Lots are generally cleared of native vegetation, although some of the lots east of Linton Street North have retained vegetation. Otherwise, paddocks and sheds predominate.

Stanley Rd Character Area

- Due to the size of the lots and the nature of the improvements, the transition to residential development will significantly affect the existing character.

- The existing road pattern follows a north-south and east-west pattern. Not all roads are through roads.

- Road reserves are 20m wide.

- A watercourse traverses the Area from south-east to north-west.

- There are two areas of Public Open Space in the Area. Between Orana Place and Walters Road is a rectangular POS comprising 1.3026 ha of cleared land. It is only accessible by two access legs connecting Orana Place to Walters Road. The other POS is 1,021m^2 sitting over the watercourse on the west side of Dalley Street.

Applicable Guidelines (Sect. 7.10) – (ii), (v), (vi), (ix), (xvi), (xviii), (xix), (xxii), (xxiii), (xxiv), (xxv), (xxviii), (xxix), (xxx), (xxxi), (xxxii), (xxxiii), (xxxiv), (xxxv), (xxxvi)

7.6. Character Area C – George Street North

Area Characteristics (2004)

- The southern portion of this area contains existing residential subdivisions fronting Larsen Road, McGurk Court and Makin Court.

"George Street North Area"

- The northern section, approximately 12 ha, comprises mainly open paddocks, although some buildings exist.

- Approval has been granted for residential subdivision of Lot 68.

- The land is relatively flat with a gentle grade from the north-west to the south-east.

- The South-Western Highway is the areas eastern boundary.

- Existing residential development is modest and relatively modern.

- Lot 3 (northernmost property) contains a winter creek, which runs diagonally from south-east to north-west. It supports the only remnant vegetation on the lot and should be incorporated into the POS for this subdivision.

Applicable Guidelines (Sect 7.10) – (ii), (v), (ix), (xi), (xvi), (xviii), (xix), (xxii), (xxiii), (xxiv), (xxv), (xxvii), (xxix), (xxx), (xxxi), (xxxii), (xxxiii), (xxxv)

7.7. Character Area D – Hillside

This Character Area extends across the escarpment at the eastern edge of the DAP.

Area Characteristics (2004)

- The land slopes upwards from west to east at grades of between 10 - 17%. Around the old excavations on Lots 502 & 890 the slopes exceed 20%.

- Two lakes exist in former excavations.

- Large variety in housing styles and forms.

"Mixed architecture"

- Some dwellings on particularly steep slopes are constructed partly on poles.
- Many dwellings are orientated to take maximum advantage of the views available.
- Dwellings are usually large, single storey with a horizontal emphasis to the street, constructed of faced brick with tile or Colorbond roofing.
- Those dwellings on steep slopes are usually of framed construction, with Colorbond, weatherboard or other light-weight cladding.
- Many dwellings are new or recently constructed. Several are currently under construction.
- Most have some form of verandah at the front.
- Roof pitch is usually about 25 degrees or less.
- Dwellings have irregular street setbacks.
- There are many original trees preserved within private yards and the road reserves.

Applicable Guidelines (Sect. 7.10) – (iii), (x), (xi), (xiii), (xvii), (xviii), (xx), (xxii), (xxiii), (xxiv), (xxvi), (xxviii), (xxix), (xxx), (xxxi), (xxxii), (xxxiii), (xxxiv), (xxxv)

7.8. Character Area E – Waterside

This area is located at the base of the escarpment straddling Beenyup Brook.

- This recent subdivision comprises lots in the order of 2000m^2.

- The area is gently undulating rising from west to east at 6 – 10%.
- Mostly "suburban" housing styles and forms, built on elevated sand pads.
- Dwellings are mostly new, and usually large, single storey with a horizontal emphasis to the street, constructed of face brick with tile or Colorbond roofing.

"New Homes"

- Most dwellings have some form of verandah at the front.
- Roof pitch is usually about 25 degrees or less.

- Dwellings are generally set well back from the road.
- Road verges are often grassed, spreading into similar front yards.
- Front fences are not common.
- Lots are large, with some remnant big trees scattered about the Area.
- Power lines are underground providing a sense of openness.

Applicable Guidelines (Sect. 7.10) – (iii), (x), (xi), (xiv), (xvi), (xviii), (xxi), (xxii), (xxiii), (xxiv), (xxvi), (xxviii), (xxix), (xxx), (xxxi), (xxxii), (xxxiii), (xxxv)

7.9. Character Area F – Nettleton North

In one ownership, this 32 ha parcel is well placed for residential subdivision.

"Open Paddock"

- The area is essentially a cleared paddock.
- Currently subject to seasonal inundation.
- The land rises gently from the South-Western Highway towards the east at a grade of 2 – 4%.
- Beenyup Brook traverses the site from east to west.
- There is anecdotal evidence of aboriginal artefacts which will need to be assessed in more detail prior to subdivision.

Applicable Guidelines (Sect 7.10) – (i), (v), (vii), (ix), (xi), (xvi), (xviii), (xix), (xxii), (xxiii), (xxiv), (xxv), (xxviii), (xxix), (xxx), (xxxi), (xxxii), (xxxiii), (xxxiv), (xxxv)

7.10. Subdivision and Development Guidelines

Land subdivision and development shall take a certain form to ensure it conforms with each of the Character Areas within which it is located. This is controlled by the guidelines prescribed below.

Each Guideline is suffixed with the objectives, both General and Residential that it is intended to satisfy with the corresponding alpha-numeric code. They are also cross-referenced to the Character Areas to which they apply.

Some guidelines are mandatory requirements. This is also noted if it applies.

(i) Lot Sizes (infill)

Lots shall conform with the Residential Design Codes of Western Australia (R Codes) for R20 i.e. minimum 440m^2 average 500m^2. (Lots within 400m of the intersection of Beenyup Road and the South West Highway, may be permitted to develop to the R30 code. The standard R Code variation for Aged Persons dwelling can also be applied. Refer to Plan P).
(G2, R1).

Applies to Residential Character Area – A, F

(ii) Lot Sizes (non-infill)

Lots shall conform with the R Codes for R20 i.e. minimum 440m^2 average 500m^2. (Mandatory) (G6, R5)

Applies to Residential Character Areas – B, C

(iii) Lot Sizes (Landscape Protection Areas)

Lots shall conform with the R Codes for R5 i.e. minimum 2000m^2. (Mandatory) (G1, G6, R1, R2, R4, R6, R8)

Applies to Residential Character Areas – D, E

(iv) Lot Configuration (infill)

Where rear laneways adjoin a lot, at the time of subdivision, the laneway shall be widened to 10m total width with the widening being shared by lots on both sides of the laneway. The laneway will then form the frontage to the "rear" lot (refer Figure A). Development on the resultant lot shall then address the laneway. In the case of a corner lot resulting development shall address both street and laneway. (See also xviii). No portion of the lot shall be provided with frontage to the primary street. This will retain the existing character of the streetscape. Subdivisions dividing these lots from front to back will not be supported (see

Figure B). The roll-out of the rear laneway widening will be co-ordinated by Council Policy (to be prepared).
(G1, G2, G6, R3, R4).

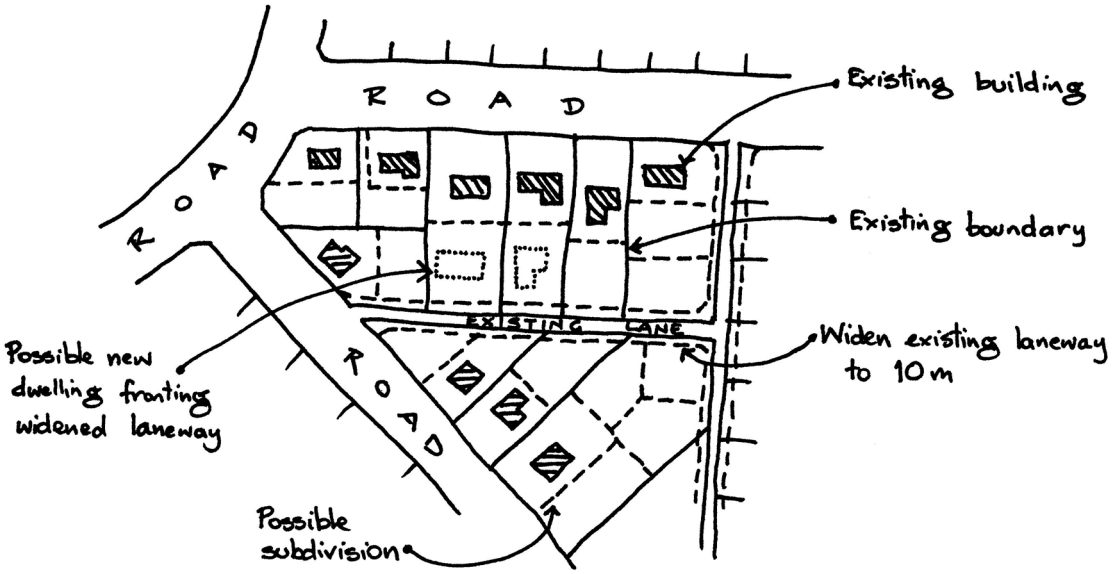


Figure A

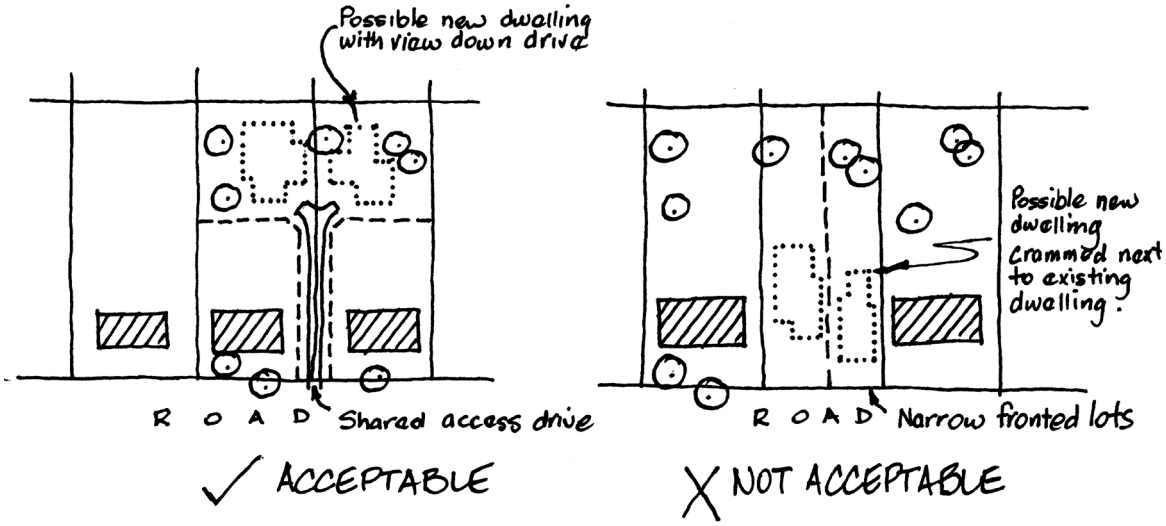


Figure B

Where a rear laneway does not exist, subdivision should be of battle-axe configuration (see figure C). This will overcome the potential disruption to the streetscape of additional dwellings "crammed" onto narrow frontage lots out of character with the existing streetscape. Where two lots share a common boundary and existing dwelling location permits, the access legs should adjoin to enable a single driveway to the rear lots with reciprocal rights of access for both lots. The driveway should be "snaked" to avoid creating a long, straight laneway to the rear and to retain trees where possible. (See Figure B)

(G1, G2, G6, R4, R6).

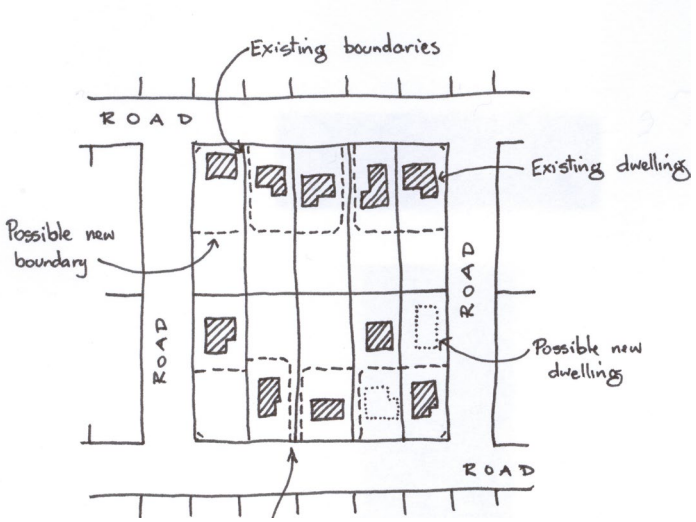


Figure C

Battle-axe access legs shall be 4m in width unless they share reciprocal rights of access with an adjoining access leg, in which case, these can be 3m wide each. They shall be constructed of red bitumen, red brick pavers, earth tone coloured concrete, pervious pavers or similar, to the satisfaction of Council.
(G1, G6, R5, R6, R9).

Applies to Residential Character Areas - A

(v) **Lot Configuration (non-infill)**

The creation of new lots shall respond to the principles of solar design. In this respect, new roads shall be aligned east-west or north-south where possible. East-west roads to be within 20° north and 30° south of true east and north-south roads to be within 20° west and 30° east of true north (refer Figure D). All lots are to be orientated so that one axis of the lot is within the same alignment parameters as described above. (Mandatory)
(G4, G6, R2, R5, R9).

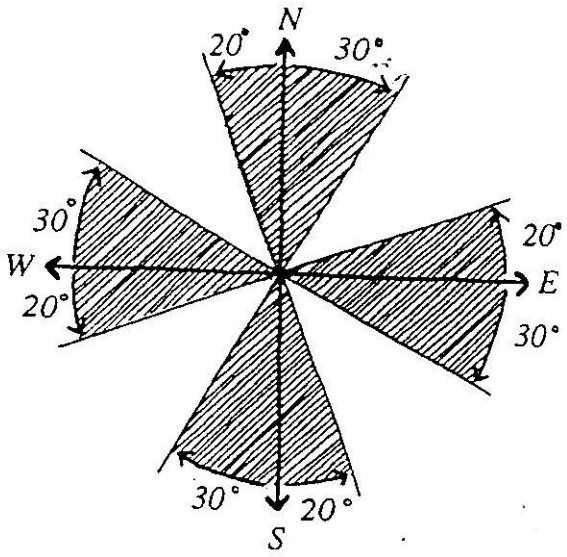


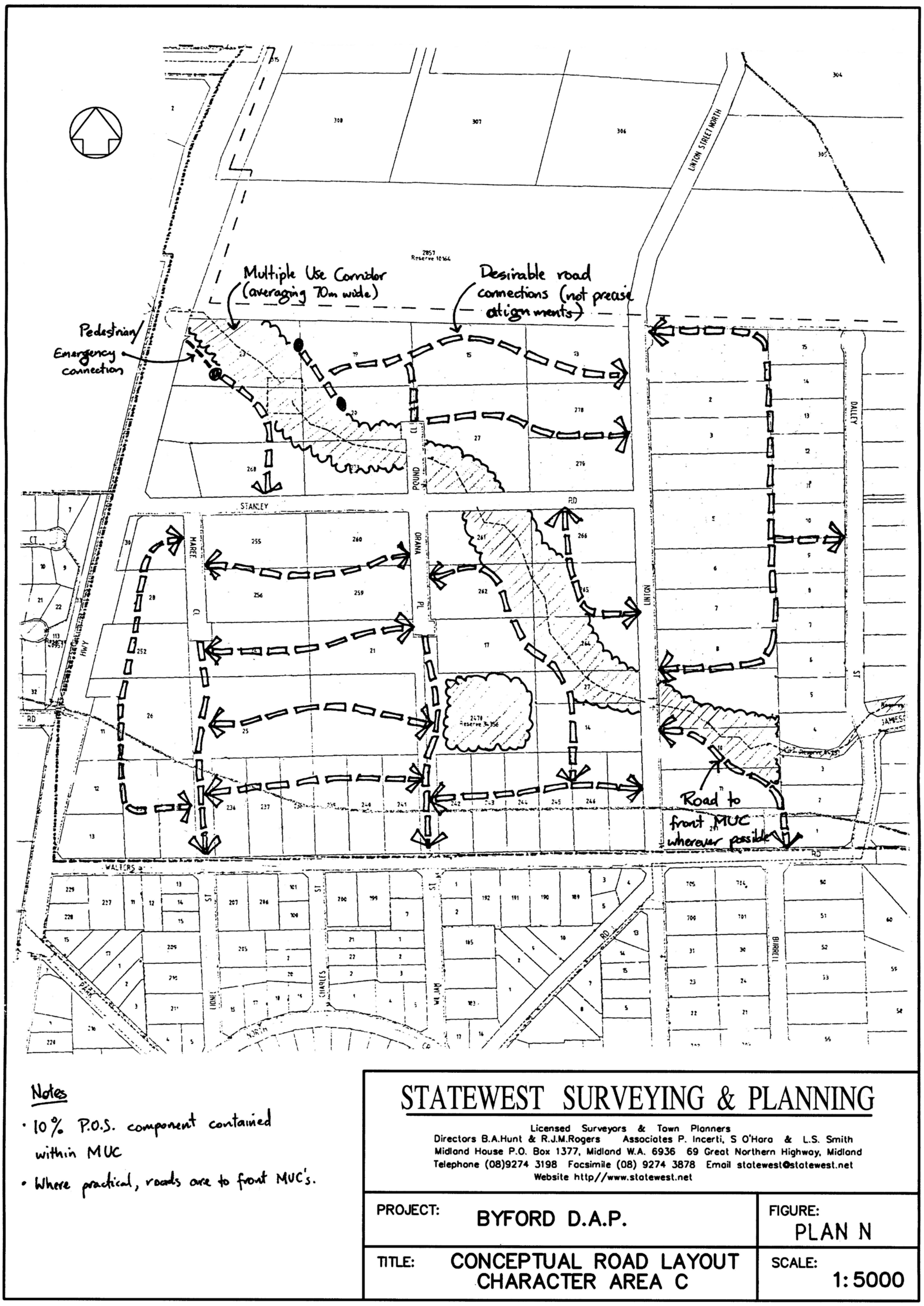
Figure D

Applies to Residential Character Areas – B,C,F

(vi) **Subdivision Form (Stanley Road Area)**

Subdivision in this Character Area will follow the general layout illustrated in Plan N. There are 12 sub-areas in this Character Area (refer Plan O). Each of these will need to prepare its own Local Structure Plan prior to subdivision. This will need to address the following matters:

- Fully dimensioned subdivision layout.
- Lot frontages shall be no less than 15m measured at the building setback line and should be consistent along the length of the street.
- Location of all existing buildings/improvements.
- Location of all significant features, i.e. watercourse, dams, soaks, etc.
- Extent of remnant native vegetation.
- Extent of proposed re-vegetation areas.
- Public Open Space areas (existing and proposed).
- Location and availability of existing services and a demonstrated capacity for new services.
- Stormwater management, consistent with the principles of this DAP and the Byford Urban Stormwater Management Strategy.
- Traffic management devices.
- Street tree planting at no less than 10 trees per 100m of road (each side).
- Other requirements for Local Structure Plans as determined by Council.


Multiple Use Corridor (averaging 70m wide)
Desirable road connections (not precise alignments)
Pedestrian/ Emergency connection
Road to front MUC wherever possible
LINTON STREET NORTH
STANLEY
RD
POUND
MAREE
CL
ORIANA
PL
LINTON
DALLEY
ST
JAMES
WALTERS
CHARLES
BIRRELL
PARK
Notes
• 10% P.O.S. component contained within MUC
• Where practical, roads are to front MUC's.
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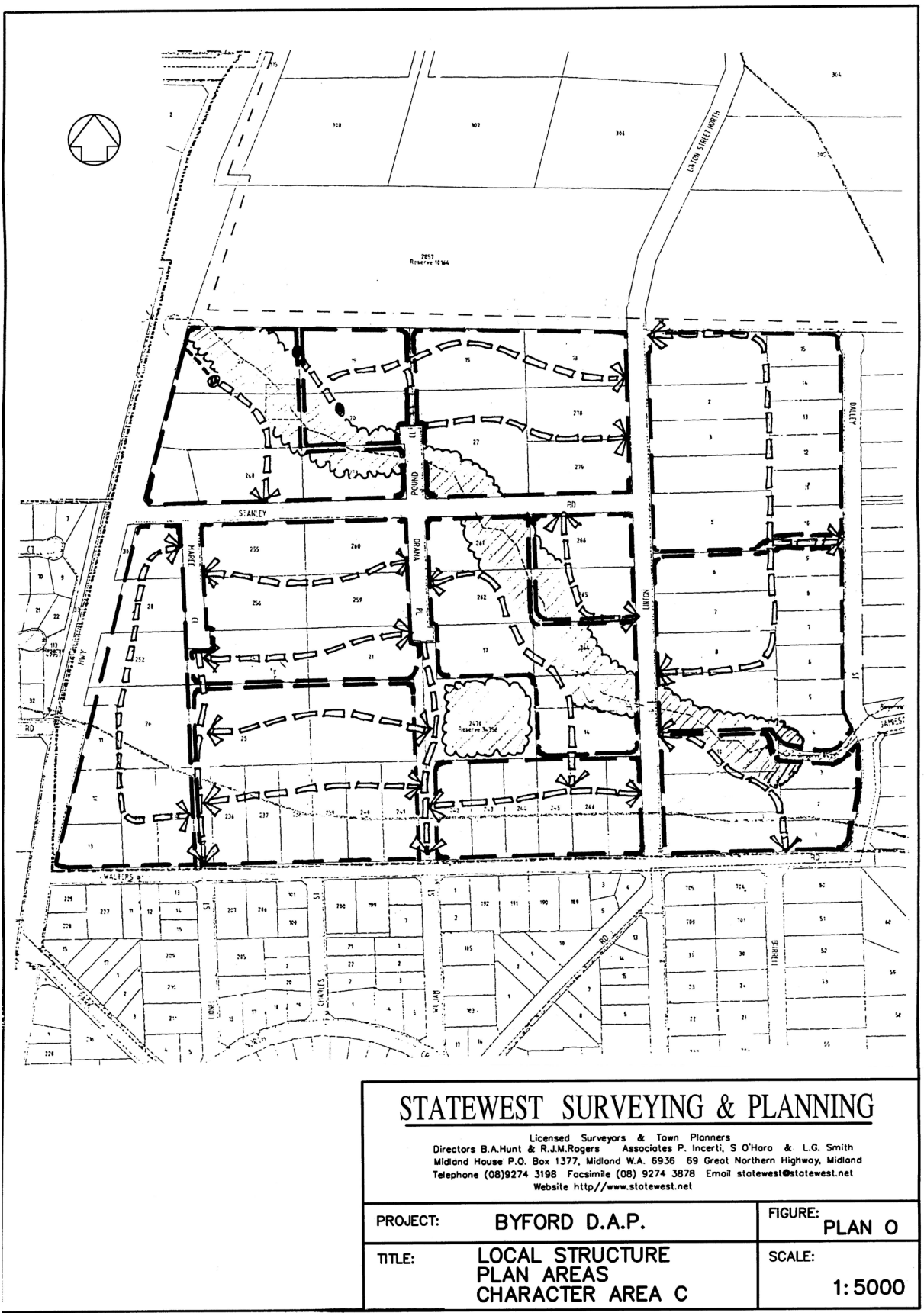
Telephone (08)9274 3198 Facsimile (08) 9274 3878 Email statewest@statewest.net
Website http//www.statewest.net
PROJECT: BYFORD D.A.P.
FIGURE: PLAN N
TITLE: CONCEPTUAL ROAD LAYOUT CHARACTER AREA C
SCALE: 1:5000

PLAN N



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Website http//www.statewest.net

PROJECT:	BYFORD D.A.P.	FIGURE: PLAN O
TITLE:	LOCAL STRUCTURE PLAN AREAS CHARACTER AREA C	SCALE: 1:5000

PLAN O

Battle-axe lots will not be supported unless they are used to provide access to lots fronting the South-Western Highway or front Public Open Space. Such lots will only be permitted with development controls to ensure the homes face the Highway or P.O.S. Any fencing to the Highway or P.O.S. shall not exceed 1.2m in height.

Applicable Residential Character Areas – B

(vii) **Subdivision Form (Nettleton North)**

Subdivision in this Character Area will follow the principal road connections and POS illustrated in Plan P. Battle-axe lots will not be supported unless they are used to provide access to lots fronting the South Western Highway or front Public Open Space. Such lots will only be permitted with development controls to ensure the homes face the Highway or P.O.S. Any fencing to the Highway or P.O.S. shall not exceed 1.2m in height.
(G2, G3, G6, R5, R7, R9)

Applicable Residential Character Areas – F

(viii) **Building Setbacks (infill)**

New buildings constructed fronting the existing streets shall be set back to achieve consistency within the streetscape. This means that a new dwelling shall be set back from the street the same distance as the dwelling being replaced, or generally consistent with its neighbours if the existing setback is greater or less than either of its neighbours. Side and rear setbacks be no less than those prescribed within the R Codes for R20, but shall take into account the requirements for solar orientation described in (xi) below.
(G1, G6, R2, R4).

Applies to Residential Character Areas – A

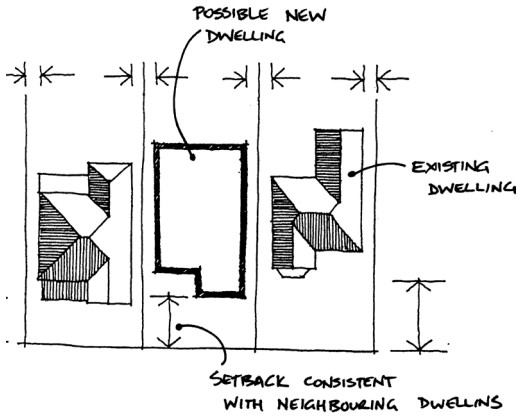
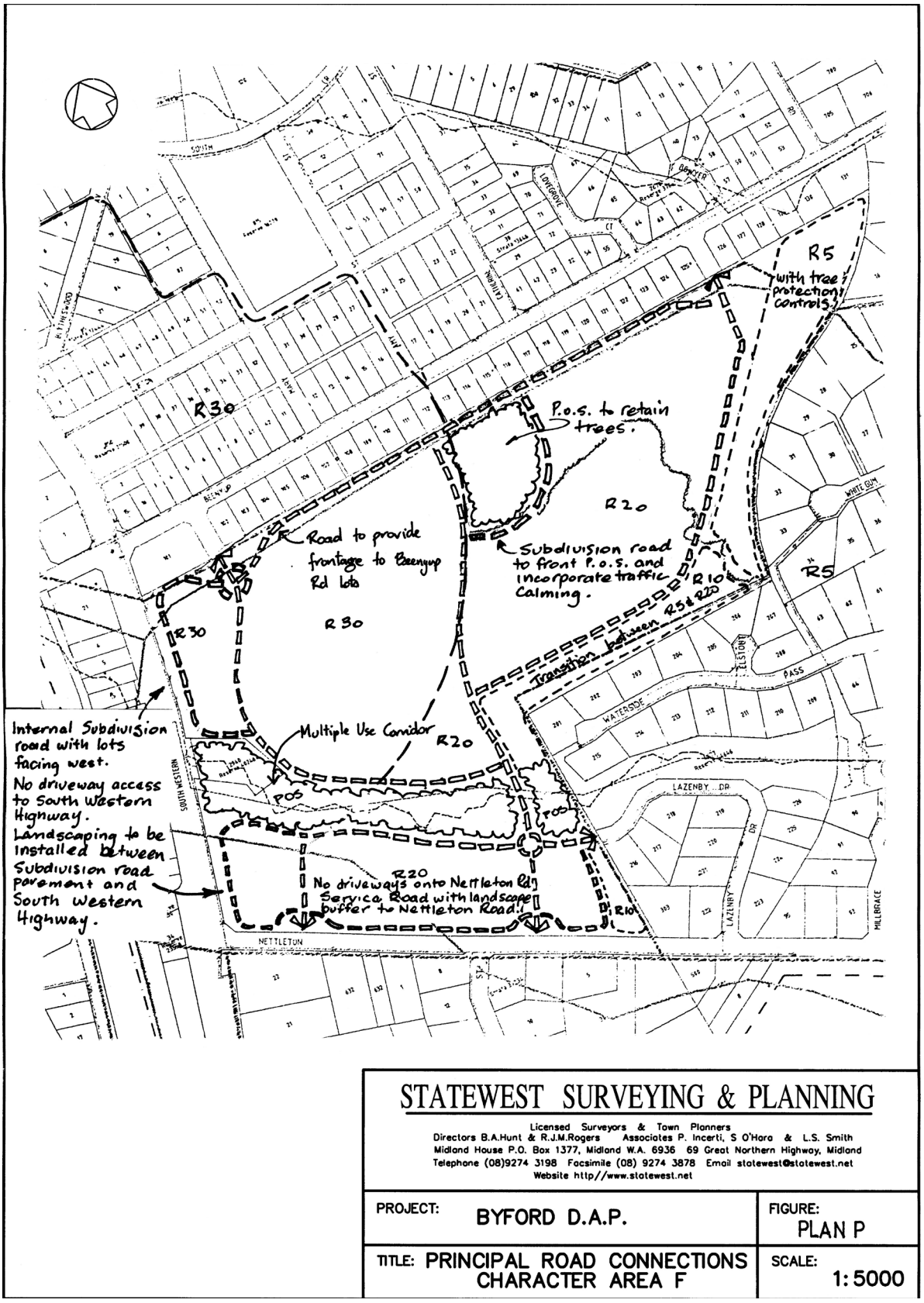


Figure E



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Website http//www.statewest.net

PROJECT: BYFORD D.A.P.	FIGURE: PLAN P
TITLE: PRINCIPAL ROAD CONNECTIONS CHARACTER AREA F	SCALE: 1:5000

PLAN P

(ix) **Building Setbacks (non-infill)**

All buildings shall conform with the requirements of the R Codes for the R20 Code unless specified otherwise under Subdivision and Development Guidelines (xi) & (xxiv) below.
(G4, G6, R2, R9)

Applies to Residential Character Areas – B,C,F

(x) **Building Setbacks (Landscape Areas)**

All buildings shall conform with the requirements of the R Codes for the R5 Code. (Mandatory)
(G6, R2, R4, R6, R8)

Applicable Residential Character Areas – D, E

(xi) **Dwelling Placement and Orientation**

All dwellings shall front the street to maximise casual surveillance of the street or open space To achieve this at least one habitable room shall face the street. They shall be orientated along a north-south or east-west axis to maximise solar access. (Refer figure D). New dwellings shall be oriented to provide living areas (rooms other than bedrooms, bathrooms, toilets, laundries and passageways) with winter sun access to the north. If the northern boundary of the lot is a side boundary, in order to provide solar access, the living areas of the dwelling are to be set back 4m from the boundary.
(Mandatory) (G4, G5, G6, R2, R5, R7, R9)

Applies to Residential Character Areas, A,B,C,D,E,F

(xii) **Scale, Proportion & Built Form (infill)**

The existing built form, as described above, is of modest, single storey homes with porches, verandahs and/or awnings and steep roof pitches. New development shall complement this character. All new dwellings and/or additions to existing dwellings shall have:

- A porch, verandah or fixed window awnings to the front of the dwelling (mandatory).

