



ARMSTRONG CREEK

URBAN GROWTH PLAN

VOLUME 1

MAY 2008 (AMENDED MAY 2010 &
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Authors

Collie Pty Ltd

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PREFACE

STATUS AND ROLE OF THE URBAN GROWTH PLAN

This is the 'Adopted' version of the Armstrong Creek Urban Growth Plan (UGP) and is included as a reference document in the Greater Geelong Planning Scheme. The UGP sets the long term strategic planning directions to guide the creation of sustainable urban growth within Armstrong Creek. It identifies the boundary for urban growth and the location of broad development types and identifies areas of high ecological, cultural heritage or aesthetic value.

The UGP was commissioned by the City of Greater Geelong. It was developed in consultation with a wide range of stakeholders, including state government agencies, adjoining local councils, the G21 Geelong Region Alliance, statutory bodies, utility companies, community groups and landowners.

The document is referenced in the Planning Scheme following adoption by Council on 13 May 2008 after consideration of the Panels recommendations.

Given that full development of the Armstrong Creek growth area may not occur for 25 years or more, the UGP has been prepared with the expectation that it will be operational for a number of years. It will, however, be necessary to monitor the development outcomes that flow from the UGP to make certain that benchmark standards in sustainable development are being achieved.

AMENDMENT TO THE URBAN GROWTH PLAN

The document has been reviewed and updated as part of Planning Scheme Amendments C206, C207 and C240 which implemented the Precinct Structure Plans for the Armstrong Creek East Precinct (ACEP), Armstrong Creek North East Industrial Precinct (NEIP) and Armstrong Creek West Precinct (ACWP) respectively.

Minor changes to the Armstrong Creek Urban Area - Framework Plan contained within this document have been made which reflect the detailed precinct planning undertaken for the aforementioned precincts.

It is anticipated that further amendments to this document will be undertaken as part of the future Planning Scheme Amendments which implement the UGP in other precincts, therefore enabling this document to remain current.

THE STRUCTURE OF THE URBAN GROWTH PLAN

The Armstrong Creek Urban Growth Plan (UGP) was developed in five volumes, however only Volume 1 is referenced in the Planning Scheme:

VOL. NO.	TITLE	CONTENT
1	Urban Growth Plan	The strategic plan for the Armstrong Creek growth area.
2	Precinct Plans	Description of the key features of the UGP within each precinct.
3	Implementation Plan	Outline of the measures recommended to implement the UGP.
4	Background Report	Analysis of the opportunities and challenges presented by the existing conditions.
5	Appendices	More detail on a range of matters.

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1 INTRODUCTION

1.1 THE GROWTH OF GEELONG

A man who does not plan long ahead will find trouble at his door. Confucius

City planning finds its validation in the intuitive recognition that a burgeoning market society can not be trusted to produce spontaneously a habitable, sanitary, or even efficient city, must less a beautiful one. Murray Bookchin, The Limits of the City (1986)

The Armstrong Creek Urban Growth Plan (UGP) is one of the City of Greater Geelong's largest and most important strategic projects. It aims to concentrate the majority of the growth of Geelong for the foreseeable future into a comprehensive community in the area south of the railway line at Grovedale and Marshall.

There is a well-documented need for additional development to accommodate growth in the Geelong region. According to the *Draft G21 Geelong Region Plan*¹, the G21 region² *"is the fastest growing region in the state, having experience (sic) population growth of 1.3% per annum between 1996 and 2005. During that time it grew at a faster rate than metropolitan Melbourne (1.2%) and Victoria overall (1.1%) and accommodated on average an additional 3,300 residents each year."*

The Department of Sustainability and Environment's Victoria in Future population forecasts predict the Geelong Region's population will increase from 254,732 in 2001 to 352,662 in 2031. The G21 Geelong Region Alliance (G21)'s population growth scenarios indicate the possibility of faster growth in the region, resulting in a population by 2031 of up to 510,000³. These two forecasts represent between 2,680 and over 7,000 additional people per year. This would result in a need for an additional 58,000 to 139,000 dwellings by 2031, or between 1,700 and about 4,100 new dwellings per year. It is incumbent upon Council to plan to accommodate this growth.

Most of Australia's major cities have now recognised the importance of planning for urban growth in a comprehensive and relatively prescriptive manner, to ensure the resulting settlement pattern is sustainable—environmentally, socially and economically. It is to this end that Direction 3 of Melbourne 2030—Planning for sustainable growth provides the following policies with respect to urban growth areas:

3.1 - Promote the growth of regional cities and key towns on regional transport corridors as part of a networked cities model

3.2 - Control development in rural areas to protect agriculture and avoid inappropriate rural residential development

Some of Geelong's population growth can be accommodated through infill and re-development projects in appropriate locations. The forthcoming Geelong Medium Density Housing Strategy will identify where such development is appropriate. However, given that a single dwelling on its own block continues to be the preferred housing type for most Australian households, infill and re-development cannot accommodate the projected growth of Geelong without unacceptable increases in density. By way of reference, Melbourne 2030 projects that growth areas will still need to accommodate 38% of Melbourne's growth despite proactive policies for increased densities in established areas.

1 Draft G21 Region Plan—A sustainable growth strategy (2005)

2 The G21 region includes the Greater Geelong, Surf Coast, Golden Plains, Colac Otway and Queenscliffe municipalities.

3 This forecast is based on the growth rate experienced by the Sunshine Coast Region between 1996 and 2001.

1.2 THE ARMSTRONG CREEK GROWTH AREA

The Armstrong Creek area was originally designated as a growth corridor in the 1980s by the Geelong Regional Commission. This was reinforced in 1994 by the Mount Duneed Armstrong Creek Urban Development Study. The status of this area as Geelong's future urban growth corridor was confirmed again in the City's Urban Growth Strategy 1996 and is supported by a range of Council documents.

Geelong's Municipal Strategic Statement (MSS) designates Armstrong Creek/ Mt Duneed as the "*primary growth corridor for future urban growth*" of Geelong, noting that "*Stage 1 of the corridor will accommodate the bulk of Geelong's long term growth*". The MSS gives the following reasons for designating Armstrong Creek as Geelong's primary growth corridor:

- it is relatively close to the centre of Geelong;
- it is immediately adjacent to the Melbourne-Warrnambool railway line and possible railway station providing excellent public transport access to Geelong and Melbourne;
- it is immediately adjacent to the Surf Coast and Princes Highways;
- it is adjacent to existing development, which means that servicing can be incremental in line with the pace of development; and
- it is gently undulating with minimal environmental constraints.

The MSS concludes that "*sensitive subdivision would provide future good quality residential living well located to all major services and facilities in Geelong*".

The Draft G21 Geelong Region Plan confirms this view, stating that "*The primary growth opportunity for Geelong are (sic) Armstrong Creek/ Mt Duneed ...*"

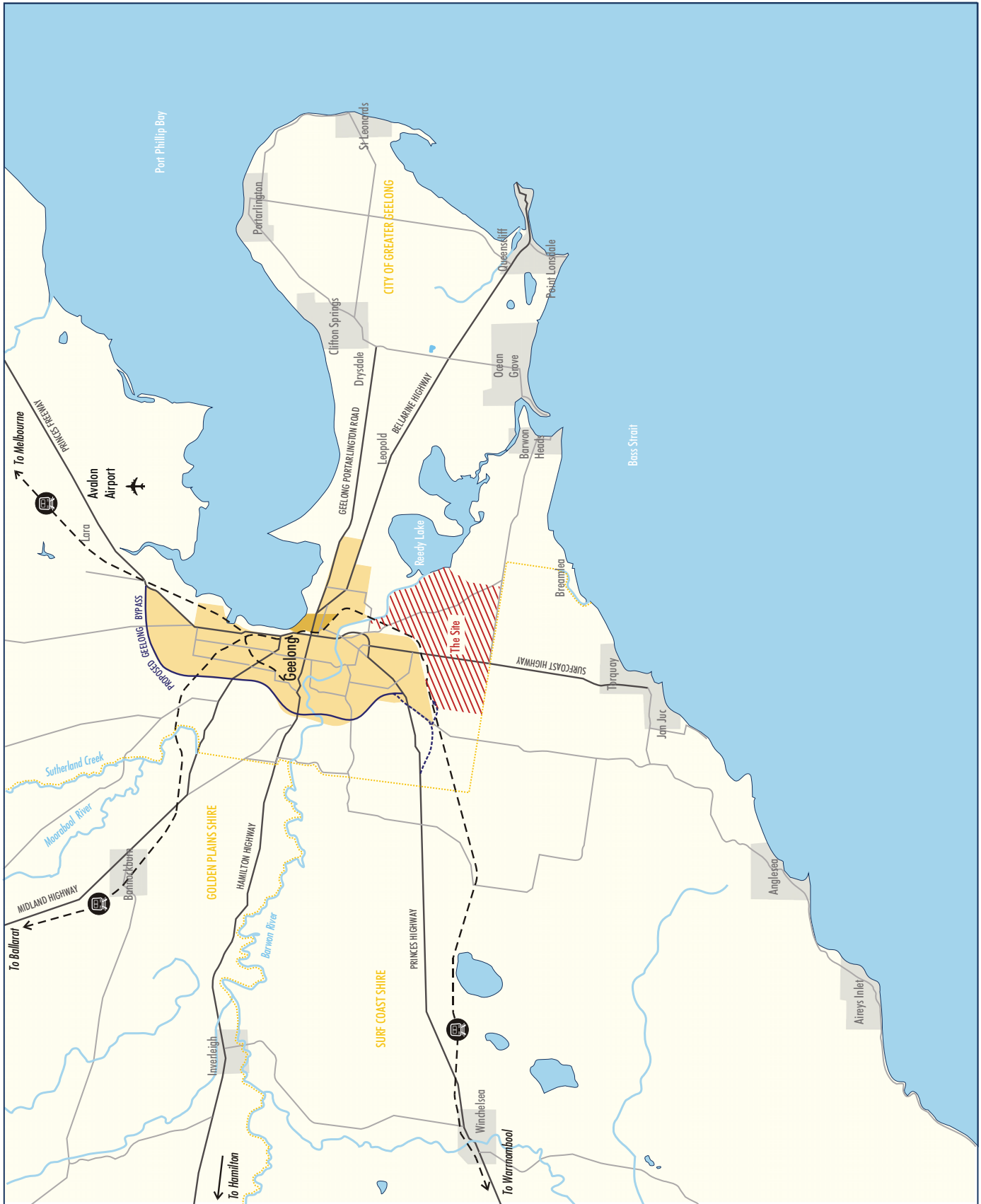
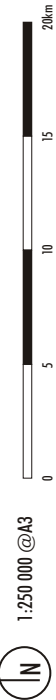


Figure 1.1 Location Plan



1.3 SUSTAINABLE URBAN GROWTH

New growth areas have often suffered from a myriad of problems, including:

- social exclusion—lack of easy access to jobs, community facilities, shops and services;
- loss of countryside—ecological, agricultural and recreational resources;
- cost of extending infrastructure;
- lack of direct pedestrian, cycle and public transport routes, contributing to poorer personal health, car use and dependency, traffic congestion and pollution;
- lack of housing choice—breaking up communities as people age;
- ‘placelessness’;
- absence of architectural variety;
- no sense of community;
- lifeless and unsafe commercial areas outside business hours; and
- poorly looked after public open space.

Urban extensions are widely considered to be the most sustainable form of growth, where there is insufficient well-connected brownfield land. As put succinctly by the Joseph Rowntree Foundation, *“Unlike free-standing settlements which generate constant car journeys, edge-of-town extensions allow new residents to link into the existing infrastructure of public transport and services, shops, work and schools.”*⁴ However, the benefits of an urban extension—no matter how sustainable—ought not to be at the expense of the previous ‘edge’ community, but ought to complement and add value to it to compensate for potential detrimental effects such as additional through traffic and the loss of a rural setting.

The Armstrong Creek growth area has many attributes from the perspective of creating a setting for a sustainable community, including its location alongside existing urban infrastructure—including, in particular, a railway line—its proximity to the Deakin University Waurin Ponds Campus and its relatively close proximity to the employment opportunities and services offered by central Geelong. The Armstrong Creek UGP thus represents a unique opportunity to create a sustainable urban extension of Geelong by applying the most progressive and innovative techniques to the design of the new community.

The City of Greater Geelong is committed to overseeing a form of greenfield development that is as sustainable as practicable. The brief for this project states:

The UGP must aim to utilise best practice in urban development planning and provide a “cutting edge” model for future housing areas. There will be an emphasis on environmental sustainability, water sensitive urban design, social/community needs and provision of a range of residential densities and styles.

However, it is recognised that the best plan is of no use unless it is deliverable. The approach taken in this plan, therefore, is to optimise development outcomes within the ‘real-world’ economic and political framework. It seeks to create leading-edge standards, but not at the cost of an unimplementable plan. In most cases, this means evolution, not revolution: today’s best practice taken forward, responding to future possibilities but within the current economic and social climate. However, it also means ensuring the potential remains to capture the benefits of revolutionary ideas that may become feasible in the future.

4 Joseph Rowntree Foundation (2001): Masterplanning a New Community—Designs for a town extension in York. Joseph Rowntree Foundation. 2001.

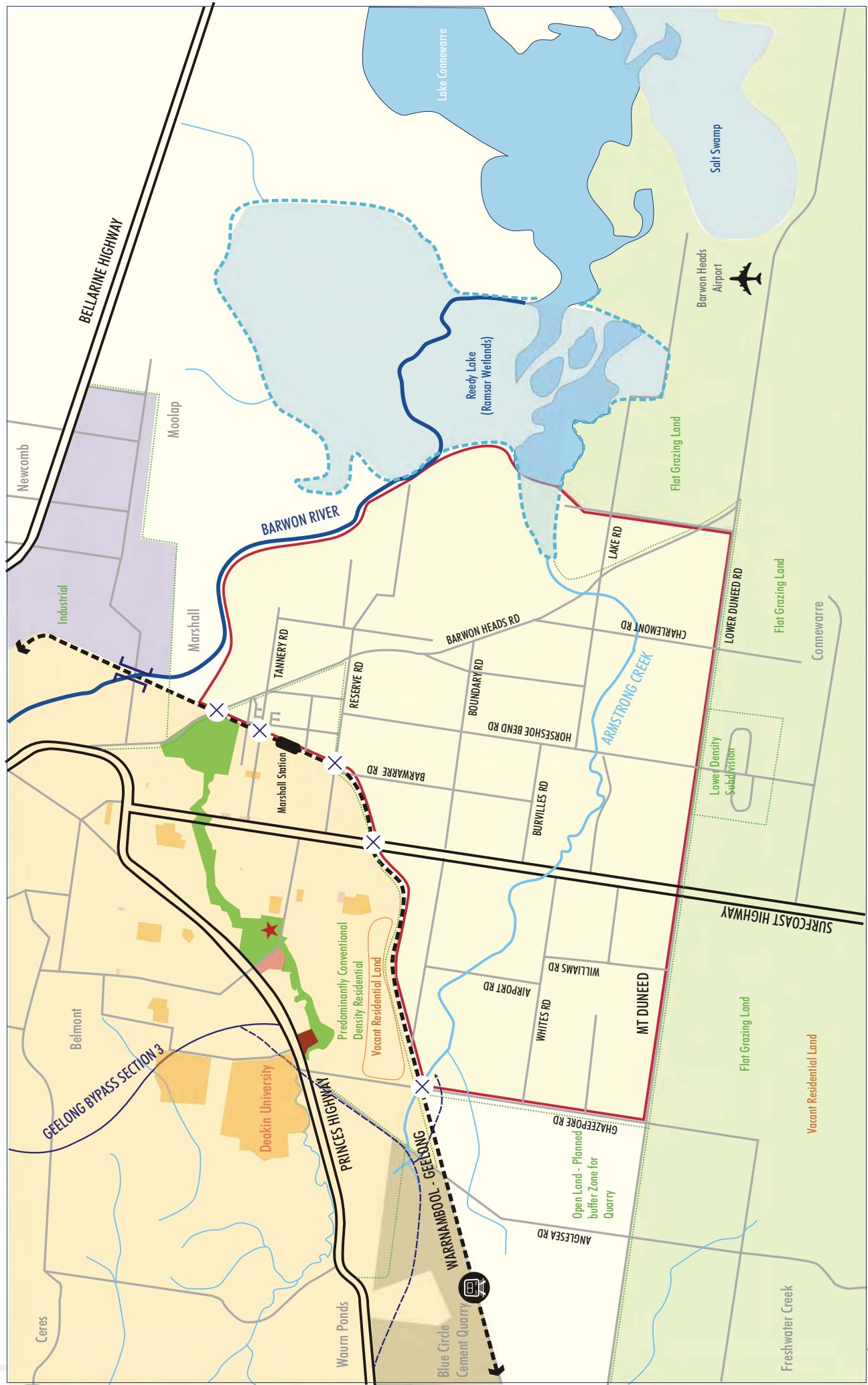


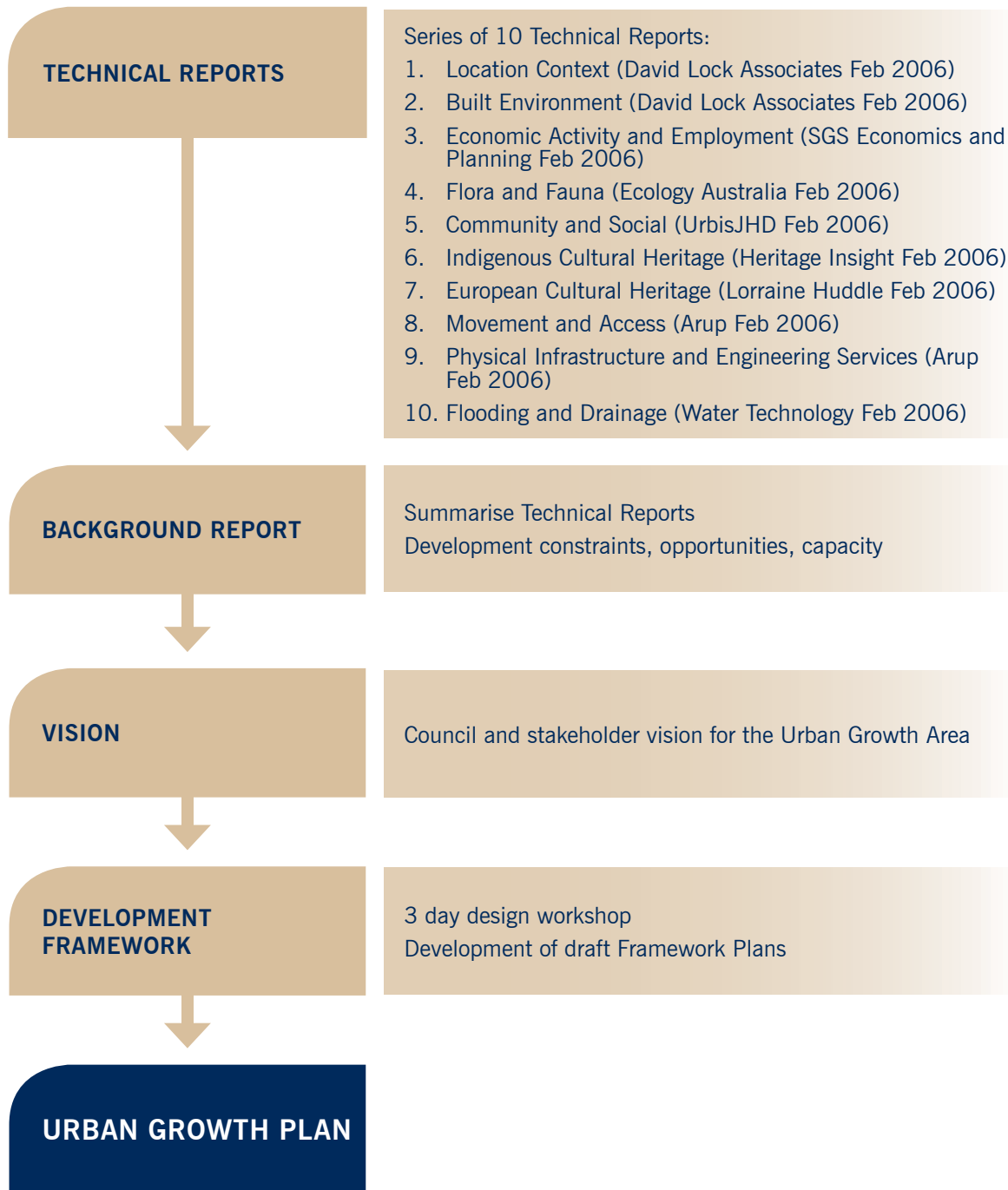
Figure 1.2 Context Plan



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FIGURE 1.3 UGP PROCESS

The UGP was developed in five stages, as illustrated below:



1.4 CONSULTATION

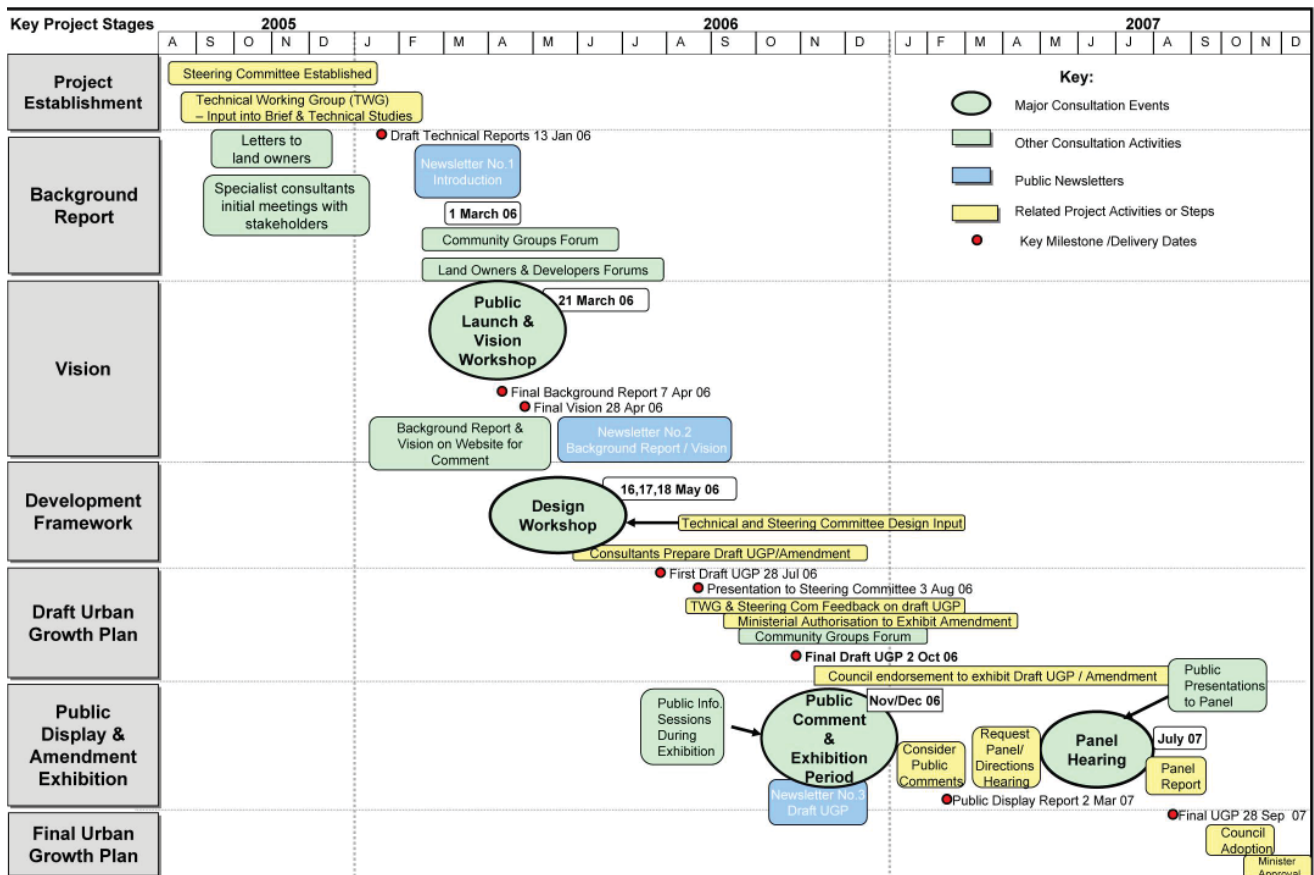
Men often oppose a thing merely because they have had no agency in planning it, or because it may have been planned by those whom they dislike. Alexander Hamilton

The development of this plan has been undertaken in close consultation with a wide group of technical stakeholders, including the City of Greater Geelong, Surf Coast Shire, Golden Plains Shire, G21, the Department of Sustainability and Environment, the Department of Infrastructure, the Department of Education and Training, VicRoads, Barwon Health, Barwon Water, Corangamite Catchment Management Authority, Country Fire Authority, Power Australia, SPI Powernet, Telstra and TXU Tenix. These stakeholders have participated in a series of meetings spanning the period of the study, and a design workshop at which the essence of the plan was developed.