- Roof pitch of no less than 25 degrees.

- Any second storey shall be no greater than 50% of the floor area of the ground floor, and located within the confines of the existing front building line.
  (Mandatory) (G1, R4)

Applicable Residential Character Areas – A

(xiii) **Scale, Proportion & Built Form (Hillside)**

The existing built form, as described under Section 6 and in the introduction to this character area, is generally of larger, more contemporary single dwellings, set within a mix of more traditional development forms. New development should complement the established patterns and character of a street. All new dwellings and/or additions to existing dwellings shall:

- have a porch, verandah or fixed window awnings on the street front of the dwelling (mandatory).

- have overhanging eaves on the street front of the dwelling

- a roof pitch of no less than 25 degrees

- maintain the skyline by ensuring that no part of the new dwelling or extension to the existing dwelling protrudes above the skyline whether or not tree cover is present
- minimise the impact that any upper storeys have on the rear yard or open space areas of adjoining properties specifically, and surrounding areas generally
  (G1, G6, R4, R5, R6, R8)

Applicable Residential Character Areas – D

(xiv) **Scale, Proportion & Built Form (Waterside)**

The existing built form, as described under Section 6 and in the introduction to this character area, is of modern, "suburban" single storey homes with simple porches or verandahs and/or awnings and shallow roof pitches. Some limited two storey development has occurred. New development can compliment this character. All new dwellings and/or additions to existing dwellings shall have:

- a porch, verandah or fixed window awnings to the front of the dwelling (mandatory)

- overhanging eaves to the front of the house

- roof pitch of approx. 20 degrees

- any second storey to be no greater than 50% of the floor area of the ground floor, and located within the confines of the existing front building line

- any car parking structure to be incorporated under the overall roof of the main dwelling
  (G1, G6, R4, R5)

Applicable Residential Character Areas – E

(xv) **Building Materials and Colours (infill)**

Building materials and colours change over time as new and/or improved materials become available. New dwellings and upgrades to existing dwellings need to be developed in a manner sympathetic to the existing character whilst at the same time recognising the new materials and colours that can improve that character. For this reason, the following materials and colours are recommended for new dwellings and upgrades to existing dwellings:

- Walls of masonry construction, either rendered or un-rendered, or weatherboard, or fibro-cement look alike weatherboards.
- Roofs of tiles or custom orb steel sheeting.
- Colours that take inspiration from the local soils and vegetation are most appropriate.

The following materials and colours are not supported:

- Walls of custom orb steel sheeting, or concrete tilt up panels.

- Colours that are garish and/or sharply contrasting with neighbouring dwellings and the context of the dwelling.

(G1, G6, R4, R5, R6)

Applicable Residential Character Areas – A

(xvi) **Building Materials and Colours (non-infill)**

Building materials and colours change over time as new and/or improved materials become available. New dwellings and upgrades to existing dwellings need to be developed in a manner sympathetic to the desired character. The following materials and colours are recommended for new dwellings and upgrades to existing dwellings:

- Walls of masonary construction, either rendered or un-rendered, or weatherboard, or fibro-cement look alike weatherboards.
- Colours that take inspiration from the local soils and vegetation are most appropriate.

The following materials and colours are not supported:

- Walls of custom orb steel sheeting, or concrete tilt up panels.
- Colours that are garish and/or sharply contrasting with neighbouring dwellings and the context of the dwelling.
- Roofing of zincalume or white or off-white powder-coated metal unless it can be demonstrated that these materials will not adversely affect other properties or traffic due to glare.

(G6, R5, R6)

Applicable Residential Character Areas – B,C,E,F

(xvii) **Building Materials and Colours (Hillside)**

This Character Area exhibits a very wide range of building materials and colours, although within some streets certain patterns have developed. Building materials and colours change over time as new and/or improved materials become available. New dwellings and upgrades to existing dwellings need to be developed in a manner sympathetic to the established patterns and character of a street, whilst at the same time recognising the new materials and colours that can improve that character. For this reason, the following materials and colours are recommended for new dwellings and upgrades to existing dwellings:

- Walls of masonry construction, either rendered or unrendered, or weatherboard, or fibro-cement lookalike weatherboards, or powder-coated metal custom orb profile sheeting
- Roofs of custom orb steel sheeting or Marseilles tiles
- Colours that take inspiration from the local soils and vegetation are most appropriate

The following materials and colours are not supported:

- Concrete tilt up panels
- Colours that are garish and/or sharply contrasting with neighbouring dwellings and the context of the dwelling
- Roofing of zincalume or white or off-white powder-coated metal unless it can be demonstrated that these materials will not adversely affect other properties or traffic due to glare.

  (G1, G6, R4, R5, R6)

Applicable Residential Character Areas – B,C,E,F

(xviii) **Corner Sites**

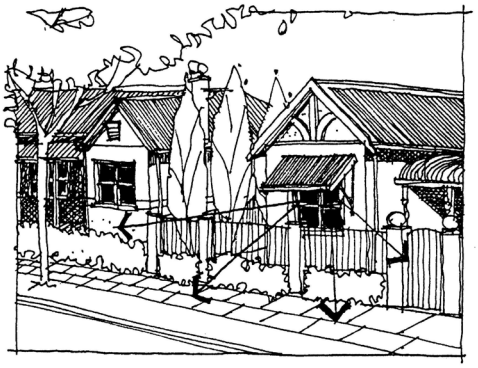
Due to their prominence in the neighbourhood, new dwellings situated on a corner lot must provide a frontage to both streets. This may be achieved by the use of feature windows, wrap-around verandahs, together with architectural detailing which reduces the visual impact of the façade. There should be no blank building facades facing either street.
(G1, G5, G6, R4, R7)

Applicable Residential Character Areas – A,B,C,D,E,F

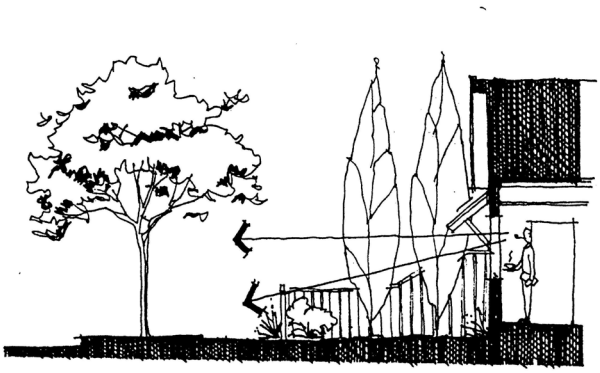
(xix) **Fences**

Front fences in Byford are not common, and therefore new front fencing is not encouraged. However, it is recognised that some residents may wish to erect a front fence to mark their property boundary, or to confine small children within their property. In order to maintain an open character to the street, the following shall apply:

a) No fences over 1.2m high in front of the building setback (Figure F).



STREETSCAPE EXTENDS TO BUILDING LINE PERMITING VIEW OF FRONT YARDS AND HOUSES.



LOW HEIGHT FENCES AND PLANTING ALLOW FOR CASUAL SURVEILLANCE OF THE STREET.

Figure F

b) In the case of corner lots, fencing over 1.2m shall only be permitted in front of the secondary street building setback, as determined by Council and at its discretion, to provide privacy to the rear yard of the property. In these cases, the fencing may be erected at the property line, but shall not exceed 1.8m in height (refer Figure G).

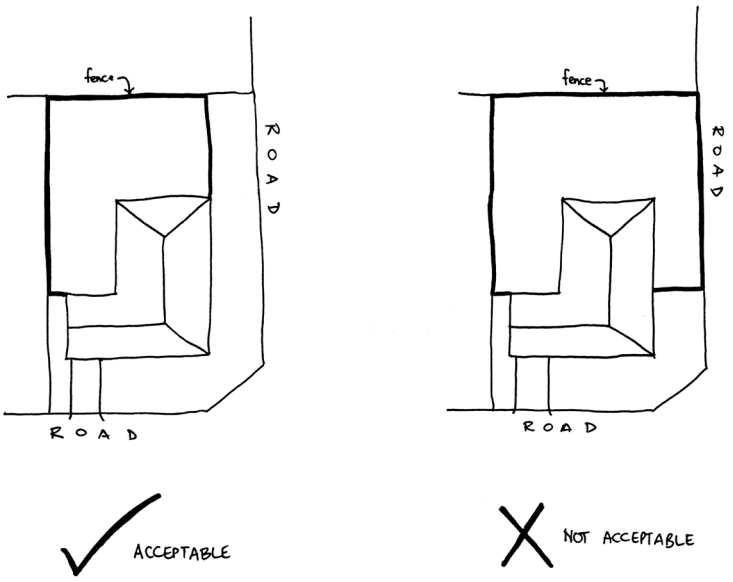


Figure G

c) Acceptable front fencing materials and colours are:

- Open or closed timber pickets decorated according to the period of the house
- Brick in keeping with the period of the house
- Hedges
- Colours which compliment those used on the front of the dwelling on the same property.

d) Unacceptable front fencing materials and colours, which are not common or in keeping with the character of the area are:

- Steel
- Swimming-pool surround type
- Corrugated fibro cement
- Colours that are dark, garish and/or which contrast with those used on the front of the dwelling on the same property
- Brush fencing
- Limestone

e) Boundary fences behind the front building setback shall not exceed 1.8m in height, and should be generally open in construction, except where privacy to a rear yard is required.

f) Fencing alongside battle-axe access legs shall not extend forward of the front building setback of the properties adjoining the access leg unless the fence is no greater than 1.2m in height.

(G1, G5, G6, R4, R7)

Applicable Residential Character Areas – A,B,C,F

(xx) **Fences (Hillside)**

Front fences in the Hillside Character Area are not common, and therefore new front fencing is not encouraged. However, it is recognised that some residents may wish to erect a front fence to mark their property boundary, or to confine small children or pets within their property. In order to maintain an open character to the street, the following shall apply:

a) No fences over 1.2m high in front of the building setback.

b) In the case of corner lots, fencing over 1.2m shall only be permitted in front of the secondary street building setback, as determined by Council and at its discretion, to provide privacy to the rear yard of the property. In these cases, the fencing may be erected at the property line, but shall not exceed 1.8m in height (refer Figure G).

c) Acceptable front fencing materials and colours are:

- Timber post and rail or ranch-type
- Local stone
- Hedges
- Colours which compliment those used on the front of the dwelling on the same property

d) Unacceptable front fencing materials and colours, which are not common, nor in keeping with the character of Hillside, are:

- Steel
- Swimming-pool surround type
- Corrugated fibro cement
- Wooden pickets
- Colours that are dark, garish and/or which contrast with those used on the front of the dwelling on the same property.
- Brush fencing

e) Boundary fences behind the front building setback shall not exceed 1.8m in height, and must be open in construction.
(G1, G5, G6, R4, R5, R7, R8)

Applicable Residential Character Area - D

(xxi) **Fences (Waterside)**

Front fences in Waterside – especially the new parts – are rare, and therefore new front fencing is discouraged. However, it is recognised that some residents may wish to erect a front fence to mark their property boundary, or to confine small children or pets within their property. In order to maintain an open character to the street, the following shall apply:

a) No fences over 1.2m high in front of the building setback.

b) In the case of corner lots, fencing over 1.2m shall not be permitted in front of the secondary street building setback.

c) Acceptable front fencing materials and colours are:

- Hedges
- Colours which compliment those used on the front of the dwelling on the same property

d) Unacceptable front fencing materials and colours, which are very rare or not in keeping with the character of Waterside, are:

- Steel
- Stone
- Swimming-pool surround type
- Corrugated fibro cement
- Ranch-style
- Wooden pickets
- Colours that are dark, garish and/or which contrast with those used on the front of the dwelling on the same property
- Brush fencing

e) boundary fences behind the front building setback shall not exceed 1.8m in height, and should be generally open in construction, except where privacy to a rear yard is required.

f) fencing alongside battle-axe access shall not extend forward of the front building setback of the properties adjoining the access leg unless the fence is no greater than 1.2m in height.
(G1, G6, R4, R5)

Applicable Residential Character Areas - E

(xxii) **Garages/Carports**

In order to maintain the open character of the streets and to enable passive surveillance of the street, it is important to ensure garages and carports don't become the dominant built form. Development of garages and carports shall comply with the following:

a) They shall be constructed of the same or similar materials as the dwelling.

b) Garages shall not be constructed in front of the building setback. (Front wall of dwelling).

c) Carports may only be constructed in front of the building setback if they remain open on all sides (other than an adjoining wall that forms part of

the dwelling) and there is no other available and accessible location on the property and the property has no existing carport or garage.

d) Carports or garages visible from the street shall be no wider than 6m.

e) If rear or side access is available to the property, carports or garages shall be accessed from those roads/laneways and not from primary street frontage. Primary street frontage shall be as determined by Council.

f) Crossovers shall be a maximum width of 4.5m.

(G5, G6, R3, R4, R7)

Applicable Residential Character Areas – A,B,C,D,E,F

(xxiii) **Servicing (bin storage, clothes drying areas, air conditioning units etc)**

Bin storage, clothes drying areas, air conditioning units, water heating systems and other plant and/or equipment are to be located such that they are not visible from the street, and all noisy plant and equipment shall be located and insulated to minimise noise impacts on neighbouring properties.

Solar hot water system panels (not with rooftop tanks) and/or PV panels are acceptable to street front where street front is north.
(G6, R4)

Applicable Residential Character Areas – A,B,C,D,E,F,

(xxiv) **Environmentally Sensitive Design**

The Shire is committed to achieving environmentally sensitive development, particularly through the application of sustainable building and design (eg water and energy efficiency, waste management) in subdivision design and development of dwellings. Some of these aspects are specifically dealt with in other parts of this section that relate to Lot Configuration and Dwelling Placement and Orientation. However, other guidelines and requirements are provided below. These form the basis of a sustainable design score sheet at the end of this section which needs to be completed with each application for a new dwelling. (Note: Some of these items are mandatory. The score sheet relates to optional initiatives).

a) All new two storey dwellings or second storey additions to existing dwellings shall submit shadow diagrams for winter solstice (21st June, 9am, 12 noon and 3pm) to demonstrate that the proposal will not negatively impact on the solar access of an adjoining property. (Mandatory).

b) Thermal mass internal wall or concrete floor with access to the northern sun in winter is encouraged in house construction. (See Figure H).

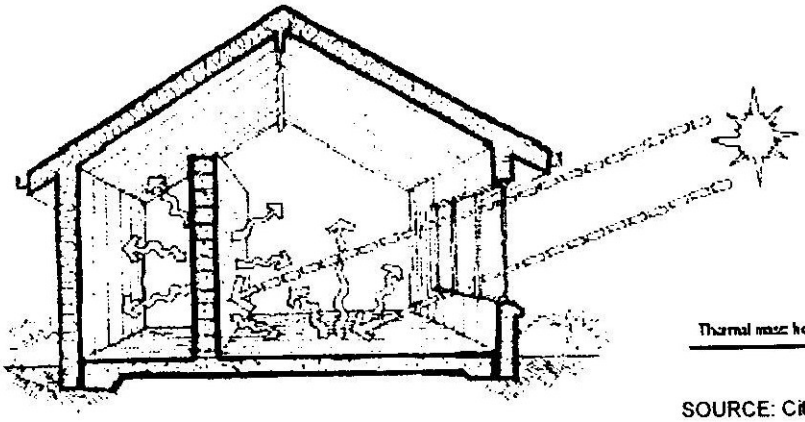


Figure 16
Thermal mass heat gain principles

SOURCE: City of Newcastle

Figure H

c) With the elevation in the eastern portion of the DAP, it is important not to have reflective roof colours or materials as this causes glare. Zincalume roofs and white or off-white powder-coated metal are not permitted unless it can be demonstrated that they will not cause glare to other properties or traffic or be visible from viewpoints such as South Western Highway or Coastal Plain. Conversely, dark roof colours absorb heat, heating homes in summer. Dark roof colours with an absorption value above 0.8 (e.g. black, dark grey, and dark blue) will not be permitted unless they are provided with additional insulation (greater than R2.5) and roof ventilation. Council's Landscape Protection Policy applies to the eastern portions of the DAP, and development needs to conform with that policy.

d) In order to reduce heating of the dwelling in summer and to gain the advantage of sunshine into the dwelling in winter, all north facing glazed areas should be shaded by eaves or awnings or other permanent shade device extending between 0.4 to 0.7 times the height of the glazed area, measured from the bottom of the glass to the lowest point of the eave, awning or shade device (refer Figure I).
(Mandatory)

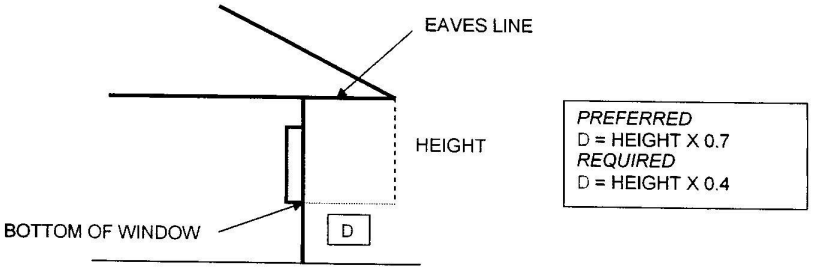


Figure I

e) Dwellings should be designed to maximise opportunities for natural cross-ventilation by providing for openings across the dwelling to catch the prevailing breezes through summer (breezeway orientation to be along an east to west or north-east to south-west axis). Ceiling and roof ventilation is also encouraged.

f) Insulation is a key factor in retaining heat in winter and keeping heat out in summer, thereby reducing reliance on artificial heating and cooling. All new dwellings should have a minimum insulation value of:

R2.7 for roofs and ceilings
R1.4 for walls
or as otherwise specified in future amendments to the BCA

g) Water heating is often a major domestic energy user. Systems with energy ratings of 4 – 5 stars are encouraged.

h) Domestic appliances with AAAA or AAAAA water efficiency ratings and 4 – 5 star energy ratings are encouraged.

i) In order to reduce the amount of stormwater discharge from roofs, rainwater storage tanks are encouraged for garden reticulation. The minimum size should be 1000 litres.

j) Re-use water from kitchen and bathroom sinks, baths, showers and laundry (greywater) on gardens.
(G4, G6, R6, R9)

Applicable Residential Character Areas – A,B,C,D,E,F

(xxv) **Stormwater (subdivision - greenfields)**

Subdivision of land will conform with the principles, and requirements and best management practices of the Byford Urban Stormwater Management Strategy (BUSMS).

This requires developers to achieve particular design objectives relating to water quality and quantity. These design objectives are as per the BUSMS or can be determined by monitoring water quality for a period of 2 – 3 years prior to subdivision, in conjunction and with the Department of Environment.

The Subdividers shall then monitor water quality for 2 years after subdivision to determine whether the water quality objectives are achieved.

The subdividers will also deal with stormwater as described in Sections 6.10 and 8 of this DAP to maintain post subdivision flows at pre-subdivision levels and water quality in accordance with the Byford Urban Stormwater Management Strategy.
(G1, G3, G4, R9)

Applicable Residential Character Areas – B, C & F

(xxvi) **Stormwater (subdivision – infill)**

Subdivision of land will conform with the principles, and requirements and best management practices of the Byford Urban Stormwater Management Strategy (BUSMS). This requires developers to achieve particular design objectives relating to water quality and quantity. These design objectives are as per the BUSMS or can be determined by monitoring water quality for a period of 2 – 3 years prior to subdivision, in conjunction with the Department of Environment.

The subdividers shall contribute towards a Council managed stormwater quality monitoring programme (refer to sections 6.10 and 9 of this DAP).

Subdividers shall also contribute to the cost of land acquisition and detention basin construction by the Council to maintain post subdivision flows at pre-subdivision levels (refer Sections 6.10, 8 and 9).
(G1, G3, G4, R9)

Applicable Residential Character Areas – A,D,E

(xxvii) **Sub-Soil Drainage (Subdivision)**

Areas requiring fill as a condition of subdivision due to the high groundwater levels identified in the BUSMS, will be required to install subsoil drainage.
(G3, R6, R9)

Applicable Residential Character Areas – C

(xxviii) **Sub-Soil Drainage (Domestic)**

Where sub-soil drainage is not present, it shall be installed as a condition of Building License to accord with the recommendations of the BUSMS.
(G3, R6, R9)

Applicable Residential Character Areas – A,B,D,E,F

(xxix) **Water Sensitive Design (domestic)**

Increased roof and paved areas that comes with increased development, reduces the area available for local groundwater recharge. This commonly results in more water having to be carried via drainage from the site. Some local measures can be taken to reduce water export. Examples of this include reduction in outdoor paved areas or use of pervious paving and installation of rainwater tanks to catch roof water for garden irrigation. These are to be encouraged.
(G1, G4, R2, R9)

Applicable Residential Character Areas – A,B,C,D,E,F

(xxx) **Landscaping – (Private Property)**

Encouraging a more sustainable or environmentally friendly approach to development should be inclusive of the development of private gardens.

Whilst it could be perceived that the development of the 'ideal' environmentally friendly garden may imply the creation of gardens focussed purely around 'local native' or endemic plants, this may not suit everyone's taste. However, there is a broadening community understanding of the need for each individual to take some responsibility for the management of the use of natural resources, particularly water, be it water for private garden development or the use of fertilisers and other chemicals that can leach into the groundwater and on into the stream and river systems.

There are some basic garden development and management principles that should be encouraged and fostered in the community generally. These are based around 'Waterwise' and 'Water Sensitive' principles.

Waterwise and Water Efficient design principles, in the development of private gardens, include the following:

1. Maximise the use of non-planting or drought tolerant turf areas (i.e. pervious paving, mulches etc).

2. Keep planted areas dense and consolidated.

3. Make use of windbreaks.

4. Prepare the soil well.

5. Choose low water demand plants.

6. Install a good watering system (water the root zone, not the foliage).

7. Monitor and adjust the irrigation system.

8. Mulch.

Further, plants in any given area of the garden should be selected on the basis of like needs, like areas, that is plants requiring similar amounts of water should be planted in the same watering zone. This is known as 'Hydrozoning'.

Further information about water efficient gardening can be obtained from the Water Corporation of WA and through a number of publications available from nurseries.

Planting of deciduous trees on the north side of buildings also promotes sustainable design by providing shade in summer and letting sunshine through in winter (refer Figure J). This principle is also discussed in (xxiv) above.

(G4, G6, R9)

Applicable Residential Character Areas – A,B,C,D,E,F

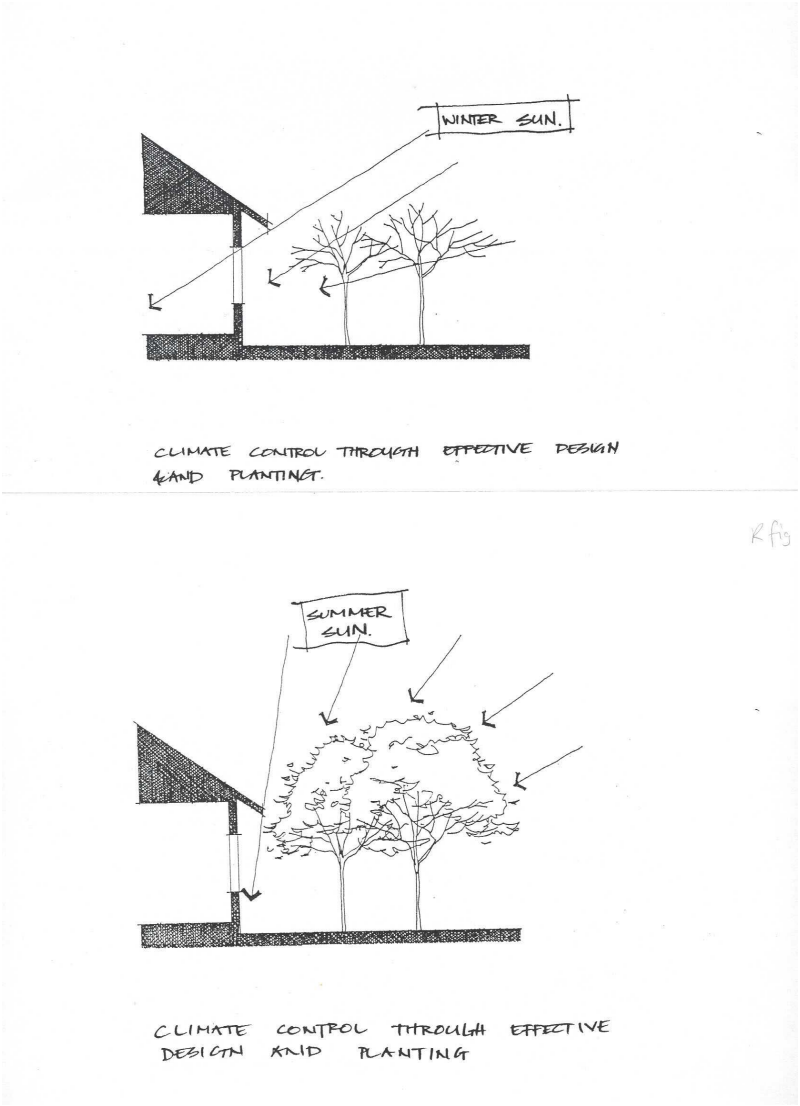


Figure J

(xxxi) **Paving**

The hard landscape component comprises mainly surface treatments in the form of footpaths, kerbs and crossovers and of course the general road pavement.

Where new paths are deemed necessary generally speaking wide simple concrete paths are appropriate pedestrian paved surfaces. The pathway should be the dominant element and not be interrupted by crossovers. Close to the Core area, and up to the school, paths should be constructed on both sides of the streets. However, elsewhere paths may be on one side of the street or on both sides. Paths should be 2 metres wide as a minimum and should be constructed with a smooth continuous surface appropriate to the principles of universal access.

Pedestrian pathways should be constructed alongside the back of the kerb in all new locations to avoid the creation of narrow strips of grass or other 'soft' surfaces requiring maintenance. In this way greater 'custodianship', and therefore maintenance, of the verge is inferred upon the owner of the property even though it still belongs to Council.