In addition, consultation has occurred with community groups, local landowners and interested developers through meetings and their involvement in a workshop to develop the vision for the Armstrong Creek growth area.

Figure 1.4 illustrates the public consultation framework.

FIGURE 1.4 PUBLIC CONSULTATION FRAMEWORK



1.5 THE STRUCTURE OF THIS REPORT

Section 2 of this report sets out the **Vision** for the Armstrong Creek growth area.

Section 3 contains the proposed **Framework Plan** for the Armstrong Creek growth area.

Section 4 outlines the **Planning and Design Principles** that underpin the plan. It also includes a series of “**Key Concepts**” central to its success.

Section 5 proposes policies for the **Non-Urban Areas**, outside the Urban Growth Boundary.

Section 6 describes the outcomes sought for the **Areas Surrounding** the growth area.

Section 7 defines the **Precinct Plans** comprising the growth area.

The following recommendations are provided in separate volumes:

- the outcomes sought for each **precinct** within the growth area—**Volume 2**.
- the measures recommended to **implement** the UGP—**Volume 3**.
- an analysis of the opportunities and challenges presented by the existing conditions—**Volume 4**.

Volume 5 provides more detail on a range of matters, including:

- an **evaluation** of the UGP against a framework of sustainability criteria,;
- a **visual impact analysis** undertaken in relation to the ridgeline bounding the area to the south;
- management recommendations for Aboriginal and post-contact (European) **cultural heritage**;
- an evaluation of the proposed provision of **community facilities** against accepted benchmarks; and
- more detail on **remnant native vegetation, water sensitive urban design treatment methods and innovative transport facilities**.

Further detail of the existing conditions is contained in a separate series of Technical Reports.

2 VISION

To accomplish great things, we must not only act but also dream. Not only plan but also believe. Anatole France

There are in reality not only, as is so constantly assumed, two alternatives—town life and country life—but a third alternative, in which all the advantages of the most energetic and active town life, with all the beauty and delight of the country, may be secured in perfect combination ... The town and country may, therefore, be regarded as two magnets, each striving to draw the people to itself—a rivalry which a new form of life, partaking of the nature of both, comes to take part in ...

... Human society and the beauty of nature are meant to be enjoyed together. The two magnets must be made one. Ebenezer Howard, Garden Cities of Tomorrow, 1902

2.1 INTRODUCTION

This statement presents the City of Greater Geelong's view of how the Armstrong Creek growth area should be developed. It was put together through an inclusive process involving local residents, landowners and interest groups, experts from various fields of urban development, the G21 organisation, Council and the state government.

The vision guided the preparation of the UGP. It looks well into the future, reflecting the long timescale over which the development of the area will occur. This means that it is necessarily broad in its outlook, in order to accommodate the changes in lifestyle preferences and development demands that will undoubtedly occur over its lifetime.

2.2 OVERALL VISION STATEMENT

The Armstrong Creek urban growth area will be developed into a sustainable community that sets new benchmarks in best practice urban development. Natural and cultural features will be protected and enhanced to create a distinct urban character. Armstrong Creek will become a highly sought-after location for living, working and recreation, forming an attractive addition to Geelong.

2.3 IDENTITY AND CHARACTER

Armstrong Creek's separation from the rest of Geelong by the railway line and Barwon River will enable the development of its own distinct identity. However, it will be well-connected to the adjoining suburbs of Waurin Ponds, Grovedale and Marshall, ensuring ready access to existing facilities for early residents.

The new development will build on its rural setting to provide a distinctive 'green' character for the new community. In particular, natural features such as Mt Duneed, Barwon River and Armstrong Creek itself will provide focal points for the new development. The green skyline provided by Mt Duneed will be retained to contribute to an attractive entrance to Geelong from the south and southwest. Heritage and cultural features such as significant indigenous heritage sites, farm homesteads and the former sewer aqueduct will also form the basis of new attractions for the Armstrong Creek community and visitors. In particular, known places of cultural and historical significance to the Wathaurong people will be preserved, and provision made for the management of Indigenous archaeological sites that may be located in the course of any future development.

Armstrong Creek will also become known as a leading example of best practice in sustainable urban development. This will set it apart from other parts of Geelong and the wider region, attracting residents, businesses and visitors who place a premium on ecologically, socially and economically responsible lifestyles.

2.4 NATURAL ENVIRONMENT

The development of Armstrong Creek will meet the highest environmental standards. The Barwon River and Armstrong Creek corridors and their floodplains will be protected from development and revegetated where necessary to strengthen their habitat value. Stormwater management infrastructure will be designed and implemented in such a manner that respects the environmental values of Armstrong Creek and its tributaries. Other ecologically-significant stands of remnant vegetation will also be protected within new conservation reserves and parkland. Roads with significant vegetation will be protected and revegetated as part of a wider network of linkages providing both wildlife corridors and recreation routes for walking and cycling. Together, these areas will create an attractive and distinctive setting for development. 'Urban forests' created by revegetated areas will absorb the inevitable carbon-based emissions from buildings and vehicles in Armstrong Creek.

2.5 COMMUNITY

Armstrong Creek will offer a wide range of living and lifestyle options to meet the needs of a full cross-section of the community. These will range from detached houses on family-sized blocks to apartments close to major shops and services, and include accommodation for the retired, aged, mobility-impaired and, potentially, Deakin University students. Higher-density housing, such as townhouses, will be clustered in areas close to public transport nodes and activity centres, maintaining the more traditional character of other residential areas. Affordable and social housing will be dotted through the development to integrate it within the community.

The scale of the new development will enable the provision of a comprehensive range of community facilities and services such as schools, a library, medical centres and meeting spaces. These will reflect leading edge thinking in terms of efficient and convenient service delivery. Community facilities and services to serve the new community will be provided early in the life of the development to ensure convenient access for new residents. Community groups will be established to encourage a sense of community and provide input into future decisions about its development.

Armstrong Creek will be a learning community. It will foster 'lifelong learning' through not only a comprehensive matrix of education facilities but also the social institutions and organisations that support an inquiring and creative lifestyle. This culture of learning will create a climate that is conducive to the establishment of new enterprise, harnessing people's imagination and talent to cultivate a durable, 'home grown' economy.

2.6 ECONOMY

Central Geelong and established industrial areas outside Armstrong Creek—such as North Geelong, Moolap, Breakwater and St Albans Park—will provide employment for some Armstrong Creek residents. However, local jobs will also be provided within Armstrong Creek to avoid the creation of a commuter suburb. A significant proportion of these jobs will be generated by the needs of the local community—such as retail and services located in traditional centres and light industry in separate estates. However, Armstrong Creek will also offer opportunities for businesses responding to broader needs such as warehousing and viticulture. Leading-edge communications infrastructure will be provided to help attract high-technology businesses and assist people in working from home. Opportunities for businesses to utilise research undertaken at Deakin University will be explored, and a range of appropriate workspace and support services will be provided for people wishing to start their own business in the area.

Initially, Waurin Ponds Shopping Centre will provide the main 'higher order' shopping centre for Armstrong Creek. However, as the community grows, new activity centres containing a broad range of shops and services will be developed to serve it, including another Major Activity Centre. These will be focused on leafy, pedestrian-friendly 'mainstreets' that provide an 'experience' in themselves. Footpaths will be broad, enabling outdoor dining, trees and places to rest, and verandahs will provide shelter and shade.

2.7 OPEN SPACE AND RECREATION

Armstrong Creek will be a healthy, active community. A comprehensive network of open space and recreation facilities will be provided within easy reach of all homes and workplaces. This will range from active sports facilities to informal parks for quiet contemplation.

Playing fields will be provided in each neighbourhood and in larger, regional-scale facilities. A range of indoor recreation facilities will also be provided. Local parks and children's playgrounds will be distributed within a short walk of every home. Opportunities will also be provided to 'escape' from the urban environment and enjoy nature—particularly the stands of remnant native vegetation and revegetated river and creek corridors.

Linking all of these open space and recreation facilities together will be a web of leisure trails and more direct walking and cycling paths, contributing to the formation of a healthy community.

2.8 TRANSPORT

The potential will be explored for improvements to Marshall Station and for new, high-quality public transport services to serve the Armstrong Creek community. Public transport services will be provided from the outset. Development will be organised to ensure that all homes are within a short walk of public transport, reducing reliance on private cars.

Torquay Road, Barwon Heads Road and a future link to the Geelong Ring Road will be developed as urban boulevards, continuing to provide good access into and out of the Armstrong Creek area without severing the communities on either side. Additional main roads will be developed to provide good vehicle access throughout the growth area.

The streets will be designed to provide a comprehensive network of safe, direct and attractive cycle paths and footpaths for commuter and recreational purposes. This, in combination with the provision of daily needs close to all homes, will enable people to walk or cycle to local destinations such as neighbourhood shops, public transport, workplaces, primary schools and parks, supporting healthy lifestyles and avoiding social isolation.

2.9 UTILITY SERVICES

The latest technology will be employed to ensure that the utility services at Armstrong Creek are as up-to-date and environmentally friendly as possible. This will include measures to minimise potable water use—such as rainwater tanks and water recycling—and to minimise the impact of stormwater runoff on the natural watercourses.

State-of-the-art recycling services will be provided and provision will be made for leading-edge telecommunications technology. Utilities will be placed below ground wherever possible, to avoid visual intrusion.

2.10 BUILDINGS

New standards will be established to ensure that buildings are as environmentally friendly and healthy as possible. This will include measures to minimise energy and water use. The siting of buildings will maximise solar access and provide for the efficient use of land.

Design guidelines will also ensure the creation of a coherent character within each neighbourhood, while maintaining scope for personalisation.

3 FRAMEWORK PLAN

3.1 KEY STRUCTURING ELEMENTS

Make not little plans; they have no magic to stir men's blood and probably themselves will not be realized. Make big plans; aim high in hope and work, remembering that a noble, logical diagram once recorded will never die, but long after we are gone will be a living thing, asserting itself with every-growing insistency. Daniel Burnham, architect

The Framework Plan illustrated in Figure 3.1 sets out the key structuring elements of the UGP. It should be noted that the infrastructure alignments and boundaries between urban land uses are indicative only, and subject to refinement at the Precinct Structure Planning stage.

The table below outlines the key elements of the plan and provides references to the sections of this report where they are discussed in more detail:

ELEMENT	NOTES	SECTION REF
Urban Growth Boundary	Boundary between urban and non-urban land	5.0
Rail Line & Station	Existing Geelong-Warrnambool railway line Upgraded Marshall Station amenities	4.8.3
Sub-Regional Transit Route	High-quality public transport link to Major Activity Centre and, potentially, beyond to Torquay	4.8.5
Possible Future Public Transport Interchange	Possible future public transport interchange providing access to high-quality longer-distance public transport services	4.8.4-4.8.5
Local Transit Services	Local public transport services integrated with road network	4.8.6
Recreational Trail	Walking and cycling leisure routes through major parks	4.7.2
Pedestrian Bridges	New footbridges linking existing and new communities	4.8.8
Geelong Ring Road	New freeway-standard road around Geelong's western outskirts linking the Princes Freeway in Corio to the Princes Highway in Waurn Ponds	4.8.10
Arterial Roads	New and existing main roads	4.8.10
Connector Streets	New trunk collector roads	4.8.9
Watercourses	New and existing watercourses	4.2
Major Activity Centre	Activity centre containing full range of convenience and comparison retail, together with wide range of community facilities and services, entertainment and employment opportunities, and shoptop apartments	4.6.5

Table continued...

ELEMENT	NOTES	SECTION REF
Neighbourhood Activity Centres	Activity centres anchored by single supermarket and containing complementary convenience retailing, business services and community services—including ‘family hub’, primary school and associated local sporting facilities—and shoptop apartments	4.6.6-4.6.7
Local Centres	Activity centres with range of convenience shops and services, ‘family hub’, primary school and associated local sporting facilities	4.6.8
Local Shops	Activity centres with range of convenience shops and services	
Secondary Schools	Secondary schools with associated indoor sports stadium and active sports ground	4.6.6 & 4.6.8
Employment Land	Industrial land providing for manufacturing, logistics, service industry and other employment purposes	4.4.4
Mixed Use Corridor	Mixed commercial—particularly bulky goods and offices—and high-density residential development	4.6.5
Medium-High Density Housing	Residential development of minimum 20-30 dwellings per hectare (gross residential density), incorporating corner stores associated with small local parks within 400m of all homes	4.5.3-4.5.4
Conventional Density Housing	Residential development of minimum 14 dwellings per hectare (gross residential density), incorporating corner stores associated with small local parks within 400m of all homes	4.5.3-4.5.4
Local/ Active Parkland	Playing fields and local parks	4.7.3
Biodiversity Corridor/ Passive Parkland	Informal parks and wildlife corridors	4.7.3
Rural Land	Land to remain non-urban	5.0

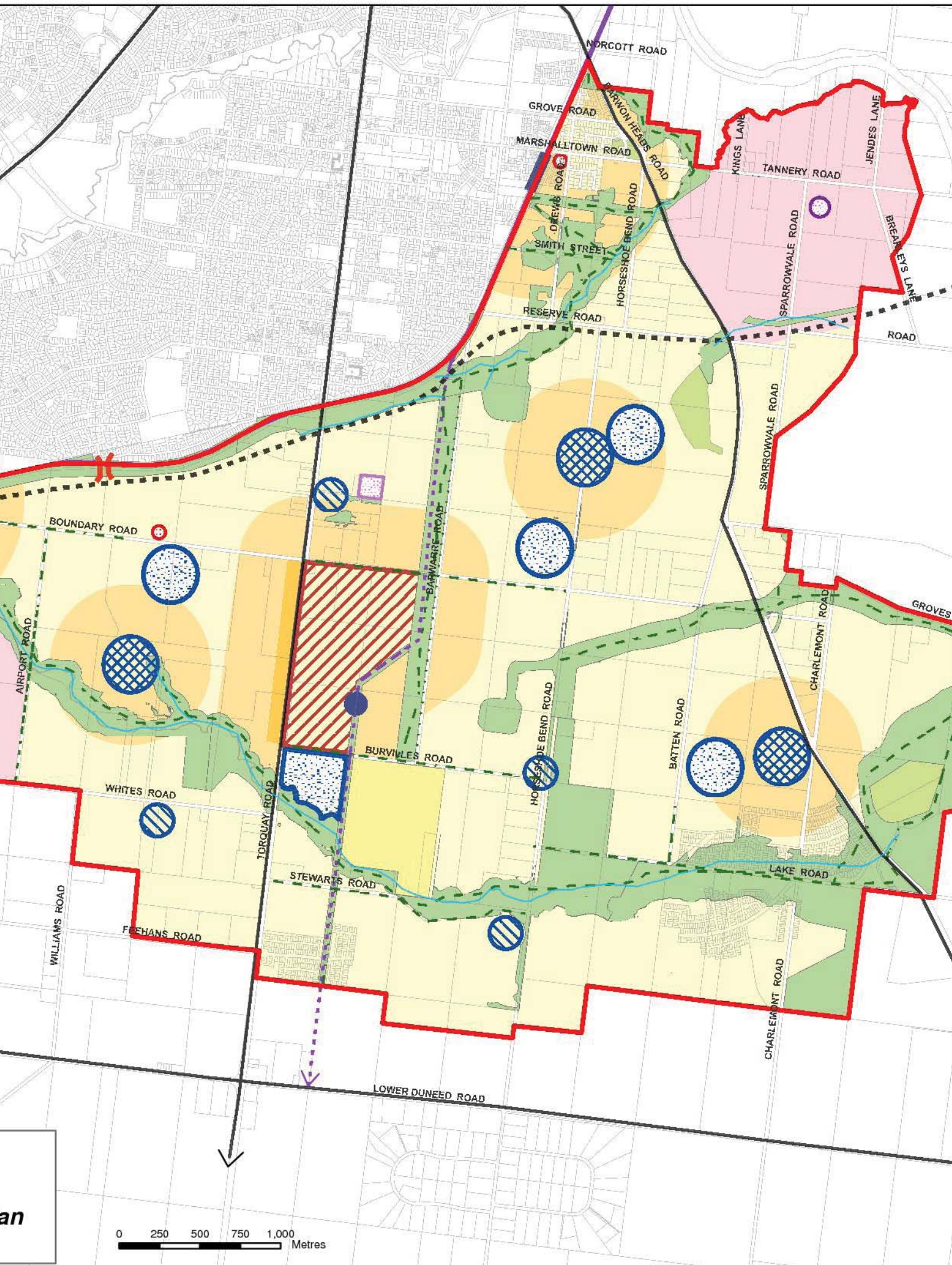
3.2 LAND USE BUDGET

The following table summarises the land areas allocated to different uses within the Urban Growth Boundary.

Table 3.1 Total land use budget within Urban Growth Boundary (indicative figures only)

ELEMENT	NOTES
Activity centres (incl. primary schools & local sporting facilities)	104.7
Secondary schools	39.9
Employment land	298.5
Mixed use corridor	20.0
Medium density housing	337.5
Conventional density housing	1,154.5
Regional sports facilities	39
Biodiversity corridor/ passive parkland	531.8
Cemetery	41.4
East-west link road reserve	40

Note: Areas are 'gross', including associated roads and local open space.



4 PLANNING AND DESIGN PRINCIPLES

4.1 NATURAL ENVIRONMENT

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Flora and Fauna Technical Report, February 2006.

4.1.1 VISION

The vision states that:

Natural and cultural features will be protected and enhanced to create a distinct urban character.

The new development will build on its rural setting to provide a distinctive 'green' character for the new community. In particular, natural features such as Mt Duneed, Barwon River and Armstrong Creek itself will provide focal points for the new development. The green skyline provided by Mt Duneed will be retained to contribute to an attractive entrance to Geelong from the south and southwest.

The development of Armstrong Creek will meet the highest environmental standards. The Barwon River and Armstrong Creek corridors and their floodplains will be protected from development and revegetated where necessary to strengthen their habitat value. Stormwater management infrastructure will be designed and implemented in such a manner that respects the environmental values of Armstrong Creek and its tributaries. Other ecologically-significant stands of remnant vegetation will also be protected within new conservation reserves and parkland. Roads with significant vegetation will be protected and revegetated as part of a wider network of linkages providing both wildlife corridors and recreation routes for walking and cycling. Together, these areas will create an attractive and distinctive setting for development. 'Urban forests' created by revegetated areas will absorb the inevitable carbon-based emissions from buildings and vehicles in Armstrong Creek.

4.1.2 KEY ISSUES

A number of areas within the growth area have been identified for protection from development due to ecological values. These coincide significantly with those areas within the 1:100 year flood extent. The floodplains of the Barwon River and Armstrong Creek harbour most of the River Red Gum dominated grassy woodland in the study area. Small pockets of the nationally rare and threatened Bellarine Yellow-gum woodland with grass and sedge understorey occur on the plains north of Armstrong Creek. Riparian buffer distances reflect the many benefits riverbank vegetation has on water quality, bank stability, salinity, aquatic habitat, and terrestrial and aquatic biodiversity. Clearing within the riparian buffer distance around certain wetlands or in or within 20m of a prescribed stream generally is not considered best practice because it is deemed to cause negative impacts on water quality.

Roadsides throughout the area retain important remnants of grassy woodland dominated by Drooping Sheoak, Bellarine Yellow-gum, River Red Gum and other native trees. All roadside native vegetation is considered to be of at least regional significance, and therefore to be retained and enhanced. Most are covered by existing Vegetation Protection Overlays (VPOs).

Excluding development from these areas allows the most significant ecological values of the study area, for flora and fauna, to be identified, reserved for management and protection, and in several cases for use as multiple-use parkland and greenways.

Several of the native vegetation remnants are of the rarest and most threatened kind (Bellarine Yellow-gum woodland on Drews Road and Barwarre Road; River Red Gum woodland on Baenchs Lane), and are sensitive to disturbance—these will be set aside for management for conservation with controlled public access. Most other remnants are either somewhat degraded or linear in nature, or both; these areas are amenable to multiple uses and less controlled public access.

Iconic species and communities of the growth area

The following species of flora and fauna are representative of the surviving indigenous biodiversity of the Armstrong Creek study area. Many are paramount in supporting the 'area character', and are ideal candidates for inclusion in conservation and re-establishment programs.

- Bellarine & Melbourne Yellow-gum – Endangered tree species confined to Otway Plain (OtP) Bioregion sections of the study area; high value remnants at Drews Road, Barwarre Road and the corner of Horseshoe Bend Road and Lake Road; good horticultural potential as ornamental planting species throughout the OtP sections of the study area
- River Red Gum – many old growth specimens across the Victorian Volcanic Plain (VVP) Bioregion sections of the study area, including the Armstrong Creek floodplain; good horticultural potential as ornamental planting species throughout the VVP sections of the study area
- Drooping Sheoak – as for above species, but occurs on both OtP and VVP substrates
- Blackthorn, Cherry Ballart, Blackwood, Harlequin Mistletoe, Studley Park Gum, Swamp Gum - ditto
- Native grassland plants – grasses, lilies, etc. – Kangaroo Grass, Common Tussock-grass, Wallaby-grasses, Swamp Wallaby-grasses, Wheat Grass, Spear-grasses, Chocolate Lily, Black-anther Flax-lily, Yellow Rush-lily, Milkmaids, Mat-rushes
- Native daisies – Milky Beauty-heads, Scaly Buttons, Common Everlasting, Fireweeds
- Plains Grassy Woodland
- Riparian Woodland
- Wetland – Reeds and Cumbungi, Sedges and Rushes, Tangled Lignum
- Waterbirds – herons, egrets, ibis, ducks, swans, waders, etc.
- Woodland birds – honeyeaters, Willie Wagtail, Australian Magpie, Grey Butcherbird, parrots (cockatoos, rosellas, lorikeets, etc.)
- Growling Grass Frog, other frogs, Glossy Grass Skink
- Water-rat, Echidna and Swamp Wallaby

Remnant vegetation conservation value

- The remnant native vegetation has been categorised according to its conservation value, as follows:
- Very high conservation significance, highest level of constraint, irreplaceable values
- High conservation significance, but amenable to passive recreation use in part or whole
- Moderate – high conservation significance, but degraded to some extent and amenable to passive recreation; some could be offset if lost
- Low – moderate conservation significance, can be offset if lost

Levels 1 – 3 are also the logical offset sites required if/when level 3/4 remnants are lost.

The hierarchy of roadside vegetation conservation significance follows the same categories above, except that no roadside vegetation is considered expendable, and therefore none has been designated level 4.

FIGURE 4.1.1 REMNANT NATIVE VEGETATION OF VERY HIGH CONSERVATION SIGNIFICANCE



River Red Gum grassy woodland, Baensch's Lane, Connewarre



Bellarine Yellow-gum grassy woodland, Drews Road, Marshall



Sedge-rich Bellarine Yellow-gum woodland, Barwarre Road



Armstrong Creek on east side of Airport Road

KEY CONCEPT: A GREEN SETTING

The vision for Armstrong Creek sees its natural setting creating a distinctive 'green' character for the new development. In particular, it envisages the retention of the green skyline provided by Mt Duneed and the use of the Barwon River and Armstrong Creek as focal points for the new development.