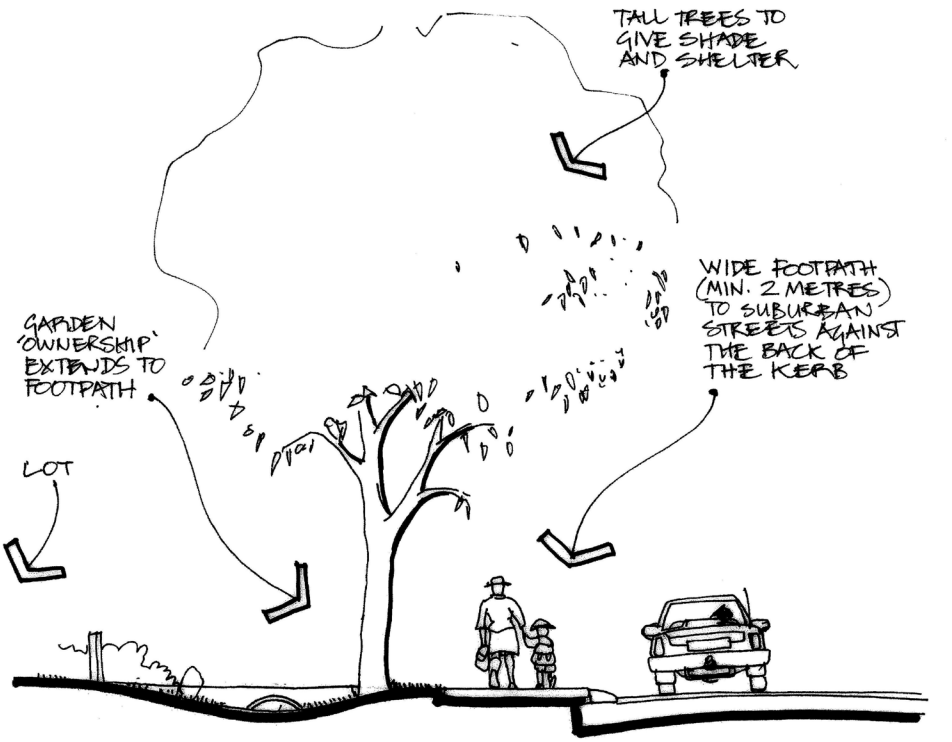


Figure K

At intersections, ramps are to be constructed to facilitate wheelchair and pram movement. Intersections identified on the landscape master plan should be demarked by the use of red bitumen and edge treatment of concrete beams set into the road surface to further indicate the intersection and assist in making a potentially safer environment for all road users. However, a pedestrian alignment in the road surface should not be marked as it may confuse who has priority or right of way. (Refer Section 9 for developer contributions towards intersection treatments).

On pathways too, some indication of the approach of an intersection should be marked. This may be achieved by the use of brick edging and lines across the path near to the intersection.
(G3, G5, G6, R5)

Applicable Residential Character Areas – A,B,C,D,E,F

(xxxii) **Walls and Structures**

This incorporates public hard landscaping features and features on private properties such as landscaping walls, steps, retaining walls, etc. Fences are dealt with under (xix), (xx) and (xxi) above.
Walls and structures should be constructed of appropriate materials. Limestone or limestone like constructions should not be permitted except where they are not visible from the street. Appropriate materials are timber, metal, red brick and granite or laterite rock constructions. These materials are consistent with the natural environment of the locality.
(G1, G6, R4, R5, R6)

Applicable Residential Character Areas – A,B,C,D,E,F

(xxxiii) **Street Trees**

Street trees are an integral part of Byford. Where subdivision occurs, street trees shall be planted by the developer at a rate of 10 per 100m, or proportional amount depending on the width of the subdivided lot. The type of street trees to be planted shall be determined by Council to ensure consistency within the street.

Where overhead power lines exist, the following street trees are recommended:

Eucalyptus todtiana
Eucalyptus ficifolia
Allocasuarina fraseriana
callistemon sp. (as used on South West Highway)

NB: Due to the presence of powerlines, these plants will still require maintenance and pruning.

Larger trees which may be used in locations free of overhead power include :

Eucalyptus lanepoolei
Corymbia haematoxylon
Corymbia calophylla rosea
Melaleuca preisiani
Eucalyptus marginata sp. elegantella
Eucallyptus rudis

Tree planting in public streets needs to be cognisant of underground services, paving integrity and line of sight safety parameters and setbacks from crossovers and street intersections.

See also sections 8 (Infrastructure, incorporating the Landscape Master Plan) and 9 (Developer Contributions).
(G1, G6, R4, R8)

Applicable Residential Character Areas – A,B,C,D,E,F

(xxxiv) **Road Reserves**

All new road reserves to be 20m wide to enable tree planting and drainage swales to be established within the road reserves. (See Figure L)
(G1, G4, G6, R4, R9)

Applicable Residential Character Areas – B,D,F

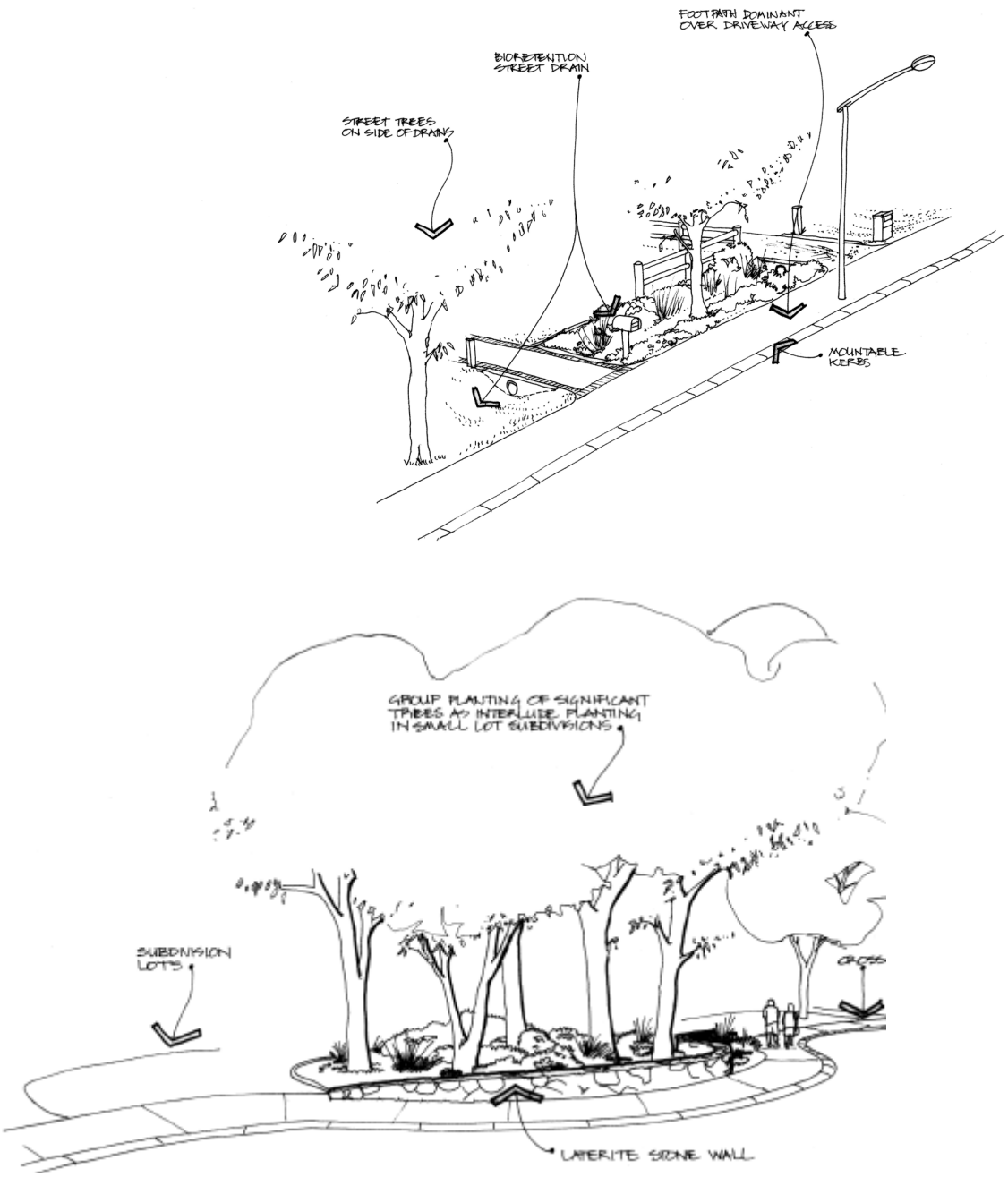


Figure L

(xxxv) **Public Open Space**

Additional POS requirements will not normallyt be required for subdivisions creating five lots or less unless the subject land is affected by POS required:

- For the provision of a designated Multiple Use Corridor (MUC)
- As a buffer to the South-Western Highway
- To conform with Plans N, P, U or V of this DAP
- To conform with another POS Strategy.

In regard to the last point, the Council is seeking to increase the amount of POS in the "Old Quarter" from approximately 3.5% to 6-7% to retain some tree canopy and provide for outdoor recreation space that will be lost as subdivision into small lots progresses. Council will prepare a strategy to enable this to occur in an equitable and rational manner.

In all other instances, the standard 10% requirement shall apply in the case of residential subdivisions.
(G2, G3, G4, G5, G6, R4)

Applicable Residential Character Areas – A,B,C,D,E,F

(xxxvi) **Public Open Space (Stanley Rd Area)**

Public Open Space shall be given up at 10% of the gross subdivisible area in order to achieve the creation of the MUC (refer Plans N and O). Each Local Structure Plan shall make provision for the MUC. Those landowners whose land does not contain a portion of the MUC (as determined by the Local Structure Plan) shall provide 10% cash-in-lieu payment (S.20C of the TP & D Act) to the Council for the acquisition and/or development of the MUC.

Costs for MUC, roads, drainage and other infrastructure will be determined in the Developer Contribution Plan being completed by the Shire.
(G2, G3, G6, R9)

Applicable Residential Character Areas - B

7.11. COMMERCIAL (NON-RESIDENTIAL) CHARACTER AREAS

The commercial component of the DAP comprises areas identified in the Byford Structure Plan as:

- Town Centre
- Highway Commercial,and
- Mixed Business Development

Added to these components is the "Community Focus" (Town Square) area on the South Western Highway between Clifton Street and Beenyup Road..

These areas are identified on Plan M.

7.12. Commercial Development Vision

Through the process of public submissions, the following vision for the commercial area has been developed, which compliments the Shire's vision and the overall DAP vision.

"Our community will share in a vibrant, identifiable and accessible commercial area that acknowledges it heritage and is welcoming to its users".

7.13. Commercial Objectives

As well as the general objectives for the whole of the DAP provided at section 5, specific objectives for commercial development can be used to measure and assess the actual form of subdivision and land development.

C1 To support development that creates an identifiable character relevant to Byfords heritage.

C2 Responding to the features of the site and surrounding areas.

C3 Contributing positively to improved vehicular access efficiency and safety within the locality.

C4 Contributing positively to pedestrian amenity and safety.

C5 Adding new dimensions to the critical mass of town centre development.

C6 To create a landmark entrance to the Byford commercial area.

Indicative Concept Plans for the future development of these four areas are shown at Plans Q, R, S & T.

7.14. Character Area G – Central Core (Town Centre)

This area is proposed, under the BSP, to continue to provide retail and employment opportunities.

Characteristics

- current (2004) development is predominantly single storey retail and mixed commercial;
- some buildings are set on the footpath edge, while others are set well back behind car parking or service areas;
- development is predominantly orientated towards the Highway, with the George Street frontage mostly reserved for service access;
- the shop fronts have simple awnings or verandahs;
- construction materials are predominantly brick and masonry, rendered or unrendered, with corrugated steel sheet roofing of a very low pitch, or hidden behind a parapet;
- commercial advertising signage and parked vehicles are dominating visual aspects of the commercial buildings within the town centre;
- the northern end of the Central Core is occupied by the Byford Districts Country Club, and vacant land. The latter site has a project board erected on the site, announcing the imminent development of a bank premises within a 12 unit mixed use commercial development.

Central Core

Future Development

An Indicative Concept Plan for future development of this Area is shown at Figure Q.

The Byford Structure Plan provides for a major new shopping and mixed business area on the western side of the railway line, straddling and focussing on Abernethy Road.

The Byford Structure Plan also proposes a new bridge over the railway line linking the eastern and western sides, designed using a "horseshoe" configuration (see Plan Q). This form of bridge structure will occupy a significant land area, and have implications for local accessibility, and the visual and environmental amenity in the near vicinity.

The construction of this bridge on the present alignment of George Street will ensure that the existing retail (town) centre on the eastern side of the line will continue to orientate towards South Western Highway, and, to a lesser extent, Abernethy Road. North of the existing Country Club, George Street will play a more important access role than it does now, with all development being required to address both George Street and the South-Western Highway.

As an alternative, a level crossing will still enable safe traffic movement and present greater opportunities for parking and a better outlook to George Street. This alternative is shown on Plan Q.

All development in this area must be considered in the context of the Byford Townscape Study. The key requirements are provided at Attachment I.

The following provisions address new development in this context.

A. SUBDIVISION AND DEVELOPMENT GUIDELINES

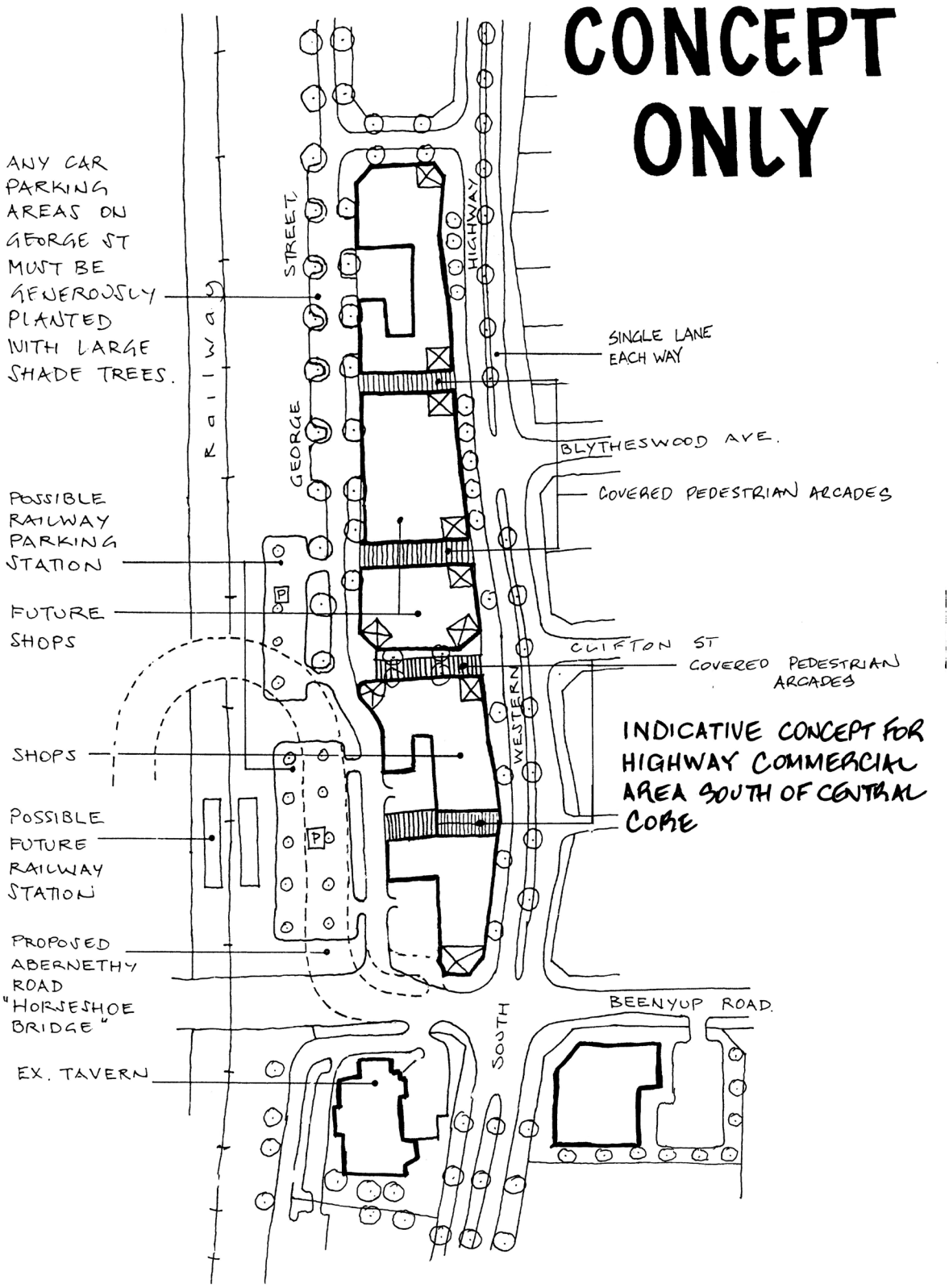
(i) Lot Sizes

Subdivision of lots (including boundary re-alignments) will not be recommended unless supported by a detailed land development concept consistent with the objectives and guidelines contained in the DAP.
(G1, C2)

(ii) Building Setbacks

New development and infill development shall be built close to the road reserve boundary to the fullest extent possible, but in all instances new buildings fronting the Highway will be constructed with a 2m front setback and a verandah over the setback area. This setback will require a modification to the development requirements in Councils TPS.

Exceptions to a 2m setback will only be permitted on street edges where car parking areas and access ways are provided.
Side setbacks shall be nil, however, allowance may be made for pedestrian connections at the side of new buildings between the street and any rear parking area.
(G2, G6, C4, C5)


CONCEPT ONLY
ANY CAR PARKING AREAS ON GEORGE ST MUST BE GENEROUSLY PLANTED WITH LARGE SHADE TREES.
POSSIBLE RAILWAY PARKING STATION
FUTURE SHOPS
SHOPS
POSSIBLE FUTURE RAILWAY STATION
PROPOSED ABERNETHY ROAD "HORSESHOE BRIDGE"
EX. TAVERN
Railway
GEORGE STREET
HIGHWAY
SINGLE LANE EACH WAY
BLYTHESWOOD AVE.
COVERED PEDESTRIAN ARCADES
CLIFTON ST
COVERED PEDESTRIAN ARCADES
WESTERN
SOUTH
BEENYUP ROAD.
INDICATIVE CONCEPT FOR HIGHWAY COMMERCIAL AREA SOUTH OF CENTRAL CORE
P
P

PLAN Q

(iii) Building Placement, Orientation and Frontages

- New development and infill development shall face the street, be built up to the road reserve boundary, and have predominantly active and visually permeable frontages;

- Buildings must contain active street frontages to all streets they are bounded by.

- All buildings are to address streets in the traditional manner, their facades should generally be built parallel to the front street boundary, and the main entry must overlook the public footpath and the street;

- Building fronts shall display a high level of detailing;

- Verandah's shall be provided in a continuous manner to provide weather protection for shoppers and pedestrian within the lot boundary;

- Ground floor development shall have walls with large glazed areas facing the street, and any other areas facing significant setbacks should also have glazed areas to enhance their commercial exposure and maximise casual surveillance both into and out of the building;

- Residential use at first floor level or above will be encouraged, however, all ground floor uses must be non-residential (apart from the areas used to access the residential component);

- Buildings on corner sites are to be designed to reflect prominent position with detailing to signify the corner and entry;

- Dual street frontage :

  New development within the town centre with dual frontage to George Road and South Western Highway shall be designed in such a manner that it has a visually acceptable "face" to both streets. This may require the location of unsightly service areas to the side of the development, or in a loading court central on the site, out of view of both streets.

  Any new on-site car parking areas shall be located on the George Street frontage, and not on the Highway frontage.

  New development forms must aim to improve the quality of the George Street streetscape, and any responsible and innovative design initiatives taken in this regard by applicants in the future (e.g., by proposing dual frontage/occupancy buildings, by sharing access ways and loading/ storage areas with neighbours etc.,) will be looked upon favourably by Council.

  Car parking areas located on the George Street frontage must be generously planted with large shade trees to ameliorate the views of the hard paved areas, as well as providing shade to parked cars (see section xiii).

(G2, G5, G6, C1, C4, C5)

(iv) Scale, Proportion and Built Form

- While new development may be contemporary in its form and style, it shall also be cognisant of the semi-rural character that prevails within the town. All new development should strive to demonstrate some consistency with other new neighbouring buildings in terms of basic form, rhythm, materials and articulation.

- Roof forms shall be broken up to add interest to the skyline. Reflective roofing materials are not permitted (unless the roof is flat and located behind a pediment). While roofing profiles and formats will be considered in their overall street context, they should contribute visually to the context of the immediate vicinity. Flat roofs behind a simple pediment, or steeply pitched roofs (approx. 25 degrees) are most appropriate .

- Buildings should be capable of adaptation over time to cater for alternative uses.

- Long, horizontal strips of retail development shall be broken into a vertical rhythm by the compartmentation of shops and fenestration to the individual shops. It is important to retain this kind of rhythm in redevelopment even where large single use developments are proposed.

- Development which is carefully designed to fit in with its neighbours may be permitted to a maximum of two storeys on the street edge, with a total roof height of 8.0 metres maximum. Corner redevelopment sites usually lend themselves well to two storey construction.

- Developments should incorporate covered arcades within individual lots to provide a pedestrian link between George Street and the South-Western Highway. (Refer Plan Q).

(G6, C1, C4, C5)

(v) Building Materials and Colours

- New buildings shall continue the existing theme of brick / masonry walls, with Colorbond (non-reflective) roofing. The use of some weatherboard or Zincalume custom orb steel sheet cladding as a small detail feature should also be considered, in combination with the brick / masonry.

- Where roofing is visible, large profile roof sheeting is not acceptable.

- The use of concrete tilt-up construction for external walls will only be permitted if the developer can demonstrate that proposed articulation, detailing and the provision of windows is compatible with the objectives and provisions of these Guidelines. Acceptable means of treating tilt-up slabs include detailing by texturing / grooving surfaces, by the use of bas-relief designs or public artworks, and the inclusion of brick headers around windows and doors. Other design devices to accentuate openings may be considered.

- Commercial property owners or tenants shall not use colours that make their buildings stand in sharp contrast to their context. Intense and lurid colours shall not be used.

- Muted neutral backgrounds with mid-range accents are acceptable. Occasional and limited use of strong colour could add life to the streetscape, but strong colour use should be the exception rather than the rule.

- Colours that take inspiration from the local soils and vegetation would be most appropriate.
  (G6, C1, C5)

(vi) Car Parking and Access

- Car parking for customers, tenants and visitors shall be provided as required by prevailing Town Planning Scheme provisions. In some circumstances cash-in-lieu of on-site parking may be accepted by Council in order to achieve consolidated parking objectives.

- Access to car parks shall not be provided directly from South Western Highway, where alternative access exists.

- The sharing of crossovers to adjoining sites will be encouraged to minimise the number of crossovers to the streets.

- Clear, direct east-west pedestrian access across street blocks shall be allowed for at mid-block locations which align with main Highway crossing points.

  Note : In the longer-term, a multi-level car parking station may be provided within the Central Core to jointly serve train users and local shoppers. Underground car parking on commercial sites is also encouraged.
  (G2, G6, C3, C4)

(vii) Corner Sites

- Buildings on corner sites shall create landmark features by emphasising greater scale or by slightly different geometry relative to the remainder of the project or surrounding development. This could include additional height, different roof forms, balconies or other design elements which accentuate building corners.

- Where new development located on a corner lot has an entrance(s) or aspect facing a side street, then great care must be taken in ensuring development form, scale, setbacks and street elevations are compatible with adjoining development in the side street, and that large, blank walls or fences are not provided to the footpath.
  (G2, G6, C1, C6)

(viii) Fences

- Fencing will not be permitted in the Central Core. Where screening of service areas is required, it shall be constructed of materials consistent with the building it services.
  (G5, C4, C5)

(ix) Servicing (bin storage, air conditioning & cooling plant, etc)

- Service areas shall be located out of sight of public roads and footpaths.

- Air conditioning equipment, satellite dishes and other roof structures shall be located so as not to extend above the roof line.

- Mechanical equipment may be permitted on building facades where it is adequately visually screened and noise insulated in a manner that is in keeping with the development.
  (G6, C2)

(x) Advertising Signage

- Advertising signage must conform to the requirements of the Shire of Serpentine-Jarrahdale Local Planning Policy No. 5 – "Control of Advertisements". However, the following signs will <u>not</u> be permitted in the town centre:

  - Building signs above roof
  - Building signs wall
  - Building signs projecting
  - Off-building signs pylon
  - Off building signs panel
  - Off building signs hoarding
  - Tethered Off-building signs
  - Off building signs product display

- A signage strategy shall be submitted with all applications for commercial development, for approval by Council, to ensure co-ordinated signage consistent with the principles and requirements of this DAP.
  (G6, C1)

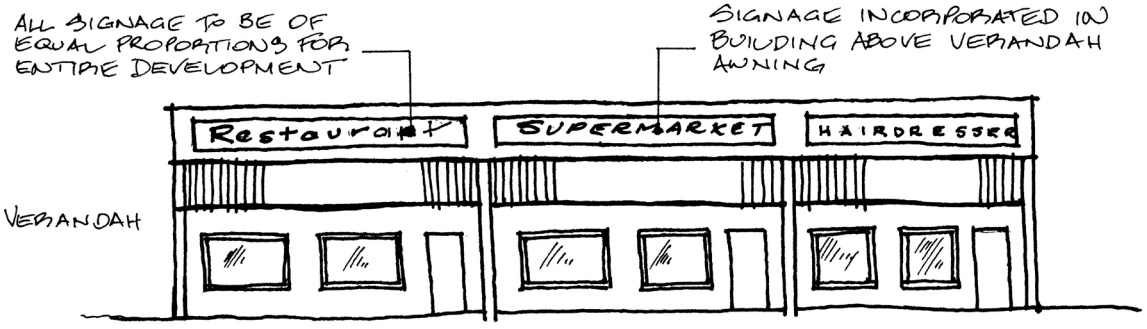
- Building signage shall be kept simple and be uniform throughout each development and set above the verandah on the building fascia at a consistent height as appropriate. Corner buildings may be treated differently where signage can be made an integral part of the design, and demonstrated to be visually compatible.

- Signage on shops shall generally be restricted to the building facias, and on shopfronts. Signage other than the name of the business, the principal activity of

the business and the street address will not be permitted. 'Third party' advertising will not generally be permitted. No signage is to be permitted more than 2m above the verandah level.

- Signs painted on shop windows or otherwise fixed to shop windows should not obscure views into or out of the shop, and to this end no more than approx. 33% of the front glazed area may be obscured in this manner.

- Colours for signs should be selected with due consideration for the colours used in neighbouring developments. Signage should be located in places that are appropriate to the architecture, and be part of the overall building.



FRONT ELEVATION – TYPICAL TOWN CENTRE

FIG. M

(xi) Environmentally Sensitive Design

New developments shall incorporate ecologically sustainable design principles, while maximising the health, safety, comfort and productivity of its users by :

- Maximising solar access and natural ventilation;

- Minimising the need for energy consumption, by reducing reliance on artificial temperature control and lighting;

- Reducing or eliminating unsustainable consumption of resources;

- Giving preference to building materials based on thermal insulating properties, low-energy production, and renewable or recyclable resources;

- Minimising adverse emissions to air, soil and water; and

- Aiming to achieve high energy and water efficiency ratings in an accredited system for energy efficient building design and maintenance (e.g., the Green Building Council of Australia's 'Green Star' environmental rating system.)

The Shire of Serpentine-Jarrahdale supports the principles of building sustainability, including use of sustainability benchmarks. The Shire will promote the application of mandatory minimum building standards that support sustainability in the Building Code of Australia.

Developers should strive to achieve 'best practice sustainability standards' including (where appropriate) conservation, adaptive re-use and renovation.

Buildings should be capable of adaptation over time to cater for alternative uses. Shop fronts should be capable of easy removal, or able to be modified to allow tenants to express the speciality of their business.
(G3, G4, C1, C2)

(xii) Paving

Use unit paving to delineate pedestrian paving surfaces. The basic units should be red clay brick in keeping with the earth tones of the natural local environment. Some variation may be appropriate, particularly to further delineate use zones, but patterning should be simple and elegant.

Street car parking and vehicle crossings shall be coloured or paved differently from the road surface. These should be earth tones.
(G6, C1, C2, C4)

(xiii) Landscaping

No on-site landscaping is required, except for car parking areas, which must be generously planted with large shade trees, at a rate of one tree per 6 car bays or every 15m. Tree species must be selected from Council's preferred palette of indigenous trees listed below:

Eucalyptus lanepoolei
Corymbia haematoxylon
Corymbia calophylla rosea
Eucalyptus todtiana
Eucalyptus wandoo
Melaeuca preisiani
Eucalyptus ficifolia
Eucalyptus marginata sp. elegantella
Allocasuarina fraseriana
Eucalyptus rudis
Callistemon sp. (as used on the South-Western Highway)

Some plants may be used for accent and features where appropriate. Such plants that may be considered would be the strap leafed plants (eg Kangaroo Paws) and the dramatic Xanthorrhoea (Grass Tree) and Macrozamia (Zamia Palms).
(G6, C1, C2, C4, C5)

(xiv) Street Furniture

Street furniture (seats, litter bins, bollards, street lighting, decorative lighting, signs etc) should be simple and elegant and must be approved by Council. It can be used to define spaces as well as roads, paths and accessways.

Avoid the temptation to 'manufacture heritage' style or use overly ornate furnishings.
(G5, G6, C1, C4, C5)

(xv) Stormwater

All development must conform with the requirements of the Byford Urban Stormwater Management Strategy.
(G3, G4, G6, C2)

7.15. Character Area H – Highway Commercial

These areas, extending both north and south of the Central Core Area, are proposed to accommodate showrooms, bulky goods, offices, medical centres, consulting rooms, and the like (BSP 7.11).

Area Chracteristics

The area to the north of the Central Core is sparsely developed. The area is occupied by large vacant lots, some old commercial buildings (some vacant), a new Medical Centre, and some residences. Most lots have a dual road frontage, although George Street is unmade in parts.

Highway Commercial – North

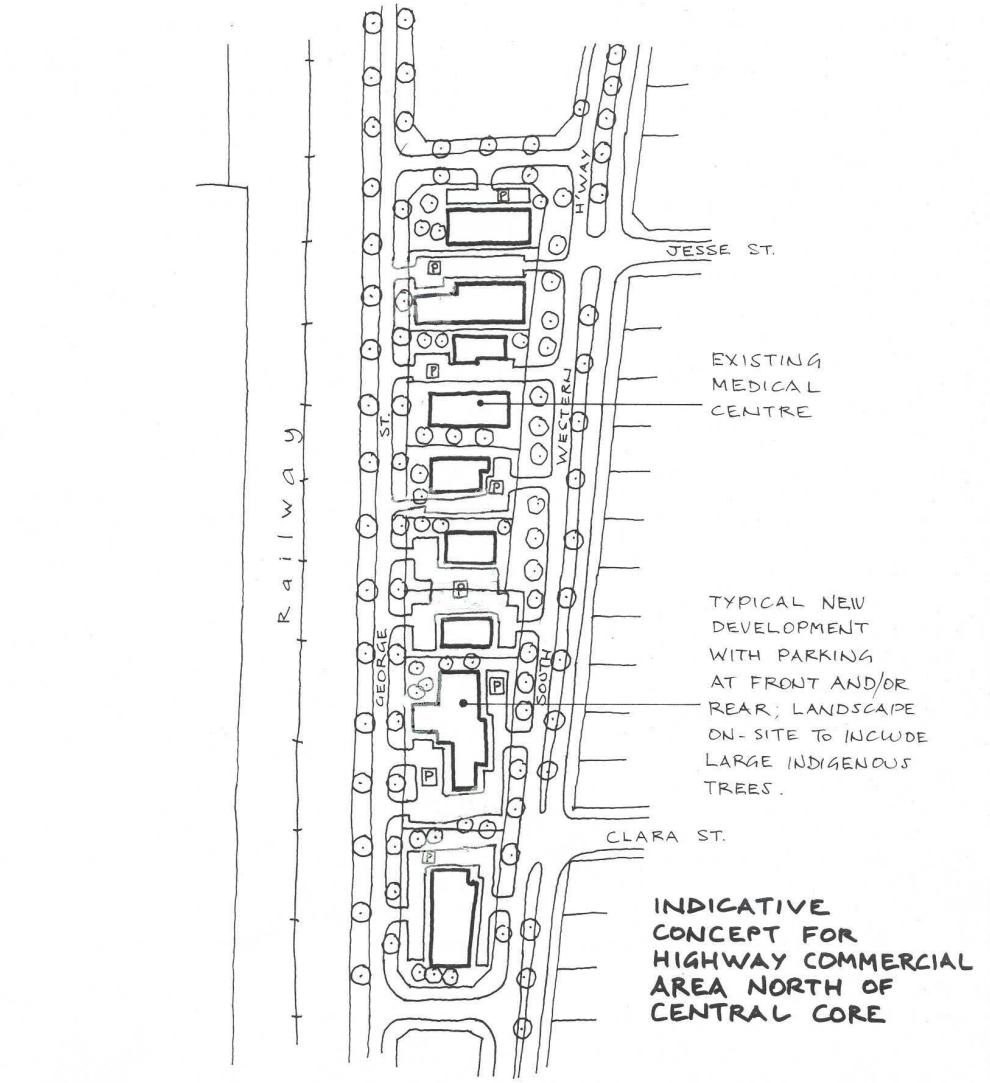
The area to the south of the Central Core is made up of narrow residential lots (almost all occupied by single dwellings set in lush gardens with large trees), and an accountant's office. The Beenyup Brook runs through several of the lots. The lots back onto a long, narrow strip of Crown Land.

"Highway Commercial – South"

"Highway Commercial" land uses will be an appropriate form of new development in the northern area, complementing and invigorating existing commercial developments. However, this will be an entirely new form of land use in the southern area.

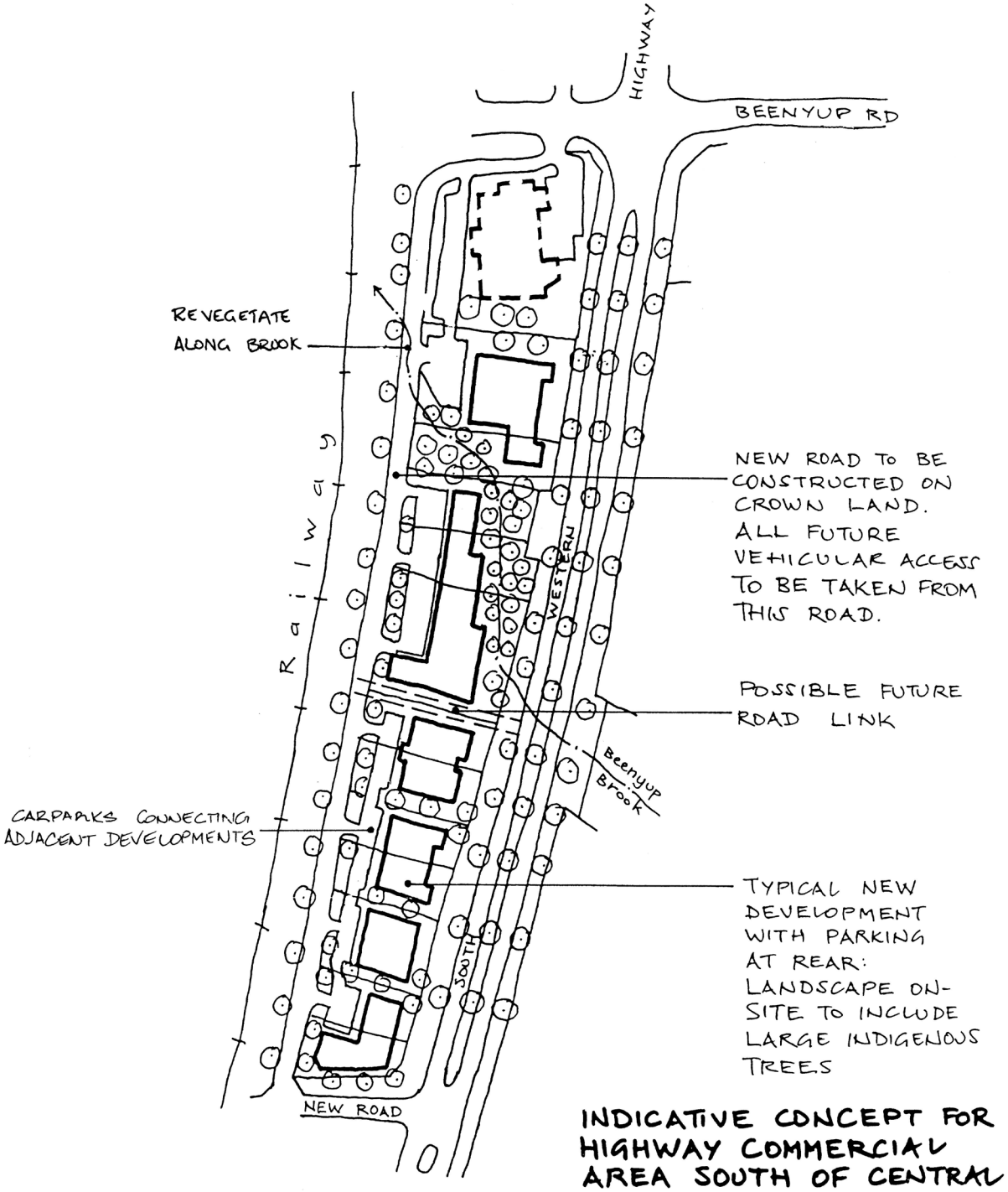
Future Development

An indicative Concept Plan for future development of each of these Areas is shown at Plans R & S.



CONCEPT ONLY

PLAN R



CONCEPT ONLY

PLAN S

A. SUBDIVISION AND DEVELOPMENT GUIDELINES

(i) Lot Sizes

The existing lot sizes in this area vary from relatively small (1000m^2) to larger lots up to around 1 ha. Given the mixture of land uses to be accommodated, some of which could benefit from the larger parcels, further subdivision will not be recommended unless supported by a detailed land development concept consistent with the objectives and guidelines contained in the DAP.
(G1, C2)

(ii) Building Setbacks

- North of the Central Core retail area, new development shall be set back from the kerb of the Highway carriageway a minimum of 15 metres.
- Car parking may be considered in this setback area within a landscaped setting and connected to neighbouring car parks or allowance for future car parks. Shade trees shall form an important part of the landscape treatment. However, preference is for centrally located car parks.
- Setbacks on other boundaries will be as determined by the Shire.
- South of the Central Core retail area, new development shall be set back from the Highway road reserve boundary a minimum of 5 metres.
- All car parking is to be provided at the rear (western side) of premises with existing vegetation incorporated within the car parking areas.
- Setbacks on other boundaries will be as determined by the Shire.

(G6, C3, C4)

(iii) Building Placement, Orientation and Frontages

- North of the Central Core new development must address the Highway, George Street, car parking and public footpath.
- South of the Central Core new development will address the west, however, in both Areas buildings must present a quality visual aspect to *all* street frontages. The main entry must be visually prominent, and clear views must be provided from the development to all adjacent streets.
- Ground floors shall have walls with large glazed areas facing the street, and any other areas facing significant setbacks should also have glazed areas to enhance their commercial exposure and maximise casual surveillance both into and out of the building;

- Buildings should generally be set parallel to existing side boundaries.
  (G5, G6, C4)

(iv) Scale, Proportion & Built Form

- While new development may be contemporary in its form and style, it shall also strive to demonstrate some consistency with the best elements of neighbouring contemporary buildings (if they exist) in terms of basic form, rhythm, materials and articulation;

- Roof forms shall be broken up to add interest to the skyline. Reflective roofing materials are not permitted (unless the roof is flat located behind a pediment). Roofing profiles and formats will be considered in their overall street context, and should contribute visually to the context of the immediate vicinity. Bearing in mind the semi-rural character of the town, pitched roofs shall be set at approx 25 degrees.

- Buildings should be capable of adaptation over time to cater for alternative uses;

- Development may be permitted to a maximum of two storeys, with a total roof height of 8.0m maximum.
  (G6, C1)

(v) Building Materials and Colours

- New buildings shall be constructed predominantly of brick / masonry – either rendered or unrendered, with metal (non-reflective) roofing. The use of some weatherboard cladding or custom orb profile steel sheeting as a detail feature should also be considered, in combination with the brick / masonry.

- Where roofing is visible, large profile roof sheeting is not acceptable.

- The use of concrete tilt-up construction for external walls will only be permitted if the developer can demonstrate that proposed articulation, detailing and the provision of windows is compatible with the objectives and provisions of these Guidelines. Acceptable means of treating tilt-up slabs include detailing by texturing / grooving surfaces, by the use of bas-relief designs or public artworks, and the inclusion of brick headers around windows and doors. Other design devices to accentuate openings may be considered.

- Commercial property owners or tenants should not use colours that make their buildings stand in sharp contrast to their context. Intense and lurid colours shall not be used.

- Muted neutral backgrounds with mid-range accents are acceptable. Occasional and limited use of strong colour could add life to the streetscape, but strong colour use should be the exception rather than the rule.

- Colours that take inspiration from the local soils and vegetation would be most appropriate.

(G6, C2, C4)

(vi) Car Parking and Access

- In the Highway Commercial Area to the north of the Central Retail Core Area where lots have a dual public road frontage, vehicular access must be provided to each road. Crossovers to South-Western Highway are to be minimized and access to crossovers on adjoining lots via connecting car parking areas will be considered acceptable.

- If the Highway is used for vehicular access of any kind, then each site will be limited to one crossover to the Highway.

- In the north, centrally located "through" parking areas linking George Street and South Western Highway are required.

- Shared crossovers between adjoining sites will be required, with interconnecting car parking areas.

- Car parking for customers and tenants shall be provided on-site as required by the prevailing Town Planning Scheme.

- In the Highway Commercial Area to the south of the Central Retail Core Area where lots are smaller, direct vehicular access to new commercial development from the Highway will not be permitted for road safety reasons. As a consequence, the Shire will take the necessary steps to convert the Crown land that exists at the rear of the lots into a public road, which will then be available for exclusive vehicular access to these lots.

  However, as the proposed road would have to cross a conservation category wetland, this may have other impacts on development. If this is to proceed, it may need Developer contributions for its construction. (This action will be the subject of further Shire investigation.)
  (G2, G6, C2, C3, C4)

(vii) Corner Sites

- New development located on corner lots with a two street frontage must be sited and designed in such a manner that large, blank walls or fences are not provided to either frontage.
  (G2, G6, C1, C6)

(viii) Fences

- Fencing will not be permitted in the Highway Commercial area. Where screening of service areas is required, it shall be constructed of materials consistent with the building it services.
  (G1, G5, G6, C4)

(ix) Servicing (bin storage, air conditioning and cooling plant, etc)

- Service areas shall be located out of sight of public roads and footpaths.

- Air conditioning equipment, satellite dishes and other roof structures shall be located so as not to extend above the roof line.

- Mechanical equipment may be permitted on building facades (other than a public street façade) where it is adequately visually screened and noise-insulated in a manner that is in keeping with the development.

(G6, C2)

(x) Advertising Signage

- Advertising signage must conform to the requirements of the Shire of Serpentine-Jarrahdale Local Planning Policy No. 5 – "Control of Advertisements". However, the following signage types will be prohibited:

  - Building signs above roof
  - Building signs projecting
  - Off-building signs pylon
  - Off-building signs hoardings
  - Tethered off-building signs
  - Off-building signs product display

- Building signage shall be kept simple and restrained, and set on the building front as appropriate. Corner buildings may be treated differently where signage can be made an integral part of the design, and demonstrated to be visually compatible.

- Signage other than the name of the business, the principal activity of the business and the street address will not be permitted. 'Third party' advertising will not generally be permitted.

- Colours for signs should be selected with due consideration for the colours used in neighbouring developments. Signage should be located in places that are appropriate to the architecture, and be considered part of the overall building design.

  (G6, C1)

(xi) Environmentally Sensitive Design

New developments shall incorporate ecologically sustainable design principles, while maximising the health, safety, comfort and productivity of its users by :

- Maximising solar access and natural ventilation;
- Minimising the need for energy consumption, by reducing reliance on artificial temperature control and lighting;
- Reducing or eliminating unsustainable consumption of resources;
- Giving preference to building materials based on thermal insulating properties, low-energy production, and renewable or recyclable resources;
- Minimising adverse emissions to air, soil and water; and
- Aiming to achieve high energy and water efficiency ratings in an accredited system for energy efficient building design and maintenance (e.g., the Green Building Council of Australia's 'Green Star' environmental rating system.

The Shire of Serpentine-Jarrahdale supports the principles of building sustainability, including use of sustainability benchmarks. The Shire will promote the application of mandatory minimum building standards that support sustainability in the Building Code of Australia.

Developers should strive to achieve 'best practice sustainability standards' including (where appropriate) conservation, adaptive re-use and renovation.

Buildings should be capable of adaptation over time to cater for alternative uses.
(G3, G4, C1, C2)

(xii) Paving

Use unit paving to delineate pedestrian paving surfaces. The basic units should be red clay brick in keeping with the earth tones of the natural local environment. Some variation may be appropriate, particularly to further delineate use zones, but patterning should be simple and elegant.

Street car parking and vehicle crossings shall be coloured or paved differently from the road surface. These should be earth tones.
(G6, C1, C2, C4)

(xiii) Landscaping

- A landscape plan must be provided and approved by the Council for every development site. The plan must incorporate the planting of substantial trees, aimed at maintaining the area's semi-rural character.
- A minimum of 15% of the total site shall be landscaped in a form approved by the Council. This area shall include any area on a secondary street frontage, and may include an open car park where shade tree planting is proposed at a rate of at least one tree per 6 car bays.

- All trees planted on the site must be from a selected palette of indigenous trees as specified by the Council and listed below:

  - Eucalyptus lanepoolei
  - Corymbia haematoxylon
  - Corymbia calophylla rosea
  - Eucalyptus todtiana
  - Eucalyptus wandoo
  - Melaleuca preisiana
  - Eucalyptus ficifolia
  - Eucalyptus marginata sp. elegantella
  - Allocasaurina fraseriana
  - Eucalyptus rudis
  - Callistemon sp. (as used on South-Western Highway)

- No planted strip shall be less than 1.5 m in width.

- All planting to be native with preference for indigenous species.

- Street trees to be provided, as required by Council, approximately every 10 metres. Species to be as required by Council.

- Exiting trees are to be maintained wherever possible.
  (G6, C1, C2, C4)

(xiv) Furniture

Street furniture (seats, litter bins, bollards, street lighting, decorative lighting, signs etc) should be simple and elegant and must be approved by Council. It can be used to define spaces as well as roads, paths and accessways.

Avoid the temptation to 'manufacture heritage' style or use overly ornate furnishings.
(G5, G6, C1, C4, C5)

7.16. Character Area I – Community Focus

This is a small area on the east side of the South Western Highway between Clifton Street and Beenyup Road.

Area Characteristics

- current (2004) development within this area is a mix of civic structures and spaces, car parking and retail/commercial premises;

- all development is single storey;

- all buildings are set back from the footpath edge, with the commercial premises located well back behind a car parking area and Byford Hall fronting the Highway, and public toilets facing Clifton Street;

- building construction materials are masonry, rendered or unrendered, with corrugated steel sheet roofing hidden behind a parapet (commercial buildings), and with a very low pitch in the case of the hall.

- there is some low level planting and grass around the hall and toilets, and an attractive small park with a memorial feature, grass, sand pit and children's play equipment and mature indigenous trees;

- a wide asphalted car park separates the hall from the shops, creating a clear physical separation between the civic and retail uses;

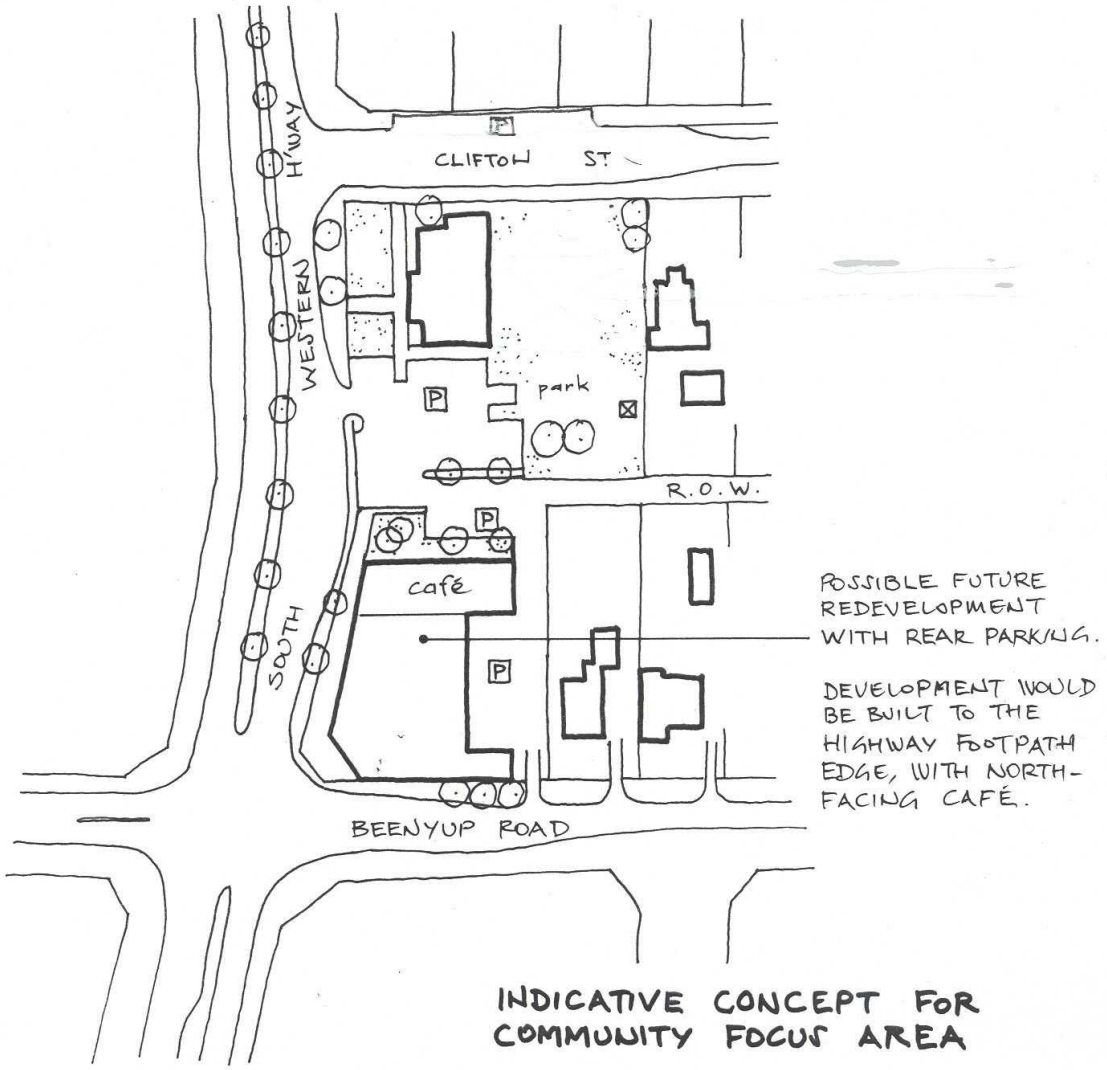
- roof-top advertising signage on the commercial buildings is a dominating visual aspect of the premises.

"Community Hall"

"Local Shopping"

Future Development

An Indicative Concept Plan for future development of this Area is shown at Plan T.



CONCEPT ONLY

PLAN T

A. SUBDIVISION AND DEVELOPMENT GUIDELINES

(i) Lot Sizes

Subdivision of lots (including boundary re-alignments) will not be recommended unless supported by a detailed land development concept consistent with the objectives and guidelines contained in the DAP.
(G1, C2)

(ii) Building Setbacks

Any future redevelopment of the commercial premises shall be required to locate on the Highway reserve edge, and wrap around the Beenyup Road corner, also on the road reserve edge. The rear (east side) of the site shall be used for car parking, with a minimum setback to the adjacent residential property of 6m.
(G5,G6, C1, C4, C5, C6)

(iii) Building Placement, Orientation and Frontages

- New development shall face the two streets, be built up to the road reserve boundary, and have predominantly active and visually permeable frontages;
- All buildings are to address the street in the traditional manner, their facades must be built parallel to the front street boundary, and the main entry must overlook the public footpath and the street;
- Building fronts should display a high level of detailing;
- Verandah's shall be provided up to the lot boundary in a continuous manner to provide weather protection for shoppers and pedestrians;
- Ground floor development should have walls with large glazed areas facing the street, and any other areas facing significant setbacks should also have glazed areas to enhance their commercial exposure and maximise casual surveillance both into and out of the building;
- All of the Highway ground floor frontage of any new commercial development shall be occupied with retail uses. The Beenyup Road ground floor frontage may be occupied by retail or office uses.
- Residential or office use at first floor level will be encouraged
- An appropriate use should be chosen for the north-facing end of the development, such as a café or restaurant, which can take advantage of the favourable solar aspect.
  (G4, G5, G6, C1, C4, C6)

(iv) Scale, Proportion and Built Form

- Any new commercial development may be built up to a maximum of two storeys or 8 metres. The roof form should be either flat behind a parapet, or feature a series of pitches facing the Highway, each of 25 degrees minimum, using a non-reflective roofing material.
- New development may be contemporary in its form and style.
- Buildings should be capable of adaptation over time to cater for alternative uses.
- Any new development should be broken into a vertical rhythm by the compartmentation of shops and fenestration to the individual shops. It is important to retain this kind of rhythm in redevelopment even where large single use developments are proposed.

Extensions to the hall should be compatible with the existing structure, and the height should not detract significantly from the amenity and solar penetration to the park behind. (G4, G6, C1, C6)

(v) Building Materials and Colours

- Any new commercial building should continue the existing theme of brick / masonry walls, with Colorbond (non-reflective) roofing. The use of some weatherboard cladding or Zincalume custom orb profile as a detail feature should also be considered, in combination with the brick / masonry.
- Where roofing is visible, large profile roof sheeting is not acceptable.
- The use of concrete tilt-up construction for external walls will only be permitted if the developer can demonstrate that proposed articulation, detailing and the provision of windows is compatible with the objectives and provisions of these Guidelines. Acceptable means of treating tilt-up slabs include detailing by texturing / grooving surfaces, by the use of bas-relief designs or public artworks, and the inclusion of brick headers around windows and doors. Other design devices to accentuate openings may be considered.
- Commercial property owners or tenants should not use colours that make their buildings stand in sharp contrast to their context. Intense and lurid colours shall not be used.
- Muted neutral backgrounds with mid-range accents are acceptable. Occasional and limited use of strong colour could add life to the streetscape, but strong colour use should be the exception rather than the rule.
- Colours that take inspiration from the local soils and vegetation would be most appropriate.
  (G6, C1, C2)

(vi) Car Parking and Access

- Car parking for customers, tenants and visitors shall be provided as required by prevailing Town Planning Scheme provisions.

- The existing access from the Highway to car parking areas may be maintained, but the entrance shall be narrowed to a maximum of 6 metres. Additional vehicular access must also be provided off Beenyup Road on the eastern boundary of the commercial site.
  (G2, G6, C3)

(vii) Corner Site

- The portion of any new building located on the Highway/Beenyup Road corner site shall create a landmark feature by emphasising greater scale or by slightly different geometry relative to the remainder of the project or adjacent development. This could include additional height, a different roof form, a balcony or some other design element which accentuates the building corner.

- A large, blank wall or fence shall not be provided to the footpath of either street frontage.
  (G2, G6, C1, C5, C6)

(viii) Fences

- Fencing will not be permitted in the Community Focus area. Where screening of service areas is required, it shall be constructed of materials consistent with the building it services.
  (G1, G5, G6, C4)

(ix) Servicing (bin storage, air conditioning and cooling plant)

- Service areas shall be located out of sight of public roads and footpaths.

- Air conditioning equipment, satellite dishes and other roof structures shall be located so as not to extend above the roof line.

- Mechanical equipment may be permitted on building facades where it is adequately visually screened and noise insulated in a manner that is in keeping with the development.
  (G6, C2)

(x) Advertising Signage

- Advertising signage must conform to the requirements of the Shire of Serpentine-Jarrahdale Local Planning Policy No. 5 – "Control of Advertisements". However, the following signs will <u>not</u> be permitted in the town centre:

  - Building signs above roof
  - Building signs wall
  - Building signs projecting
  - Off-building signs pylon

- Off building signs panel
- Off building signs hoarding
- Tethered Off-building signs
- Off building signs product display

- A signage strategy shall be submitted with all applications for commercial development, for approval by Council, to ensure co-ordinated signage consistent with the principles and requirements of this DAP.
  (G6, C1)

- Building signage shall be kept simple and be uniform throughout each development and set above the verandah on the building fascia at a consistent height as appropriate. Corner buildings may be treated differently where signage can be made an integral part of the design, and demonstrated to be visually compatible.