The UGP capitalises on the ridgeline bounding the area to the south and the Barwon River floodplain to provide a 'green belt' around the southern and eastern edges of the new development. This will have a number of benefits, including:

- Establishing a permanent and natural edge to development
- Protecting ecologically-sensitive areas
- Maintaining a green skyline to the south of the development
- Maintaining an attractive green entrance to Geelong from the south and southwest
- Providing opportunities for ecological reserves, recreation, reforestation (to capture carbon emissions) and market gardening
- Protecting the existing character of the Mt Duneed township

4.1.3 PRINCIPLES – NATURAL ENVIRONMENT

The following principles should guide the development of the Armstrong Creek growth area:

P 1.1 The 3 highest priority biodiversity areas—Bellarine Yellow-gum woodland at Drews Road and Barwarre Road, and River Red Gum woodland at Baenchs Lane—must be protected, particularly from any form of development (including roads and other infrastructure). This can be achieved by:

- applying Environmental Significance Overlay 1 (ESO1) to the areas;
- acquiring the areas and protecting the vegetation in publicly-owned conservation reserves, fully fenced to prevent pest and domestic animal invasion and illegal human activities;
- identifying the areas as sites for Net Gain offset works;
- basic reserve management (control of fire, weeds, vertebrate pests, etc.); and
- precluding public access in core areas without special arrangements with Council, with interpretation and low-impact passive uses (walking on formal trails, nature study, etc.) in fringing lower quality and revegetation areas.

P 1.2 All native roadside vegetation must be retained and enhanced (some are already covered by VPOs). This can be achieved by:

- applying the Vegetation Protection Overlay (VPO) to native roadside vegetation not currently covered by VPO, and Environmental Significance Overlay (ESO) to higher value patches;
- minimising the impact of development (including road widenings and other infrastructure);
- avoiding additional road crossings through roadside vegetation of high conservation significance; and
- revegetation.

P 1.3 The habitat values alongside Armstrong Creek and its tributaries must be protected. This can be achieved by:

- ensuring the extent of public open space along Armstrong Creek and its tributaries aligns with the 1-in-100 year flood event extent and
- avoiding clearing within the riparian buffer distance around certain wetlands or in or within 35m of either side of Armstrong Creek.

P 1.4 Linkages between vegetated areas (particularly along the creek) should be created or strengthened through strategic revegetation.

P 1.5 Revegetation should use the key iconic local native tree species (ie. River Red Gum, Bellarine Yellow-gum, Swamp Gum, Drooping Sheoak, Blackwood, Blackthorn, Cherry Ballart, etc.).

- P 1.6** Water quality and aquatic biodiversity within Armstrong Creek must be protected and enhanced. This can be achieved by:
- protecting stormwater flows and quality;
 - rehabilitating the riparian zone and restricting public access/ use (passive only); and
 - maintaining a buffer to neighbouring land uses of 35m in each direction from the stream banks.

P 1.7 At least one major, high value, conservation park should be established at a regional scale. This can be achieved by:

- consolidating one of the largest blocks of remnant native vegetation at the eastern end of Armstrong Creek around existing Stewarts Road Reserve, taking in Hooper's Paddock, adjacent south and west of Horseshoe Bend Road, Armstrong Creek between Torquay Road and Batten Road, and the Geelong Crematorium/ Cemetery; and
- designating core ecological areas, revegetation areas, and public access areas, with differing degrees of access and approved uses: the creek and Hoopers Paddock are not suitable for playing fields but could have bicycle paths, picnic tables and so on; other areas may have scope for playing fields.

P 1.8 The impact of roads on environmental corridors should be minimised. This can be achieved by:

- limiting additional road crossings of Armstrong Creek's tributaries and other vegetation linkages;
- ensuring road crossings of watercourses are on raised decks (rather than causeways), with no piles in the channel; and
- ensuring road crossings of environmental corridors are of minimal width and, where they are four or more lanes wide, divided into separate carriageways.

P 1.9 A non-urban 'green belt' should be established around the southern and eastern edges of the defined Urban Growth Boundary.

4.2 FLOODING AND DRAINAGE

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Flooding and Drainage Study Technical Report, February 2006.

4.2.1 VISION

The vision states that:

The Armstrong Creek urban growth area will be developed into a sustainable community that sets new benchmarks in best practice urban development.

The latest technology will be employed to ensure that the utility services at Armstrong Creek are as up-to-date and environmentally friendly as possible. This will include measures to minimise potable water use—such as rainwater tanks and water recycling—and to minimise the impact of stormwater runoff on the natural watercourses.

Stormwater management infrastructure will be designed and implemented in such a manner that respects the environmental values of Armstrong Creek and its tributaries.

4.2.2 KEY ISSUES

The growth area consists mainly of rural land. The associated drainage is via a number of drainage depressions and larger watercourses. Formal stormwater drainage infrastructure in the area is limited to a small area of urban development.

Changes will occur to stormwater runoff quality and quantity characteristics due to the planned urban development within the Armstrong Creek growth area. An excess of stormwater runoff is typically created in the urban environment due to the abundance of impervious surfaces such as roads, concrete and house roofs. Often, the runoff water quality is poorer due to pollutants, trace metals and nutrients associated with sediments.

Flooding and drainage management in the Armstrong Creek urban growth area will aim to achieve the following best practice objectives, as outlined in Urban Stormwater – Best Practice Environmental Management Guidelines (CSIRO 1999)¹:

- impact minimisation: minimise waterway disturbance caused by the alternation of flow regimes;
- natural drainage system protection: protect channel form and aquatic ecosystems from flow related impacts; and
- integrated stormwater management: adopt an integrated approach to stormwater system management that meets both hydraulic capacity and waterway projection objectives.

¹ Urban Stormwater: best practice environmental management guidelines, CSIRO, 1999. Other references include WSUD Engineering Procedures: Stormwater, CSIRO Publishing, 2005; Urban Stormwater: Best Practice Environmental Management Guidelines, CSIRO Publishing, 1999; and City of Greater Geelong Stormwater Management Plan, 2002.

4.2.3 PRINCIPLES – FLOODING AND DRAINAGE

The following principles should guide the development of the Armstrong Creek growth area:

- P 2.1** Natural channels and floodplains should be maintained.
- P 2.2** Direct connections between impervious areas and the underground stormwater system should be minimised.
- P 2.3** The extent of paving should be minimised through such means as porous pavements, shorter driveways and small road widths.
- P 2.4** The use of grass swales should be considered.
- P 2.5** Roadways and parking areas should be designed to incorporate detention areas and vegetation.
- P 2.6** Infiltration/ detention basins should be integrated and co-located with public open space.
- P 2.7** Small flood storages should be provided to limit peak flows for the lot/ block scale.
- P 2.8** Household rainfall tanks should be employed to supplement flood storage.

Measures to achieve the above principles fall into three categories: flood-related development controls, lot and street scale measures, and local area measures. The lot and street scale measures aim to provide mitigation at a small scale and are distributed across a drainage catchment. The local area scale measures provide mitigation at the drainage sub-catchments scale and are located at inflow points to larger waterways.

4.2.4 FLOOD-RELATED DEVELOPMENT CONTROLS

A set of draft development guidelines applicable to the draft FO and LSIO has been prepared. These are outlined in Table 4.2 overleaf.

It should be noted that the current Greater Geelong Planning Scheme (Floodway Overlay Clause 44.03) contains development requirements only for subdivision. No other specific development requirements are provided in the current planning scheme.

It is suggested that CoGG and CCMA consider the preparation of specific development requirements for the FO and LSIO informed by the land identified as impacted by flooding or inundation in Figure 4.2.1 and other relevant technical reports. It is believed that such development requirements will provide a clearer understanding for CoGG, CCMA and applicants.

TABLE 4.2 FLOOD RELATED DEVELOPMENT CONSTRAINTS

ACTIVITIES	DEVELOPMENT CONSTRAINTS/REQUIREMENTS		SOURCE
Subdivision	<p>No new lots to be created entirely within FO.</p> <p>Any lot affected by the FO must have a building envelope to Council's satisfaction.</p>	<p>No specific requirement.</p>	<p>Greater Geelong Planning Scheme (Clause 44.03)</p>
Dwelling	<p>Floor level at least 300 mm freeboard above 100 year flood level.</p> <p>The location, floor level and design of any new building or extension should consider adequate drainage for the site and any adverse hydraulic effects on neighbouring properties.</p>	<p>Floor level at least 300 mm freeboard above 100 year flood level.</p> <p>The location, floor level and design of any new building or extension should consider adequate drainage for the site and any adverse hydraulic effects on neighbouring properties.</p>	<p>Building regulations (2006)</p> <p>Planning Practice Notes (DOI 2000 a& b)</p>
Commercial buildings	<p>Floor level at least 300 mm freeboard above 100 year flood level.</p> <p>The location, floor level and design of any new building or extension should consider adequate drainage for the site and any adverse hydraulic effects on neighbouring properties. Where possible, the building should be aligned to minimise the obstruction to flood flows.</p>	<p>Floor level at least 300 mm freeboard above 100 year flood level.</p> <p>The location, floor level and design of any new building or extension should consider adequate drainage for the site and any adverse hydraulic effects on neighbouring properties. Where possible, the building should be aligned to minimise the obstruction to flood flows.</p>	<p>Building regulations (2006)</p> <p>Planning Practice Notes (DOI 2000 a& b)</p> <p>Practice Note 12 (revised November 2012) - applying the flood provisions in planning schemes</p>

DOI (2000 b) notes that the 300 mm freeboard requirement is a minimal standard and that higher freeboard (> 300 mm) may be applied. It is considered that the relatively unconfined nature of flooding in the study area enables large increases in flows to occur without significant increases in flood levels. As such, it is considered that the 300 mm freeboard requirement is sufficient.

KEY CONCEPT: WATER SENSITIVE URBAN DESIGN

The term Water Sensitive Urban Design (WSUD) was originally coined to describe a new Australian approach to urban planning and design and was first referred to in various publications in the early 1990s. The underlying aim of this shift is the need to provide more economical and environmentally appropriate ways of providing water, wastewater and stormwater solutions.

In its broadest context, WSUD encompasses all aspects of integrated urban water cycle management, including water supply, sewerage and stormwater management with urban planning and design. As such, it represents a significant shift in the way water and related environmental resources and water infrastructure are considered in the planning and design of urban areas.

This new approach is based upon the premise that the processes of urban development and redevelopment need to address adequately the sustainability of the water environment. It has become increasingly recognised as what were once easily available water resources have become limited and the capacity of our receiving environments to accept more waste has been utilised or assimilated.

A WSUD approach adopts a planning and design philosophy that aims to integrate the following opportunities into the built form of urban areas:

- Detention of stormwater, rather than rapid conveyance;
- Utilisation of stormwater to conserve potable water;
- Use of vegetation for filtering purposes;
- Water-efficient landscaping;
- Protection of water-related environmental, recreational and cultural values; and
- Localised water harvesting for various uses and localised wastewater treatment systems.

WSUD has emerged as a practical planning and design approach that seeks to bring a single management framework to the issues that traditionally have been considered in isolation. To achieve WSUD, new urban development should include a stormwater management system which ensures that the peak discharge rate, volume and pollutant load of stormwater leaving a site after a development is no greater than pre-development. The most innovative WSUD approaches also incorporate the design of localised water storage, treatment and reuse technologies. The WSUD approach aims to integrate urban design and stormwater and associated water supply/ treatment technologies into an economic, aesthetic and sustainable framework.

4.2.5 LOT AND STREET SCALE MEASURES

Various measures can be implemented to improve stormwater quality at a lot and street scale to minimise the need for 'end of pipe'/ local area drainage catchment measures. These 'Water Sensitive Urban Design' (WSUD) measures integrate urban planning with the management of stormwater. Benefits of following WSUD principles include the reduction of pollutants, flood retardation and enhancement of the urban landscape.

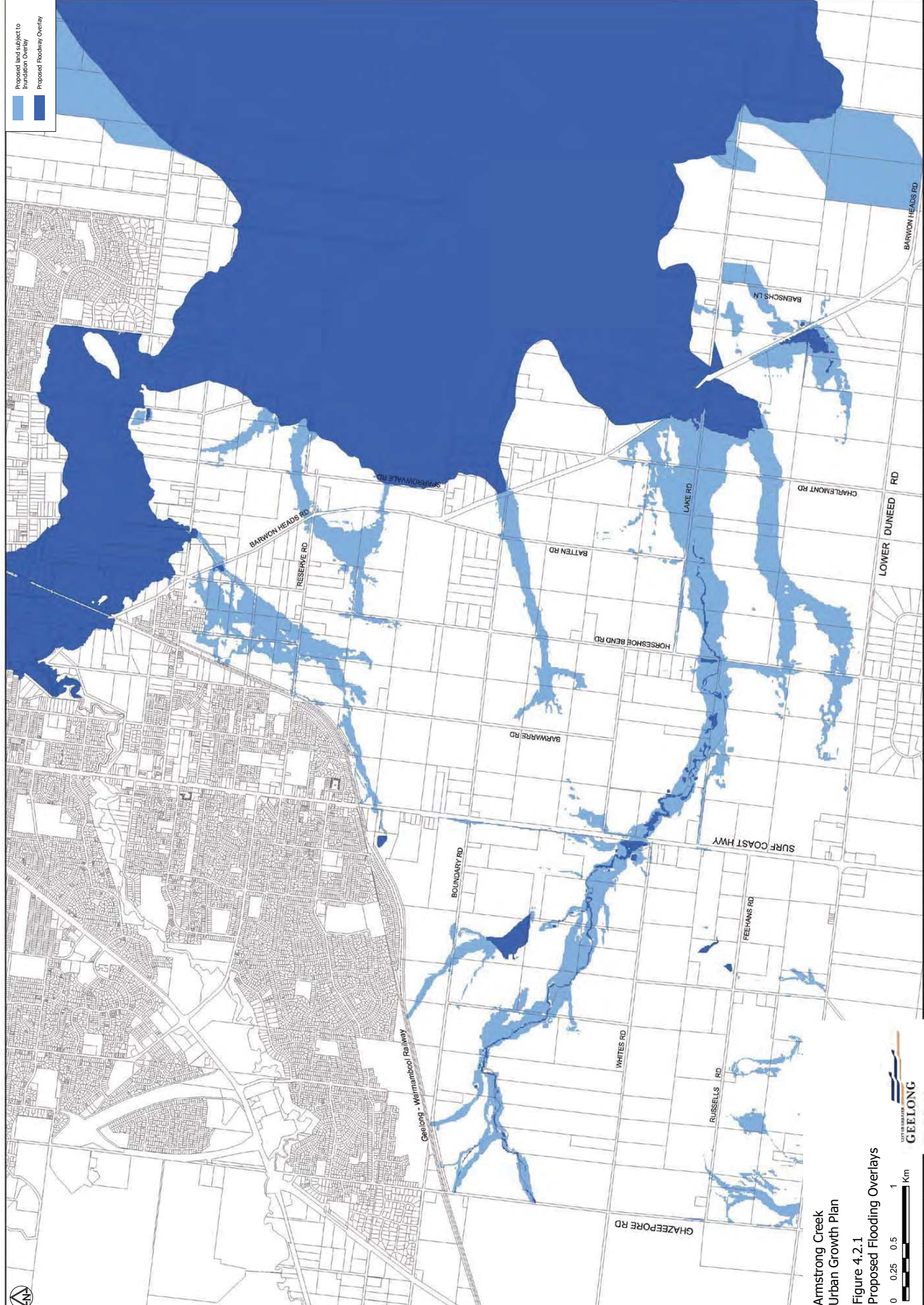
Various WSUD stormwater treatment methods include:

- Gross Pollutant Traps
- Buffer Strips
- Swales
- Bioretention Systems
- Porous Pavements

The basic premise behind these systems is to remove the direct connection between the impervious areas and the stormwater system by minimising the reliance on pipe and drain networks. Water quality improvements are observed due to the natural filtration of the water through vegetation.

The general application of WSUD measures is outlined in Appendix D in Volume 5. Pollutant removal targets will need to be determined based on the ability of the receiving waters to cope with inputs, rather than using standard removal targets.

Water conservation measures—such as rainwater tanks—are also applicable at the lot and street scale.



Armstrong Creek
Urban Growth Plan

Figure 4.2.1
Proposed Flooding Overlays



Proposed land subject to
Inundation Overlay
Proposed Floodway Overlay



4.3 HERITAGE

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Indigenous Cultural Heritage and Cultural Heritage – European Technical Reports, February 2006.

4.3.1 VISION

The vision states that:

Natural and cultural features will be protected and enhanced to create a distinct urban character.

Heritage and cultural features such as significant indigenous heritage sites, farm homesteads and the former sewer aqueduct will also form the basis of new attractions for the Armstrong Creek community and visitors. In particular, known places of cultural and historical significance to the Wathaurong people will be preserved, and provision made for the management of Indigenous archaeological sites that may be located in the course of any future development.

4.3.2 KEY ISSUES—INDIGENOUS CULTURAL HERITAGE

This section outlines the key issues and principles associated with the management of the indigenous cultural heritage in the Armstrong Creek growth area. Further detailed information is included in Appendix E in Volume 5, which sets out a proposed archaeological management plan for the Armstrong Creek growth area.

The Indigenous Cultural Heritage Technical Report identifies several known and potential Aboriginal heritage issues within the urban growth study area. In summary, these are:

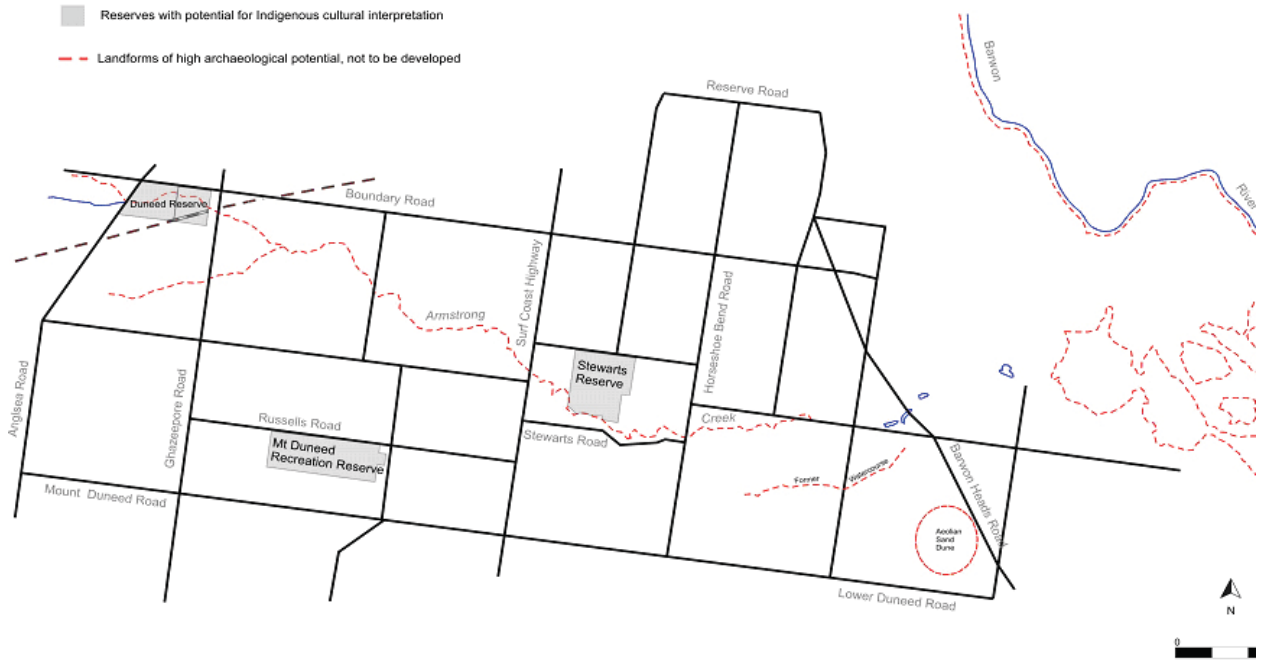
- The existence of two registered Aboriginal Historic places, the former Duneed Reserve (AAV 7.1-6) and area around the alluvial flats of the Barwon River (AAV 12.9-17). The former Duneed Reserve was the last known place where groups from traditional Wathaurong Clans lived together between 1862 and 1885. It was also a traditional Wathaurong campsite and contains archaeological sites. The former Duneed Reserve is immediately east of and outside the growth area, but is linked to sites and places within the growth area.

- The identification of two new Aboriginal historic places, the Mount Duneed Recreation Reserve, where Wathaurong people lived in huts, prior to 1861, and Stewart's Reserve, a Wathaurong campsite in the 1850's. Archaeological sites occur in both reserves. There is some possibility that Wathaurong people who died at the Mount Duneed Reserve were buried in the adjoining cemetery.
- The identification of 6 previously recorded Aboriginal archaeological sites and 17 new archaeological sites, which were recorded in the current survey. Archaeological sites consisted of surface scatters of stone artefacts and scarred trees. The majority of these sites were located within 200 metres of Armstrong Creek, but archaeological surveys have still not been carried out across most of the land within the study area.
- The identification of a traditional Wathaurong pathway/route of movement along Armstrong Creek, which linked campsites between Mount Moriac, Reedy Lake and the coast.
- Identification of areas of potential sensitivity for Aboriginal archaeological sites within the growth area (see Technical Report: 41-44).

The growth area has significant Aboriginal heritage values, including historical associations with contemporary Wathaurong descendants. Stewarts Reserve continues to be used by Aboriginal people as a cultural place, where bark has been procured from trees using traditional methods, to manufacture items of traditional technology.

Both the Wathaurong Aboriginal Co-operative and the Wathaurong Aboriginal Corporation have indicated during consultation that the former Duneed Reserve, the Mount Duneed Recreation Reserve, Stewarts Reserve and the corridor along Armstrong Creek are of extremely high cultural value to the contemporary Aboriginal communities. Figure 4.3.1 shows the indigenous cultural heritage of the area, which is described further in Appendix E in Volume 5.

FIGURE 4.3.1: LOCATION OF HISTORIC ABORIGINAL RESERVES AND LANDFORMS WHICH SHOULD NOT BE DEVELOPED



4.3.3 PRINCIPLES—INDIGENOUS CULTURAL HERITAGE

The following principles should guide the development of the Armstrong Creek growth area:

- P 3.1** The buffer of 100 metres radius around Duneed Reserve as detailed in Figure 4.3.1.
- P 3.2** Consideration should be given to developing an Aboriginal heritage management plan for the Mount Duneed Recreation Reserve. This should:
- be prepared by a qualified cultural heritage practitioner with experience in the preparation of cultural heritage management plans, in consultation with the Wathaurong Aboriginal Co-operative and the Wathaurong Aboriginal Corporation;
 - contain a more comprehensive historical and archaeological assessment of the reserve than has been possible during this assessment;
 - attempt to balance the interests of recreational users of the reserve and the local community with the conservation and interpretation of Aboriginal heritage values; and
 - consider the strategic linkages between the Mount Duneed Reserve and other Aboriginal heritage assets in the growth area.

Further detailed requirements for a management plan are included in Volume 5.

- P 3.3** The City of Greater Geelong should consult with the Wathaurong Aboriginal Co-operative and the Wathaurong Aboriginal Corporation to ascertain whether some form of cultural interpretation should be carried out within Stewarts Reserve. This should include consideration to developing a linkage between Stewarts Reserve and the Mount Duneed Recreation reserve, possibly through a walking track with appropriate signage.

- P 3.4** Any future engineering or construction works which may occur within Stewarts Reserve should be subject to an archaeological field survey and possible sub-surface testing and monitoring.

- P 3.5** There should be consultation between the City of Greater Geelong, the Wathaurong Aboriginal Co-operative and landowners who own the properties on which the aeolian sand dune is located (see Figure 4.3.1) regarding the future management and protection of the landform.

- P 3.6** Any recreation development or creek stabilisation/erosion control works which occur within the public open space preserved along Armstrong Creek should be subject to a detailed archaeological survey, as outlined below.

- P 3.7** Any recreation development or bank stabilisation/erosion control works which occur within 200 metres from the east bank of the Barwon River or near Reedy Lake should be subject to a detailed archaeological survey, as outlined below.

- P 3.8** View lines should be maintained at the following locations:

- From Armstrong Creek (preferably Stewarts Reserve) to Mount Duneed
- From Mount Duneed to the coast line, Reedy Lake/Hospital Swamp, Armstrong Creek
- From the Aeolian inland dune to Armstrong Creek (if possible)
- From Reedy Lake to Mount Duneed.

- P 3.9** An interpretation trail should be developed linking places of Aboriginal cultural significance in consultation with the Wathaurong Aboriginal Co-operative and with any other Aboriginal stakeholders.

P 3.10 An archaeological assessment should be required as part of all development applications as follows:

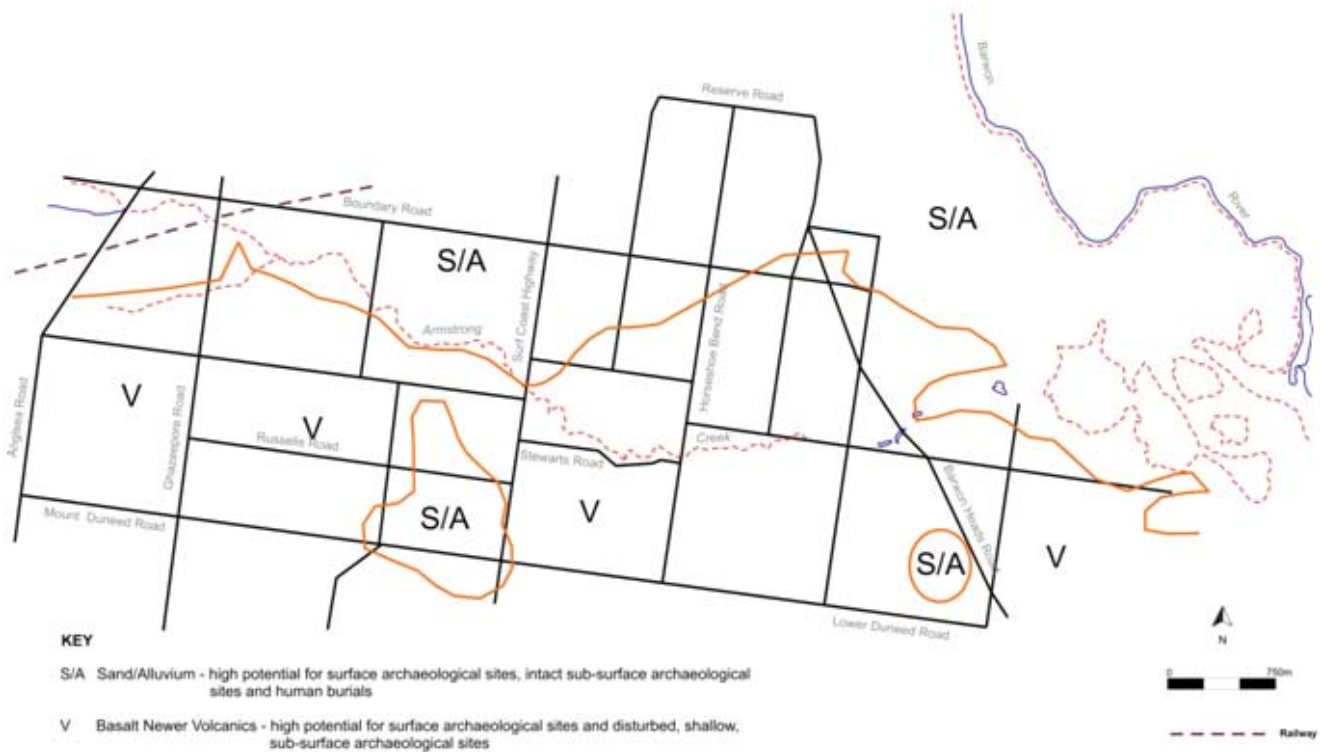
- An archaeological assessment should be carried out of any land which is subject to any future application for rezoning or subdivision within the study area.
- An archaeological assessment should be carried out on land on which services will be constructed.

(See Appendix E in Volume 5 for a full description of archaeological assessment requirements.)

P 3.11 Land should not be rezoned or permits issued for subdivision until an archaeological assessment has been completed, in accordance with the existing 'Aboriginal Cultural Heritage Management and Protection Development Protocol' and Part IIA of the Commonwealth Aboriginal and Torres Strait Islander Heritage Protection Act (1984). The Archaeological assessment should involve sub-surface testing for Aboriginal archaeological sites within the area defined in the Technical Report as an area having 'high potential for surface archaeological sites, intact sub-surface archaeological sites and human burials' (see Figure 4.3.2).

P 3.12 Developers or organisations engaged in landscaping works should be notified that an archaeological assessment is required prior to works commencing.

FIGURE 4.3.2: INDICATIVE AND SIMPLIFIED GUIDE TO POTENTIAL ARCHAEOLOGICAL SITE DISTRIBUTION WITHIN THE ARMSTRONG CREEK GROWTH AREA



4.3.3 KEY ISSUES—POST CONTACT (EUROPEAN) CULTURAL HERITAGE

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Technical Report, February 2006.

This section outlines the key issues and principles associated with the management of the post contact (European) cultural heritage in the Armstrong Creek growth area. Further detailed information is included in Appendix F in Volume 5, which sets out a proposed cultural heritage management plan for the Armstrong Creek growth area.

A total of 46 sites have been identified in the growth area as having cultural heritage significance (see Table 4.3 below). However, most of them are outside the areas designed for high density development.

Nine (9) of the 46 places already have statutory protection in the form of a Heritage Overlay pursuant to Clause 43.01 of the Greater Geelong Planning Scheme. The remaining 37 places have been researched and assessed.

The places marked in Table 4.3 with an asterisk have been assessed by a windscreen survey. They may be adequately or partly protected on the Heritage Inventory as archaeological places, and may require more research and fieldwork to determine the appropriate curtilage for Heritage Overlay protection.

One of the nine sites is also included on the Victorian Heritage Register under the Heritage Act 1995. Three further places (marked with two asterisks in Table 4.3) are considered to have state significance and are proposed to be protected by inclusion on the Victorian Heritage Register. However, as the waiting period for the process is several years, it is recommended that they be afforded Heritage Overlay protection as a first stage. This is also desirable as only parts of the sites may be registered at a State level and the remainder, especially the protection of the setting within the wider area, will need to be protected by a Heritage Overlay.

TABLE 4.3 POST CONTACT (EUROPEAN) CULTURAL HERITAGE PLACES 2006

No. on Fig 4.3.3	No.	Street	Town/ Suburb	Historic Theme	Site Name	Overall Significance	Existing HO No.
1	105	Groves Road	Conne-warre	Agricultural	Vic Cottage, Wash house, Undgrd. tank	Local	HO1716
2	421	Lower Duneed Road	Conne-warre	Agricultural	House & Ugd Tank	Local	HO1716
3	421	Lower Duneed Road	Conne-warre	Agricultural	Cottage Ruins, Tank, Horse Works	Local	HO1716
4	421	Lower Duneed Road	Conne-warre	Agricultural	Dairy	Local	HO1716
5	421	Lower Duneed Road	Conne-warre	Agricultural	Water Tank	Local	HO1716
6	421	Lower Duneed Road	Conne-warre	Agricultural	2 Infant Graves	Local	HO1716
7	375	Barwon Heads Road	Marshall	Residential	Vic Bluestone Cottage & Outbldg	Local	
8	624	Barwon Heads Road	Marshall	Residential	Vic House, outbuildings & trees-	Local	
9	10	Batten Road	Marshall	Residential	Inter war House -	Local	
10	5	Grove Road	Marshall	Residential	Vic House & Outbuilding	Local	
11**	40	Jendes Lane	Marshall	Residential	Green Banks – Victorian House	State	
12**	40	Jendes Lane	Marshall	Industrial	Australian Tannery Ruins	State	
13	1	Marshall-town Road	Marshall	Civic	Marshalltown Historic Civic Area	Local	
14	28	Marshall-town Road	Marshall	Residential	House	Local	
15**	64A	Marshall-town Road	Marshall	Industrial	Pipe Factory (former) & Pipes	State Register HV Inventory H7721/01/19	
16	42	Sparrow-vale Road	Marshall	Agricultural	House, Outbuildings & trees Victorian	Local	
17	103	Sparrow-vale Road	Marshall	Agricultural	S'vale Outblids & Trees	Local	
18	103	Sparrow-vale Road	Marshall	Agricultural	S'vale Manager's House	Local	
19	1	Tannery Road	Marshall	Agricultural	Cottage - Victorian	Local	
20	46	Tannery Road	Marshall	Agricultural	Cottage - Victorian	Local	
21	61	Tannery Road	Marshall	Agricultural	Holanthe Cottage & trees - Victorian	Local	
22	81	Tannery Road	Marshall	Residential	Barwonside	Local	
23	81	Tannery Road	Marshall	Industrial	Barwonside Tannery Ruins	Local	
24	128	Tannery Road	Marshall	Residential	Sunnyside House	Local	
25	128	Tannery Road	Marshall	Civic	Sunnyside Recreation Reserve	Local	
26	55	Woolscour Road	Marshall	Industrial	Woolscour Ruins	Local	
27	0	Barwon River	Marshall	Civic	Barwon Footbridge & Aqueduct	State	HO56

No. on Fig 4.3.3	No.	Street	Town/ Suburb	Historic Theme	Site Name	Overall Significance	Existing HO No.
28	460	Boundary Road	Mount Duneed	Agricultural	Vic House & Outbuildings	Local	
29	20	Mount Duneed Road	Mount Duneed	Agricultural	Calder Park	Local	
30	40	Mount Duneed Road	Mount Duneed	Civic	Mount Duneed Park	Local	
31	60	Mount Duneed Road	Mount Duneed	Agricultural	Bellevue Outbuildings & trees	Local	
32	170	Mount Duneed Road	Mount Duneed	Industrial	Bluestone Quarry	Local	
33	280	Mount Duneed Road	Mount Duneed	Agricultural	House	Local	
34	80	Russells Road	Mount Duneed	Agricultural	Cottage Ruins	Local	
35*	130	Russells Road	Mount Duneed	Civic	Mount Duneed Reserve	Local	
36*	100A	Stewarts Road	Mount Duneed	Post Contact	Stewarts Reserve	Local	
37	580	Surfcoast Highway	Mount Duneed	Residential	House	Local	
38	710	Surfcoast Highway	Mount Duneed	Residential	House	Local	
39	50	Whites Road	Mount Duneed	Agricultural	Oak Grove	Local	
40	140	Whites Road	Mount Duneed	Agricultural	Cottage Ruins & Outbuilding	Local	
41	210	Whites Road	Mount Duneed	Agricultural	Uplands	Local	
42*	25	Williams Road	Mount Duneed	Industrial	Bluestone Quarry	Local	
43	30	Williams Road	Mount Duneed	Agricultural	Hillside Homestead, Stable & Cottage Outbuilding	Local	HO317
44*	80	Williams Road	Mount Duneed	Civic	JW & EB White Park ; Pistol club	Local	
45	100	Williams Road	Mount Duneed	Civic	Mount Duneed Primary School	Local	
46	110	Williams Road	Mount Duneed	Civic	Mount Duneed Cemetery	Local	HO315

Note: This publication of this list does not constitute that the heritage place will be subject to a heritage overlay.

KEY CONCEPT: HERITAGE TRAILS AND VIEWS

The vision for Armstrong Creek sees heritage and cultural features within the growth area as key contributors to its sense of place. To this end, the plan for the growth area seeks to capitalise on these features as attractions and focal points.

A cultural heritage interpretation trail is proposed linking all the places of significant indigenous and post-contact (European) cultural heritage value. The trail will incorporate interpretation panels that detail the significant and heritage values of the location. It will be linked to key view lines to significant heritage places as shown on Figure 4.3.3. There is also an opportunity to establish an interpretation and cultural centre at the Mt Duneed Reserve.

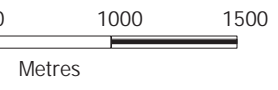
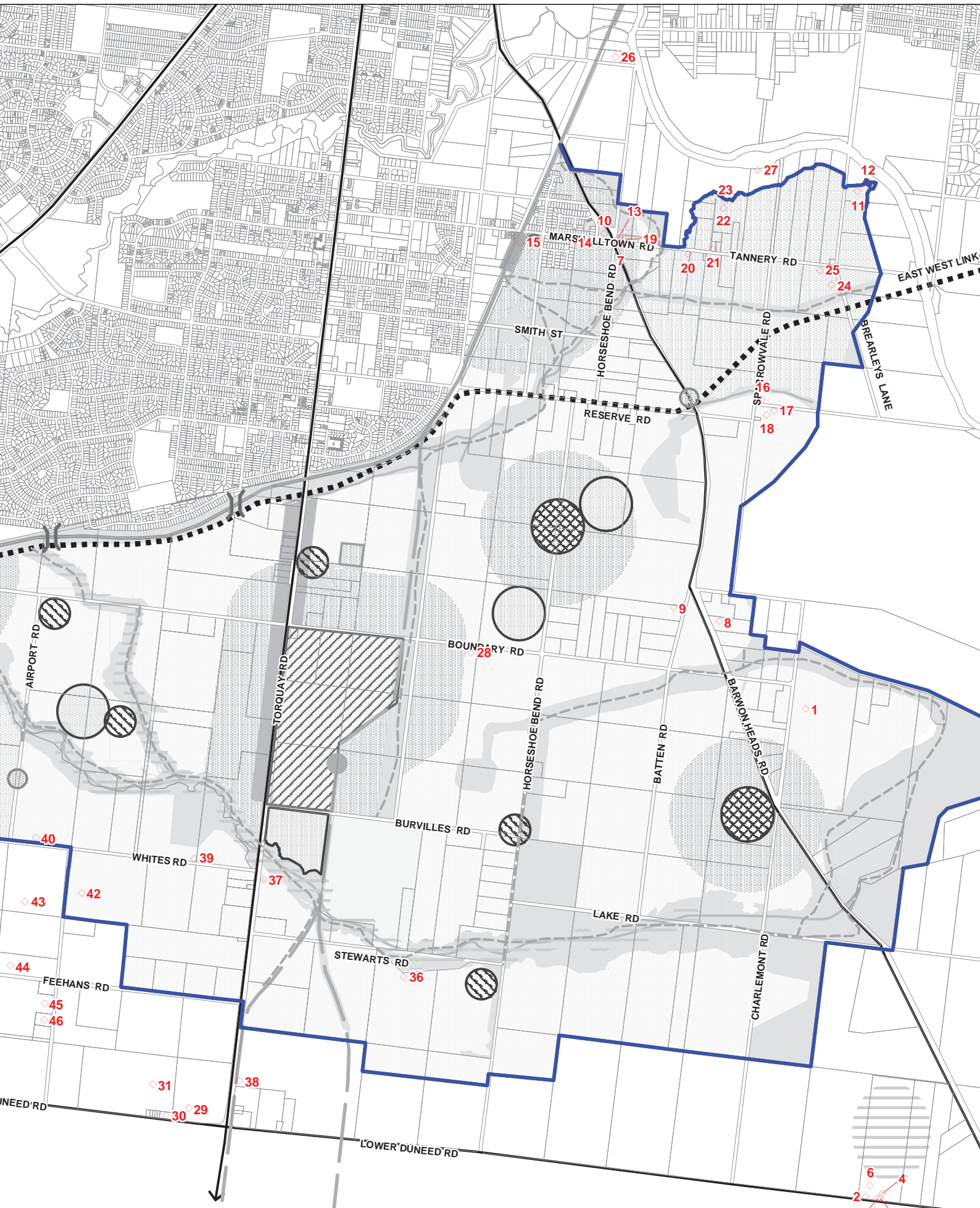
The trail and centre will be developed in consultation with the Wathaurong Aboriginal Co-operative and with any other indigenous stakeholders

4.3.4 PRINCIPLES—POST CONTACT (EUROPEAN) CULTURAL HERITAGE

The following principles should guide the development of the Armstrong Creek growth area:

- P 3.13** Clause 21.16 of the Greater Geelong Planning Scheme (MSS clause on Cultural Heritage) should be applied to the heritage places in the growth area.
- P 3.14** Clause 22.20 of the Greater Geelong Planning Scheme (Local Planning Policy on Cultural Heritage) should be applied to the growth area.
- P 3.15** The 37 Post Contact (European) Cultural Heritage Places listed in Table 4.3 which do not already have statutory protection should be nominated for inclusion within a Heritage Overlay in the Greater Geelong Planning Scheme, subject to the normal statutory amending processes provided under the Planning and Environment Act 1987.
- P 3.16** The places marked with an asterisk in Table 4.3 should be the subject of further research and fieldwork to determine the appropriate curtilage for HO protection.
- P 3.17** The three places marked with two asterisks in Table 4.3 should be nominated for inclusion on the Victorian Heritage Register. However, as the waiting period for the process is several years, they should be afforded Heritage Overlay protection as a first stage.
- P 3.18** Cultural heritage management plans should be prepared (subject to available funding) for the Mount Duneed Recreation Reserve, Stewarts Reserve and the Barwon River corridor, prior to expenditure on major works and development plans.

- P 3.19** The following view lines associated with post contact heritage places should be mapped with the assistance of a land surveyor, and planning controls introduced to protect them:
 - from the Aqueduct and footbridge to the archaeological remnants of wool and tannery processing factories nearby;
 - from the Aqueduct and footbridge to the indigenous flora landscape along the Barwon River corridor;
 - to the Aqueduct from Barwon Heads Road, Tannery Road, Jendes Lane, Kings Lane, Horseshoe Bend Road and the railway line and at the level crossing;
 - from the road reserves to the historic houses, and homesteads and or their historic trees and to the Mt Duneed Cemetery; and
 - along the length of the homestead driveways where they are lined with avenues or lines of historic trees.
- P 3.20** An historic interpretation pedestrian trail should be developed linking places of cultural heritage significance, including the aqueduct footbridge and the sewer easement leading from it towards Black Rock, and the Mount Duneed Cemetery.
- P 3.21** Consideration should be given to the establishment of an interpretation and cultural centre at the Mount Duneed Recreation Reserve.



4.4 EMPLOYMENT

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Economic Activity and Employment Technical Report, February 2006.

4.4.1 VISION

The vision states that:

Central Geelong and established industrial areas outside Armstrong Creek - such as North Geelong, Moolap, Breakwater and St Albans Park - will provide employment for some Armstrong Creek residents. However, local jobs will also be provided within Armstrong Creek to avoid the creation of a commuter suburb. A significant proportion of these jobs will be generated by the needs of the local community—such as retail and services located in traditional centres and light industry in separate estates. However, Armstrong Creek will also offer opportunities for businesses responding to broader needs such as warehousing and viticulture. Leading-edge communications infrastructure will be provided to help attract high-technology businesses and assist people in working from home. Opportunities for businesses to utilise research undertaken at Deakin University will be explored, and a range of appropriate workspace and support services will be provided for people wishing to start their own business in the area.

Armstrong Creek will be a learning community. It will foster 'lifelong learning' through not only a comprehensive matrix of education facilities but also the social institutions and organisations that support an inquiring and creative lifestyle. This culture of learning will create a climate that is conducive to the establishment of new enterprise, harnessing people's imagination and talent to cultivate a durable, 'home grown' economy.

4.4.2 KEY ISSUES

The Armstrong Creek growth area is expected to accommodate approximately 22,000 households south of the rail line at full development. This equates to a population of 54,000 at that time. It is anticipated that 61.5% of the population will be aged between 15 and 64, equating to a maximum potential labour force of up to approximately 33,000. However, actual labour force rates are usually around 50% of the population when factors like late entry into the labour force (due to schooling and tertiary education) and early retirement are taken into account. This rate generates a probable labour force of approximately 27,000 living within Armstrong Creek at full development.

Growth areas generally lag behind in terms of job provision relative to the population and workforce base, especially in the so-called 'higher order' jobs. In pursuit of economic and social sustainability, a key challenge will be to integrate the area with employment areas and develop an internal employment structure that achieves job mix and self-containment to the extent that this is possible. This will provide residents with the opportunity to work locally, reducing the social, financial and environmental costs of long commutes.

Therefore, the economic and employment strategy seeks to provide a large number and wide range of jobs for the growth area and its workers. Employment to population ratios for Victoria and Geelong provide the following benchmarks (2001 data):

	Victoria	Geelong
Population per Job	2.32	2.49
Armstrong Creek	23,869	22,239

This suggests that an employment target for Armstrong Creek could be set at 22,000 to 27,000 jobs, based on a population of 54,000. The lower figure in this range will meet the crude benchmark above, but not satisfy the full job needs of the labour force. This is considered reasonable given that Armstrong Creek will play a sub-regional role in a Geelong region context. Therefore, the jobs target set for Armstrong Creek is 22,000.

The Economic Activity and Employment Technical Report identified that the region has an opportunity for competitive advantage in the areas of Education, Research, Advanced Manufacturing, Health, Tourism, Small Businesses and Food. Future economic growth will rely on maintaining an adequate supply of appropriately zoned industrial land, particularly on highly accessible transport routes. The role of urban form—especially a robust network of activity centres—is recognised in a number of strategies as key to sustainable economic development.

The Technical Report recommends Service Industry as a strong industrial development candidate for the growth area. It also identifies hi tech or advanced manufacturing as possible target sectors that can blend in with commercial precincts. Heavy industry is better suited to other parts of Geelong, where land is already available.

This suggests an economic development strategy for the growth area based on the following themes:

1. Economic integration: the growth area should be integrated into the Geelong Region economy.
2. Regional innovation: the UGP should facilitate innovation in the Geelong Region economy.
3. Sub-regional self-containment: the UGP should deliver sub-regional self-containment.

4.4.3 PRINCIPLES - EMPLOYMENT

The following principles should guide the development of the Armstrong Creek growth area:

P 4.1 Development in the growth area should complement the existing activity centre structure of Geelong by supporting the CAA as the primary centre in the region and providing an internal sub-regional scale activity centre structure.

P 4.2 Development in the growth area should complement the existing industrial structure of Geelong by providing niche industrial development opportunities in the form of:

- locally oriented service industry opportunities in the northeast of the growth area, east of Barwon Heads Road; and
- export oriented hi tech manufacturing opportunities in a business park setting in the west of the growth area, south of Armstrong Creek as shown in Figure 4.4.1.

P 4.3 Development in the growth area should establish high-quality public and private transport links to central Geelong, Melbourne and regional Victoria for improved engagement with external employment areas.

P 4.4 Development in the growth area should provide opportunities for advanced business services to establish in home based businesses and activity centres (see section 4.6).

P 4.5 Development in the growth area should provide a mix of activity centre office spaces and business park spaces that showcase the latest and most advanced forms of commercial and industrial development.

P 4.6 Development in the growth area should harness opportunities to generate synergies with Deakin University and regional research and commercial businesses.