- Signage on shops shall generally be restricted to the building facias, and on shopfronts. Signage other than the name of the business, the principal activity of the business and the street address will not be permitted. 'Third party' advertising will not generally be permitted. No signage is to be permitted more than 2m above the verandah level.

- Signs painted on shop windows or otherwise fixed to shop windows should not obscure views into or out of the shop, and to this end no more than approx. 33% of the front glazed area may be obscured in this manner.

- Colours for signs should be selected with due consideration for the colours used in neighbouring developments. Signage should be located in places that are appropriate to the architecture, and be part of the overall building.

(xi) Environmentally Sensitive Design

New developments should incorporate ecologically sustainable design principles, while maximising the health, safety, comfort and productivity of its users by :

- Maximising solar access and natural ventilation;

- Minimising the need for energy consumption, by reducing reliance on artificial temperature control and lighting;

- Reducing or eliminating unsustainable consumption of resources;

- Giving preference to building materials based on thermal insulating properties, low-energy production, and renewable or recyclable resources;

- Minimising adverse emissions to air, soil and water; and

- Aiming to achieve high energy and water efficiency ratings in an accredited system for energy efficient building design and maintenance (e.g., the Green Building Council of Australia's 'Green Star' environmental rating system.

The Shire of Serpentine-Jarrahdale supports the principles of building sustainability, including use of sustainability benchmarks. The Shire will promote the application of mandatory minimum building standards that support sustainability in the Building Code of Australia.

Developers should strive to achieve 'best practice sustainability standards' including (where appropriate) conservation, adaptive re-use and renovation.

Buildings should be capable of adaptation over time to cater for alternative uses. Shop fronts should be capable of easy removal, or able to be modified to allow tenants to express the speciality of their business.
(G3, G4, C1, C2)

(xii) Paving

Use unit paving to delineate pedestrian paving surfaces. The basic units should be red clay brick in keeping with the earth tones of the natural local environment. Some variation may be appropriate, particularly to further delineate use zones, but patterning should be simple and elegant.
(G6, C1, C2, C4)

(xiii) Landscaping

No planting is required on the commercial site. However, any new development taking advantage of the site's northerly aspect may choose to use grass or low planting on the northern edge of the development as a setting or forecourt for a café/restaurant development.

The existing large carpark separating the commercial premises from the hall should be redesigned to provide more planter beds. This would reduce the visual impact of the large expanse of paving, and reduce the speed of manoeuvring vehicles.

Council shall ensure that the surrounds of the hall and the small public park adjacent are maintained in good order.
(G1,G5, G6, C1, C3, C4, C6)

(xiv) Furniture

Street furniture (seats, litter bins, bollards, street lighting, decorative lighting, signs etc) should be simple and elegant and must be approved by Council. It can be used to define spaces as well as roads, paths and accessways.

Avoid the temptation to 'manufacture heritage' style or use overly ornate furnishings.
(G5, G6, C1, C4, C5)

7.17. Character Area J – Mixed Business Development

This area is located in the southern portion of the DAP on the west side of the South Western Highway, north of Cardup Siding Road. It is proposed under the BSP to accommodate larger business type uses together with some compatible service commercial and light industrial uses.

Area Characteristics

The land is predominantly vacant, with remnant bush and paddocks occupying most of the area. A creek runs through the southern end of the area (Lot 1) from east to west.

"Open Paddocks"

There is an area identified as "landscape sensitivity" in the BSP. This comprises some remnant vegetation. It has not been identified under Bush Forever and the presence of the vegetation should not preclude future subdivision and development, but should be taken into account when detailed designs are prepared.

Future Development

As indicated on Plan U, the subdivision opportunities for this area are difficult to determine at this stage due to the need to finalize the alignments of the Orton Road extension and its intersection with the South-Western Highway. Whilst this affects each landowner insofar as loss of land to these important road reserves is concerned, it also affects access options for those owners, particularly if the Orton Road extension acts as the southern end of the Tonkin Highway pending its further extension to Mundijong, which appears to be a very long-term option.

As discussed above under *Area Characteristics*, the remnant vegetation identified as of Landscape Sensitivity under the BSP should be taken into account as a design consideration when subdivision and development plans are prepared.

A SUBDIVISION AND DEVELOPMENT GUIDELINES

(i) Lot Sizes

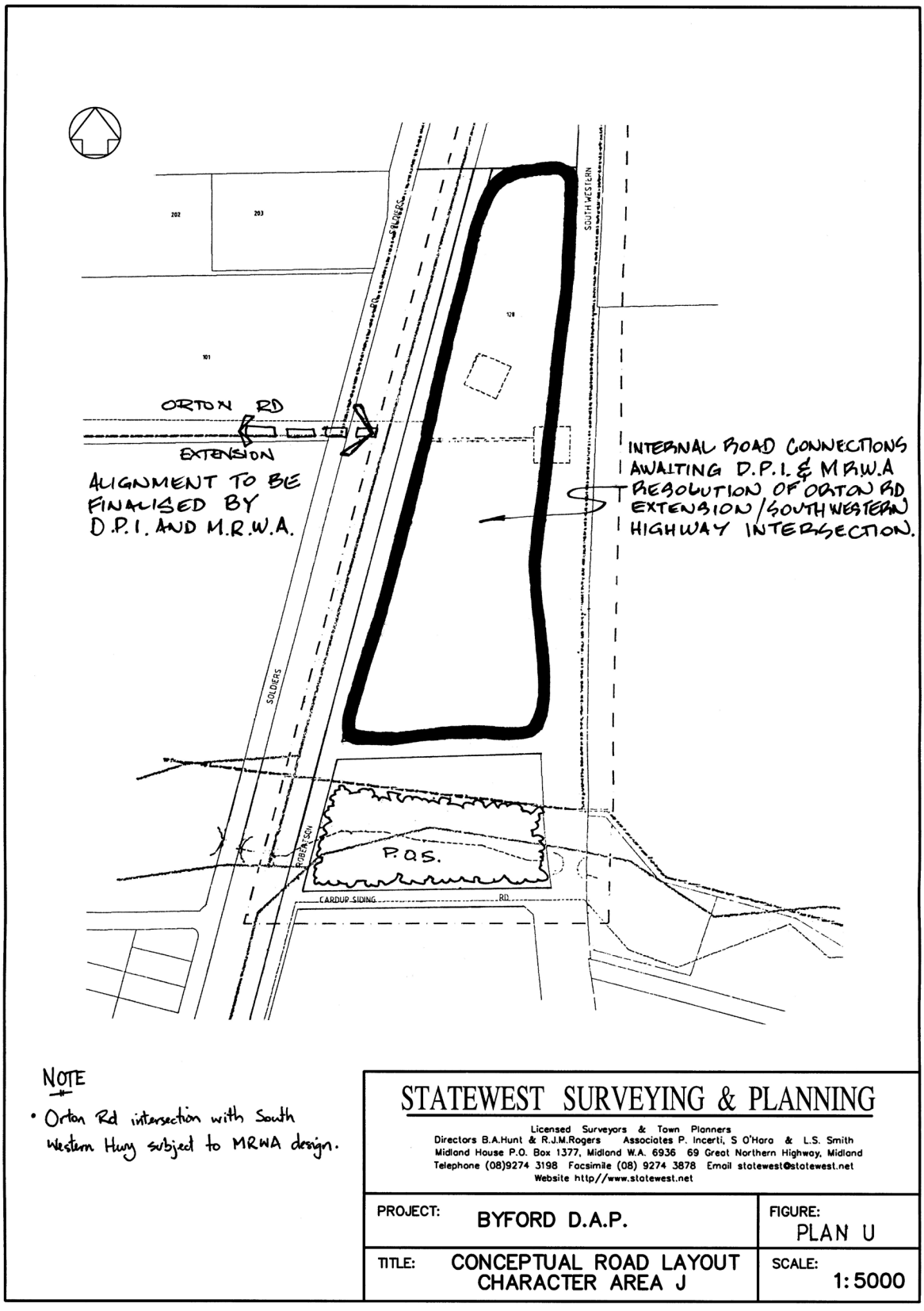
Prior to supporting any subdivision of this area, an overall subdivision concept plan shall be submitted and approved by Council and endorsed by the WA Planning Commission. Lots shall be no less than 1000m^2 each with a minimum effective road frontage of 25m. The plan shall generally conform with the conceptional layout illustrated at Plan U.
(G2, G3, G6, C3)

(ii) Building Setbacks

- All buildings must be set back a minimum of 15m from the South Western Highway road reserve boundary, and 5m from all other perimeter/boundary roads.
- Within the area, all buildings are to be set back a minimum of 5m from a primary access road, and for corner sites 3m from the secondary road (as nominated by Council).
- Rear boundary setback shall be a minimum of 5m.
- A nil setback is allowed to a side boundary if the materials used in building construction are brick, masonry, or concrete and appropriate arrangements are made for emergency access to vehicles. Where a wall of a building is of unprotected metal or timber framed construction, the setback distance shall be such that it complies with the fire resistance levels for the relevant building elements specified in the Building Code of Australia.
(G2, G6, C2)

(iii) Building Placement, Orientation and Frontages

- Buildings shall address the primary street, and be set parallel to side boundaries.
- The main entry to the premises shall be at the front of the building, and
- the customer/public entry shall be visually unambiguous.
- While care shall be taken to ensure that all sides of the building(s) on a lot present well visually, particular attention shall be paid to the front of the building in terms of detailing, advertising signage, colours and weather protection to doorways.
(G6, C1, C3, C4)


ORTON RD
EXTENSION
ALIGNMENT TO BE FINALISED BY D.P.I. AND M.R.W.A.
INTERNAL ROAD CONNECTIONS AWAITING D.P.I. & M.R.W.A RESOLUTION OF ORTON RD EXTENSION / SOUTH WESTERN HIGHWAY INTERSECTION.
SOUTH WESTERN
SOLDIERS
ROGERS
P.O.S.
CARDUP SIDING
RD
202
203
128
101
NOTE
• Orton Rd intersection with South Western Hwy subject to MRWA design.
STATEWEST SURVEYING & PLANNING
Licensed Surveyors & Town Planners
Directors B.A.Hunt & R.J.M.Rogers Associates P. Incerti, S O'Hara & L.S. Smith
Midland House P.O. Box 1377, Midland W.A. 6936 69 Great Northern Highway, Midland
Telephone (08)9274 3198 Facsimile (08) 9274 3878 Email statewest@statewest.net
Website http//www.statewest.net
PROJECT: BYFORD D.A.P.
FIGURE: PLAN U
TITLE: CONCEPTUAL ROAD LAYOUT CHARACTER AREA J
SCALE: 1:5000

PLAN U

(iv) Scale, Proportion and Built Form

- No part of any building shall exceed 6.5m in height.
  (G1, G6, C2)

(v) Building Materials and Colours

- Preferred wall materials are brick, stone, glass, masonry or concrete.
- Commercial property owners or tenants should not use colours that make their buildings stand in sharp contrast to their context. Intense and lurid colours shall not be used.
- Colours that take inspiration from the local soils and vegetation would be most appropriate.
- Sheet metal shall not be used as an external wall material unless it is powder-coated in a neutral colour, not on a wall fronting a street and is less than 50% of the wall coverage.
  (G6, C1)

(vi) Car Parking and Access

- No vehicular access to any lot may be taken directly from South Western Highway.
- Car parking shall be provided in accordance with the requirements of Councils Town Planning Scheme for the applicable land use.
  (G6, C3)

(vii) Corner Sites

- The exposed side wall of a corner building and the side setback to it must be treated in such a manner (i.e., using architectural detailing, painting, planting) that it presents attractively to the street.
  (G6, C5)

(viii) Fences

- Boundary fences shall be predominantly "open" in design, to permit casual surveillance into and out of the premises. Timber fencing is considered unacceptable.

- All boundary fences must be kept in good order.
  (G6, C4)

(ix) Servicing (bin storage, air conditioning and cooling plant)

- General car parking areas and loading/unloading areas must be physically separated.

- Provision shall be made for one or more areas for the storage of cartons, containers or refuse, and these areas shall be screened from view from any public street or from within the site, and enclosed by a wall of masonry or other approved building material of not less than 1.8m in height, and not less than 9 sq.m in floor area.

- Air conditioning equipment, satellite dishes and other roof structures shall be located so as not to extend above the roof line.

- Mechanical equipment may be permitted on building facades, except the front façade, where it is adequately visually screened and noise insulated in a manner that is in keeping with the development.
  (G6, C2)

(x) Advertising Signage

- Advertising signage must conform to the requirements of the Shire of Serpentine-Jarrahdale Local Planning Policy No. 5 – "Control of Advertisements". However, the following signs are prohibited:

  - Building signs above roof
  - Tethered off-building signs

- Building signage shall be kept simple and restrained, and set on the building front as appropriate. Corner buildings may be treated differently where signage can be made an integral part of the design, and demonstrated to be visually compatible.

- Signage other than the name of the business, the principal activity of the business and the street address will not be permitted. 'Third party' advertising will not generally be permitted.

- Colours for signs should be selected with due consideration for the colours used in neighbouring developments. Signage should be located in places that are appropriate to the architecture, and be considered part of the overall building design.
  (G6, C1)

- Applications for subdivision must contain guidelines for consistent signage for each lot, requiring pylon and boarding signs to be of the same material, size , shape and colour and general location on each lot.

(xi) Environmentally Sensitive Design

New developments shall incorporate ecologically sustainable design principles, and cleaner production principles while maximising the health, safety, comfort and productivity of its users by :

- Maximising solar access and natural ventilation;

- Minimising the need for energy consumption, by reducing reliance on artificial temperature control and lighting;

- Reducing or eliminating unsustainable consumption of resources;

- Giving preference to building materials based on thermal insulating properties, low-energy production, and renewable or recyclable resources;

- Minimising adverse emissions to air, soil and water; and

- Aiming to achieve high energy and water efficiency ratings in an accredited system for energy efficient building design and maintenance (e.g., the Green Building Council of Australia's 'Green Star' environmental rating system.

- Developments will be encouraged to incorporate cleaner production principles into their operations and investigate industry programmes such as Green Stamp.

The Shire of Serpentine-Jarrahdale supports the principles of building sustainability, including use of sustainability benchmarks. The Shire will promote the application of mandatory minimum building standards that support sustainability in the Building Code of Australia.

Developers should strive to achieve 'best practice sustainability standards' including (where appropriate) conservation, adaptive re-use and renovation.

Buildings should be capable of adaptation over time to cater for alternative uses. Shop fronts should be capable of easy removal, or able to be modified to allow tenants to express the speciality of their business.
(G6, C1, C5)

(xii) Landscaping

- A landscape plan must be provided and approved by the Council for every development site. The plan must incorporate the planting of substantial trees, aimed at maintaining the area's semi-rural character.

- A minimum of 15% of the total site shall be landscaped in a form approved by the Council. This area shall include any area on a secondary street frontage, and may include an open car park where shade tree planting is proposed at a rate of at least one tree per 6 car bays.

- All trees planted on the site must be from a selected palette of indigenous trees as specified by the Council (refer section 8 of this DAP).

- No planted strip shall be less than 2.0 m in width.
(G1, G4, G6, C2, C5, C6)

(xiii) Public Open Space

The area along Cardup Brook at the southern end of this Character Area is a Conservation Category Wetland and is proposed to be set aside as POS. The precise area will be determined at subdivision stage. It will be the only POS in Area J and accordingly the other owners will be required to contribute to its acquisition by way of a Developer Contribution.
(G6, C2)

(xiv) Stormwater

All development must conform with the requirements of the Byford Urban Stormwater Management Strategy.
(G3, G4, G6, C2)

7.18. Industrial Character Area

Whilst not included in the Byford Structure Plan, there is an existing industrial area on the south-east corner of the South-Western Highway and Nettleton Road that is included in the DAP area (refer Plan M).

7.19. Industrial Development Vision

The vision below is developed to compliment the Shires vision and the overall DAP vision.

> *"Industrial development will provide local employment and service opportunities contributing positively towards a sustainable community".*

7.20. Industrial Area Objectives

As well as the general objectives for the whole of the DAP provided at Section 5, specific objectives for industrial development can be used to measure and assess the actual form of subdivision and development of land.

I.1 To encourage opportunities for a range of industrial development.
I.2 To facilitate subdivision and development to high aesthetic standards.

I.3 To achieve safety and efficiency in traffic circulation.

I.4 To minimise the visual impact of the industrial area on the South Western Highway and surrounding residential areas.

7.21. Character Area K – Industry

Plan M shows the area, which is located on the south side of Nettleton Road. Totalling approximately 20 ha, it is also bounded by the South Western Highway to the west and the curved alignment of a former rail spur to its south. This area is

not contained within the Byford Structure Plan and is therefore not affected by that document, other than in a peripheral manner.

Area Characteristics (2004)

- The northern portion of the area is developed with a mixture of industrial activities, in what appears to be an adhoc manner.

- The southern and largest property (Lot 523 – 8.25 ha) remains undeveloped. It contains open paddocks with scattered trees.

- All vehicle access to the area is via Nettleton Road apart from 2 lots off the Highway.

- There are two internal roads, Dougall Street and Michael Street. These are designed such that they come to a dead end, with no provision for large vehicle turning.

- There are quite a few remnant trees on the developed lots. This appears to be due to the limited development that has occurred i.e. small industrial buildings and outdoor storage areas. Lots with more substantial buildings have few (if any) remaining trees. This is a general characteristic of industrial areas as owners seek to maximize the use of their sites.

- The most substantial development is on Lot 9, which is set well back from the South Western Highway and utilises vehicle access off Michael Street rather than the Highway.

- The estate is not prominent from the Highway.

- The area contains recorded aboriginal artefacts (Refer Plan D).

A. SUBDIVISION AND DEVELOPMENT GUIDELINES

Land subdivision and development shall take a certain form to ensure that it achieves the general and specific objectives. Those objectives are referenced at the end of each guideline listed below.

(i) Lot sizes

A variety of lot sizes shall be encouraged. In any case, lots should not be less than 1,000m^2, with a minimum effective frontage of 20m.
(G2, I 1)

(ii) Subdivision Form

Subdivision shall generally accord with Plan V. This will create a loop road system to enable easier vehicle movement without resulting in additional intersections with the Highway. It will enable Lot 523 to subdivide independently and yet provide for the extension of Michael Street through to the rest of internal road system should Lot 9 ultimately be re-developed and subdivided.

Furthermore, should a road be created at the southern edge of Lot 523, the opportunity to connect to this is available, although this needs to consider the requirement of (ix) below.
(G1, G2, G6, I 1, I 3, I 4)

(iii) Building Setbacks

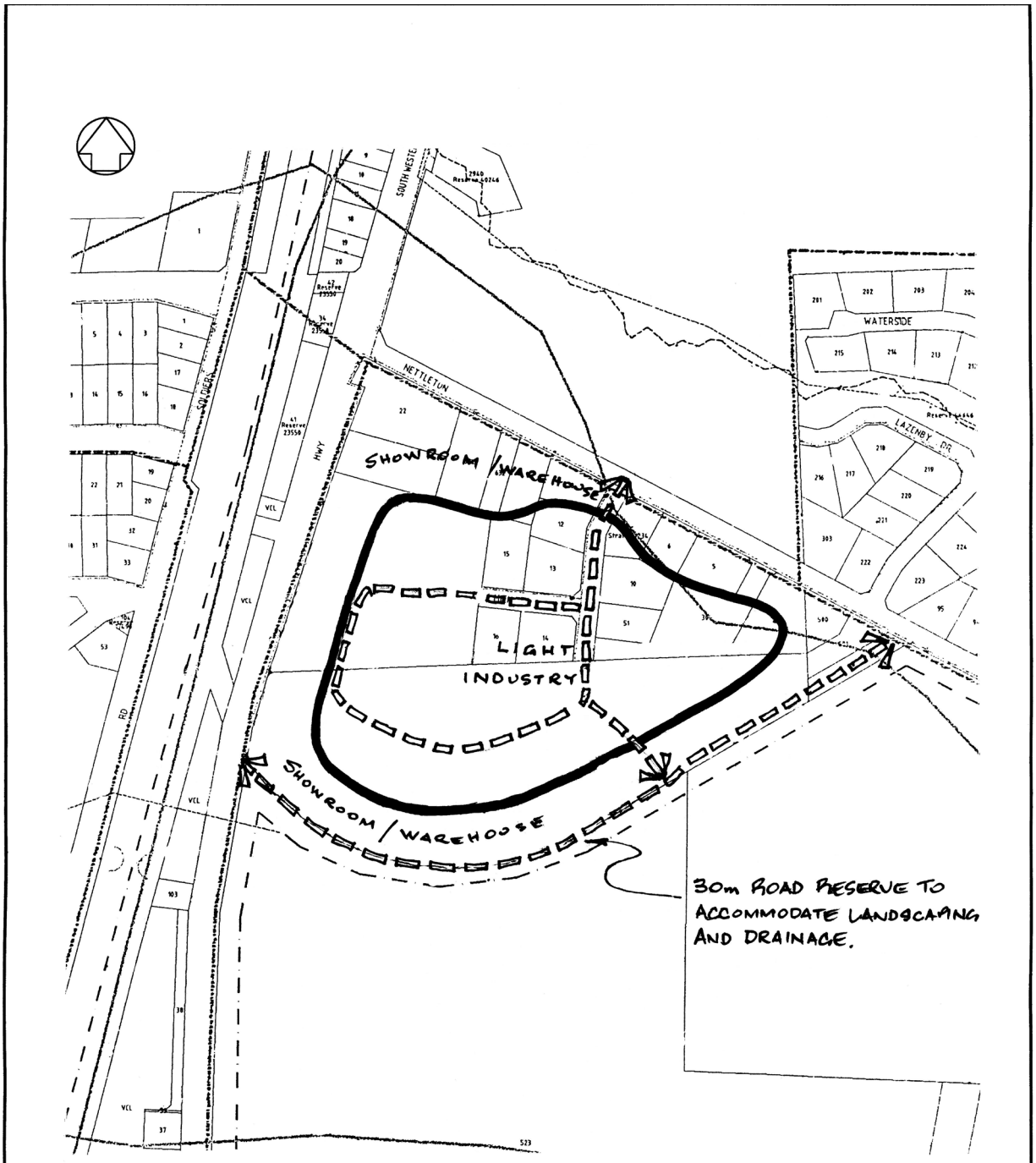
As required under Councils Town Planning Scheme other than for the South Western Highway, which shall be 20m minimum.
(G1, G6, I4)

(iv) Building Materials and Colours

Building facades should be constructed predominantly of masonry, concrete, stone, timber or glass, or any combination of these products. Zincalume will not be permitted in the façade. Colourbond metal will be permitted as a feature only or as a visible roof material. This requirement extends to all street frontages.
(G1, G2, G6, I 2).

(v) Fences

Closed screen fencing shall only be permitted behind the front building line. Fencing forward of the building line is not supported, but Council can permit open, security fencing forward of the building line under special circumstances.
(G1, G6, I 2)



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PROJECT: BYFORD D.A.P.	FIGURE: PLAN V
TITLE: CONCEPTUAL ROAD LAYOUT CHARACTER AREA K	SCALE: 1:5000

PLAN V

(vi) Servicing (outdoor storage, air-conditioning units, plant and equipment, etc).

All outdoor storage and plant and equipment shall be located out of sight from any public road.
(G1, G6, I 2)

(vii) Signage

Signage shall comply with Council's Local Planning Policy LPP5 – Control of Advertisements. No signage shall be permitted on the South Western Highway frontage. The only signage permitted on Nettleton Road shall be on the buildings.
(G1, I 2, I 4)

(viii) Landscaping

- A landscape plan must be provided and approved by the Council for every development site. The plan must incorporate the planting of substantial trees, aimed at maintaining the area's semi-rural character.

- A minimum of 10% of the total site shall be landscaped in a form approved by the Council. This area shall include any area on a secondary street frontage, and may include an open car park where shade tree planting is proposed at a rate of at least one tree per 6 car bays.

- All trees planted on the site must be from a selected palette of indigenous trees as specified by the council (refer section 8 of this DAP).

- No planted strip shall be less than 2.0 in width.

(G1, G4, G6, C2, C5, C6)

(ix) Off-site Impacts

The interface between different land uses is always difficult to deal with due to the potential for conflict, particularly where commercial or industrial land has an interface with residential land. The following requirements should be applied in this instance.

- **Nettleton Road:** This frontage is essentially developed. Any proposals for re-development should impose a landscaping requirement as per (viii) above. This should be complimented by a street tree planting programme along Nettleton Road. (Refer Section 9 for developer contributions).

- **South-Western Highway**: There is potential for some further subdivision along this frontage. A 10m wide landscape buffer should be provided and landscaped with screening vegetation to no less than 1.8m high, with tree planting to establish a canopy. Landscaping should be of indigenous species with a mix of groundcovers, shrubs and trees.

- **Southern Perimeter:** The land to the south has been identified as future urban land. In the event of further subdivision of Lot 523 at the end of Dougall Street, a

10m wide landscape buffer should be provided, earth bunded and planted with screening vegetation to deflect noise from the industrial area over future residences and to provide visual screening.
(G1, G6, I 2, I4)

(x) Environmentally Sensitive Design

New developments shall incorporate ecologically sustainable design principles, and cleaner production principles while maximising the health, safety, comfort and productivity of its users by:

- Maximising solar access and natural ventilation;
- Minimising the need for energy consumption, by reducing reliance on artificial temperature control and lighting;
- Giving preference to building materials based on thermal insulating properties, low-energy production, and renewable or recyclable resources;
- Minimising adverse emissions to air, soil and water; and
- Aiming to achieve high energy and water efficiency ratings in an accredited system for energy efficient building design and maintenance (e.g., the Green Building Council of Australia's 'Green Star' environmental rating system.
- Developments will be encouraged to incorporate cleaner production principles into their operations and investigate industry programmes such as Green Stamp.

The Shire of Serpentine-Jarrahdale supports the principles of building sustainability, including use of sustainability benchmarks. The Shire will promote the application of mandatory minimum building standards that support sustainability in the Building Code of Australia.

Developers should strive to achieve 'best practice sustainability standards' including (where appropriate) conservation, adaptive re-use and renovation.

Buildings should be capable of adaptation over time to cater for alternative uses. Shop fronts should be capable of easy removal, or able to be modified to allow tenants to express the specialty of their business
(G6, C1, C5)

8. INFRASTRUCTURE

As the infrastructure works required for development of each portion of the study area differ substantially, the study area has been separated into infrastructure precincts. The infrastructure works within each precinct are addressed separately in the Infrastructure Matrix provided overleaf.

The stormwater catchments were chosen as the basis for the infrastructure precincts as they are physical/tangible boundaries. The catchment names and boundaries used are consistent with the "Byford Urban Stormwater Management Strategy" and are shown in the Future Services Plans and Landscape Master Plan. (Appendices II and III)

These catchments are referred in the preceding sections 6.10 & 6.11 of this document.

It is intended that the catchment boundaries form the basis of calculating the developer contributions for stormwater infrastructure (refer Section 9).

Whilst the traffic management works are separated into the precinct within which they fall for this section, it is not intended that the infrastructure precincts be used in the calculation for developer contributions for stormwater infrastructure (Refer Section 9).

The Infrastructure Matrix summarises the required infrastructure works into the following sections:

- stormwater quantity and quality;
- POS contributions;
- sewer reticulation;
- water reticulation;
- gas reticulation;
- power reticulation;
- Telstra;
- Traffic management.

INFRASTRUCTURE MATRIX

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INFRASTRUCTURE MATRIX

Some specific matters require more detailed discussion. These are discussed below.

8.1. South Western Highway Intersections

The following intersection treatments with the South Western Highway will be required:

- Main Roads WA has produced a concept design for the upgrade of the Thomas Road and South Western Highway intersection. This design includes left turn slip lanes in and out of Thomas Road as well as a right turn slip lane into Thomas Road. As discussed in Section 6.10 of this DAP, Council are seeking a round-about at this intersection and will approach MRWA again on this matter once the timing of the Tonkin Highway extension to Orton Road is determined.

- The Abernethy Road and South Western Highway intersection is to be upgraded to include left turn slip lanes in and out of Abernethy Road and cater for the proposed pavement widening.

- The Beenyup Road intersection with the South Western Highway is to be modified to include left turn slip lanes in and out of Abernethy Road to cater for the proposed pavement widening.

- The Nettleton Road intersection with the South Western Highway is to be upgraded to include a right turn slip lane into Nettleton Road as well as a left turn slip lane out of Nettleton Road. The intersection is to be designed to take into consideration the turning movements of trucks in and out of the adjacent industrial area.

- Orton Road will connect to the Tonkin Highway extension. Its intersection with the South Western Highway is to have right and left turn slip lanes for traffic movements in and out of Orton Road.