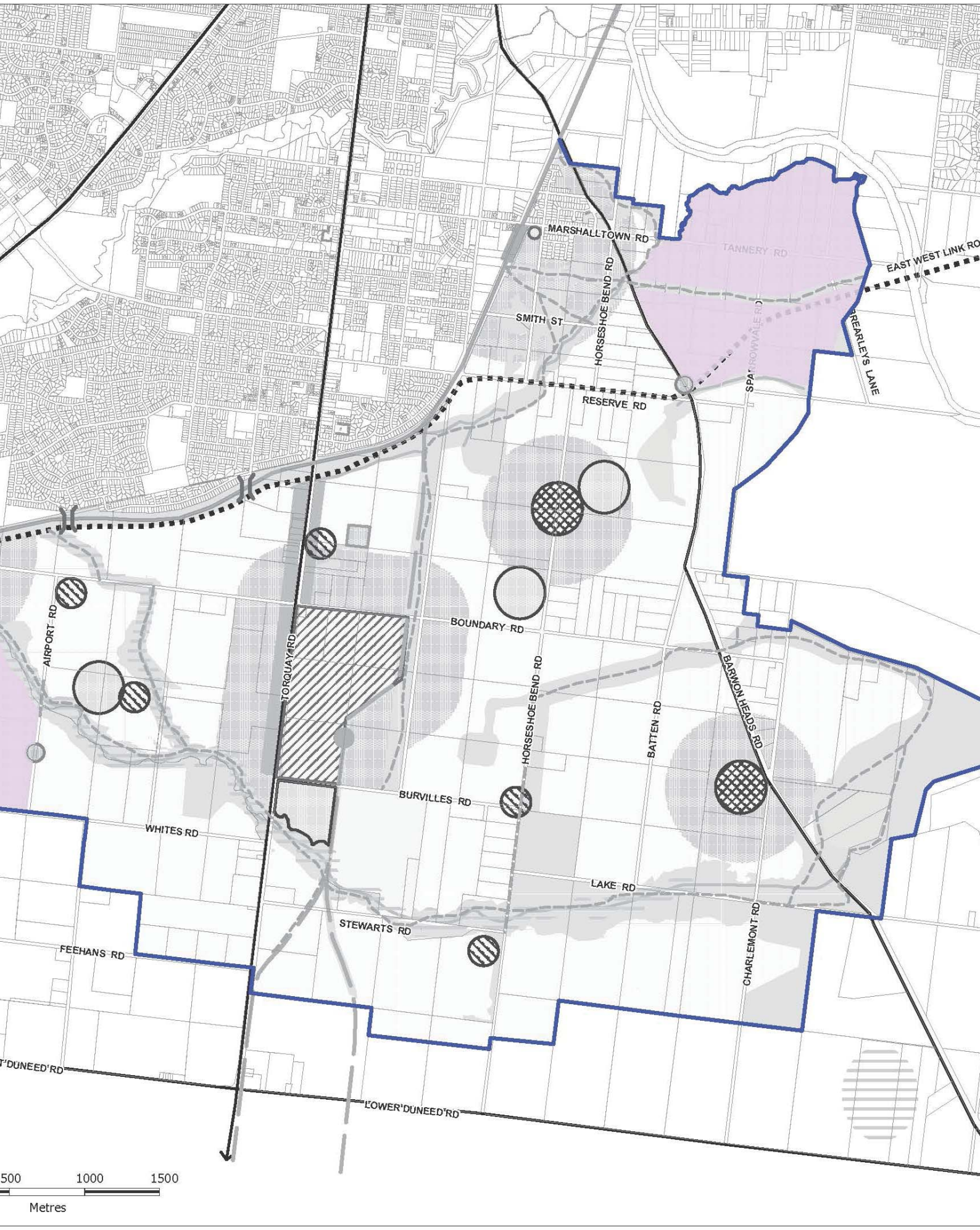
P 4.7 Development in the growth area should provide for 22,000 jobs. The job offer should meet best practice standards in terms of number and type of jobs, including provision of the so-called 'higher order' professional, managerial and advanced technical jobs.

P 4.8 Development in the growth area should complement the existing activity centre and industrial development structure of Geelong, with a focus on meeting the sub-regional needs of the local population and business base.

The application of these principles is expressed in three urban land use groups as follows:

- Activity centres;
- Industrial areas; and
- Emergent business locations.

Activity centres are discussed in section 4.6.



4.4.4 INDUSTRIAL AREAS

Industrial Land Budget

The overall generation of industrial (including new economy industrial) activity from Armstrong Creek's population base is assessed as potentially 645 hectares. Of this figure, 270 hectares will be accommodated within the growth area and the residual in other parts of the Geelong region, which has vacant land stock.

This is based on the 54,000 residents in Armstrong Creek potentially generating a need for:

- 187 hectares of land for manufacturing;
- 316 hectares of land for logistics;
- 103 hectares of land for service industry; and
- 39 hectares of land for other purposes.

Armstrong Creek is being positioned (see below) for two of the possible industrial segments: manufacturing (in particular hi tech manufacturing) and service industry. The other segments are to be accommodated elsewhere in the Geelong region.

This provides an Armstrong Creek industrial land budget of 290 hectares, segmented as:

- 187 hectares for manufacturing; and
- 103 hectares for service industry.

In the design process, approximately 320 hectares was allocated to industry, being divided into two precincts: North Eastern Precinct (180 hectares) and Western Precinct (140 hectares). This approximates to the assessed land need in terms of quantum of land and precinct segmentation. Any requirement of land above the 320 hectares will be provided in other parts of the Geelong region.

The two industrial precincts are located on the 'edges' of the growth area. There are site specific reasons for this (see below) and also 'take-up insurance' reasons. Should industrial land take up be slower and/ or lower than anticipated, the internal residential elements of the growth area will not be adversely affected by undeveloped 'holes' in the urban structure, as could be the case if the industrial areas were located within the central portion of the growth area. The UGP is therefore considered robust in terms of take up risk.

North Eastern Industrial Precinct

The North Eastern Industrial Precinct is an extension of the Marshall Industrial Area. This area is conceptualised to accommodate a mix of business types, with a focus on the service industry needs of the area. The primary role of the Precinct is to be the home of businesses that serve the regional population and business base with light industry and trade supplies.

Approximately 180 hectares is allocated to this Precinct. Although designed for service industry, it is likely that this area will absorb some of the hi tech manufacturing development that is targeted for Armstrong Creek.

Key elements of the rationale for the location of this precinct are:

- Extension to the existing Marshall Industrial area.
- Junction of Barwon Heads Road and future east-west link to the Geelong Ring Road will provide businesses with quality access and exposure.
- Located in relatively isolated (and in some cases lower amenity) pockets to the east of Barwon Heads Road, that are difficult to provide with residential services.

This area can expect to hold approximately 8,000 jobs. The job mix will be focused on technical, trades, transport and labouring jobs.

Western Industrial Precinct

The Western Industrial Precinct is a 'new' type of industrial development form in Geelong. This area is conceptualised as a high amenity business park, designed to accommodate hi tech manufacturing firms and research activity. The focus is on industrial land users that require a higher amenity environment in a recognisable address for corporate, research and advanced manufacturing activities. The primary role of the Precinct is to be the home of businesses that serve international and national clients. Approximately 140 hectares is allocated to this role in a consolidated precinct.

Although called industry, this precinct is geared to provide an outlet for 'new economy' industrial-based land uses. Pure office facilities will be clustered in activity centres. However, this employment area will accommodate a significant stock of office and research space associated with a production and/or warehouse function.

Links to Deakin University are important. It is conceptualised that this precinct will provide commercialisation space for Deakin University research in biotechnology, primary industries and food. Whilst Deakin University already has 54 hectares of land earmarked for a technology park—the Geelong Technology Park (GTP)—this will not provide enough space for the long-term employment needs of Armstrong Creek. The GTP can establish a niche based on its co-location with the university, which will set it apart from the Western Industrial Precinct.

Consolidation of a sizable land pocket for this activity will enable a leader in business park development to package and develop a unique real estate product for the area.

Key elements of the rationale for the location of this precinct are:

- Proximity to Deakin University.
- Consolidated land pocket in a high amenity setting.
- Proximity to the Geelong By-Pass and future east-west link to the Geelong Ring Road, which will provide quality access and exposure.
- Provides a buffer between residential and quarry activities (the latter being located to the west of Ghazeepore Road).
- Enables expansion of an enlarged (but still consolidated) employment precinct to west side of Ghazeepore Road in the future.

This area can expect to hold approximately 7,350 jobs. The job mix will include a variety of managerial, professional, technical, trades, transport and labouring jobs.

A precondition for this area to succeed is quality main road access and exposure to the Geelong Ring Road system.

4.4.5 EMERGENT BUSINESS LOCATIONS

In addition to activity centres and industrial zones, the economic and employment strategy seeks to encourage the development of 'new economy' activities in other settings as much as possible. In a spatial sense, these opportunities can be summarised as:

- Advanced business services that are initially established by individuals within their homes (as home based businesses), which eventually evolve into small to medium sized enterprises in activity centres; and
- Mixed use service precincts within specialised activity centres nodes in or near industrial areas.

Advanced Business Services (Home Based and Activity Centre Based)

The residential zones of the growth area are conceptualised as 'intelligent' and 'active' zones, which encourage local business formation and activity. The continuing shift to a services based economy is encouraged across the housing areas of the growth area.

An important part of the economic strategy is to provide spaces for home based businesses to 'evolve into and out of' as they grow over time. This is enabled by the development of a diverse activity centre structure that provides a range of office tenancies, avoiding the establishment of malls which are controlled by a small number of landlords.

It is assessed that approximately one in ten households will accommodate a home base business in the future. Assuming one job per business, this translates into a residential employment base of 2,200 jobs. It is likely that the bulk of the jobs will be professional or personal service oriented.

Mixed Industrial, Commercial and Service Centres (Specialised Local Centres)

The industry zones are also planned to accommodate specialised local centres, which are geared to serve the needs of the workforce with services like cafes and restaurants. These nodes are well placed to also accommodate the higher job density activities of the industrial areas, which includes activities like research and development.

The development of specialised local centres within industry zones enables public transport to be focused at the nodes of highest job density and activity.

It is estimated that the specialised local centres will achieve:

- About 2,800 sqm in the North Eastern Industrial Precinct, located centrally to the precinct; and
- About 3,800 sqm in the Western Industrial Precinct located centrally to the precinct.

This level of space will generate approximately:

- 80 jobs in the North Eastern Industrial Precinct; and
- 110 jobs in the Western Industrial Precinct.

4.4.6 OTHER EMPLOYMENT LOCATIONS

Other dispersed activities like schools, health facilities and recreation nodes are assumed to generate a further 2,000 jobs across the area.

4.4.7 SUMMARY

In summary, the total growth area job estimates are as follows:

Major Activity Centre*	3,540
North Eastern Neighbourhood Activity Centre*	248
South Eastern Neighbourhood Activity Centre*	213
Local Shops (Residential)*	214
North Eastern Industrial Precinct	8,000
Western Industrial Precinct	7,350
Home Based Business	2,200
Specialised Local Centres in Industrial Zones	190
Other	1,000
Total Jobs	22,955

*See section 4.6.

KEY CONCEPT: KNOWLEDGE-BASED ENTERPRISE

Increasingly, we live in a world where cities compete for people, and businesses follow. This trend has largely been ignored by many cities, which are still focused on business climate and tax incentives. But I think the big question businesses will ask in the years to come is going to be 'Can I hire talented people in this city?' Cities need to be able to answer 'yes' to succeed. Carol Coletta

Achievement of the higher order economic and employment aspirations will be largely determined by the skills base of the area. 'Higher order' refers to activities that are not substantially 'population driven'—in particular the Western Industrial Precinct business park concept and the advanced business service aspirations for activity centres and home based businesses. Businesses in these categories are generally 'footloose', and are driven by—and attracted to—areas that offer the highest possible range and depth of skills.

'Skills base' refers to business leaders and entrepreneurs who drive higher order economic development. It also refers to the workers that provide the innovation input into the business process.

Therefore, the quality of the urban environment is a critical feature in contemporary economic and employment development. A place with a high quality environment and a positive image will have an advantage over a competitor location, all other things being equal. In the new economy, where skilled workers hold the keys to business success, quality urban environments are important marketing tools for businesses in the battle to attract and retain skilled workers. Businesses will not locate in areas where their managers or staff will not go.

Armstrong Creek will have a slim chance of achieving the higher order business aspirations shown in this plan without a quality urban offer to underpin the nurturing, attraction and retention of skilled workers. An important part of the urban offer will be quality housing estates, quality activity centres, a range of lifestyle amenities and first rate schools and higher education facilities—key elements for a high quality of life.

The western part of the growth area contains or is proposed to contain most of the attractions for knowledge workers: excellent accessibility by train and car, an attractive setting, the proximity of Deakin University's Waurin Ponds campus and high quality housing nearby. The proposed plan for the growth area capitalises on the presence of these attractions to grow an 'innovation hub' in the western part of the site. This will go a long way to creating local employment opportunities for the residents of the growth area.

The activity centres—especially the Major Activity Centre—and residential parts of the growth area will also provide opportunities for knowledge-based enterprise. In particular, it is envisaged that advanced business services will be established initially as home-based businesses and then 'graduate' into an activity centre when they need to expand. For this to happen, it is critical that the centres contain a range of office tenancies suitable for small and medium sized businesses.

Another critical foundation for the promotion of knowledge-based enterprise is a culture of learning. Fostering a culture of learning in Armstrong Creek will create a climate that is conducive to the establishment of new businesses and the development of new products and services. This means providing not only the hardware of educational institutions, but also the software of social institutions and organisations that support a learning, inquiring and creative lifestyle. To foster a learning community, the design of Armstrong Creek will encourage citizens to meet, interact and work together.

4.5 RESIDENTIAL NEIGHBOURHOODS

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Community and Social/ Recreation and Open Space, and Economic Activity and Employment Technical Reports, February 2006, and the Armstrong Creek Urban Growth Plan Preliminary Housing Analysis, September 2006.

4.5.1 VISION

The vision states that:

Armstrong Creek will become a highly sought-after location for living, working and recreation, forming an attractive addition to Geelong.

Armstrong Creek's separation from the rest of Geelong by the railway line and Barwon River will enable the development of its own distinct identity. However, it will be well-connected to the adjoining suburbs of Waurn Ponds, Grovedale and Marshall, ensuring ready access to existing facilities for early residents.

Armstrong Creek will offer a wide range of living and lifestyle options to meet the needs of a full cross section of the community. These will range from detached houses on family-sized blocks to apartments close to major shops and services, and include accommodation for the retired, aged, disabled and, potentially, Deakin University students. Higher-density housing, such as townhouses, will be clustered in areas close to public transport nodes and activity centres, maintaining the more traditional character of other residential areas. Affordable and social housing will be dotted through the development to integrate it within the community.

4.5.2 KEY ISSUES

Walkability

Convivial towns can offer solace in disaster, solidarity in protest, and a quiet everyday delight in urban life ... Creating and revitalizing places that foster conviviality is essential to the good life. Mark C. Childs

Having defined the non-developable areas and major employment areas, the UGP needs to determine the structure of the remaining area, which will consist of residential development and supporting retail, commercial and community services and facilities (including parks).

Much of the greenfield residential development built in the second half of the 20th Century was designed around the car. Street networks were planned around traffic management, rather than walking, and commercial and community activity was increasingly focused in larger centres spaced far apart. This approach had a number of adverse outcomes:

- It left those not able to drive or without the use of a car lacking ready access to basic needs—convenience shops and services, schools, essential community services and so on¹.
- It encouraged use of the private car, with consequent detrimental impacts on:
 - personal health, through reduced physical exercise ²,
 - the environment,
 - road congestion, and
 - road safety³.
- It reduced the number of pedestrians in the streets, with consequent detrimental impacts on:
 - social interaction, lessening social cohesion and capital ⁴, and
 - personal security.

Instead, therefore, it is now considered best practice to design residential communities around walking. There are a number of key ingredients to making 'walkable neighbourhoods' work:

1 It is worth noting that 50% of the households in Greater Geelong do not own a car or only own one, and a proportion of the community is also mobility-impaired. However, the average household size is 2.6 people. Therefore, it is likely that a considerable proportion of the Geelong community does not have ready access to a car all the time.

2 See Community and Social/ Recreation and Open Space Technical Report, page 17.

3 See Community and Social/ Recreation and Open Space Technical Report, page 17.

4 See Community and Social/ Recreation and Open Space Technical Report, page 18.

- a 'larger' number of 'smaller' centres—rather than a 'smaller' number of 'larger' centres—so that most homes are within a comfortable walking distance;
- sufficient residential density to achieve the necessary catchment to sustain local facilities;
- the minimisation of substantial, low-density uses—such as large parks—within the walkable catchment of the neighbourhood centres; and
- the provision of a well-connected, safe and inviting network of walking routes, including footpaths on both sides of streets.

Housing Mix

In [the traditional New England town], one can live above the store, next to the store, five minutes from the store or nowhere near the store, and it is easy to imagine the different age groups and personalities that would prefer each alternative. In this way and others, the traditional neighbourhood provides for an array of lifestyles. In conventional suburbia, there is only one available lifestyle: to own a car and to need it for everything. Andres Duany

The detailed housing mix in each neighbourhood will be determined at the next level of planning for each precinct.

KEY CONCEPT: WALKABLE NEIGHBOURHOODS

We must not build housing, we must build communities. Mike Burton

The UGP organises residential development within the growth area into a series of neighbourhoods, each large enough to support the provision of daily needs—basic convenience shops and services, a primary school, essential community services and local parks/ recreation facilities—but small enough that it is possible to walk comfortably from any part of the neighbourhood to those daily needs if centrally located. These are called 'walkable neighbourhoods'.

By enabling people to walk (or cycle) to meet their daily needs, this:

- reduces car dependency and, therefore, the social exclusion of those not able to drive or without access to a car;
- fosters community spirit or social cohesion and capital—and, consequently, a sense of ownership of and belonging to the area—through increased social interaction between the residents in a neighbourhood;
- improves personal health, through increased physical exercise;
- improves personal security in the public realm, through more 'eyes on the street'; and
- reduces car use and, consequently, oil consumption, greenhouse gas emission, road accidents and congestion.

The plan for the growth area is based on the premise that many people are willing to walk up to ten minutes—approximately 800 metres—to reach local facilities if it is a pleasant walk. Neighbourhoods sized on this basis can provide sufficient catchment to support a 'family hub' of children and family services, co-located with a primary school and retail floorspace ranging from a multipurpose 'corner' store to a small supermarket and a number of convenience shops and services. Any smaller, and they are not large enough to support more than a milk bar unless densities are at undesirable levels.

Therefore, the plan for the growth area is organised around such neighbourhoods: each around 3000 dwellings or 7,500 people. Within each of those neighbourhoods, local parks and corner stores are also proposed within a five-minute walk—approximately 400 metres—of each home.

The UGP provides attractive and safe walking routes to the centres of all neighbourhoods.. It also provides a network of local transit routes that will offer direct links to each of the centres.

The centres are also located on connector streets, in order to contribute to their viability through the provision of exposure to passing trade. This can be contrasted with the small strip centres typically provided in late 20th Century suburban development, many of which failed through poor location and low densities.

However, it is important that the UGP provide for minimum densities in order to ensure that sufficient population is reached to support a comprehensive range of commercial and community facilities for the community.

It is also important that the UGP provide for a variety of housing types and price-points, in order to provide suitable choices for a range of different needs, lifestyle preferences and income levels. This will ensure that Armstrong Creek attracts a diverse mix of people—of varied ages, ethnicity, religion and levels of socio-economic advantage, in households ranging from single-person to large families— a hallmark of strong communities. It will also avoid the need for people to move away from their community as their housing needs change.

The Preliminary Housing Analysis undertaken for Armstrong Creek indicates that, in the period to 2031, the proportion of homes that are separate houses is likely to decrease to between 72 and 82%. It also concludes that the average sized modern home (assumed to be 228 sqm) can be comfortably accommodated on a lot of 427 sqm, or 256 sqm in a two-level configuration. Further, whilst lot sizes between 500 and 600 sqm may be the most popular, a trend towards smaller lot sizes may be emerging, with major property developers now providing lots in the 200-450 sqm range as core product.

It is best practice to mix different forms of housing. This avoids the creation of single-income-level 'ghettos' and promotes healthy interaction between people of different socio-economic backgrounds and age. 'Gated communities', which exclude the public from passing through large areas are to be avoided because they tend to result in homogenous groups of residents who do not mix with other people. They also reduce permeability.

There is a current trend towards smaller lot sizes. This is likely to continue. Therefore, it will be important that the design of lot layouts and controls over their use do not limit their potential for further subdivision to respond to changing market preferences.

4.5.3 PRINCIPLES – RESIDENTIAL NEIGHBOURHOODS

The following principles should guide the development of the Armstrong Creek growth area:

- P 5.1** Residential development should be organised into a series of 'walkable neighbourhoods' approximately 1.6 kilometres across.
- P 5.2** Larger parks should be located at the edge of 'walkable neighbourhoods'.
- P 5.3** Each residential neighbourhood should have a distinct identity, based on its natural setting and/or role within the broader urban area.
- P 5.4** Each neighbourhood should contain a comprehensive mix of housing types and 'price-points', from 'traditional' houses on their own block of land to smaller, lower maintenance homes, units and terraces for older people and young singles or couples, and from affordable houses and apartments for first home buyers to aged care facilities.
- P 5.5** The different housing types within each neighbourhood—including affordable and social housing—should be inter-mixed with each other (although there will be a greater concentration of medium and higher density housing towards the centres and aged care facilities should also be located close to centres).

- P 5.6** ‘Gated communities’, which exclude the public from passing through large areas, should be avoided.
- P 5.7** Housing should be designed to be adaptable so that people can ‘age in place’.
- P 5.8** Housing should achieve a minimum gross residential density⁵ of 15.5 dwellings per hectare across the whole growth area (excluding shoptop apartments). It should also achieve the following more specific minimum gross residential densities:
- 30 dwellings per hectare—‘higher density housing’—within 400 metres of Marshall Station and the proposed public transport interchanges at Rossack Drive and the Major Activity Centre. This equates to an average lot size of approximately 225 sqm, suitable for generous terrace houses or apartments.
 - 20 dwellings per hectare—‘medium density housing’—beyond the ‘higher density housing’ up to 800 metres from Marshall Station and the proposed public transport interchange at Rossack Drive, and within 400 metres of the edge of the Sub-Regional and Neighbourhood Activity Centres. This equates to an average lot size of approximately 360 sqm, suitable for small detached or semi-detached houses (duplexes) with small gardens.
 - 15 dwellings per hectare—‘conventional density housing’—in the remainder of the residential areas. This equates to an average lot size of approximately 550 sqm, able to comfortably accommodate conventional detached houses.
- P 5.9** Lot layouts within 400 metres of the Sub Regional, Neighbourhood and Local activity centres should be designed to enable future intensification.
- P 5.10** Medium-high density housing areas should have more intensely-planted street trees and more frequent parks to compensate for the loss of planting opportunities in private gardens.

⁵ ‘Gross residential densities’ include local roads and parks, but exclude main roads, activity centres, employment areas, schools and regional parks.

4.6 ACTIVITY CENTRES

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Community and Social/ Recreation and Open Space, and Economic Activity and Employment Technical Reports, February 2006.

4.6.1 VISION

The vision states that:

The scale of the new development will enable the provision of a comprehensive range of community facilities and services such as schools, a library, medical centres and meeting spaces. These will reflect leading edge thinking in terms of efficient and convenient service delivery. Community facilities and services to serve the new community will be provided early in the life of the development to ensure convenient access for new residents. Community groups will be established to encourage a sense of community and provide input into future decisions about its development.

Initially, Waurm Ponds Shopping Centre will provide the main ‘higher order’ shopping centre for Armstrong Creek. However, as the community grows, new activity centres containing a broad range of shops and services will be developed to serve it, including another Major Activity Centre. These will be focused on leafy, pedestrian-friendly ‘mainstreets’ that provide an ‘experience’ in themselves. Footpaths will be broad, enabling outdoor dining, trees and places to rest, and verandahs will provide shelter and shade.

KEY CONCEPT: MIXED-USE ACTIVITY CENTRES

Intricate minglings of different uses in cities are not a form of chaos. On the contrary, they represent a complex and highly developed form of order. Jane Jacobs

The activity centres in the Armstrong Creek growth area will be mixed-use centres, containing retail, entertainment, office, community and residential uses, in contrast with the single-use shopping centres often found in late 20th Century urban areas. Mixed use centres:

- provide an important focus for communities by increasing opportunities for social interaction;
- enable trip combining;
- concentrate demand and therefore efficiency of public transport services;
- increase the potential for the exchange of ideas and other synergies among businesses;
- result in safer places by incorporating uses active at different times of the day and week;
- offer the potential for an urban lifestyle; and
- are more robust, due to the range of potential tenants.

In particular, the UGP presents the opportunity to design a community facilities network that accords with State Government policy and the Healthy by Design guidelines—that is, a network that incorporates multipurpose facilities situated within or in close proximity to other activity nodes, such as retail, commercial and recreational spaces. Such a network would create ‘clusters’ of activity that are accessible by pedestrians and public transport users, and minimise the total travel requirements of residents by providing a range of opportunities at the one location. Co-location also facilitates joint use of facilities and encourages the development of social networks and cohesion.

The clustering of community facilities and/or services in one building allows for:

- co-ordinated approach to the provision of services to children and families;
- reduced isolation; and
- more flexible and efficient use of building space.

School facilities including the sporting facilities will be shared with the community.

The centres will contain neighbourhood or community foci. These foci, in association with careful environmental design, are very important for a safe, strong and identifiable community.

There will be a mixed use activity centre at the heart of each neighbourhood.

4.6.2 KEY ISSUES

Retail activity

The Economic Activity and Employment Technical Report notes ⁶ that the basic 'building block' of an activity centre network and hierarchy is, in most cases, retail activity.

Centres that generate a 'large' number of retail visits from a 'large' catchment are well placed to accommodate other regional scale activities such as community services and other commercial activities. This is because retailing generates a large number of trips for a variety of purposes (from daily, weekly and more infrequent purposes). This enables other land uses to co-locate with retailing and thus generate co-location benefits (see Key Concept: Mixed-use activity centres, below).

It is acknowledged that in some cases a centre is defined by a non-retail role. However, for the purposes of establishing a 'new' activity centre network in a growth area, this is rare.

A street-based environment that engages with the public domain is critical in encouraging the development of a mixed-use centre (see Key Concept below) as opposed to a shopping mall. External engagement will encourage the provision of diverse spaces for a mix of business types.

Community Strength and Cohesion

The Community and Social/ Recreation and Open Space Technical Report notes that, with the exception of facilities orientated to young people, the community service network in the adjacent suburbs relating to children's services, education facilities, aged care and community spaces, is generally adequate and has some scope to accommodate further demand ⁷. However, apart from the Heyers Road precinct, the system is characterized by single purpose facilities which are spatially disparate.

Development in the Armstrong Creek growth area will necessitate expansion of the existing network of community facilities into the area. Given strong support for multi-purpose facilities and the benefits that accompany this style of community service provision in terms of health, community cohesion and equitable access to facilities, it is advisable that the pattern of service distribution in the adjacent suburbs not be replicated in the growth area.

6 Page 50.

7 Page 29.

Instead, the co-location of services that aim to meet the diverse needs of children and families in a community generates benefits in terms of encouraging the development of social networks and cohesion, and reducing the need for single-purpose car-based trips. At the local level, multipurpose community facilities should include child care and family support hubs, which have the potential to bring together services that aim to meet the diverse needs of children and families within a community, and may also include family support services, parenting support, child health services, community activities and education services.

4.6.3 PRINCIPLES – ACTIVITY CENTRES

The following principles should guide the development of the Armstrong Creek growth area:

P 6.1 An activity centre should be provided at the heart of each neighbourhood, containing locally-oriented facilities and services—convenience shops, a primary school (in most cases), community services and local sporting facilities.

P 6.2 A Major Activity Centre should be developed alongside Torquay Road towards the south of the growth area. This should provide a full range of convenience and comparison retail together with a wide range of community facilities and services, entertainment and employment opportunities, and high-density residential accommodation. In particular, the Major Activity Centre should contain:

- all retail and entertainment activities with a sub-regional catchment (except those located in the mixed use corridor along Torquay Road);
- a privately-run medical/ wellness centre associated with allied health services, indoor leisure centre and gymnasium;
- a library/ culture/ adult learning centre (including TAFE, University of Third Age and meeting rooms);
- a City of Greater Geelong Customer Service Centre with police shopfront;
- a multi-level aged care facility including independent living and supported low level care;
- a town square.

P 6.3 A mixed-use corridor should be provided along Torquay Road, excluding bulky goods retailers, but containing offices and high-density residential accommodation.

P 6.4 Three Neighbourhood Activity Centres should be developed, one on Horseshoe Bend Road (the “North Eastern Neighbourhood Activity Centre”), one on Barwon Heads Road, (the “South Eastern Neighbourhood Activity Centre”) and one central to the West Precinct north of Armstrong Creek (West NAC). Each of these centres should contain convenience retailing, business and community services, and high-density residential accommodation. In particular, the Neighbourhood Activity Centres should contain:

- a single supermarket;
- a government primary school and associated local sporting facilities jointly used by the community; and
- a ‘family hub’ of children and family support services including parenting support, child health services, medical, community health and wellness services, as well as other flexible spaces for use by all lifecycle groups.

Retail floorspace in the North Eastern Neighbourhood Activity Centre should be capped at 7,000m².

P 6.5 Local centres should be developed in areas that have relatively poor access to the four primary centres, including at Marshall Station and the possible future public transport interchange at Rossack Drive, and adjacent to the aged care facility near Torquay Road. All local centres should contain:

- local shops (at least a multi-purpose ‘corner’ store);
- a government primary school and associated local sporting facilities jointly used by the community (except at Marshall, where an additional school is not required); and
- a ‘family hub’ of children and family support services associated with kindergarten, child care, maternal and child health.

P 6.6 Additional multi-purpose ‘corner’ stores co-located with a local park should be provided within 400 metres of all dwellings.

P 6.7 Two ‘Specialised Local Centres’ should be developed at the edges of the proposed employment areas. These centres should contain services such as cafes and restaurants to serve the needs of the workforce, along with higher job density activities such as research and development.

P 6.8 Three government secondary schools should be provided, one towards the west of the growth area and one towards the northeast. Each of these schools should, in accordance with Clause 56 of the Greater Geelong Planning Scheme:

- be co-located with a Neighbourhood or Local Activity Centre;
- contain an indoor sports stadium and active sports ground, jointly used by the community; and
- incorporate a base for youth services.

P 6.9 All centres, schools and community facilities should be located proximate to the proposed local collector road system and pedestrian networks.

P 6.10 All activity centres within the growth area should be oriented to support active street frontages, street-based community interaction and pedestrian safety, in accordance with Clause 56 of the Greater Geelong Planning Scheme.

P 6.11 Some services required at the local and neighbourhood level should be available to residents at the outset of the development, for example a multi-purpose community facility.

4.6.4 ACTIVITY CENTRE STRUCTURE

The overall activity centre structure, based on the sub-regional population level of 54,000, is anchored by a Major Activity Centre, supported by three supermarket-based Neighbourhood Activity Centres and a series of local shop nodes (which includes two transit oriented nodes). The Neighbourhood and local centres will provide the lower order facilities and services but will be large enough to minimize the economic risk for the retail and associated activities in the centres.

The size and role of the four primary activity centres within the growth area will be determined by the ultimate population level of the area (given by housing density and take up) and by the socio-economic and demographic composition of the population. Whilst the activity centre structure of the UGP is based on the population level noted above, the formation of the four primary centres remains valid in the context of a lower housing density and population yield (albeit the size of centres is scaled back in such a scenario). The UGP is therefore considered robust in terms of density and population yield risk.

The range of community facilities and services or opportunities for interaction have been developed taking into account the spatial distribution and staging of facilities and services within this hierarchy or network of activity centres. Such a hierarchy is the most efficient and equitable way of providing the commercial, shopping, education, health, recreation and other community facilities and services.

The development and composition of the activity centres will recognise that the facilities and services will operate within an existing network in the Waurm Ponds – Grovedale area. The location and timing of provision must be related to the rate of household formation and the demographic characteristics of households likely to use the facilities provided.

4.6.5 MAJOR ACTIVITY CENTRE

The Major Activity Centre is conceptualised to provide:

- the full range of convenience and comparison retail, anchored by discount department stores, supermarkets, speciality stores and bulky goods stores;
- a wide range of community facilities and services, education services and health services;
- entertainment space, including a tavern and associated cinema;
- employment opportunities, including commercial and government offices.

This will create a vibrant, cultural heart active throughout the day and night.

The Major Activity Centre is designed to provide services for the Armstrong Creek population and service parts of the Surf Coast Shire, particularly its existing escape expenditure. However, the Centre will complement the Geelong CAA. The Armstrong Creek Major Activity Centre will perform a similar role to Waurm Ponds but have a largely distinct catchment, which is notionally defined by the rail line.

As a result, it is estimated that the Major Activity Centre will:

- accommodate approximately 35,000 sqm of retail space;
- target approximately 25,000 sqm of restricted retail space;
- target approximately 7,000 sqm of entertainment space;
- target approximately 35,000 sqm of office space; and
- target approximately 35,000 sqm of community services space.

Other key elements include high-density housing, a town square, a possible future public transport interchange on a proposed new high-quality public transport link and a local transit route linking it with the whole growth area. Provision has also been made for a private school immediately south of the centre.

It is planned that commercial activity will cluster in the centre proper but also line Torquay Road as far north as the existing rail line, forming a node and strip of supporting commercial activity but excluding bulky goods.

The Major Activity Centre will be located alongside Torquay Road. Key elements of the rationale for its location are:

- Central part of Armstrong Creek catchment, accessible from all development cells.
- Unique catchment to nearest competitor at Waurm Ponds.
- Location adjoining Torquay Road to capture expenditure from Surf Coast Shire (first intervening opportunity for north bound trips).
- Positioned just off Torquay Road to encourage development of an integrated and pedestrian oriented precinct.
- Location adjacent proposed high-quality public transport link.
- Location adjacent Armstrong Creek parkland to provide associated recreational opportunities and attractive walking and cycling connections.

This area can expect to hold approximately 3,034 jobs. The job mix will be focused on service, managerial, professional and clerical jobs.

4.6.6 NORTH EASTERN NEIGHBOURHOOD ACTIVITY CENTRE

The North Eastern Neighbourhood Activity Centre is conceptualised to accommodate a single supermarket that is associated with complementary convenience retailing, business services and community services.

This centre has the potential to grow beyond the recommended size of 7,000 sqm retail if market forces are free to dictate growth. If uncapped, this centre could grow early in the development process and absorb some of the catchment that is designed to be allocated to the South Eastern Neighbourhood Activity Centre and the Major Activity Centre.

In order to encourage a larger number of smaller centres, and thus encourage walking and non car based activity centre trips, it is recommended that the retail floorspace of the North Eastern Neighbourhood Activity Centre be capped.

It is estimated that the North Eastern Neighbourhood Activity Centre will:

- require a cap of 7,000 sqm of retail space;
- be associated with approximately 1,400 sqm of business and community service space;
- incorporate a 'family hub' of children and family support services including parenting support, child health services, medical, community health and wellness services as well as other flexible spaces for use by all lifecycle groups;
- contain a 3.5ha primary school that provides opportunities for schools and community partners to work together and share the use of school facilities, for example, resource centre, hall or meeting spaces, performing arts spaces, information technology centre, local sporting facilities jointly used by the community; create spaces to support school-aged holiday, before and after school programs; and co-locate pre-school centres on school grounds; and
- be co-located with an 8.4ha secondary school, indoor sports stadium, active sports ground and base for youth services.

The North East Neighbourhood Activity Centre will be located on Horseshoe Bend Road. Key elements of the rationale for its location are:

- Central part of a north-eastern sub catchment.
- Unique catchment to South Eastern Neighbourhood Activity Centre and Major Activity Centre (for local supermarket level retailing).

The centre should be located at the intersection of two collector roads and two routes on the local public transport system.

The local road network will be designed to provide convenient access to the centre and 'feed' it with passing trade to support the viability of its businesses through exposure.

This area can expect to hold approximately 248 jobs. The job mix will be focused on service and clerical jobs.

4.6.7 SOUTH EASTERN NEIGHBOURHOOD ACTIVITY CENTRE

The South Eastern Neighbourhood Activity Centre is conceptualised to accommodate a single supermarket that is associated with complementary convenience retailing, business services and community services.

It is estimated that the South Eastern Neighbourhood Activity Centre will:

- accommodate about 6,000 sqm of retail space;
- be associated with approximately 1,200 sqm of business and community service space;
- incorporate a 'family hub' of children and family support services including parenting support, child health services, medical, community health and wellness services as well as other flexible spaces for use by all lifecycle groups;
- contain a 3.5ha primary school that provides opportunities for schools and community partners to work together and share the use of school facilities, for example, library or resource centre, hall or meeting spaces, performing arts spaces, information technology centre, local sporting facilities jointly used by the community; create spaces to support school-aged holiday, before and after school programs; and co-locate pre-school centres on school grounds;

- collocate with a secondary school (8ha) and special needs school (2.5ha).

The South East Neighbourhood Activity Centre will be located adjacent to Barwon Heads Road. Key elements of the rationale for its location are:

- Central part of a south-eastern sub catchment.
- Unique catchment to North Eastern Neighbourhood Activity Centre and Major Activity Centre (for local supermarket level retailing).
- The centre should be located at the intersection of two routes on the local public transport system with frontage to Barwon Heads Road.
- The local road network will be designed to provide convenient access to the centre and 'feed' it with passing trade to support the viability of its businesses through exposure.
- This form of development can expect to hold approximately 213 jobs. The job mix will be focused on service and clerical jobs.

4.6.8 WESTERN NEIGHBOURHOOD ACTIVITY CENTRE

The Western Neighbourhood Activity Centre is conceptualised to accommodate a single supermarket that is associated with complementary convenience retailing, business services and community services.

This centre has the potential to grow beyond the recommended size of 3,000 - 5,000 sqm retail if market forces are free to dictate growth. If uncapped, this centre could grow early in the development process and absorb some of the catchment that is designed to be allocated to the Major Activity Centre.

In order to encourage a larger number of smaller centres, and thus encourage walking and non car based activity centre trips, it is recommended that the retail floorspace of the Western Neighbourhood Activity Centre be capped.

It is estimated that the Western Neighbourhood Activity Centre will:

- require up to 3000sqm of retail floorspace in the short to medium term and up to 5000sqm subject to demonstrating a net community benefit;
- be associated with approximately 1,400 sqm of

business and community service space;

- incorporate a 'family hub' of children and family support services including parenting support, child health services, medical, community health and wellness services as well as other flexible spaces for use by all lifecycle groups;
- contain a 3.5ha primary school that provides opportunities for schools and community partners to work together and share the use of school facilities, for example, resource centre, hall or meeting spaces, performing arts spaces, information technology centre, local sporting facilities jointly used by the community; create spaces to support school-aged holiday, before and after school programs; and co-locate pre-school centres on school grounds; and
- be co-located with an 5.5ha secondary school, indoor sports stadium, active sports ground and base for youth services.

The Western Neighbourhood Activity Centre will be located on the intersection of two collector roads. Key elements of the rationale for its location are:

- Central part of a western sub catchment.
- Unique catchment to the west of the Surf Coast Highway and the Major Activity Centre (for local supermarket level retailing).

The centre should be located at the intersection of two collector roads and two routes on the local public transport system.

The local road network will be designed to provide convenient access to the centre and 'feed' it with passing trade to support the viability of its businesses through exposure.

This area can expect to hold approximately 180 jobs. The job mix will be focused on service and clerical jobs.

4.6.9 LOCAL CENTRES WITHIN RESIDENTIAL AREAS

The growth area will include local centres scattered throughout the residential areas, focusing on areas that have relatively poor access to the three primary centres. This includes nodes at Marshall Station and the possible future public transport interchange at Rossack Drive.

At this level of the retail system, a larger number of smaller centres will encourage walking trips and form important social foci for those in the immediate area. They will assist in community building by providing a sense of community spirit and belonging, and providing opportunities for social interaction, thus reducing social isolation. They will also be important information resources.

These local nodes fall into three categories:

Local Centres

May contain, subject to specific Precinct Structure Planning:

- up to approximately 1000 sqm of local convenience shops and services or a multi-purpose store;
- 3.5ha Primary school that provides opportunities for schools and community partners to work together and share the use of school facilities, for example, library or resource centre, hall or meeting spaces, performing arts spaces, information technology centre, local sporting facilities jointly used by the community; create spaces to support school-aged holiday, before and after school programs; and co-locate pre-school centres on school grounds;
- local sporting facilities including an additional oval co-located with school oval; and
- 'family hub' including children and family services associated with kindergarten, child care, maternal and child health.

Local Shops

It is estimated that these will contain:

- up to approximately 1000 sqm of local convenience shops and services and other services considered desirable as part of Precinct Structure Planning.

Corner Stores

It is estimated that these will contain:

- multi-purpose store for convenience food items, coffee, newspapers, dry cleaning and café (based on corner store model).

Principles for Location of Local Centres

In total, some 7,000 sqm of retail development in the form of dispersed local shop retail can be expected across the area.

One of the local centres will be co-located with the planned aged care facility near Torquay Road. This centre will contain a base for a range of more specialised services serving the whole growth area, co-located with the other facilities and services, and linked to the other centres where provision would be on a smaller scale. It will be clustered around a sensory park to be shared by the old and the young.

All the smaller centres should be located on the local public transport system. While the retail components of these smaller centres will be located on a main road to benefit from exposure and accessibility, the community facilities will typically be off the main road to enhance safety and amenity.

These local centres can expect to hold approximately 214 jobs. The job mix will be focused on service jobs.

'Specialised Activity Centres' are also envisaged within the industrial precincts.

Appendix G in Volume 5 provides an analysis of the provision of community facilities against accepted benchmarks (most of which are outlined in the Community and Social/ Recreation and Open Space Technical Report). This material will inform the composition of Local Centres at Precinct Structure Plan level.

4.7 OPEN SPACE AND RECREATION

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Community and Social/ Recreation and Open Space Technical Report, February 2006.

4.7.1 VISION

The vision states that:

Armstrong Creek will be a healthy, active community. A comprehensive network of open space and recreation facilities will be provided within easy reach of all homes and workplaces. This will range from active sports facilities to informal parks for quiet contemplation.

Playing fields will be provided in each neighbourhood and in larger, regional-scale facilities. A range of indoor recreation facilities will also be provided. Local parks and children's playgrounds will be distributed within a short walk of every home. Opportunities will also be provided to 'escape' from the urban environment and enjoy nature—particularly the stands of remnant native vegetation and revegetated river and creek corridors.

Linking all of these open space and recreation facilities together will be a web of leisure trails and more direct walking and cycling paths, contributing to the formation of a healthy community.

4.7.2 KEY ISSUES

The Role of Open Space

The Community and Social/ Recreation and Open Space Technical Report notes that open space performs various functions within a community, including conservation of biodiversity and accommodation of utilities and services⁸. The following open space functions have particular relevance to the quality of an area's social life:

- accommodates recreational activities;
- contributes to the sense of livability and the appeal of the area for residents and visitors; and
- provides locations where unforeseen demand for social services can be met.

Significant health benefits flow from increased physical activity. As a result, provision of adequate open space and recreational facilities within the growth area would contribute to the formation of a healthy community. Moreover, awareness is growing of the importance of sport to community life. Sport and recreation provide opportunities to make and maintain friendships and can help to give a sense of belonging. Both of these aspects are important to a person's mental health and wellbeing.

The City of Greater Geelong has adopted an aim of achieving a minimum unencumbered open space contribution within the City's growth areas of 10%. The appropriateness of this figure was subsequently reinforced by a recommendation of the Outer Suburban Interface Services Development Committee⁹. Allocation of this space should occur in such a way that positive features of the existing landscape are retained and preserved. Furthermore, open space in the growth area should be integrated with existing open space networks, particularly those in the adjacent suburbs, to maximise the utility of this network and assist in the integration of Armstrong Creek with the surrounding community.

8 Page 32.

9 See Community and Social/ Recreation and Open Space Technical Report, page 32.

The following 'Principles of Open Space Provision' documented in the City of Greater Geelong's Study of Open Space Networks 2001 provide a guide to open space planning in the growth area:

- Conserve and protect the natural environment
- Reflecting community needs
- Enhancing recreation and tourism opportunities
- Improving provision and optimising access
- Ensuring diversity of provision
- Expanding the network of linkages
- Providing for people with disabilities
- Site responsive uses
- Maintenance
- Providing clear guidance to Council
- Contribute to social and/or economic well-being and growth
- A flexible long term focus
- Provision partnerships

Existing Recreational Facilities

The Community and Social/ Recreation and Open Space Technical Report notes that several of the recreational reserves in the suburbs adjacent to Armstrong Creek are located on the boundary of the growth area and thus have the potential to provide for the local recreational needs of future residents of the northern segment of the growth area. In addition, the Leisure Link facility and Deakin University are also located in the southern portion of Geelong's urban area¹⁰.

Nevertheless, the existing sporting reserves in Grovedale and Waurm Ponds are becoming over-used, perhaps with the exception of Grovedale Recreation Reserve. Thus, these reserves are unlikely to be sufficient to provide for the growth area's recreational needs. In any case, the physical barrier between Armstrong Creek and the adjacent suburbs presented by the rail line would inhibit, to some degree, the usability of existing recreational facilities by the Armstrong Creek population.

10 Page 34.

KEY CONCEPT: A GREEN WEB

...each additional hour spent in a car per day was associated with a 6% increase in the odds of being obese, while each additional kilometer walked per day was associated with a 4.8% reduction in the odds of being obese.
R.E.Anderson, US Dept of Health and Human Services

The vision for Armstrong Creek sees the provision of a network of recreation routes linking parks containing the major stands of remnant native vegetation. This implements one of the key initiatives of the Draft G21 Geelong Region Plan.

Much of the remnant native vegetation occurs along the Barwon River and Armstrong Creek corridors. These corridors create continuous ribbons of land running through the whole development, ideal for public parkland. Just north of the growth area, Barwon River connects with the Waurn Ponds Creek corridor, which already boasts a linear park. Therefore, the UGP plans to preserve the Barwon River and Armstrong Creek corridors for public parkland and linkages to other regional open space.

The growth area is currently dissected by a number of rural roads, many of which are bordered by stretches of attractive and ecologically valuable vegetation. If these roads were to be converted to urban roads, the widening, utility services or driveway accesses required would be likely to result in the removal of much of this vegetation.

Instead, the UGP proposes the retention of some of the existing rural roads as tree-lined lanes for walking and cycling that are integrated into the design of the collector road network. These tree-lined lanes will retain the rural character of the area and form part of a walking and cycling grid connected with the circuit around Barwon River, Armstrong and Waurn Ponds Creeks, described above, to offer numerous alternatives for attractive leisure circuits.

Road crossings of vegetated roadways should be minimal in width and spacings.

Future Provision

Provision should be made within the growth area for a recreational and open space network capable of servicing the local recreational needs of the Study Area's population. This should include:

- indoor recreation facilities, such as swimming pools and gymnasiums;
- active parks, such as playing fields; and
- passive parks, such as bushland and walking trails.

The Community and Social/ Recreation and Open Space Technical Report notes that the popularity of walking and other individualistic leisure activities in the suburbs surrounding the Armstrong Creek growth area and indeed across the nation should be considered when the rate of provision of particular recreational facilities in the growth area is determined¹¹. Specifically, a basis is available for greater levels of investment in linked open space networks and walking/ cycling trails. These networks should be designed to promote walking and cycling as an attractive mode of transport, link facilities and services in the growth area and beyond, and should meet the actual and perceived safety requirements of all users. In this way, such a network can provide a multitude of benefits including integration of the growth area with surrounding suburbs, improved physical and mental health and increased interaction and reciprocity with the growth area population.

The Armstrong Creek itself presents an opportunity to create a linear open space corridor through the study area, which could be linked with the existing Waurin Ponds Valley Parkland to the north. In addition, an open space allocation (described in the Barwon River Land Use & Open Space Corridor Plan 2003) is planned to buffer the Barwon River as it traverses the Geelong urban area through to Ocean Grove. One of the functions of this open space 'spine' is to establish a linked open space corridor along the Barwon River through the existing and future urban areas of Geelong. Integration of open space allocations within Armstrong Creek with the Barwon river open space buffer would connect Armstrong Creek's pedestrians and cyclists with urban Geelong and Ocean Grove and the natural amenity offered by the river itself. Such integration would provide health and community safety benefits.

4.7.3 PRINCIPLES – OPEN SPACE AND RECREATION

The following principles should guide the development of the Armstrong Creek growth area:

- P 7.1** An indoor leisure centre would ideally be provided in the Major Activity Centre, including a privately operated lap pool and gymnasium.
- P 7.2** Indoor sports stadia would ideally be provided with each of the two government secondary schools, each containing two basketball courts.
- P 7.3** At least 10% of subdividable land within the growth area should be provided as unencumbered public open space.
- P 7.4** Three regional sporting facilities should be provided, one each of at least 12 and 18 hectares consisting of multi-purpose sports reserves with the potential to accommodate soccer pitches, football/ cricket ovals, etc, and located close to good public transport, the recreational trail network (see below), and proposed retarding basins to minimise the cost of using stormwater runoff for irrigation.
- P 7.5** Public sports grounds should be shared between schools and the wider community. Co-located ovals will create more manageable facilities. The sports grounds should be multi-purpose, irrigated playing fields, able to be used for a variety of sports. Where possible, harvested stormwater should be used for irrigating the fields, rather than potable water.
- P 7.6** Small local parks of at least 0.5 hectares each, containing play equipment, should be provided throughout the residential areas in accordance with Clause 56 of the Greater Geelong Planning Scheme.
- P 7.7** The existing and new watercourses and their associated floodplains should be revegetated to provide opportunities for people to experience nature and 'escape' from the urban environment. These also contain most of the remnant native vegetation and indigenous cultural heritage sites in the growth area.