- Whilst Walters Road is not a proposed Neighbourhood connector it will be a major access street. Therefore the intersection with the South Western Highway is to include a right turn slip lane into Walters Road.

- Whilst Stanley Road is not a proposed Neighbourhood connector it will be a major access street. Therefore the intersection with the South Western Highway is to include a right turn lane into Stanley Road. The road pavement is to be upgraded to 6m wide minimum and the road pavement is to be reconstructed as it is currently in poor condition.

- Park Road will remain a more minor access road and the right turn movement onto the South Western Highway is to be prevented by extending the South Western Highway median island past the intersection.

8.2. Intersections on Neighbourhood Connectors & Major Access Roads

Traffic management measures in the form of T-junction deviations similar to those existing on Walters Road are to be constructed at the following existing intersections as well as at T-intersections created by any future access roads with neighbourhood connectors:

- On Beenyup Road –
  Mary Street, Amy Street, Bradshaw Road and Old Brickworks Road
- On Nettleton Road –
  Dougall Street, Lazenby Drive and Old Brickworks Road

Where a four-way intersection results from access roads intersecting a neighbourhood connector a roundabout is to be constructed in order to manage the traffic flow at the intersection. A roundabout is to be constructed at the following proposed four way intersections.

- On Walters Road –
  Lionel, William, Linton and Burrell Street

As Abernethy Road will be the main link between the current townsite east of the highway and the proposed townsite west of the railway line, the Byford Structure Plan recommends that a grade separated crossing is constructed at the intersection of the Abernethy Road and the railway line. As this crossing point is close to the South Western Highway the recommended approach in the Byford Structure Plan is a "horseshoe bridge" over the railway line. The construction of the grade separated crossing will not be required until the development of the future townsite has commenced. At this time detailed designs for the grade separated crossing are to be considered further. Its impact on the town centre will be significant, as will its cost, and the benefits should be the subject of review as development takes place.

The Byford Structure Plan proposes some main access streets within the greenfields development sites between Beenyup Road and Nettleton Road as well as south of Nettleton Road south of the industrial area. These access streets are shown in the Byford Structure Plan at Fig A and are to be constructed by the developers of these sites. The standard for these access streets are to in accordance with Liveable Neighbourhoods Edition 2 which calls for a 7.2m wide pavement within an 18m minimum road reserve.

The Byford Townscape Committee has lodged a request, endorsed by the Shire's engineering department, to Main Roads WA for a pedestrian crossing across the South Western Highway. Main Roads WA is currently undertaking video surveillance to determine pedestrian crossing locations and numbers. Main Roads WA expects this information to be available in late August 2004 and further discussion will then be held with Council regarding the merits of the crossing and the most suitable location.

Notwithstanding the outcomes of Main Roads WA's findings, the ideal location for this pedestrian crossing would appear to be at the intersection of Abernethy / Beenyup Road and the South Western Highway. This will act as a pedestrian link between the existing

townsite and the proposed townsite west of the railway line. Traffic signals can be installed and will act to control traffic and pedestrians at this intersection.

8.3. **Stormwater Quantity**

Coping with the increased stormwater quantity that will result from closer urban development will require certain works which are complicated by the exiting land ownership fragmentation. These include:

- Retention within precincts of stormwater capacities defined in the BUSMS.
- Better defining existing natural channels, particularly the channel within catchment 6F.
- Constructing swale drains in the road reserve along the north side of Thomas Road and along the future Orton Road extension to the South Western Highway.
- Filling of proposed lots above water table and flood levels in the area catchments 3D3 and 5F.

As well as these stormwater infrastructure works the stormwater runoff will need to be catered for within each proposed subdivision.

Where roads are constructed as part of the subdivision swales are to be used for stormwater conveyance. Other than for road crossings or as erosion prevention at steep grades piped drains are to be avoided. Existing open drains are to be re-designed as swales and the stormwater drains constructed as part of the subdivision are to be swales. In order to cater for this all road reserves are to be a minimum of 20m wide.

Swales are to be designed to cater for 1 in 10 year storm events with provision made for 1 in 100 year event flood routes within the road reserve These drains are to flow into the existing stormwater drainage channels shown on the Landscape Master Plan at Appendix III .

In areas of fill (refer to the Landscape Master Plan at Appendix III) subsoil drains spaced at approximately 40m intervals will be required (in accordance with Section 6.2 of the Byford Urban Stormwater Strategy) are to be constructed to maintain the structural integrity of the footings of future buildings. The subsoil drains can be installed along the road reserve boundary and at the rear boundary of lots. These subsoil drains are to be installed as part of the subdivisional works.

8.4. **Water Quality**

Water quality is also addressed as part of the BUSMS. Best management practices are required in the design of stormwater drains and detention basins.

These measures include the following :

- The use of swales, rather than a piped system to detain and treat stormwater.
- The use of ephemeral wetlands in detention basins to treat stormwater.
- The use of bioretention media in swales to filter nutrients.
- The integration of stormwater treatment into the landscape by incorporating multiple use corridors that maximise the visual and recreational amenity of developments.

As the Urban Sensitive Design guidelines published by the Water & Rivers Commission show a preference for open channels, as opposed to piped drains, open channels are to be used. Road reserves for new subdivisions must be wide enough to accommodate these drains. When combined with vegetation planting and service provision, 20m wide road reserves are to be provided in all instances.

New subdivisional roads, which are constructed are to have swales, unless the close spacing of crossovers is prohibitive.

The Byford Urban Stormwater Management Strategy (BUSMS) calls for the following two stage approach in steps in ensuring water quality:

1. Use nutrient export modelling in the detailed design of subdivisions to meet:
    - The required water quality objectives in the BUSMS

OR

- Fund and implement a 3-4 year best practice, pre-development water quality monitoring program to finalise the water quality objectives. In this way the designer can choose whether to adopt the conservative (but achievable) water quality-related design objectives presented in the BUSMS or collect the data needed to review them using a risk based approach as outlined in ANZECC & ARMCANZ (2000). The developer may get a return on his/her investment in monitoring, in that water quality objectives may become less stringent and stormwater quality management costs may be reduced.

AND

2. Undertake post-development water quality monitoring for at least 2 years to test compliance with a range of performance objectives. The most important of which will be whether the water quality-related objectives (adopted in stage 1 above) for stormwater and/or receiving waters are being met.

Timing

As development is likely to occur in a "piecemeal" fashion over time, it is possible that subdivision will occur first at the upstream end of any given catchment. This will mean that the stormwater works proposed within a catchment (eg regrading existing drains and

construction of a detention basin) would not necessarily fall within areas that are subdivided first.

It is possible to impose conditions on each subdivision such that the developer is to ensure that pre-development flows are not exceeded. However this could result in a large number of detention structures within each catchment and, as stated in the Byford Structure Plan, this is not the Shire of Serpentine Jarrahdale's intention and not consistent with the Byford Urban Stormwater Management Strategy.

Therefore the proposed stormwater works will need to be constructed as and when required. For example, prior to runoff from subdivision and development increasing to the point where properties downstream are at risk of being flooded.

This will require the Shire to monitor development and determine when the stormwater works are critical to the area, the creation of drainage reserves as part of the MUCs and the purchase of land for detention basin sites if required. The works can either be constructed by the Shire of Serpentine Jarrahdale or pre-funded such that developers construct the works and are refunded by the Shire of Serpentine Jarrahdale through development contributions from the catchment.

Area F is different as it is held in one ownership. It's stormwater detention will need to be designed at the local structure plan stage, as will Areas B and C.

8.5. **Public Open Space**

The main thrust of POS development in new subdivisions within the DAP area will be orientated around the creation of Multiple use Corridors (MUC).

Housing lots should **not** back onto the MUC area (as they currently do at the eastern end near Old Brickworks Road). This only leads to isolation of the area and a lack of overlooking or surveillance and less likelihood of development of a community attitude of caring and fostering of the redevelopment of the creek. There should be community access along the MUC in a controlled manner (not dissimilar to that which has occurred at the 'Rain Forest' in the centre of old Byford).

Constructed wetlands and associated drainage streams will be an integral part of the landscape fabric of the new subdivision developments and basically form the open space component of the new subdivisions.

The open space system will contain passive recreation components inclusive of lighting, seats, play equipment, pathways as well as some open grass areas for ball kicking and the like (see figures M, N & O). These facilities may or may not be directly linked to wetland areas. If they are, there must be adequate physical protection of the wetlands areas from invasion by weeds.

All development proposals for POS are to be accompanied by a Landscape Plan prepared by a qualified and suitably experienced Landscape Architect as described in Section 6.9 of this DAP (Future Public Open Space Development and Requirements).

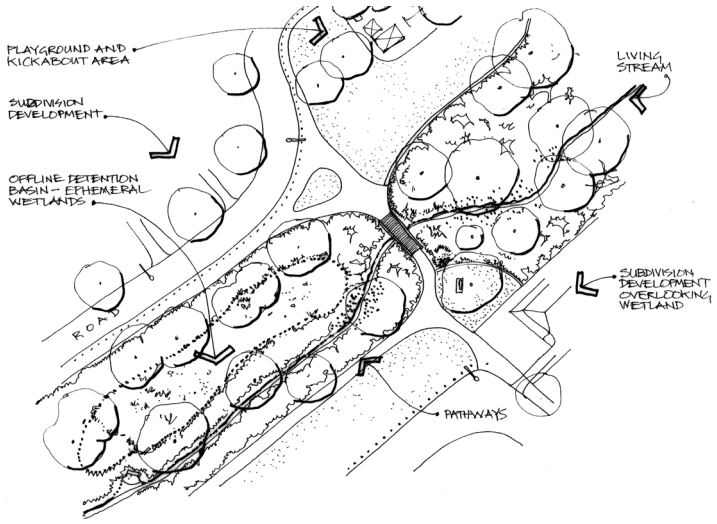


Fig. N

These MUC, and associated areas, will have the following attributes:

1. House elements of water sensitive urban design including wetlands (basins, channels and flats).
2. Provide habitat corridors linking the Darling Scarp to the greater Swan Coastal Plain.
3. Provide public recreational and educational facilities and experiences.

Best practice for Water Sensitive Urban design is to be used in the development of a water treatment system. The design of such a system is to take into account pollutant levels, water volumes, treatment capacities and naturally occurring wetland systems of the region. The system will utilise landforms and vegetation assemblages from seasonally inundated and waterlogged wetland types of the region.

Such a system will include a variety of vegetated creeks, sumplands, damplands, floodplains and palusplains. This approach will form a dynamic system with water being exposed to a variety of wetland (and vegetation) structures fulfilling different components of water purification.

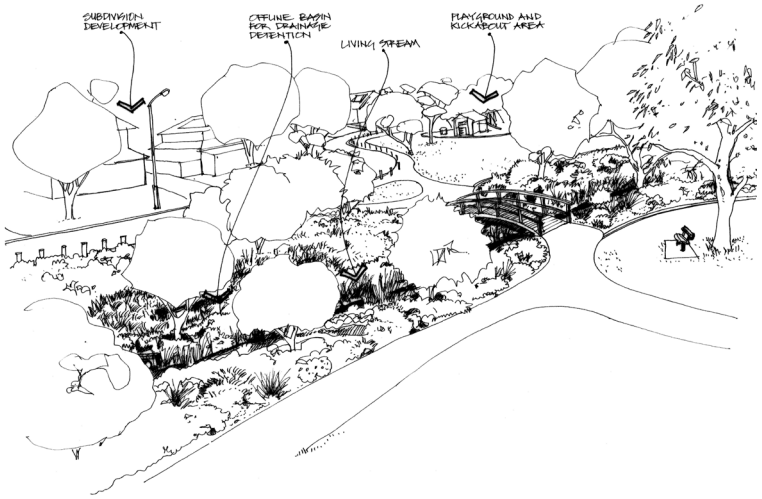


Fig. O

Wetland vegetation is a principal element in the removal of dissolved pollutants. Bacteria housed on the root matrix of wetland plants breaks down pollutants while fixing heavy metals to soil. A variety of plants should be used allowing for different growth cycles of vegetation and associated bacteria. Species selection should match species endemic to the area to modelled hydroperiods within wetland forms. Species selection should include rushes and sedges from the Cyperace, Juncace and Restionace families.

Habitat creation and linkage is an essential component of the corridor. A variety of wetland types linked with upland peripheral assemblages will provide a variety of vegetation assemblages and forms ranging from open forests and woodlands, shrublands, herblands, sedgelands, and grasslands. While a variety of conditions allows for high species richness, it also allows for species migration through the corridor.

As a minimum, 32m width is recommended (refer Structure Plan) for the corridor. It is recommended that all of this area is used for vegetation with minimal area being used for built forms such as walkways, boardwalks, bird hides and educational structures. Recreational activities that require larger areas should be excluded from the corridor but may be set adjoining it in order to provide linkage to recreation and pedestrian networks within the area.

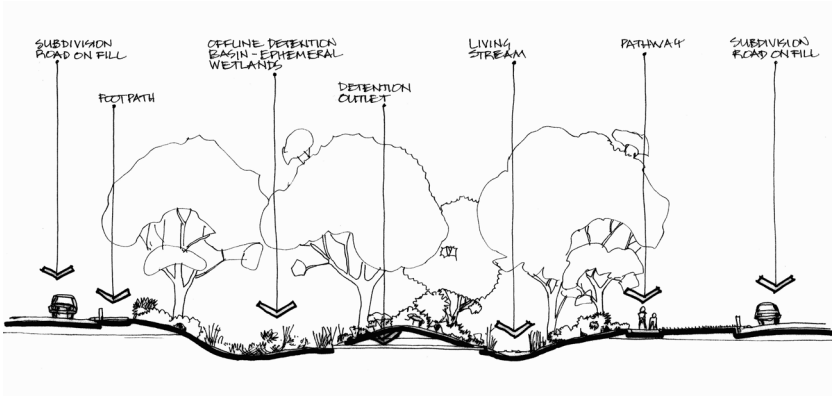


Fig. P

It is not recommended that any vegetation other than endemic vegetation be used within the corridor. The system must have hard edges between endemic vegetation and non endemic vegetation (such as lawn). This minimises the threat of weed invasion.

Following is an indicative list of possible dominant species to be included within the vegetation corridors. Final landforms, soils and hydroperiods will dictate the final planting. Planting is to compliment regional vegetation in its form, density and species selection while fulfilling requirements of best practice water management.

A) UPLANDS

Areas that do not receive seasonal inundation.

Trees
Acacia saligna
Allocasuarina fraseriana
Banksia attenuata
Banksia grandis
Banksia ilicifolia
Banksia menziesii
Banksia prionotes
Corymbia calophylla
Eucalyptus lane-poolei
Eucalyptus marginata
Eucalyptus wandoo

Shrubs
Acacia pulchella
Acacia sessils
Allocasuarina humilis
Baeckea camphorosmae
Bossiaea eriocarpa
Conostephium pendulum
Daviesia nudiflora
Daviesia physodes
Daviesia triflora
Dryandra lindleyana subsp. lindelyana
Eremaea pauciflora
Gompholobium tomentosum
Grevillea wilsonii
Hakea ruscifolia
Hakea stenoptera
Hakea undulata
Hibbertia heugelii
Hibbertia hypericoides
Hypocalymma robustum
Jacksonia densiflora
Kingia australis
Kunzea recurva
Pericalymma ellipticum
Petrophile striata
Philotheca spicatus
Scaevola repens
Xanthorrhoea acanthostachya
Xanthorrhoea gracilis
Xanthorrhoea preissii

Herbs
Burchardia congesta
Conostylis aurea
Conostylis setigera
Dampiera linearis

Drosera spp.
Haemodorum laxum
Lomandra spp.
Patersonia occidentalis
Stylidium spp.

Sedges
Alexgeorgia nitens
Cyathochaeta avenacea
Cyathochaeta cladestina
Desmocladus flexuosus
Lepidosperma longitudinale
Mesomelaena pseudostygia
Mesomelaena tetragonia
Tetraria octandra

Grasses
Amphipogon turbinatus
Austrodanthonia occidentalis
Neurachne alopercuroidea

B) WETLANDS
Areas that receive seasonal inundation

Trees and Tall Shrubs
Casuarina obesa
Corymbia calophylla
Eucalyptus rudis
Melaleuca preissiana
Melaleuca rhaphiophylla

Shrubs
Acacia lasiocarpa var. bracteolata
Actinostrobus pyramidalis
Astartea fascicularis
Calytrix aurea
Dryandra lindleyana subs. lindleyana
Grevillea thelmanniana
Hakea sulcata
Hakea varia
Hypocalymma angustifolium
Kingia australis
Melaleuca lateritia
Melaleuca teretifolia
Melaleuca uncinata
Melaleuca viminea
Verticordia densiflora
Viminaria juncea
Xanthorrhoea preissii

Herbs
Burchardia multiflora
Drosera spp.
Lomandra spp.
Patersonia occidentalis
Polypompholyx multifida
Stylidium spp.

Sedges
Centrolepia aristate
Cyanthochaeta avenacea
Meeboldina aristatus
Meeboldina cana
Meeboldina coangustata
Mesomelaena tetragona
Schoenus rigens

Other important POS is to be provided in locations identified in the Byford Structure Plan and reflected in Plans N, P. U and V and as described under each Character Area.

8.6. Other Services

Water, power, sewerage, Telstra and gas services are able to be provided through the normal subdivision process and are discussed at 6.11 and the Matrix in this section.

9. FUNDING DEVELOPMENT

As a general rule, this DAP seeks to enable individual landowners to subdivide and develop their land independently yet consistent with the aims of the broader community. (Some level of neighbour co-ordination will be essential in Area B).

However, in order to co-ordinate development and to achieve the objectives of this DAP, some items will need to be funded by the broader community who will benefit from their provision, or whose development would not be possible without their provision.

These items will require a Developer Contribution, which is to be paid to the Council so that it can do or arrange the works, or acquire the necessary land.

9.1. Roads

The construction of the roadworks on Beenyup, Nettleton and Walters Roads (Refer Section 8.2) is to be undertaken by the Shire of Serpentine Jarrahdale. Developers within the Study Area are to share the cost of these works.

The access roads in the proposed greenfields sites are to be funded and constructed by developers, as and when development occurs. Other subdivisional roads are also to be constructed by the developers as and when development occurs.

9.2. Water

The water reticulation within the boundaries of any proposed subdivision will need to be constructed by the developer at the developer's cost. The Water Corporation will impose a headworks charge on the developer of each subdivision in order to fund the future upgrade and extension of its existing assets as required. The standard water headworks charge which applies to most suburbs within the metropolitan area, also applies to Byford. These charges are available on the Water Corporation's website.

Where a particular subdivision triggers the requirement for upgrading or extending existing infrastructure, the Water Corporation will assess the method by which these works are funded and constructed.

In the case of a greenfields subdivision and / or areas that are ahead of the development front (that is areas outside of the currently reticulated area), the Water Corporation will address the way in which the required works are funded as follows:

- If the works are on the Water Corporation's capital works program to be completed concurrently with a proposed subdivision, then the Water Corporation will construct the infrastructure work at their cost (headworks charges are still applicable).

- However if the works required are not on the capital works program at the time and the works required are to be permanent, the developer is able to pre-fund the works. The cost of the works will then be refunded over time (the time for refunding the cost of the works will be the subject of a customer constructed works agreement for each development).

- If temporary works are necessary the developer will be required to carry out the works at the developer's cost without refund.

In the case of water reticulation within the "development front", for example the existing Byford Townsite and the areas currently reticulated with water, the Water Corporation has advised they would incur the cost of any infrastructure upgrade necessary regardless of whether these works featured on their immediate program.

9.3. Sewer

Whilst the Water Corporation has these long term plans, it generally only reacts to applications for development so as to keep up with the "development front".

The sewer reticulation within the boundaries of any proposed subdivision will need to be constructed by the developer at the developer's cost. The Water Corporation will impose a headworks charge on the developer of each subdivision, in order to

fund the future upgrade and extension of its existing assets as required. The standard sewer headworks charge, which applies to most suburbs within the metropolitan area, also applies to Byford. These charges are available on the Water Corporation's website.

Where a particular subdivision triggers the requirement for upgrading or extending existing infrastructure, the Water Corporation will assess the method by which these works are funded and constructed.

In the case of a greenfields subdivision and / or areas that are ahead of the development front (that is areas outside of the currently reticulated area) the Water Corporation will address the way in which the required works are funded as follows:

- If the works are on the Water Corporation's capital works program to be completed concurrently with a proposed subdivision, then the Water Corporation will construct the infrastructure work at their cost (headworks charges are still applicable).

- However if the works required are not on the capital works program at the time, and the works required are to be permanent, the developer is able to pre-fund the works. The cost of the works will then be refunded over time (the time for refunding the cost of the works will be the subject of a customer constructed works agreement for each development).

- If temporary works are necessary then the developer will be required to carry out the works at the developer's cost without refund.

In the case of infill sewer, for example the currently reticulated area, the Water Corporation has advised they would incur the cost of any infrastructure upgrade necessary regardless of whether these works featured on their immediate program.

9.4. Stormwater

The characteristics of each catchment differ in accordance with the subdivision and development potential as well as the number of land holders in the catchment. For example the catchment 5G1 consists of one major land holder with large scale subdivision potential and catchments 3 F1 to 3 F3 consist of many land holders with the potential for small scale subdivision. The approach to the funding and construction of the works need to reflect these differences. This is discussed in detail below for each catchment.

- Catchment 3D3

  The area west of the South West Highway and south of Thomas Road in catchment 3D3 consists of two land holdings with subdivision potential. The site has an approved Local Structure Plan which identifies an MUC along the existing watercocurse.

- Catchment 3E1

  The area north of Walters Road and east of the South Western Highway (catchment 3E1) will most likely be subdivided by individual lot owners. This will only occur once a local structure plan (LSP) has been approved for the cell (refers Plan O). The local structure plan will require demonstration of how the BUSWMS will be met. Individual subdivisions will be in accordance with this. Whilst the stormwater works associated with the new subdivisional roads are to be constructed by the developer it will not be practical to have each lot owner / developer design, construct and monitor the stormwater works associated with the MUC and detention basin when they subdivide their land. Therefore the developer is to give up any land required to accommodate the MUC and detention basin and make a contribution to Council for the costs associated with design, construction and monitoring of these works. Where a number of lots are developed simultaneously the developer can design, construct and monitor the stormwater works.

- Catchments 3F1 to 3F3

  In the existing townsite area (that is catchments 3F1, 3F2 & 3F3) where future subdivision will most likely be by individual lot owners subdividing one lot into two, it is not practical to require each lot owner to carry out design and monitoring of the stormwater works. Therefore the design, construction and monitoring of the stormwater will be undertaken by the Shire, with the associated costs to be paid by the developers as and when they develop. However individual lot owners can take measures to reduce the amount of water leaving their property and maintain its quality.

- Catchment 5F

  The commercial area west of the South Western Highway in catchment 5F has no subdivision potential however the existing lots can be developed. It is not practical for each developer to design, construct and monitor the stormwater works within this catchment. Therefore each developer will pay a contribution to the Shire who will design construct, and monitor the stormwater works. These works include filling the lots either side of Beenyup Brook. The portion of Beenyup Brook within this catchment itself is listed for conservation and cannot be disturbed. Fill shall only be placed up to 10m from the remnant vegetation within the Brook to leave sufficient room to batter to the existing levels. This buffer area shall then be replanted with native vegetation. Development can be designed to reduce the amount of water leaving the site. However individual lot owners can take measures to reduce the amount of water leaving their property and maintain its quality.

- Catchment 5G1

  The area north of Nettleton Road in catchment 5G1 is made up of a single lot. The design, construction and monitoring of the stormwater works is to be undertaken by the land owner, upon subdivision in accordance with an approved local structure plan. No other contribution to stormwater works will therefore be required by this land owner.

- Catchment 5G2 to 5G3
  The area north of Nettleton Road in catchment 5G2 and 5G3 has reached its subdivision potential (except for 2 lots east of the Old Brickworks Road). However there is scope to improve the stormwater quality in the some of the road reserves and the MUC in this area. As practically no further development will take place in this area, the Shire is to fund the stormwater quality works in this area out of its general revenue.

- Catchment 6G
  The industrial area south of Nettleton Road is partially developed. However there is one land holding still to be subdivided and developed and a second with potential for subdivision or re-development in the long-term. Development of the new lots will need to include a stormwater design, consistent with the principles of the BUSMS, that maintains pre-development flows in terms of quantity and quality.

- Catchment 6F
  The area between the railway line and the South Western Highway in catchment 6F has no subdivision or development potential. There are no stormwater works proposed in this area.

- Catchment 8D
  The area between the railway line and the South Western Highway in catchment 8D consists of two land holdings with development potential. Whilst the stormwater works associated with the new subdivisional roads are to be constructed by the developer, it will not be practical to have each lot owner / developer design, construct and monitor the stormwater works associated with the proposed swale drain along the South Western Highway and proposed Orton Road extension. Therefore, the developer is to give up any land required to accommodate the Orton Road reserve and drain and make a contribution to Council for the costs associated with design, construction and monitoring of these works.

Contributions

As the stormwater works to be undertaken by the Shire of Serpentine Jarrahdale will not necessarily proceed concurrently with the subdivision of land adjacent to the works, the most reasonable and effective method of raising sufficient capital for the construction of the works and the purchase of land is to impose a contribution charge to developers within the respective catchments as and when they develop.

As the size and costs for stormwater drains & structures is generally proportional to the area which drains into them, it is logical to apportion the cost of the proposed works within each catchment on a "per square metre of land holding" basis. Developer contributions are, however, the subject of a separate plan yet to be developed.

9.5. Public Open Space

Public Open space shall be provided as per section 7.10 (xxxv) and (xxxvi). These shall be based on the standard 10% for residential subdivision, with up to 50% credit from drainage areas that can be utilised as recreation space.

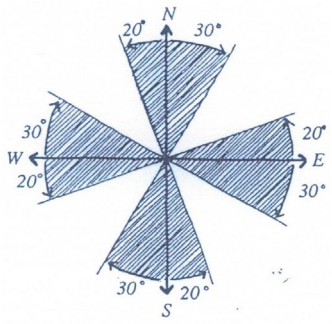
9.6. Street Trees

Council will require a developer contribution from all developers towards the installation of street trees on all streets in areas with development potential

10. SUSTAINABLE DESIGN SCORE SHEET

This section provides a list of desirable features for residential development. Any application for a building license must contain at least four of these features.

☐ Living areas with good solar access to the north.



Preferred orientation of long axis of lots in temperate climates in accordance with R17.

Source: Liveable Neighbourhoods (WAPC)

☐ House designed to accommodate natural cross-ventilation through the roof space and through the ceiling.

☐ Installation of solar hot water system or 5 star gas hot water system.

☐ Installation of rainwater tank to catch roof water connected to irrigation system.

☐ Provision of window shades, awnings, extended eaves or verandah over west and east facing windows. (North is mandatory).

☐ Use of energy efficient glazing.

- Installation of high energy efficiency appliances, at building stage (all to be within 1 star of maximum available on the mass market for the particular applicant).

- Pervious paving to be used on all outdoor paved areas within the property, including driveway.

- Insulation provided to all walls (where double brick or rammed earth not used to R1.4), floor (where floor is suspended to minimum R1.0) and roof (minimum F2.7 insulation).

- Provision of a central mass wall (on an east-west axis) having northern solar access

- AAA rated showerheads to all showers and flow regulators on all taps and dual flush toilets.

APPENDIX I

BYFORD TOWNSITE - DETAILED AREA PLAN

QUESTIONNAIRE RESPONSES (17/2/04 – 22/03/04) - COLLATION

STATEWEST SURVEYING & PLANNING
69 Great Northern Highway, Midland WA 6056
Att. Simon O'Hara. Associate Town Planner

Date: 22nd March 2004

Dear Simon
Thank you for the opportunity to provide collation on the Byford Townsite D A P Community Form. For your interest, total response forms numbered 113; set out as follows:

PAGES 2 - 5
The TABLE containing the results across nine (9) questions, including section 5.0 - which contains responses for or against subdivision specific to areas A - E.

PAGE 5 continued
Additional community comments for or against subdivision.

PAGES 6 - 7
Conclusions & methodology.

Notes

- Throughout, N/A refers to no response or unclear response. Percentages for N/A are derived from total respondents (113)
- Responses given via letter rather than form submittal were assessed and added to collation where appropriate.