P 7.8 A regional scale conservation park should be created at the eastern end of Armstrong Creek Zaround existing Stewarts Road Reserve, taking in Hooper's Paddock, adjacent south and west of Horseshoe Bend Road, Armstrong Creek between Torquay Road and Batten Road and the Geelong Crematorium/ Cemetery. This consolidates one of the largest blocks of remnant native vegetation. Much of it is suitable for multiple use, however there will be a need to restrict public access to certain parts for reasons of nature conservation and species protection.

P 7.9 A naturalistically vegetated corridor should be developed alongside the proposed high-quality public transport link to the Major Activity Centre.

P 7.10 A network of recreational walking and cycling trails should be developed across the whole growth area, incorporating:

- linear open space corridors along the Barwon River, Armstrong Creek and its tributaries, and Waurin Ponds Creek;
- existing vegetated rural roads; and
- other, new routes, as required, to create a comprehensive network that provides direct links to all activity centres, schools and major parks.

P 7.11 All parks should be edged by streets and development frontages.

4.7.4 SUMMARY

The following table summarises the open space provided by the UGP within the growth area (as defined by the Urban Growth Boundary). This conforms with the City of Greater Geelong's Study of Open Space Networks, which states Council's aim to achieve a minimum unencumbered open space contribution within the City's growth areas of 10% of subdividable land (incorporating retention of positive features of existing landscape). The layout also ensures every home is within 800 metres—or a comfortable 10 minute walk—of nature.

Appendix G in Volume 5 provides an analysis of the provision of open space and recreation facilities against accepted benchmarks (most of which are outlined in the Community and Social/ Recreation and Open Space Technical Report).

4.8 MOVEMENT AND ACCESS

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Movement and Access Technical Report, February 2006.

4.8.1 VISION

The vision states that:

The potential will be explored for improvements to Marshall Station and for new, high-quality public transport services to serve the Armstrong Creek community. Public transport services will be provided from the outset, offering frequent and reliable services along dedicated corridors to key destinations including railway stations, central Geelong, Deakin University and Torquay. Development will be organised to ensure that all homes are within a short walk of public transport, reducing reliance on private cars.

Torquay Road, Barwon Heads Road and a future link to the Geelong Ring Road will be developed as urban boulevards, continuing to provide good access into and out of the Armstrong Creek area without severing the communities on either side. Additional main roads will be developed to provide good vehicle access throughout the growth area.

The streets will be designed to provide a comprehensive network of safe, direct and attractive cycle paths and footpaths for commuter and recreational purposes. This, in combination with the provision of daily needs close to all homes, will enable people to walk or cycle to local destinations such as neighbourhood shops, public transport, workplaces, primary schools and parks, supporting healthy lifestyles and avoiding social isolation.

4.8.2 KEY ISSUES

Public Transport

It is likely that private car-based travel will continue to be the dominant mode of transport for the foreseeable future, despite increasing fuel prices. However, car use is a major consumer of fossil fuels and a significant source of greenhouse gases. A focus on cars as the primary mode of transport also isolates the substantial proportion of the community who cannot drive or do not have ready access to a car. Further, alternative modes of travel such as walking and public transport promote social interaction which, in turn, fosters a sense of community.

Therefore, it is critical that the UGP promotes and facilitates public transport for reasons of both environmental sustainability and social equity. The growth area is large enough to warrant multiple levels of public transport:

- heavy rail for longer-distance trips, eg. to central Geelong or Melbourne;
- buses for regional trips, eg. to Torquay or Geelong;
- buses for sub-regional trips, eg. to Deakin University;
- light-rail or rapid bus, to take people to and from stations on the rail system and act as an internal distribution system; and
- local community bus services, for special needs groups.

Longer-distance Public Transport

Marshall is already serviced by a railway station offering services to central Geelong and beyond to North Geelong and Melbourne. The presence of the rail line along the whole northern boundary of the growth area offers the opportunity to supplement this with a new public transport interchange.

However, even with this additional public transport interchange, much of the growth area would still be relatively distant from longer-distance public transport services. Therefore, if the growth area is to be properly served, a high quality public transport link is needed that extends southwards into the development.

The Department of Transport, in conjunction with key stakeholders such as V/line and the City of Greater Geelong, is undertaking a study of this rail corridor. This study will review all current railway stations and potential future public transport interchanges on the corridor.

Local Public Transport

Key elements of a successful local public transport service are:

- convenience—linking places that people want to travel between;
- speed—at least comparable with travel by private car;
- reliability;
- frequency—preferably sufficient that passengers do not feel the need to consult a timetable;
- safety—for all types of people at all times of day and night; and
- comfort.

In order to achieve this, local public transport services must travel between activity nodes without delays from traffic. They must also have well-lit and sheltered stops, and comfortable vehicles.

The scale of the growth area offers the opportunity to plan a comprehensive local public transport system from the outset of development. This system should incorporate or be integrated with routes into central and North Geelong.

KEY CONCEPT: HIGH-QUALITY PUBLIC TRANSPORT

In the annals of history, many recognize that we have moved as far as we can go on untamed wheels. A nation in gridlock from its auto-bred lifestyle, and environment choking from its auto exhausts, a landscape sacked by its highways, has distressed Americans so much that even this go-for-it nation is posting “No Growth” signs on development from shore to shore. All these dead ends mark a moment for larger considerations. The future of our motorized culture is up for change. Jane Holtz Kay, Asphalt Nation (1998)

Trips to and from work represent a significant proportion of private car travel. It is likely that, notwithstanding the proposed level of employment in the growth area, many Armstrong Creek residents will commute outside the area to central or North Geelong, or even Melbourne. Therefore, the UGP proposes to provide attractive and high capacity links to these destinations via new high quality public transport services, accessed via a potential new public transport interchange at Rossack Drive and a high quality public transport link extending to the Major Activity Centre at the heart of the growth area.

The UGP proposes that residential development densities are increased to a minimum of 30 dwellings per hectare within 400 metres of Marshall Station and the proposed public transport interchanges at Rossack Drive and the Major Activity Centre—the equivalent of townhouse development. This optimises the number of origins and destinations within a comfortable walk of these interchanges, in accordance with the G21 Geelong Region Plan.

Approximately 50% of the 54,000 people who will make up the Armstrong Creek community will live within 1.2 kilometres—a comfortable 15 minute walk—of one of these interchanges. Further, the proposed local transit system will bring all homes in the growth area within a maximum of approximately 25 minutes total travel time from a interchange (including the walk to the local transit stop and a potential 10 minute wait).

A development of the scale of Armstrong Creek offers a rare opportunity to plan for and around higher-quality public transport services. It will be important that the new public transport infrastructure and services are established as early as possible in the life of the Armstrong Creek development, to ‘capture’ residents before they develop a car ‘habit’.

Street Network

Streets perform many functions. They do not merely carry traffic and provide vehicular access to adjoining properties, but also provide for most walking and cycling, and form the setting for a wide range of active and passive social interaction. These 'other' functions are fundamental to the health of the community and of its individuals. Therefore, it is critical that the street network is designed to provide an appropriate balance between these various uses.

The key principles for designing pedestrian-friendly streets are:

- ensure they are addressed by building fronts, rather than back fences, to provide an attractive edge and natural surveillance;
- avoid very wide roads, dominated by traffic;
- minimise the speed of traffic, to lessen the likelihood of pedestrians feeling unsafe when walking along them;
- provide frequent opportunities for pedestrians to cross;
- provide generous footpaths;
- incorporate kerbside parking, to provide a buffer between pedestrians and moving traffic; and
- provide large street trees, to soften the 'hard' appearance of the road.

The width of streets can be reduced by dispersing traffic into a large number of roads, spaced evenly across the development, rather than concentrating it in a small number of very busy roads.

Arterial roads

There is a need for three arterial roads within the growth area: Torquay Road, Barwon Heads Road and a new road providing an east-west link between the planned Geelong Ring Road and the Bellarine Peninsula.

The primary purpose of the "east-west link" is to provide a linkage between the Geelong Ring Road and Bellarine Peninsula, thus reducing traffic in the Geelong CAA. In addition, it is intended to provide improved access into the growth area from the north (via Geelong Ring Road).

4.8.3 PRINCIPLES – MOVEMENT AND ACCESS

The following principles should guide the development of the Armstrong Creek growth area:

- P 8.1** Marshall Station should be further developed to provide improved amenity, including enhanced kiss-and-ride facilities.
- P 8.2** The potential should be explored for a new public transport interchange at Rossack Drive, leading from the outcomes of the DOT corridor study referred to above. This should incorporate pedestrian access from both sides of the rail corridor and interchange facilities in accordance with Austroads' Guide to Traffic Engineering Practice – Part 16: On Road Public Transport.
- P 8.3** A high quality "Sub-regional public transport link" should be developed between the existing railway line and the proposed Major Activity Centre, with provision for it to be extended beyond towards Torquay. This should:
 - incorporate an interchange at the eastern edge of the Major Activity Centre that is in accordance with Austroads' Guide to Traffic Engineering Practice – Part 16: On Road Public Transport and does not incorporate park-and-ride;
 - be designed so that it has maximum integration with the urban form of the centre; and
 - have regular pedestrian and cycle crossings, and more limited road crossings.

- P 8.4** A comprehensive local public transport system should be provided. These services should:
- travel on routes that link all activity nodes and pass within 600 metres of all dwellings;
 - be frequent enough that passengers are willing to just turn up without consulting a timetable;
 - incorporate stops with a high level of passenger amenity, including bicycle parking, real-time information, good lighting and compliance with the Disability Discrimination Act; in accordance with Clause 56 of the Greater Geelong Planning Scheme, and
 - be linked to central and North Geelong using SmartBus principles.
- P 8.5** Additional local specialised bus services should be provided to cater for special needs, such as “night rider” and community buses.
- P 8.6** Public transport services should be provided at the outset of development.
- P 8.7** A comprehensive pedestrian and bicycle path network should be provided, integrated with existing and proposed external municipal bicycle network links along Surf Coast Highway (Torquay Road), Mt Duneed Road, Barwon Heads Road, Horseshoe Bend Road and Boundary Road.
- P 8.8** New pedestrian bridges should be provided across the existing railway line and proposed east-west link road (see below) at:
- Rossack Drive (integrated with station);
 - Bieske Road;
 - the eastern end of Bickford Road; and
 - the western end of Bickford Road.
- P 8.9** A network of connector streets should be provided across the growth area spaced approximately 800 metres apart and aligned to provide convenient access to the activity centres, as shown in Figure 4.8.1. In accordance with Clause 56 of the Greater Geelong Planning Scheme, these streets should have:
- one traffic lane in each direction;
 - generous footpaths on both sides;
 - shared or dedicated cycle paths on both sides;
 - kerbside parking on both sides; and
 - development frontages on both sides.
- P 8.10** The local street network should be highly interconnected, in accordance with Clause 56 of the Greater Geelong Planning Scheme, with most local streets connected at both ends.
- P 8.11** A new link road (the “east-west link road”) should be provided linking Anglesea Road (the Geelong Ring Road) with the Bellarine Highway, broadly on the alignment shown in Figure 4.8.1.
- P 8.12** Provision should be maintained for Barwon Heads Road to be widened to two lanes in each direction.

P 8.13 Provision should be made for grade-separated crossings of the existing rail line at Barwon Heads Road, Torquay Road and the east-west link road.

P 8.14 All arterial roads should:

- be divided into dual carriageways where they are more than four lanes in width;
- have service roads to provide access to abutting properties, incorporating kerbside parking;
- have generous shared paths where there is adjoining development;
- have large trees along both nature strips and on any central median and outer separators (specified in accordance with road safety standards);
- be of minimum possible design speed and width; and
- avoid grade-separated road intersections unless absolutely necessary.

P 8.15 All streets should be edged by development frontages or parks.

P 8.16 The design of all streets and roads should meet the requirements of Clause 56 of the Greater Geelong Planning Scheme.

4.8.4 ROSSACK DRIVE PUBLIC TRANSPORT INTERCHANGE

The proposed new public transport interchange at Rossack Drive would encourage the use of public transport for long and shorter distance trips by people in western sections of the growth area and in existing urban areas to the north, potentially as far as Deakin University. The interchange would have excellent road access via the east-west link road facilitating park-and-ride for people in the growth area, near Rossack Drive, and those further to the south and west. It also offers the potential for a relatively direct link to Deakin University.

4.8.5 SUB-REGIONAL TRANSIT ROUTE

A high-quality public transport link should be provided between the existing rail line and the planned Major Activity Centre, with the potential to extend towards Torquay, to encourage the use of public transport for people in the southern part of the growth area and to provide access to the centre for people outside the growth area. This public transport link should be designed to accommodate a range of different high-quality public transport modes offering links to central Geelong, North Geelong and central Melbourne.

The proposed public transport link should be designed so that it has maximum integration with the urban form of the Major Activity Centre, with a strong public transit focus. The alignment of the public transport link is designed to meet the eastern edge of the Major Activity Centre, where a public transport interchange can serve as an 'anchor'.

Park and Ride facilities should not be provided at the Major Activity Centre interchange, as they would fragment the centre and the interchange at Rossack Drive will be more accessible by car—particularly once the Geelong Ring Road is constructed. The local transit services are intended to replace the need for park and ride for Armstrong Creek residents. Instead, the interchange will be focused on people who arrive on foot, cycle or the local transit services.

There is potential to extend the link further south. Significant upgrades were recently implemented to an existing high-quality trunk public transport service between Geelong and Torquay, which is capable of further upgrading.

4.8.6 LOCAL TRANSIT SERVICES

A network of transitways integrated with road network will be provided throughout the growth area to carry local public transport services. This network will be linked to key destinations within the broader Geelong area—such as Deakin University, central Geelong and North Geelong—via existing and proposed bus routes.

Stop spacings will be consistent with those generally adopted for public transport services (bus, light rail) and are intended to balance a desire to minimise walking distances to stops with that to minimise delays due to stopping and starting. All stops will provide high amenity for passengers including real-time information and good lighting for security. They will also provide bicycle parking and will need to be configured to satisfy Federal DDA (Disability Discrimination Act) requirements so that all services are accessible for all persons.

It will be paramount to coordinate services to achieve a ten-minute travel time objective to the furthest point of the growth area and to provide greater encouragement for residents to use the system to get to destinations outside the growth area. This will also require operators to maintain clean vehicles and terminal/ stop facilities.

Initially, the local transit services are likely to take the form of gas- or electric (battery)-powered buses, distinguished by a specific livery and name.

An indicative staging of the local transit system might be:

1. Buses on roads in Transitways servicing each staged development cell and connect to Major Activity Centre, Marshall Station, Geelong CAD.
2. Expand bus routes in accordance with the staging of the overall development.

4.8.7 LOCAL SPECIALISED BUSES

In addition to the local transit system, local bus services will be provided to cater for special needs. These are likely to be 12.5 metre Ultra Low Floor buses that meet DDA requirements, and include:

1. “Night rider” bus services, to cater for those who do not possess transport or have access to alternative modes after hours.
2. Community bus services, to cater for the frail, mobility-impaired, youth or other groups who do not have alternative means of accessing facilities in or around the growth area.

KEY CONCEPT: PUBLIC TRANSPORT

In a quality city, a person should be able to live their entire life without a car, and not feel deprived. Paul Bedford

It is hoped that many of Armstrong Creek’s residents will be able and choose to work locally. Most of its children will also go to school locally. These trips represent the majority of travel demand. Therefore, a local transit system will be provided connecting all parts of the growth area with its employment areas, centres and other key destinations such as railway stations and schools. Existing Torquay Road and Barwon Heads Road bus services will be enhanced and integrated with the proposed local transit system to provide services beyond the growth area to other parts of Geelong and the region.

In order to offer a fast and reliable service, it is hoped that a frequent-enough service can be achieved so that people feel able to just turn up at a stop and wait, rather than having to consult a timetable and plan their journey.

The local transit network should be designed to ensure that at least 90% of homes and businesses within the growth area are within 600 metres—a comfortable 7-8 minute walk—of a transit route. This is consistent with ResCode’s provisions for trams, which the local transit system will have more in common with than a bus service. Based on an average speed of 25km/h, the maximum travel time from the furthest point in the growth area to the Major Activity Centre will be approximately 10 minutes.

Local transit services should be provided from day 1 of development so that residents are not encouraged to adopt a ‘car habit’ and have a viable alternative.

4.8.8 PEDESTRIAN AND CYCLE ROUTES

Designated shared pedestrian/cycle paths will be provided, and will be linked to existing and proposed external municipal bicycle network links along Surf Coast Highway (Torquay Road), Mt Duneed Road, Barwon Heads Road, Horseshoe Bend Road, Boundary Road and off road trails through the linear parks.

A network of shared pedestrian/cycle paths will connect to the Major Activity Centre and Neighbourhood Activity Centres and connector streets where there will be safe crossing facilities. Bicycle use will be encouraged along all streets in the growth area by design strategies to reduce levels of traffic activity and increase safety for users.

North-south pedestrian overbridges are proposed across the railway in the vicinity of Rossack Drive and the western and eastern end of Bickford Road. These bridges will link into the network along the north side of the east-west link road.

4.8.9 LOCAL STREETS

Within the growth area, a network of local streets will be provided. Two-lane connector streets will be provided at a spacing of approximately 800 metres, which will lead to low traffic flows and a safe and pleasant environment in which pedestrians can move around the development area. Lower order streets will provide access to individual properties.

The majority of intersections within the development will be unsignalised and the network will be designed to minimise the generation of “rat runs”. However, where connector streets intersect with main arterial routes (Surf Coast Highway, Barwon Heads Road, etc) signals or roundabouts will need to be considered. In general, it is proposed that the following intersection controls will be incorporated in the development:

- Arterial/ Arterial – Signals
- Arterial/ Level 2 Connector – Signals
- Connector/ Connector (Level 1 or 2) – Unsignalised (possible roundabouts)
- Level 1 Connector/ Access Street – Unsignalised
- Access Street/ Access Place - Unsignalised

In general the subdivisional roads in the development should meet the requirements of Clause 56 of the Greater Geelong Planning Scheme.

KEY CONCEPT: PEDESTRIAN-FRIENDLY STREETS

A street is a spatial entity and not the residue between buildings. Anonymous

Any town that doesn't have sidewalks doesn't love its children. Margaret Mead

In order to ensure Armstrong Creek's streets are pedestrian-friendly, a network of 'connector streets' will be provided across the growth area. This will distribute traffic evenly, avoiding almost entirely the need for major, heavily-trafficked 'non-frontage' roads which are typically unpleasant and unsafe for pedestrians and cyclists, and create a barrier between development on either side.

The connector streets are spaced approximately 800 metres apart, which will ensure their traffic can be accommodated by one travel lane in each direction. Generous footpaths, kerbside parking and development frontages on both sides will ensure a pedestrian-friendly environment.

Local streets are also required to be interconnected, to distribute local traffic movements through the provision of convenient routes between any two points. This can be contrasted with culs-de-sac and loop roads, which rely on busy, wide collector roads.

4.8.10 ARTERIAL ROADS

Existing arterials

Service roads will need to be provided on Torquay Road and Barwon Heads Road to give access to adjoining properties. Grade-separated crossings of the existing rail line at Barwon Heads and Torquay Roads will also need to be provided for in future planning.

East-west link road

To reduce any barrier effect of the east-west link road on the growth area, it has been located close to the existing railway reservation. It is currently envisaged that the east-west link will be a divided road with 2-3 lanes in each direction and a design speed of 60-80kph. Efforts should be made to minimise the width and speed of the road to minimise its barrier effect.

Allowance is also made for service roads to provide access to adjoining development. Service roads will allow a reduction of traffic accessing development cells onto connector streets and seeking access to the east-west link road. The road will be a limited access road with signalised intersections with Connectors spaced at 800 metres.

The minimum cross-sectional arrangements for each section of the east-west link road are shown in the diagrams below.

Geelong Bypass to Surf Coast Highway Link

The linkage between Geelong Bypass Stage 4 and the Surf Coast Highway is proposed via Anglesea Road and Mt Duneed Road. It is anticipated that both roads would be developed and maintained by VicRoads as part of the long term linkage to the Surf Coast.



FIGURE 4.8.2 POSSIBLE CROSS-SECTION OF CONNECTOR STREET

KEY CONCEPT: BOULEVARDS

If you plan cities for cars and traffic, you get cars and traffic. If you plan for people and places, you get people and places. Fred Kent

The role of the street is social as well as utilitarian. Andres Duany

There is a need for three arterial roads within the growth area: Torquay Road, Barwon Heads Road and a new road providing an east-west link between the planned Geelong Ring Road and the Bellarine Peninsula. The arterial roads need to be integrated as best as possible with the future urban fabric of Armstrong Creek.

The new east-west link road has been aligned and designed to minimise the creation of a barrier between the urban areas on either side. The arterial roads have also been designed to create attractive streets, given that they will inevitably perform as local connectors for the Armstrong Creek community in addition to their sub-regional and regional functions, and that they will serve as the primary entrances to the Armstrong Creek area.

This means:

- maximising opportunities for crossing and gaining access to them by all travel modes;
- minimising width—in particular at crossing points; and
- providing a high quality environment, both for people moving along them—especially at crossing points—and for development alongside.

Maximising crossing and access opportunities

Direct vehicular intersections are limited to minimum spacings on arterial roads. However, additional opportunities to gain access to them in between these intersections will be provided through left in-left out intersections onto service roads. This will increase the directness of crossing movements for trips with an origin or destination that is close to the arterial but not close to one of the major cross roads, avoiding convoluted trips, inconvenience and increased trip length.

Minimising width

Torquay Road and the east-west link will need to be at least 4 lanes wide. A four-lane road can be comfortably accommodated within an urban area without becoming a significant barrier, provided that the width of any central median and nature strips are minimised. Wider roads should not be contemplated unless absolutely necessary, due to their increased barrier effect.

Minimal width is particularly important at intersections, where pedestrians are most likely to be wishing to cross the arterial. Therefore, all intersections with arterial roads will be signalised. Signals will also aid pedestrians wishing to cross the road.

A high quality environment

As noted above, arterial roads will inevitably be used as local connector streets in addition to their sub-regional and regional 'through traffic' functions. Therefore, it is important that they are attractive roads—to contribute to a high quality image for the development as a whole—and that they offer reasonable pedestrian and cycle amenity—to contribute to the attractiveness of the development as a whole and encourage walking and cycling.

There are a number of ways in which arterial roads can be designed to contribute to a high quality environment. These are:

- Where they are not edged by parks (including retarding basins), they should be edged by building 'fronts', rather than high fences or service yards associated with the 'sides' or 'backs' of buildings. This means that there would need to be service roads to provide access to the abutting properties.
- They should have generously broad shared paths where there is adjoining development.
- They should have large trees along both nature strips and on any central median and outer separators (specified in accordance with road safety standards).
- Their design speed should be minimised, to lessen the likelihood of pedestrians feeling unsafe when they are walking along them.
- Grade-separated intersections should not be contemplated unless absolutely necessary, as they blight the surrounding environment and, in particular, land alongside through their visual impacts and restrictions on access.

Multi-carriageway boulevards

As noted above, service roads are required to enable buildings to 'front' arterial roads. This creates a multi-carriageway 'boulevard', which can be a very attractive street despite the fact that this increases the overall width of the road (eg. St Kilda Road).