Kind regards
Chris Lees. Principal

TABLE

BYFORD TOWNSITE D A P COMMENT FORM	113 SURVEY RESPONDENTS	
	Households	%
1.0 WHICH OF THE AREAS DO YOU RESIDE IN?		
A	4	3.6
B	37	33.3
C	19	17.1
D	3	2.7
E	48	43.2
Response total & percentage	**111**	**99.9**
2 (1.7%) of 113 respondents did not supply this information		
2.0 ARE YOU A LANDOWNER OR TENANT?		
LANDOWNER	108	99.0
TENANT	1	0.9
Response total & percentage	**109**	**99.9**
4 (3.5%) of 113 respondents did not supply this information		
3.0 DO YOU RESIDE..?		
ON YOUR OWN	6	5.5
ON YOUR OWN WITH CHILDREN	7	6.4
WITH A PARTNER	50	45.8
WITH A PARTNER & CHILDREN	42	38.5
VACANT LAND	2	1.8
COMMERCIAL PROPERTY	2	1.8
Response total & percentage	**109**	**99.9**
4 (3.5%) of 113 respondents did not supply this information		
4.0 WHAT IS THE APPROXIMATE SIZE OF THE PROPERTY?		
0 – 500m^0	0	-
501 - 1000 m^0	11	10.0
1001 - 2000 m^0	39	35.4
2001 - 4000 m^0	35	31.8
>4000 m^0	25	22.7
Response total & percentage	**110**	**99.9**
3 (2.6%) of 113 respondents did not supply this information		

5.0 WHAT ARE YOUR DEVELOPMENT ASPIRATIONS FOR YOUR PROPERTY? (eg. unaltered, subdivision etc)

Responses by Property / Household

Area A		Area B		Area C		Area D		Area E	
UNALTERED	1	UNALTERED	23	UNALTERED	11	UNALTERED	1	UNALTERED	31
SUBDIVIDE	3	SUBDIVIDE	12	SUBDIVIDE	7	SUBDIVIDE	1	SUBDIVIDE	12
		N/A	2	N/A	2	N/A	1	N/A	3

Percentage in favour of Subdivision by Area

75	34.2	38.8	50.0	27.9

Totals regardless of area (105 responses)

38 in favour of subdivision - (36.1%)
67 not in favour of subdivision - (63.8%)
8 no response or unsure - (7.0%)

6.0 WHICH LOCAL FACILITIES DO YOU USE? (eg. Parks, walk-trails etc)

Household/Property - multiple responses: Facility Use by percentage

N/A	PARKS	WALK-TRAILS	ALL SPORTS FACILITIES	LOCAL BUSINESS SHOPS
11.5	54.0	81.0	23.0	33.0

7.0 WHAT IS YOUR MAIN MODE OF TRANSPORT IN THE LOCAL AREA? (Personal & Family/Children)

Household/Property - multiple responses

	Personal	%	Family	%
FOOT	44	39.6	25	22.5
BICYCLE	20	18.0	18	16.2
CAR	99	89.1	42	37.8
OTHER (Bus when available)	0	-	3	2.7

2 (1.7%) of 113 respondents did not supply this information

8.0 WHAT DO YOU LIKE ABOUT THE AREA YOU RESIDE IN (eg. Parks, streetscapes etc) **Household/Property - multiple responses by percentage**	
PARKS	10.0
NOT LIKE A TYPICAL PERTH SUBURB SMALL POPULATION LARGE BLOCKS, PEACEFULNESS COMMUNITY SPIRIT RURAL ENVIRONMENT	98.0
NATIVE FLORA AND FAUNA RAINFOREST VIEWS (esp. escarpment)	40.3
WALK-TRAILS & CYCLING PATHS	5.5
REMOVED FROM BUT WITHIN COMMUTING DISTANCE TO PERTH	8.2
STREET SCAPING 'BUSH' APPEARANCE & PLANTING CHOICES	9.1
3.5% of 113 respondents did not supply this information	

9.0 WHAT IMPROVEMENTS WOULD YOU LIKE TO SEE IN THE AREA? **Household/Property - multiple responses - percentage of 113**	
RECREATION	
RECREATION CENTRE, including: Gymnasium Youth Centre Swimming pool Amphitheatre	15.0
EXTRA CYCLING PATHS & WALKING TRAILS Including: Cycle route to Armadale, Mundijong etc	18.7
IMPROVED OR EXTRA PARK AMENITIES Including: Children's Playgrounds BBQ areas General tourism attractions	13.5
ROADS	
infill of drains road signage road calming commercial vehicle and general vehicle access buffer zones around commercial/industrial areas pedestrian crossing (Tonkin /SW H'ways) repairs to existing spots (i.e. footbridge)	31.1
TOWNSITE	
UPGRADE OF TOWNSITE WHILE PRESERVING UNIQUE CHARACTER Including: Upgraded shopping facilities New restaurants Al fresco spots 'Landmark' similar to Kalamunda Public Library Bank	22.0
SERVICES	
UNDERGROUND POWER Including: The removal of power lines on Old Brickworks Rd	6.3
DEEP SEWERAGE	4.6
GENERAL STREET MAINTENANCE Including: Maintenance of verges and landscaped areas Removal of old cars and other refuse More Street Trees	27.0
HIGH SCHOOL	3.6
PROVISION FOR AN AGEING POPULATION Including: Diversified housing Townhouses Units Smaller lots	9.3
STREET LIGHTING Including: Solar passive design	9.0
PUBLIC TRANSPORT (expressed as Byford being too heavily car dependent)	13.6
POLICING AND SECURITY (i.e. vandalism, noise)	3.0

OTHER SUGGESTIONS	
CESSATION OF TRAIL BIKE RIDING	0.8
CESSATION OF QUARRYING	0.8
RELOCATION OF QUARANTINE FACILITY	0.8
A SHIRE THAT LISTENS & RESPONDS APPROPRIATELY	1.7
REVIEW OF PHONE CHARGES RE. METRO POSTCODE BOUNDARIES	0.8
DIVIDING FENCES UNIFORM IN APPEARANCE	0.8
EXPAND RAINFOREST RESERVE TO LINK WITH PRIMARY SCHOOL	0.8

ADDITIONAL COMMUNITY COMMENTS

THOSE FOR SUBDIVISION commented that:

- Subdivision was essential for Byford providing that it was done with sensitivity to the existing character and did not degrade the area. One respondent noted that the development of Armadale had not addressed population growth or commercial development very successfully and that a repeat of that scenario was undesirable
- Subdivision would create room for people who do not necessarily want 'acreage' but who *do* want a semi-rural lifestyle
- A variety of lot sizes within A, B, D and E is acceptable, and that area C lots remain larger. Along similar lines: that areas B & E should have strictly controlled development
- Subdivision or appropriate development would enable the elderly to remain in the area
- Development brings revenue and employment to the area; and along similar lines: Byford is 'screaming out' for housing lots and population

THOSE AGAINST SUBDIVISION commented that:

- R 20 zoning will permanently 'destroy' area and cause environmental damage
- That there was a fairly high level of distrust for the consultation process
- That development 'fed on human greed'
- That Area C is restricted in terms of development
- That any improvements must preserve the existing Townsite and surrounding areas (especially the escarpment and skyline)
- That infill for extra residential development would 'destroy' Byford
- Subdivision would result in smaller blocks and the 'urbanisation' of Byford

CONCLUSIONS & METHODOLOGY

Methodology: Percentages for each section were offset by the numbers of respondents. For example, section 1.0 (in delivering the ratios for each area) calculates percentage in terms of actual responses - 111 of a total 113. Throughout the remainder of the form, N/A - responses not supplied or which were unable to be inferred via letters - were calculated as a percentage of the total respondents (113).

SECTIONS 1 - 9

1.0: Who lives where

- Clearly, Area E comprises the majority (43.2%) followed by Areas B, C, A & D respectively (33.3%, 17.1%, 3.6% and 2.7%).

(2 respondents did not supply this information)

2.0: Of the five areas:

- 99.0% are Landowners
- 0.9% are tenants

(4 respondents did not supply this information)

3.0: Concerning household / property makeup:

- Partners without children stands at 45.8%, closely followed by
- Partners with children at 38.5% - both therefore comprising 84.3% of the population.
- Singles and Singles with Children are fairly evenly spread at 5.5% and 6.4% respectively
- Vacant Land and Commercial ownership both stand at 1.8%

(4 respondents did not supply this information)

4.0: Concerning size of property:

- There were no respondents living on 0 - 500m properties.
- 10% live on 501 - 1000m properties.
- 35.4% live on 1001 - 2000m size properties; and
- 31.8% occupy 2001 - 4000m properties. These two segments are in aggregate 67.2%.
- The remaining 22.7% live on or own 4000m properties

(3 respondents did not supply this information)

5.0: Concerning property aspirations in general (over all 5 Areas):

- 36.1% favour subdivision
- 63.8% do not favour subdivision

(8 respondents did not supply this information or were unsure of their aspirations)

Resident aspirations FOR subdivision by Area:

Area A - 75%
Area B - 34.2%
Area C - 38.8%
Area D - 50.0%
Area E - 27.9%

Conclusions for this segment would rely to a large extent on a knowledge of the topography and a range of other factors for each area. I note however that the question 'What are your development aspirations for your property?' allows for a degree of anomaly. Some respondents

replied in favour of subdivision, building extensions or development *of their own property,* which does not necessarily imply their agreement with subdivision or development in Byford per se. Conversely, others replied 'unaltered' - in other words, they had no aspirations for development *of their own property* - again, not necessarily implying that they were against subdivision or development within Byford per se. Consequently, from a research point of view the weighting of those responses (for or against) is suspect. Note: there is an aggregate 45.1% for subdivision or development.

6.0 Concerning the usage of local facilities:

- Walk trails come in the winner at 81% usage
- Parks are second at 54%
- Skate parks, the Oval, the Rifle Range and sporting facilities in general are 23%
- Local business: shops, medical and day-care facilities are 33%

Clearly there is substantial usage of the local nature facilities. Since the survey did not include questions on employment or age-groups it is difficult to say whether use of the local shops and/or businesses are work related or some other factor; though a desired upgrade of shopping and the Townsite in general is indicated quite strongly on section 9.

7.0: Concerning main mode of (local) transport:

- Personal use has the car at 89.1%, followed by foot and bicycle at 39.6% and 18.0% respectively.
- Family use has the car at 37.8%, followed by foot, bicycle and bus (when available) at 22.5%, 16.2% and 2.7% respectively.

(2 respondents did not supply this information)

No surprises here though of note is that the question 'What is your main mode of transport in the local area?' allows for some degree of ambiguity: whether families possess more than one vehicle (and presumably increase road usage) or share the same vehicle is unknown.

8.0: What pleases people about Byford and frequency of mention:

- Large blocks, peacefulness and small population, community spirit, rural environment and definitely not like a typical Perth suburb - 98.0%
- Native flora and fauna (including the views with frequent reference to the rainforest) - 40.3%
- Parks - 10.0%
- Street-scaping, 'bush' appearance, planting choices - 9.1%
- Removed from but within commuting distance to Perth - 8.2%

(4 respondents did not supply this information)

Since this question was open many things were expressed differently though essentially appearing to mean the same thing. Overall, it would be safe to say that there is a very strong liking for Byford as it exists today; and perhaps safe to assume that any development should echo these characteristics.

9.0: Concerning improvements in the area listed by frequency of mention:

- Roads - 31.1%
- General Street Maintenance - 27.0%
- Upgrade of Townsite (including new facilities designed in keeping with area) - 22.0%

- Extra Cycling Paths & Walking Trails - 18.7%
- A new Recreation Centre (including a range of facilities) - 15.0%
- Public Transport - 13.6%
- Improved or extra Park Amenities - 13.5%
- Provision for an Ageing Population - 9.3%
- Street Lighting - 9.0%
- Underground Power - 6.3%
- Deep Sewerage - 4.6%
- A High School - 3.6%
- Extra Policing and security (referring to vandalism and noise) - 3.0%

Plus a number of other comments as shown page 5
(5 people did not supply this information)

QUESTIONNAIRE

(Mailed out to Landowners on 16/2/04)

BYFORD TOWNSITE DETAILED AREA PLAN

COMMENT FORM

In order for us to learn more about the area you reside in and gain an understanding of your aspirations for it, we would appreciate it if you as the head of the household would take the time to provide us with the following information:

1.0 Which of the areas A – E, identified on the attached map, do you reside in?

A ☐
B ☐
C ☐
D ☐
E ☐

2.0 Are you a landowner or tenant in the area?

Landowner ☐
Tenant ☐

3.0 Do you reside:

On your own ☐
On your own with children ☐
With a partner ☐
With a partner and children ☐

4.0 What is the approximate size of the property you reside on?

0 – 500m² ☐
501-1000m² ☐
1001-2000m² ☐
2001-4000m² ☐
>4000m² ☐

(Note 4000m² = approx. 1 acre)

5.0 What are your development aspirations for your property? (eg. remain unaltered, subdivision etc.)

6.0 Which local facilities do you use? (eg. parks, walk trails etc.)

7.0 What is your main mode of transport within the local area:

	For you	**For your family (children)**
On foot	☐	☐
Bicycle	☐	☐
Car	☐	☐
Other	☐	☐

8.0 What do you like about the area you reside in? (eg. the parks, streetscape etc.)

9.0 What improvements would you like to see in the area?

Many thanks and if you have any queries or further comments please do not hesitate to contact us.

BRIAN HUNT
Statewest Surveying and Planning
69 Great Northern Highway
MIDLAND WA 6056
Tel: 9274 3198

for the Study Team

Attachment: Plan of study area

APPENDIX II

Infrastructure Plans

APPENDIX III

Landscape Master Plan

ATTACHMENT 1

Byford Townscape Study (Extracts)

11.0 TOWNSCAPE PLAN

11.1 Concept

Based on the Character Study (Section 6.0), design parameters generated by the Townscape Committee (Section 8.0) and the Community Design Workshop (Section 10.0) a Concept Plan was prepared for the Byford Town Centre.

The Concept incorporates three areas as follows –

- A central Core Area of more intensive commercial activities and retailing. This includes the existing retail/shopping strip with some expansion.

  This area would see consolidation of activities, significant upgrading of paving, lighting, landscaping and public facilities and conveniences.

  The area will be mostly pedestrian and car parking should be discouraged from this area and be at the perimeter.

  Strong pedestrian links will be needed to areas to the north and south and east and west, and to the railway station.

- A Highway Commercial –north and south less intensive commercial strip

  This area includes the area to the south of the Tavern and north of the Byford Hall/George Street, extending up to Larson Road.

  This area would provide for less intensive non retail activities such as offices, consulting rooms, doctors surgeries, showrooms etc.

  In this area the existing open rural character could be retained with landscaping being the predominant feature of the median and frontage.

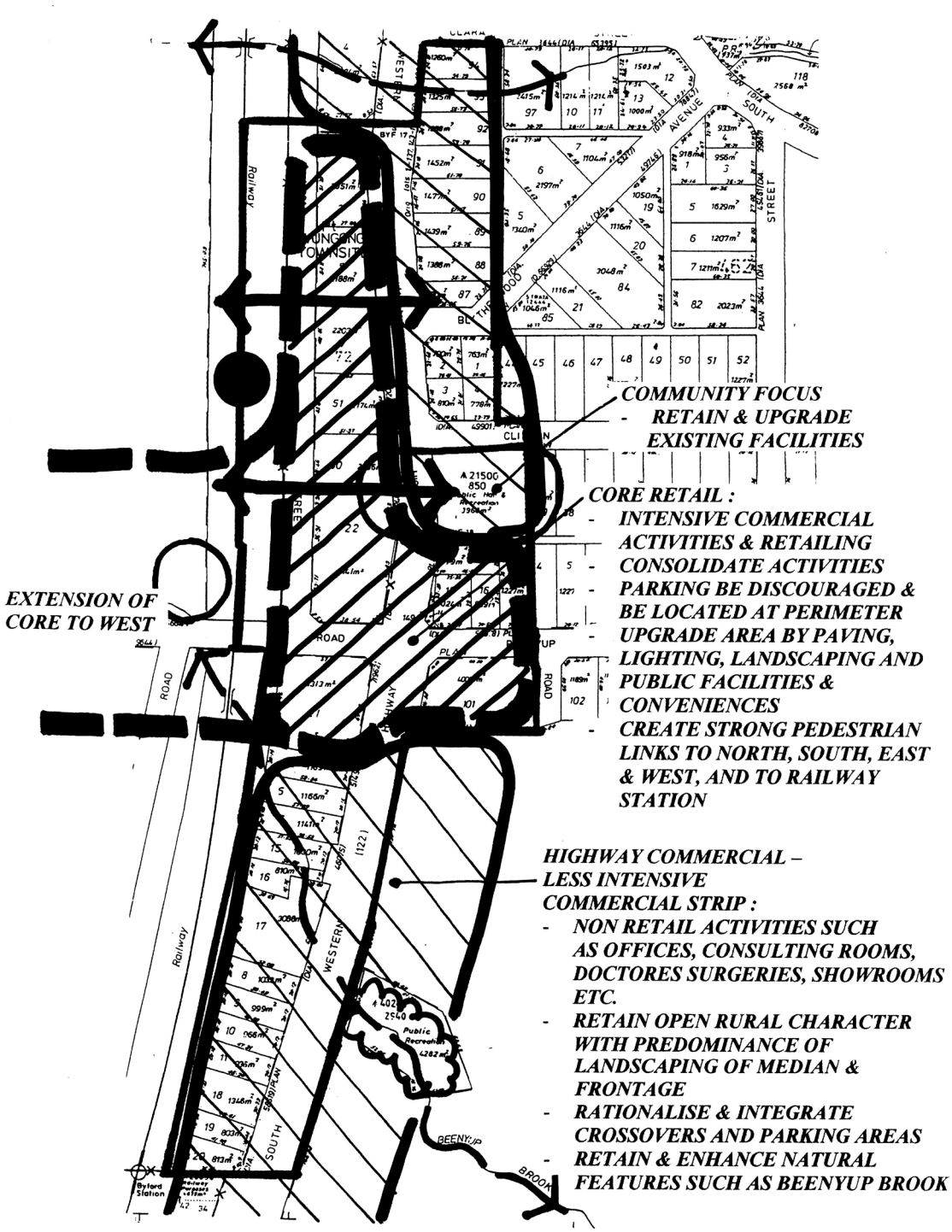
  Existing natural features such as Beenyup Brook should be retained and enhanced.

  There will need to be a rationalisation and integration of crossovers and parking areas.

- A community focus area based on the existing hall and park. This area should be retained as a community facility for the existing Byford community (east of the railway line).

  This area should be upgraded and landscaped.

Plan 10 shows the concept for upgrading of the Town Centre.
As part of this plan it is assumed that the horseshoe bridge option has not been pursued in the short term.



TOWNSCAPE CONCEPT
Byford Townscape Study

SJB • TOWN PLANNERS
CHATSWORTH HOUSE, 16 CHATSWORTH ROAD, HIGHGATE 6003 PH/FAX 9328 2378 MOBILE 0419 915 852
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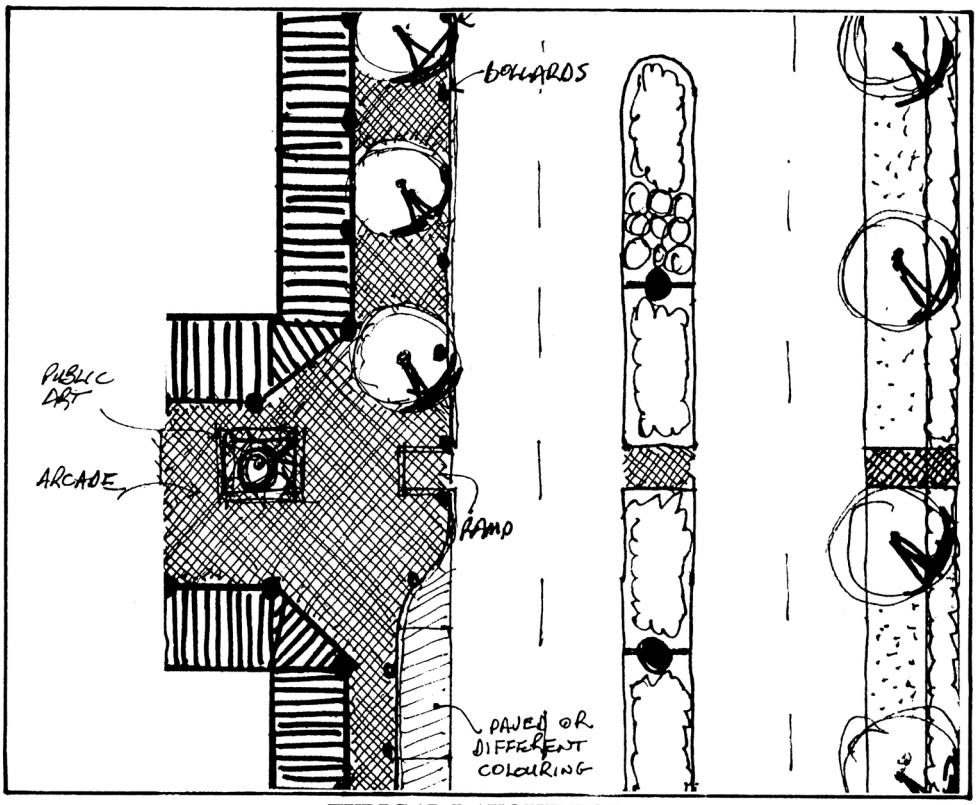
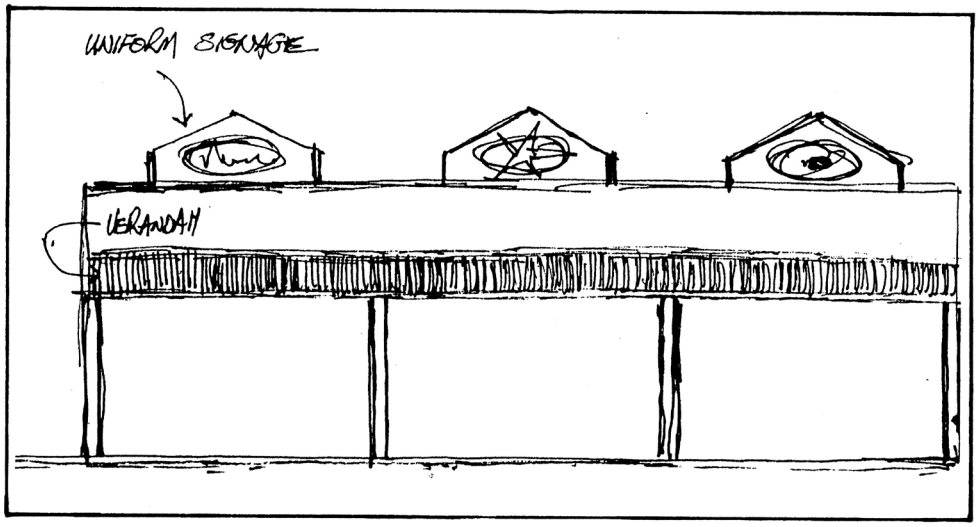
ACN 080 754 623 SJB Town Planners Pty Ltd

Plan 10



TYPICAL LAYOUT FOR RETAIL CORE AREA



TYPICAL BUILDING DESIGN

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Figure 1

11.2 Specific Components

The specific components of the Townscape Plan are as follows:

11.2.1 Landuses

The intensive commercial activities such as retail shopping should be consolidated in the Core area to create a Town Centre.

It should be noted that the Townscape Committee considered that the Core Area should extend up to where George Street intersects with the Highway so that it abuts the future railway station. This is contrary to the Byford Townscape Plan (see Plan 3).

The Highway Commercial areas to the north and south shall provide for less intensive activities such as offices, consulting rooms, doctors surgeries, showroom etc.

This area includes the area to the south of the Tavern and north of the Byford Hall/George Street, extending up to Larson Road.

11.2.2 Buildings

The Core Retail area should contain more intensive buildings. Buildings in this area should address the surrounding streets and predominate.

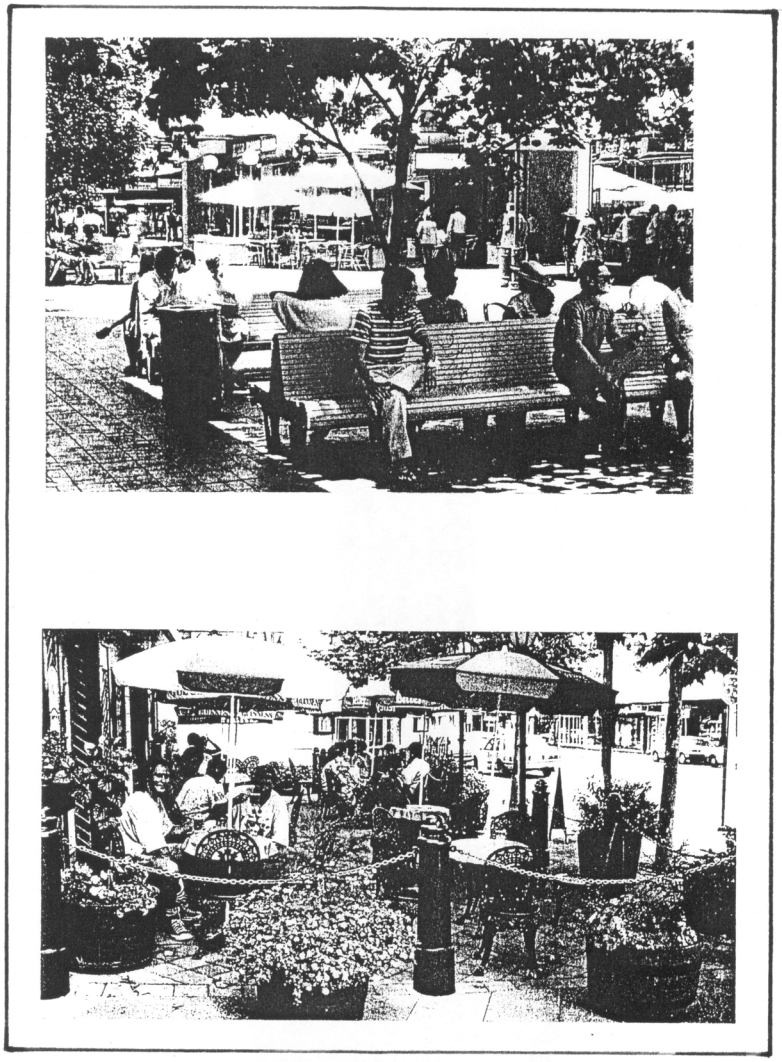
Car parking should be located on the perimeter and not break up the consolidated activity.

Pedestrian access should be provided for so as to connect to the north and south and east and west. Provision should be made for arcades (enclosed or open) to provide for east-west movement between the Highway and eastern residential areas and the railway station. (see Figure 1).

Activities that add colour, activity and interest should be promoted in the Retail Core Area, including:

- the display of produce on sidewalks
- weekend markets
- alfresco dining (see Figure 2).

For the Highway Commercial areas to the north and south landscaping shall dominate the median and lot frontages. Buildings shall be located at greater setbacks. (see Figure 3).



ALFRESCO DINING AND SEATING -
FOCUS OF ACTIVITY IN CORE AREA

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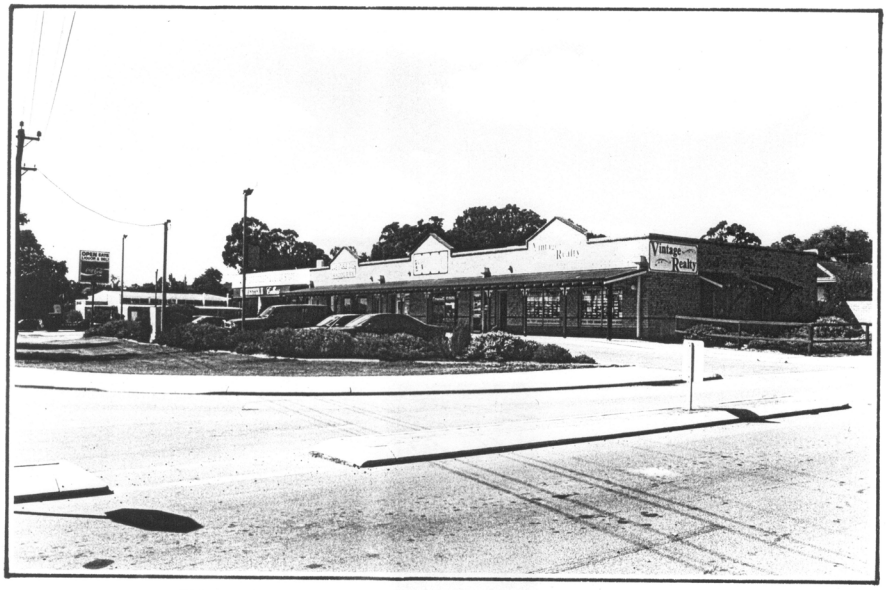
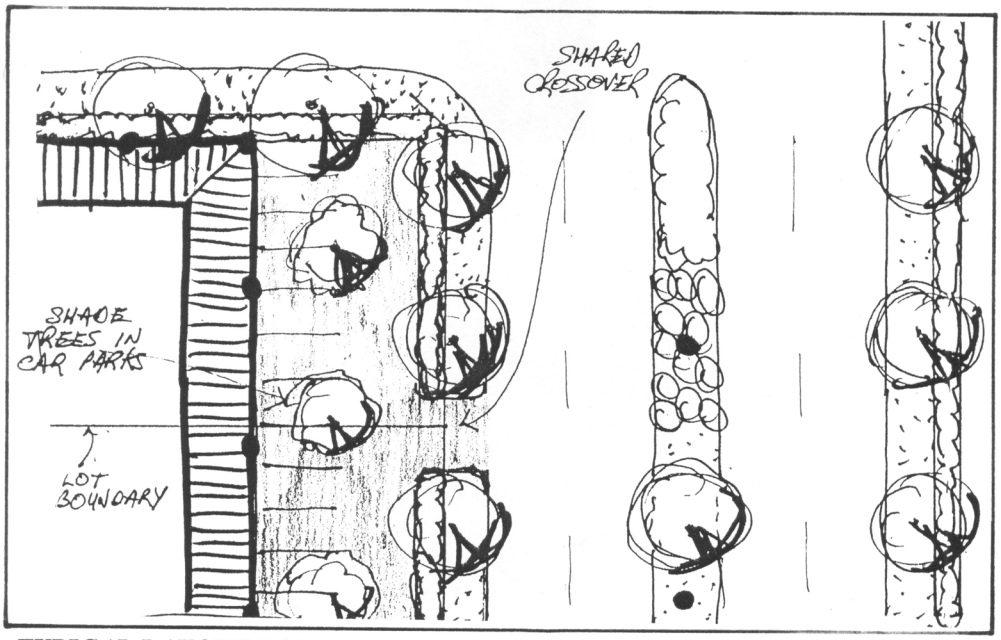
Figure 2



TYPICAL EXISTING BUILIDING DESIGN



TYPICAL LAYOUT FOR HIGHWAY COMMERCIAL

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Figure 3

All buildings shall be designed to build on the existing theme of cream/light brown brick buildings with corrugated iron rooves and verandahs. (see Figure 3).

Buildings in the Retail Core should be continuous and there should be no gaps in the streetscape. Verandahs too should be continuous to provide protection for shoppers and pedestrians.

It is recommended that Council prepare design guidelines for future development in the Town Centre. Corporate designs such should be discouraged.

11.2.3 Landscaping

In line with the foregoing, the Highway Commercial shall have a predominance of landscaping in order to retain the open rural character.

The median and verge lot frontages shall be intensively landscaped.

For the Core Retail area landscaping shall not be as predominant with street trees on the verge and in the median. Landscaping shall be less intensive so as to allow for open views for safe pedestrian road crossings and visibility of the shops.

Landscaping should continue from the rural areas into the Town Centre so as to retain and build on the character of the area.

All car parking shall have shade trees of a rate of 1 per 8 bays.

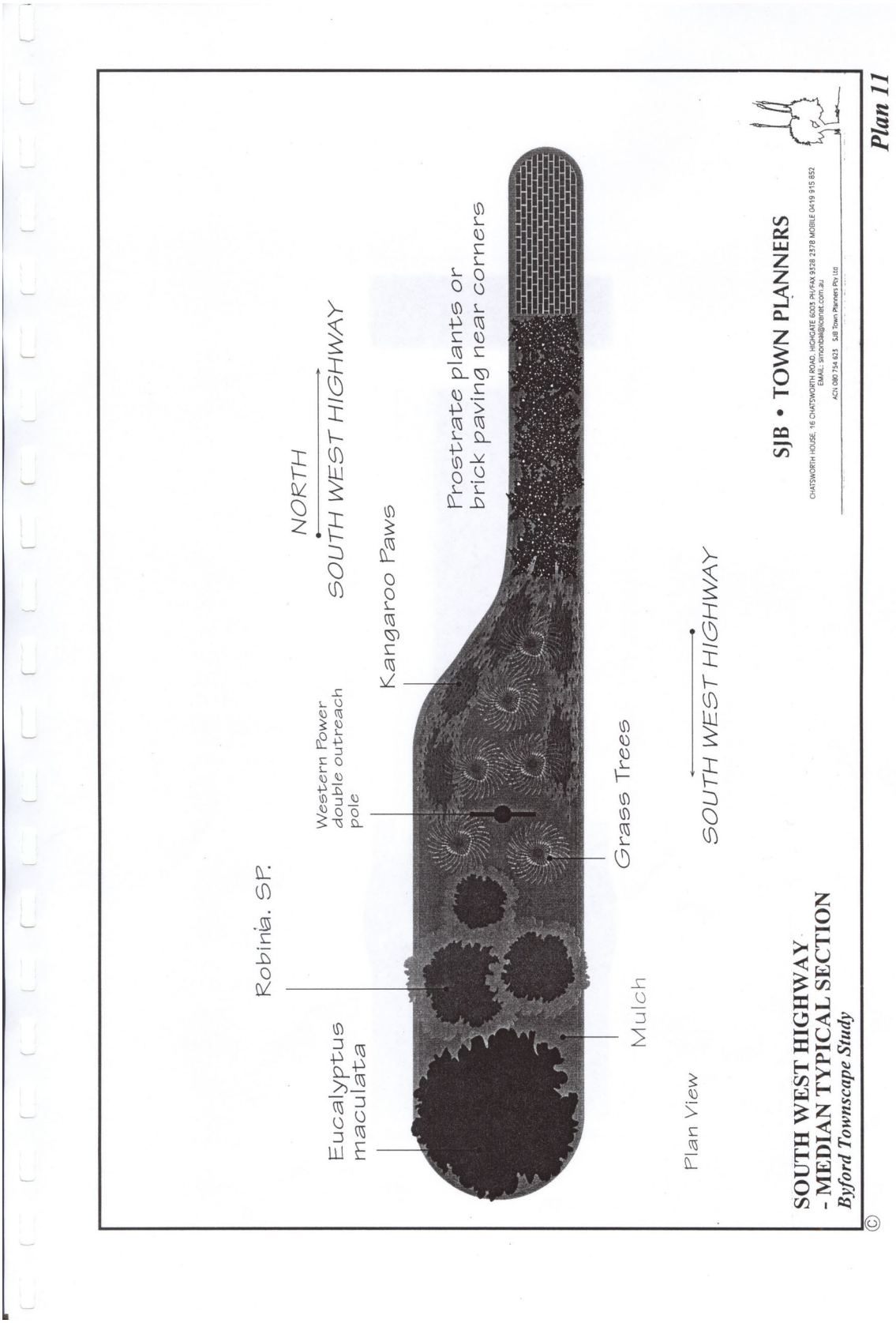
The landscaping theme builds upon the existing bottlebrush, blackboys (Xanthorrhoea) and jacarandas, with Grevilleas and Diosmas for medians and verges for the pedestrian areas in the Retail Core. Eucalyptus Marginata, Eucalyptus Rudis and Eucalyptus Lane-Poolei should also be included in the landscaping theme.

A detailed landscaping plan for the median is contained on Plan 11.

11.2.4 Parking

Car parking for the Highway Commercial areas are proposed to be rationalised and integrated so that there is reciprocal rights of carriageway over each property for vehicle access and parking. Crossover points will need to be limited.

For the Retail Core it is recommended that on site car parking be discouraged so as to enable a consolidation of activities. Car parking should be located strategically around the Core Area on street and in the railway reserve. Westrail has confirmed their land can be used subject to referral of the Townscape Plan to them and their approval being gained. Contributions should be gained for land purchases and construction.


NORTH
SOUTH WEST HIGHWAY
Prostrate plants or brick paving near corners
Kangaroo Paws
Western Power double outreach pole
Robinia. SP.
Eucalyptus maculata
Grass Trees
Mulch
SOUTH WEST HIGHWAY
Plan View
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SOUTH WEST HIGHWAY
- MEDIAN TYPICAL SECTION
Byford Townscape Study
Plan 11
©

The car parking should be designed to accommodate shopper and commuter parking, when the railway station proceeds. A comprehensive car parking study will be required to coordinate and control car parking. This should also cover the proposed new commercial areas to the west.

Because of the mix of land uses that will be promoted in the Town Centre there are opportunities for reciprocal and shared car parking, greatly reducing car parking demands. Places like the Fremantle City Centre, Subiaco Town Centre and regional centres like Geraldton all have policies of a 50% reduction in normal car parking standards for Town Centres. This will happen over time with new developments and Council should monitor the car parking supply and demand.

Council should, in the future prepare and adopt a similar policy, allowing for a reduction up to 50% where proven by the applicant.

11.2.5 Traffic

The Byford Structure Plan makes provision for future road proposals, with a new east-west link between George Street and South West Highway. This road link was envisaged in this general location shown on the Townscape Plan. There has otherwise been no detailed assessment of the need for this road, its precise location or standard of construction.

It should be noted that the Townscape Committee considered this road link is not required.

Provision has also been made for the Horseshoe Bridge that was also envisaged n the Byford Structure Plan. An alternative road and parking layout is included should the bridge not be constructed. (see Townscape Plan).

The plan makes provision for deceleration and turning lanes that will be required to cater for the increased traffic.

A comprehensive traffic study is needed for the Townscape Study area and the future Town Centre to the west to ensure adequate traffic circulation and an integration of both areas, as well as the urban expansion area.

Of note a detailed traffic assessment will be required for this and the proposed new commercial areas to the west.

11.2.6 Byford Hall and Park

This area has been identified as an area for Community Focus. This area has traditionally provided a community facility for the existing Byford residents and should be retained and added to with such uses as:

- library

- telecentre
- recreation centre
- centre for social activity
- service provision for banking and local government

This is an important community asset that should be retained and upgraded.

A concept plan has been prepared showing how this area could be upgraded. Key features include:

- community notice board
- bike racks
- paving and marking bays in the car park
- extensive landscaping
- demolition of the existing toilets and construction of new toilets fronting Clifton Road – already done
- relocation of the war memorial
- landscaping and paving of the park
- children`s play equipment
- possible extension of the hall
- drinking fountain

The area could also be used for weekend markets.

The new war memorial should be designed to continue the jarrah leaf theme and the existing memorials rock base should be incorporated into the new memorial.

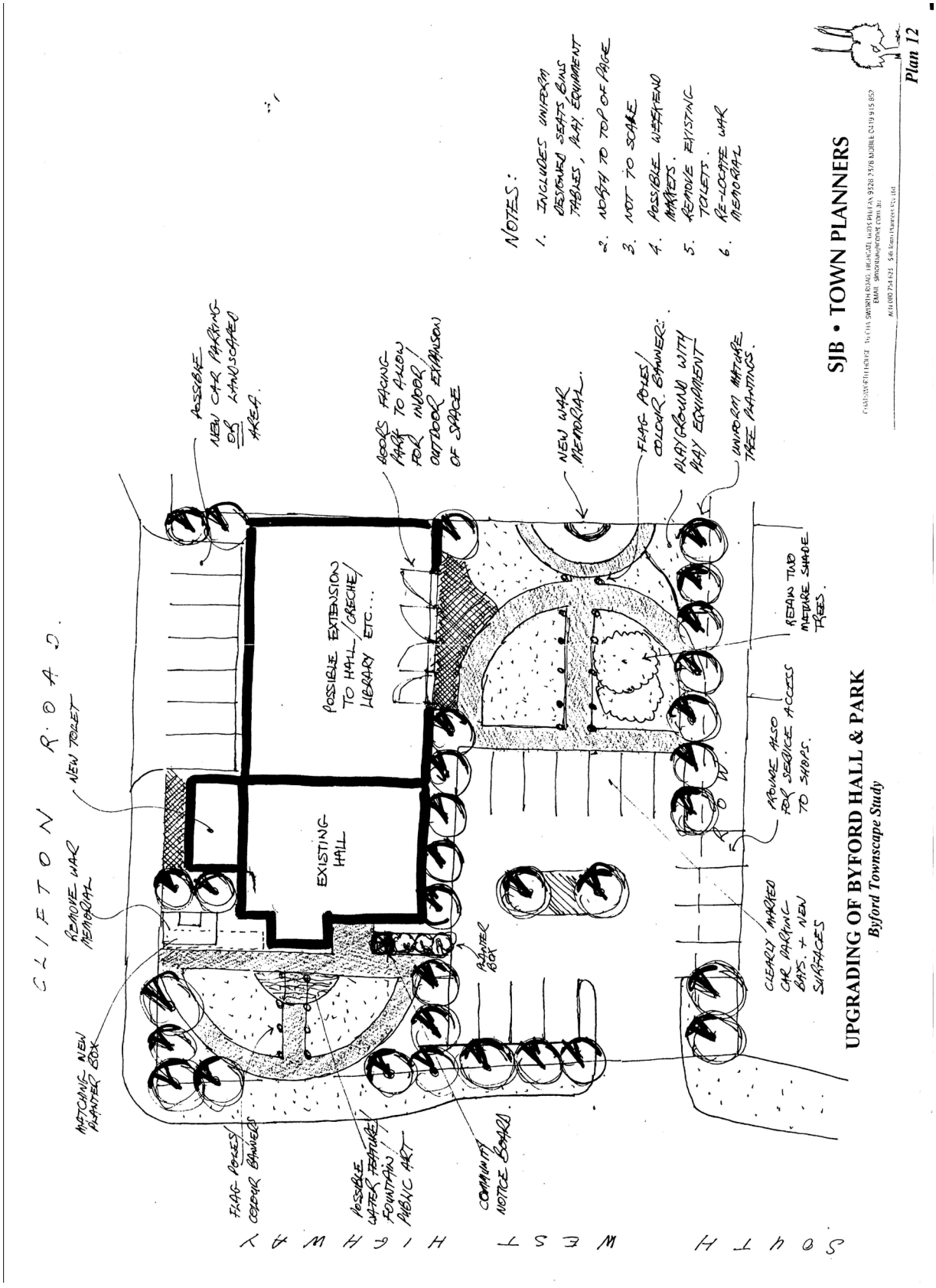
Plan 12 shows the proposed upgrading of this area and Plan 6 shows the design of the new toilets.

It is recommended that any upgrading or extension of the Hall be as per the recommendations in Section 11.2.2.

11.2.7 Street Furniture

Analysis of the existing Town Centre shows there is a smattering of public facilities in the area including:

- 6 yellow tin bins
- 3 green timber slatted bins
- 2 normal bus stops
- 1 normal telephone box
- 2 old seats not comfortable or useable and no shade next to shops
- public toilets
- 1 post office box
- 1 seat to north of Bowling Club very much degraded
- 2 seats near war memorial not comfortable or shaded
- playground equipment


NOTES:
1. INCLUDES UNIVERSAL DESIGNED SEATS BINS TABLES, PLAY EQUIPMENT
2. HEIGHT TO TOP OF PAGE
3. NOT TO SCALE
4. POSSIBLE WEEKEND MARKETS.
5. REMOVE EXISTING TOILETS.
6. RE-LOCATE WAR MEMORIAL
SJB • TOWN PLANNERS
UPGRADING OF BYFORD HALL & PARK
Byford Townscape Study
Plan 12
CLIFTON R.O.A.D.
SOUTH WEST HIGHWAY
NEW TOILET
REMOVE WAR MEMORIAL
MATCHING NEW PLANTER BOX
EXISTING HALL
POSSIBLE EXTENSION TO HALL / CRECHE / LIBRARY ETC...
POSSIBLE NEW CAR PARKING BY LANDSCAPED AREA.
DOORS FACING PARK TO ALLOW FOR INDOOR / OUTDOOR EXTENSION OF SPACE
NEW WAR MEMORIAL.
FLAG POLES / COLOUR BANNERS
PLAY GROUND WITH PLAY EQUIPMENT
UNIFORM MATURE TREE PLANTINGS.
RETAIN THIS MATURE SHADE TREES.
MOUNDS ALSO FOR SEATING TO SHOPS.
CLEARLY MARKED CAR PARKING BAYS + NEW SURFACES
PLANTER BOX
COMMUNITY NOTICE BOARD
POSSIBLE WATER FEATURE / FOUNTAIN / PUBLIC ART
FLAG POLES / COLOUR BANNERS

- tables and chairs in park

There is also no overall theme.

There is the beginning of a theme with green wooden slatted bins and seats. This theme could be continued and built on with green wooden "rural" style –

- bins
- bus shelter
- seats
- bollards etc.
- bike racks
- drinking fountains

There should also be entry statements to continue/set the theme for the Town Centre.

Figure 4 shows a possible theme for street furniture and entry statements.

High quality facilities in appropriate locations are required. Seats should be located where required and should be shaded.

Council needs to select a suite of suitable street furniture. This could be done after inviting expressions of interest from interested companies.

Bollards could be incorporated in to the design of the Retail Core area. These should be used to provide added protection to pedestrians adjacent to the highway and guide pedestrians to the Highway safe crossing points.

An alternative is for a low landscape strip or hedge to provide some pedestrian separation form the Highway.

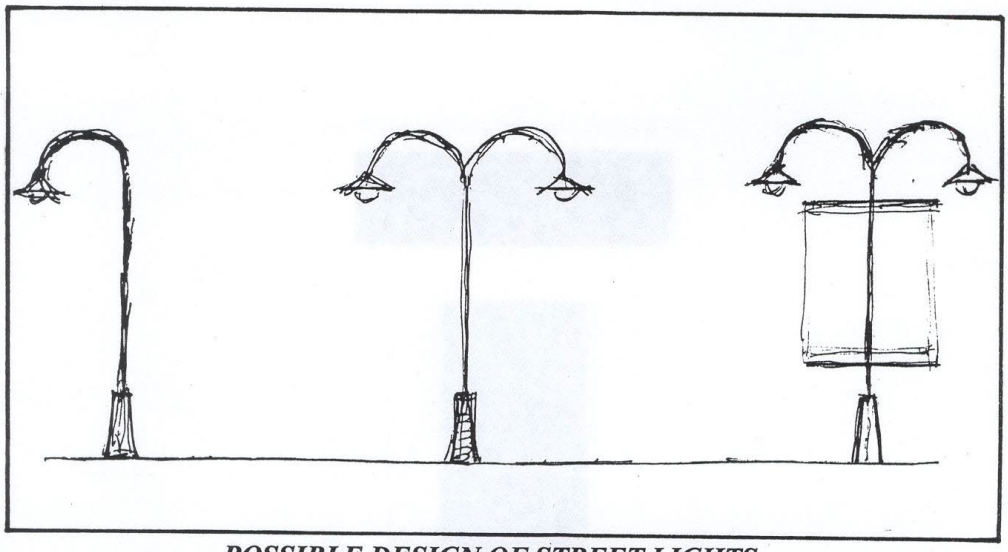
During the progress of the study the Townscape Committee considered a proposal for the provision of public seating paid for by advertising rights. There was no support for the specific proposal but the Committee considered that Council should invite expressions of interest for the provision of street furniture.

11.2.8 Lighting

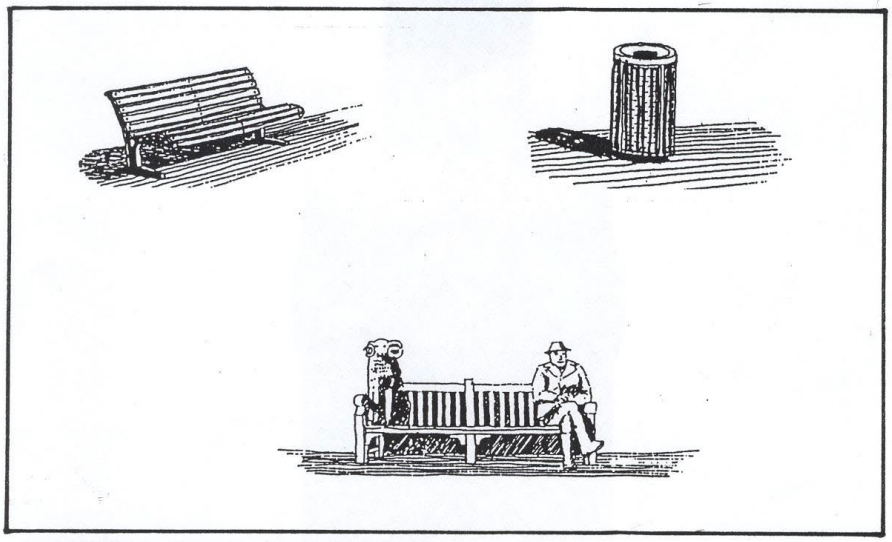
Lighting is also part of the street furniture. Adequate lighting needs to be provided for the existing and new commercial areas, and along the Highway.

A suite of street lighting is required for each area. A simple design reflecting a rural character that complements the other street furniture is recommended. (see Figure 4).

The existing overhead powerlines restrict the scale of street planting which can take place below them, and are widely regarded as unsightly by the community. While the cost of undergrounding powerlines is still significant,



POSSIBLE DESIGN OF STREET LIGHTS



POSSIBLE DESIGN OF STREET FURNITURE AND PUBLIC ART

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Figure 4

it is reducing steadily as Western Power becomes more efficient in its methods, and material costs come down.

In these circumstances it may be feasible for the Shire to have some powerlines placed underground within the town centre, and to introduce feature lighting and more shade tree planting as a result.

11.2.9 Public Art

The vitality and interest in an area depends upon how pleasurable it is to use and visit. Public art is one way of stimulating an area.

It is recommended that Council encourage public art through the Town Centre.

Key locations such as within the Hall/Park area, on key street corners or within pedestrian precincts/arcades are ideal locations. Preferred locations are identified on the Townscape Plan.

Council could also gain contributions towards public art from developments. This approach is taken in East Perth and Subi Centro.

11.2.10 Signage

The current signage is many and varied. There is a proliferation of different styles.

Signs are most effective if they are kept simple and a uniformity of design creates a sense of place. Corporate logos such as McDonalds should be discouraged.

It is recommended that Council prepare a signage policy for the Town Centre that contains guidelines for promoting rural character signage.

One of the features identified as being desirable in the Character Study is a "Welcome" sign or entry statement.

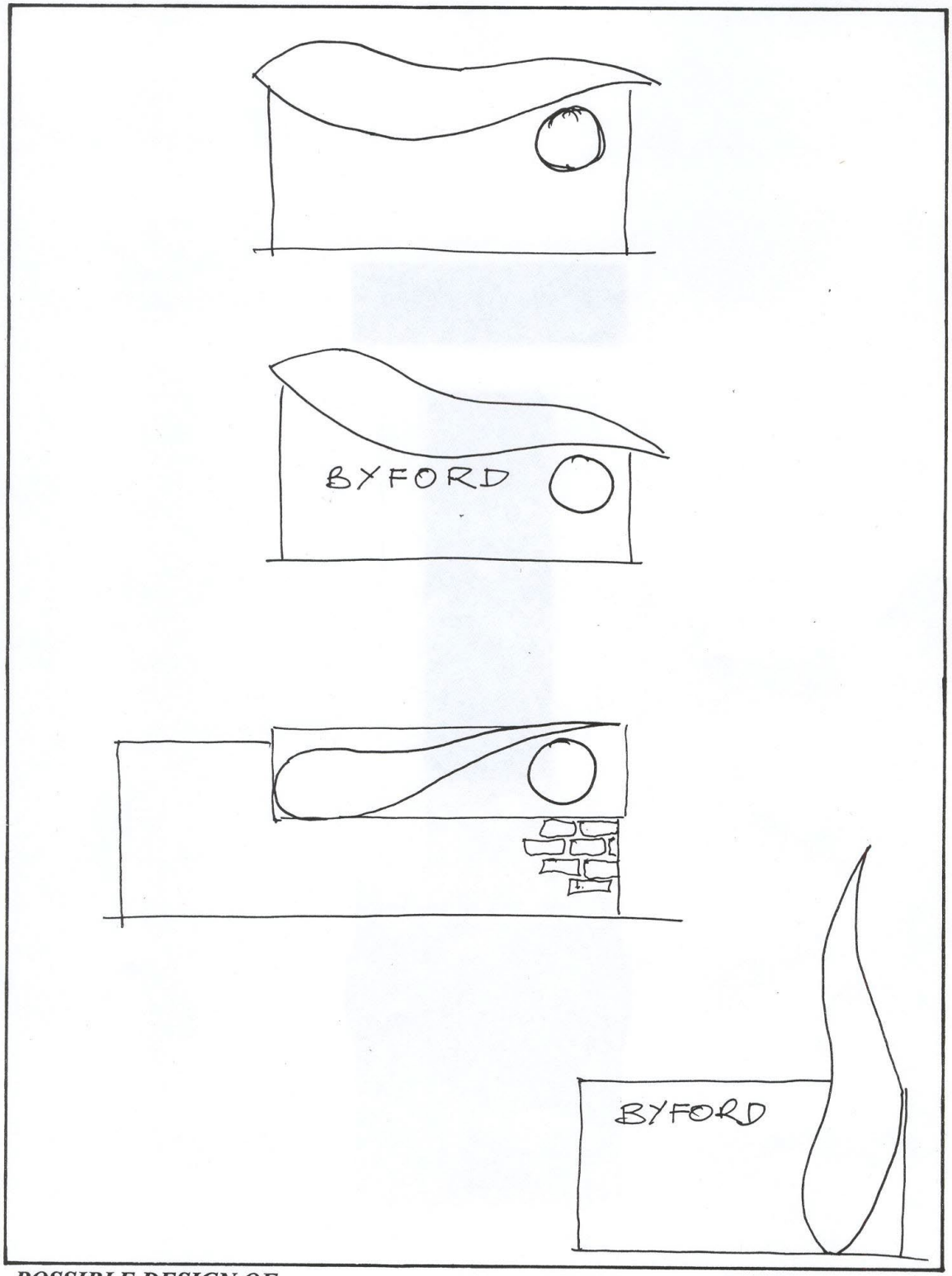
Such a sign could be integrated into the landscaped median. It should reflect the rural character of the area, as well as the history.

The Townscape Committee has suggested use of a design that continues the theme of the jarrah leaf for the public seating project. (see Figure 5).

The entry statements should be located at the entries in to the new urban area and then there could be new statements at the entry to the Town Centre.

11.2.11 Paving

The paving surfaces are throughout the study area many and varied. The Retail Core area has the beginnings of a theme with red brick paving.



POSSIBLE DESIGN OF ENTRY STATEMENT

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Figure 5

This should be continued throughout the Retail Core area and brick paving as features throughout the Highway Commercial area.

Ideally there should be patterning or the use of contrasting bricks to add interest in the Core.

11.2.12 Colours

Council can control the range of colours used on street furniture, signage (public and private) and the colours of new development.

It has already been recommended that the existing theme of red and green with cream or light brown be used for buildings, and that dark green be used for a base colour for bins and seating. This colour scheme should continue throughout the Town Centre.

The Townscape Committee should select a palette of colours that are appropriate for use in Byford that continues the rural theme of the area.

REFERENCES

Green Towns Study - Hocking Planning & Architecture

CALM (Rare Flora search)

Byford Structure Plan (Taylor Burrell, Kinhill, April 2003)

Municipal Heritage Inventory (Shire of Serpentine-Jarrahdale)

Byford – A Pictorial History 1903 – 2002

Main Roads WA (traffic information)

Byford Townscape Study (SJB)

Shire of Serpentine-Jarrahdale Town Planning Scheme No.2

Metropolitan Region Scheme, Perth Western Australia (MRS)

Urban Water Management Station/Byford Urban Stormwater

Study of Rights of Way in Byford and Mundijong (SJB)

Shire of Serpentine-Jarrahdale LPP12 – Requirements for Detailed Area Plans

Draft LPP – Energy Efficiency Policy (Shire of Serpentine-Jarrahdale)

Liveable Neighbourhoods (WAPC)

Shire of Serpentine-Jarrahdale LPP8 – Landscape Protection

Trail Master Plan for Shire of Serpentine-Jarrahdale (Draft)

WAPC Policy DC 2.3 Public Open Space in Residential Areas.

WAPC Special Planning Policy No. 2 – The Peel-Harvey Coastal Plain Catchment

Liveable Neighbourhoods (WAPC)

Darling Range Regional Park Supplementary Report No.3, Visual Resource Assessment of Darling Range Sub-Region (WAPC)

Reaching the Remote – Landscape Characters of Western Australia (CALM)

Shire of Serpentine-Jarrahdale LPP5 – Control of Advertisements

Shire of Serpentine-Jarrahdale – Local Law: Fences

Residential Design Codes of Western Australia, Oct 2002

Byford Urban Stormwater Management Strategy – Parson Brinkerhoff

Evolution from LA 21 to Regional Sustainability (presentation to International Sustainability Conference 2003 by J Stove & M De Lacey)

Shire of Serpentine-Jarrahdale LPP13 Woodlot Subdivision

Jarrahdale Design Guidelines

Harvest Lakes Detailed Area Plan WAPC Planning Bulletin 61