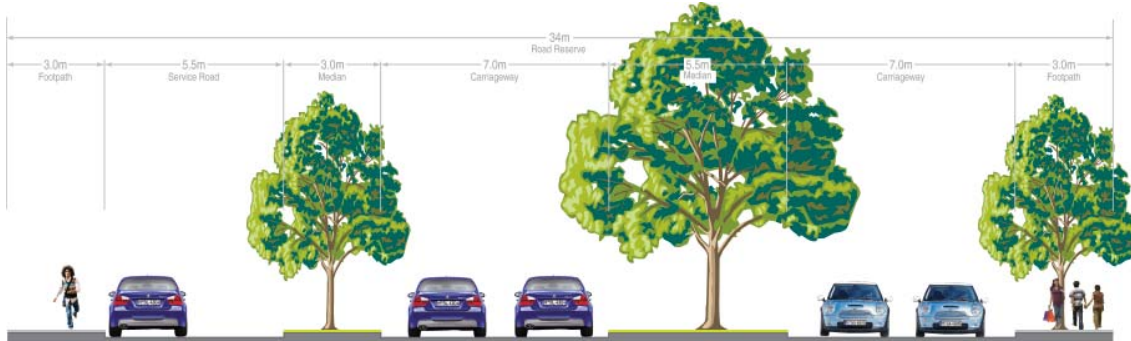
In essence, a multi-carriageway boulevard divides the traffic into a number of carriageways. The separators between these carriageways provide 'staging posts' at pedestrian crossings. They also allow multiple lines of trees along the street, reducing its apparent scale and enhancing its appearance both for people moving along it and for development alongside.

The division of the traffic in each direction into two carriageways creates the opportunity for each to be treated slightly differently. For example, the central carriageway can be focused mainly on faster, through movement, whereas the outer carriageway (service road) can be focused more on the pedestrian and development environment that is created, with a slower design speed suited to local traffic. In particular, the outer carriageways create the opportunity for:

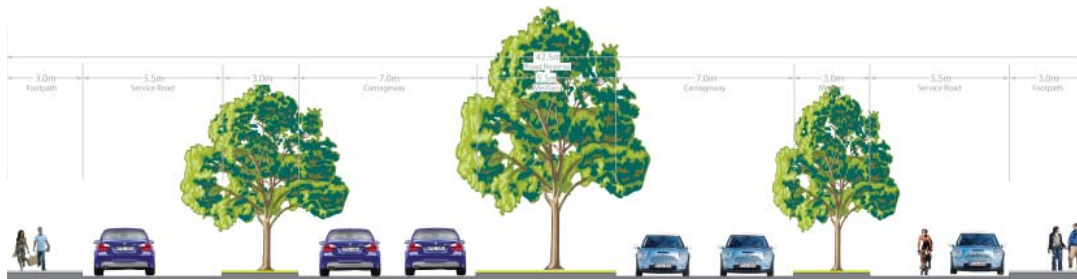
- kerbside parking, enhancing the feeling of safety for pedestrians, offering visitor parking for adjoining uses and slowing traffic through the 'friction' created by cars moving in and out of parking spaces;
- more frequent intersections with side streets, enhancing access opportunities; and
- direct access to abutting properties, avoiding the need for other access arrangements.

Many of Melbourne's 'famous' boulevards provide good examples of multi-carriageway boulevards.

FIGURE 4.8.3 MINIMUM CROSS-SECTIONS OF EAST-WEST LINK ROAD



West of Sub-Regional Transit Route



East of Barwarre Road

4.9 UTILITY SERVICES

This section should be read in conjunction with the Armstrong Creek Urban Growth Plan Physical Infrastructure and Engineering Services Technical Report, February 2006.

4.9.1 VISION

The vision states that:

The latest technology will be employed to ensure that the utility services at Armstrong Creek are as up-to-date and environmentally friendly as possible. This will include measures to minimise potable water use—such as rainwater tanks and water recycling—and to minimise the impact of stormwater runoff on the natural watercourses.

A sustainable energy policy will be developed for Armstrong Creek to reduce consumption and emissions. This will include demand reduction strategies and the exploration of opportunities for local energy production such as combined heat and power and energy from waste, wind, solar and geothermal sources. A strategy will be set in place for transitional energy sources—such as hydrogen—to bridge the gap between fossil fuel and renewable energy sources.

State-of-the-art recycling services will be provided and provision will be made for leading-edge telecommunications technology. Utilities will be placed below ground wherever possible, to avoid visual intrusion and—in the case of high-voltage transmission lines—minimise the risk of harmful radiation.

4.9.2 KEY ISSUES

Sewerage

Barwon Water has advised that their capital works program includes the planned construction of a new pumping station located at Marshall, near the intersection of the Ovoid and Outfall Sewers, in conjunction with a new 10km long pipeline between Reserve Road, Marshall and Black Rock Water Reclamation Plant (WRP). The new main would comprise of a 1.1m diameter pressure pipeline that closely follows the existing pipeline, generally in the same easement. The construction of the new pipeline will provide sufficient capacity for the proposed Armstrong Creek development. The target construction date for the new sewerage infrastructure is 2015.

Water Supply

Barwon Water is currently preparing a Water Supply-Demand Strategy, which will describe how it will supply water to its region within the overall water resource allocation determined in the Central Region Sustainable Water Strategy. Both strategies will allow for future growth, including Armstrong Creek.

Barwon Water has set targets to reduce average water use by 25% per head by 2015, and increase water recycling from the current level of 11% to 25% by 2015. However, in order to supply the future Armstrong Creek development with potable water, a major feeder main will need to be extended from the Pettavel Basin (in the west) to the study area.

Augmentation of the Pettavel Basin may also be required. Grovedale is currently fed by gravity from the Pettavel Basin but connection of major development areas south of the railway line in the Armstrong Creek/Mt Duneed region to the Grovedale system without this augmentation would not be acceptable to Barwon Water.

The City of Greater Geelong would also like to explore the potential for a '3rd Pipe' system to supply recycled water to the Armstrong Creek area (see Key Concept: Water Conservation below).

KEY CONCEPT: WATER CONSERVATION

Barwon Water's highest priority is for the conservation of water resources through a number of strategies including reducing domestic demand. For large new developments, such as Armstrong Creek, Barwon Water is seeking a best practice approach to water conservation and water sensitive urban design.

Currently, it is considered good water conservation practice to install rainwater tanks for toilet flushing, hot water supply, clothes washing and install water efficient appliances, fittings and fixtures in all new homes. Encouragement of low water use gardens at the planning stage is also important to reduce water consumption significantly into the longer term.

Good practices in water conservation and urban design could also include provision of alternative water supplies such as recycled water or the use of stormwater (ie rainwater from surfaces other than a building roof) to irrigate sports fields. EPA-Victoria has a draft document "Frameworks for Alternative Water Supplies" which provides useful information on this subject. Any alternative water supply options will need to evaluate specific environmental, social and economic aspects and impacts before being considered as an alternative to potable water supply.

Dual reticulation systems (also known as 3rd pipe systems) are another potential measure to partially replace potable water by providing a supply of recycled water. Such systems are useful for industrial use, watering sports grounds, other public open spaces and potentially for use in residential gardens, clothes washing and toilet flushing. State Government policy, as stated in 'Our Water Our Future', is to work with local government, water authorities and developers to support dual pipe systems for recycling where they are likely to be economically viable.

Currently, Barwon Water's view is that this may not be an appropriate option for Armstrong Creek, due to the high level of salt in the recycled water produced at the Black Rock water reclamation plant. The cost of desalinating this water to levels suitable for residential use and then reticulating it to the growth area would result in the cost of water being significantly higher than the current cost of providing potable water. A requirement of the Essential Services Commission is that Barwon Water must fully recover the costs of all non-essential services such as water recycling. Therefore, the additional costs associated with the treatment and reticulation of recycled water would need to be covered by either the developers of the growth area or the broader Barwon Water customer base through increased water rates.

Council is keen to explore the potential for dual reticulation systems further. Therefore, it is recommended that this be the subject of further discussions.

Another form of water recycling that could be developed in the longer term is the treatment of recycled water to potable water quality. After treatment to a very high standard, recycled water would be stored in underground aquifers before being pumped back into the potable water storage upstream of the water treatment process to augment traditional water supplies. Distribution would be through the existing potable water reticulation systems, negating the need for a dual system. Such systems have already been taken up in Europe, USA and parts of Asia but are yet to be approved for use in Australia.

Electricity (Transmission)

There are two organisations that own, operate and maintain the two electricity transmission lines within the study area: SP AusNet and Alcoa.

The first line, the Geelong – Point Henry line, is owned by SP AusNet. The line enters the study area at the railway crossing at Marshall and runs in an easterly direction through to the Barwon River crossing within an easement generally 62.0 metres in width. Within the study area, this easement contains existing double circuit 220kV transmission line mounted on steel lattice towers (pylons). On the northern side of the 220kV line, and within the easement, is a 66kV overhead power line operated and maintained by Powercor.

The second line, the Anglesea – Point Henry line, is owned by Alcoa. This line is aligned across the eastern part of the study area in a generally south-west to north-east direction, within an easement approximately 36 metres in width.

Electricity (distribution)

The principal electrical distribution main consists of a 66kV (sub-transmission) overhead line that is located to the south of existing pylon mounted 220kV transmission lines. Both lines are contained within an easement approximately 62 metres wide, aligned generally east-west across the north of the study area

To provide sufficient capacity for the future development Powercor will need to extend the sub-transmission (66kV) overhead powerlines to a zone substation within the study area. To provide redundancy and supply contingencies two overhead lines will be required, travelling alternate routes to the zone substation. Powercor's preference for the alignment of the two routes would be to follow the main roads within the development

The preferred location of the zone substation is central to the residential precinct East of the Surf Coast Highway.

Powercor advises that route and substation location selection is an involved process that will need to include studies into environmental effects, electrical design and other utility requirements, once development staging and layouts are established.

Natural gas

SP AusNet (formerly known as TXU) is the supplier of natural gas within the study area. t-Squared (t2) is a service provider for SP AusNet.

It has been established that the existing gas infrastructure has insufficient capacity to service the Armstrong Creek development, and that a new gas main will need to be installed.

A new gas main will be able to take advantage of a future upgrade to the gas supply network. t2 advises that a new 160mm diameter supply main to Barwon Heads is scheduled for the latter quarter of 2007 with the supply source originating from Waurn Ponds. The route for this supply main runs along the southern boundary of the study area, i.e. along Mt Duneed Road, Lower Duneed road, and Barwon Heads Road.

To supply the development area, a spur from the proposed 160mm supply main would enter the study area at a strategic location, and terminate at a Field Regulator (required to maintain the distribution pressure in the gas reticulation system, particularly at peak demand times). From the Field Regulator, smaller gas mains and reticulation systems will supply gas to the end users. The Field Regulator is likely to be constructed underground with an approximate size of 4m x 4m x 3m deep.

The initial preference is that the spur be located at the intersection of Mt. Duneed Road and Torquay Road. The new gas main will then enter the study area along Torquay Road reserve and extend as far as the proposed Major Activity Centre location, where the Field Regulator would be constructed.

KEY CONCEPT: RENEWABLE ENERGY

Managing the level of greenhouse emissions and resource consumption related to energy is a key challenge for the future. A comprehensive sustainable energy policy for the Armstrong Creek urban growth area is needed to achieve the most benefit for the development. Such a policy is multi-faceted and should include:

- demand reduction strategies, i.e. reduced energy consumption by good planning and design; and
- supply strategies, i.e. stationary energy (conventional/grid, renewable sources) and transport energy.

The staged implementation of the sustainable energy policy relies upon the robust processes for:

- setting of the sustainable energy vision for the precinct and investigation, analysis and setting of individual and collective strategies;
- policy setting within a local, regional, state and national context;
- frameworks for attracting partners to achieve the vision in a context of good sustainable business;
- promotion and education to encourage reduced consumption and higher percentage demand for sustainable energy; and
- careful space planning to facilitate short and long term strategies.

Implementation at each stage needs to be cognisant of the vision, strategies, policies, frameworks, partnering, business strategies and demand led success of the sustainable energy solutions.

Telecommunications

Telstra advises that existing infrastructure in and around Mt Duneed (MTDU) and Grovedale (GROX) exchanges is currently very limited and will need to be reviewed to meet the demands of the proposed development.

The provision of services to this development will depend on many factors such as:

- The likely number of dwellings and their location within the development.
- The staging of the development.
- The likely technologies available at the time services are required. The wireline technologies currently providing narrowband and broadband access are:
 - copper cable from existing exchanges using current technology;
 - optic fibre cable and Multiplexors from existing exchanges using current technology; and
 - fibre to the Premise (FTTP). This technology may not be available from the MTDU or GROX exchanges and a developer contribution would be required. (NB: Fibre to the Node (FTTN) is not an approved technology yet.)
- Whether the developer is willing to provide a capital contribution for FTTP or to a Telstra Smart Community offering.

Given the forecast of 22,000 dwellings for the development, it is highly unlikely that either or both the MTDU and GROX exchanges would have the capacity to service a development of this size. A detailed study would therefore be required to ascertain as to how this development might best be serviced. Possible options are to:

- Expand the GROX or MTDU exchanges.
- Build a new Access Exchange within the development area.
- If FTTN becomes available, then the above two options will not be required.

There may also be a need to augment the existing mobile phone infrastructure. Further investigation will be required once the development footprint and staging has been finalised.

Refuse Disposal

City of Greater Geelong Council is the authority responsible for the collection and disposal of refuse within the study area.

Council has a Waste Management Future Directions (WMFD) Strategy that identifies that there is not a need for any further putrescible landfill sites and that the Drysdale landfill will become the significant regional site. This is confirmed by the Barwon Regional Waste Management Group, which is currently reviewing its Regional Waste Management Plan. Drysdale landfill has at least 20 years life remaining, up to possibly 40 year depending on the potential to use an adjacent Council owned quarry.

The WMFD Strategy is based on working towards the targets of the State "Towards Zero Waste Strategy" and identifies the need to investigate the provision of an Integrated Resource Recovery Centre (IRRC) to replace the Corio landfill upon its closure at the end of 2009 and to maximise materials recovery for the whole municipality and the Barwon region. It is intended that the Centre cater for the receipt of all waste, recovery of whatever material possible, and the disposal of residual waste to landfill (at Drysdale). Council advises that the investigation into the IRRC has commenced.

If given the go-ahead, the IRRC could be located within the proposed industrial area at Marshall. This would provide a centralised treatment facility with easy access to/from existing refuse facilities, and one which could service the developing Armstrong Creek area by making use of the proposed east-west link road. Future technologies for converting waste to energy could then be implemented, with generated electricity being supplied direct to the local grid for distribution. It is understood that the Marshall employment zone would cater for service industries, where demand is likely to be significant, and a local electrical supply would be readily absorbed.

4.9.3 PRINCIPLES – UTILITY SERVICES

The following principles should guide the development of the Armstrong Creek growth area:

P 9.1 Rainwater harvesting (eg. rainwater tanks) and low water use gardens should be standard requirements for all new buildings in the growth area.

P 9.2 New development in the growth area should incorporate leading edge water supply strategies, and alternative water supplies such as recycled water (including '3rd Pipe') or the use of stormwater should be explored.

P 9.3 A comprehensive sustainable water policy should be developed for the growth area, in time to be implemented from the commencement of the development. This should include both demand reduction strategies and supply strategies, and involve:

- setting the sustainable water vision for the growth area and investigation, analysis and setting of individual and collective strategies;
- policy setting within a local, regional, state and national context;
- frameworks for attracting partners to achieve the vision in a context of good sustainable business;
- promotion and education to encourage reduced consumption and higher percentage demand for sustainable water; and
- careful space planning to facilitate short and long term strategies.

P 9.4 To reduce any impact on the new development, the new feeder main should be aligned closely to the existing 825mm diameter main that currently follows the southern edge of the rail reserve, effectively duplicating the existing main. This alignment will also make use of the road and services corridor created by the planned east-west link road. From the new feeder main, connection points at strategic locations along its length will allow reticulation mains to "drop down" into the growth area as the development staging progresses.

P 9.5 The determination of the location of the new electricity distribution zone substation should take into account the visual impact of such infrastructure, and consider locations such as the linear park running alongside the proposed sub-regional transit route where it can be more easily screened.

P 9.6 Harvesting of solar energy (eg. solar hot water) should be a standard requirement for all new buildings and public lighting in the growth area.

P 9.7 A comprehensive sustainable energy policy should be developed for the growth area, in time to be implemented from the commencement of the development. This should include both demand reduction strategies and supply strategies, and involve:

- setting the sustainable energy vision for the growth area and investigation, analysis and setting of individual and collective strategies;
- policy setting within a local, regional, state and national context;
- frameworks for attracting partners to achieve the vision in a context of good sustainable business;
- promotion and education to encourage reduced consumption and higher percentage demand for sustainable energy; and
- careful space planning to facilitate short and long term strategies.

P 9.8 All new development within the growth area should provide for leading edge telecommunications technology, while remaining sufficiently flexible to facilitate its upgrade as new innovations emerge.

P 9.9 The potential should be explored for the Integrated Resource Recovery Centre (IRRC), if given the go-ahead, to be located within the proposed industrial area at Marshall.

5 NON URBAN AREAS

5.1 INTRODUCTION

The areas within the growth area excluded from urban development are:

- Barwon River floodplain
- Elevated areas at Mt Duneed
- Sloping land at Lower Duneed Road

Policies and land use options that may be suitable for these areas are discussed below.

5.2 BARWON RIVER FLOODPLAIN

The Barwon River floodplain extends almost to Barwon Heads Road, creating an extensive area of land that is inappropriate for development.¹

The area contains a stand of remnant River Red Gum woodland, which is of very high conservation significance (see Figure 5.1). This land should be acquired as a nature conservation reserve. Public access should be restricted in the core area, with interpretation and low-impact passive uses (walking on formal trails, nature study, etc) in fringing lower quality and re-vegetation areas—including alongside the river itself as part of the broader recreational trail circuit linking Waurn Ponds Creek with Armstrong Creek. This area would be appropriate for Net Gain offset works in addition to basic reserve management (control of fire, weeds, vertebrate pests, etc).

This area also contains a site alongside Barwon River and Reedy Lake, which should be exempt from future development due to its indigenous cultural heritage significance. This site is contained within the state-owned conservation reserve at the northern end of Baensch Lane.

It is appropriate for the remaining land to continue to be used for agricultural purposes. The most appropriate zone for that purpose is the Farming Zone, as this prevents the land from being further subdivided beyond the lot size specified in the schedule to the zone and, importantly, prevents any serial excisions eroding the primary agricultural purpose of the zone. The application of this zone will also encourage use and development of land based on comprehensive and sustainable land management practices, and ensures any non-agricultural uses, particularly dwellings, do not adversely affect the use of the land.

¹ It should be noted that this floodplain is not managed by the City of Greater Geelong.

At present there are existing development controls over the Barwon River floodplain provided by the Floodway Overlay and Land Subject to Inundation Overlay. It is important that these controls be maintained and extended if necessary, as the area is subject to significant flooding, as identified in earlier sections.

It should be noted that drainage is difficult in parts of the Sparrowvale drainage catchment due to slopes of less than 1 in 250. There is currently a private levee enclosing low lying land within the Sparrowvale drainage catchment to prevent inundation up to a 1-in-10 year flood. This results in a need to pump local runoff over the levee for discharge into the Barwon River.

5.3 MT DUNEED

Mt Duneed is a very prominent feature in the landscape of the growth area and its surroundings. It is occupied by a rural community defined by its location on the hill and existing community facilities.

The UGP precludes Mt Duneed from urban development due to the desire to maintain an attractive green entrance to Geelong from the south and southwest, and a green backdrop to development within the growth area. This will also protect the rural character of its township. Mt Duneed and the adjoining ridgeline along Lower Duneed Road form an appropriate southern boundary to the Geelong conurbation.

Therefore, the land outside the Urban Growth Boundary (see Figure 5.1) should continue to be used for agricultural purposes. The existing Farming Zone is primarily in place to provide for the sustainable use of land for extensive animal husbandry and crop raising.

This area also contains a significant indigenous cultural heritage site—the Mt Duneed Recreation Reserve.

5.4 LOWER DUNEED ROAD

The sloping land near Lower Duneed Road is visually prominent from Mt Duneed Road and Lower Duneed Road itself. Allowing urban development on this land would detract from the green, rural character otherwise presented within the visual catchment of those two roads.

There is also an aeolian sand dune within this area which should be exempt from future development due to high potential sensitivity for indigenous cultural heritage issues.

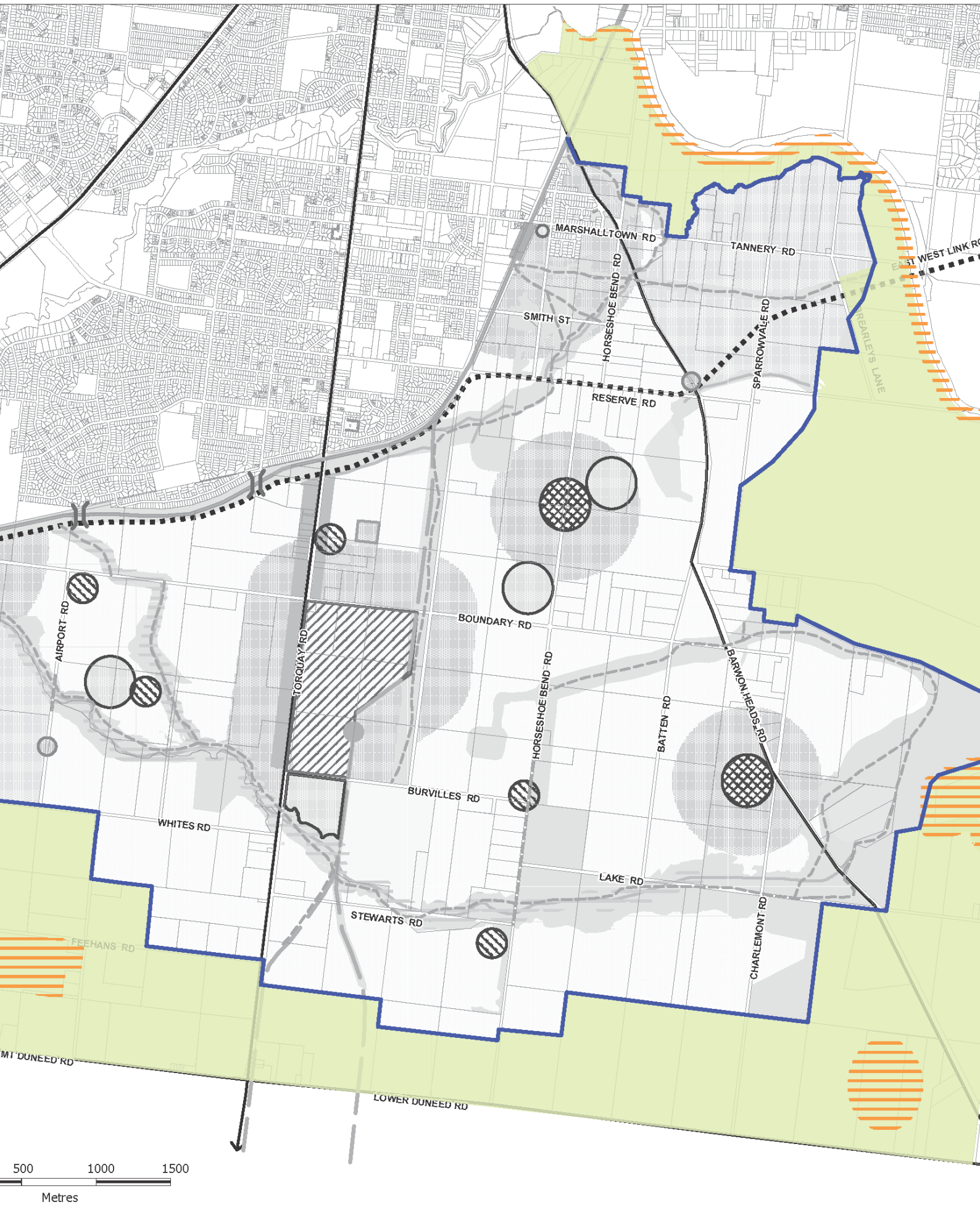
Therefore, the slopes near Lower Duneed Road are precluded from urban development. The current rural zoning will maintain the existing agricultural value of the land. The Farming Zone will ensure that the land is not further subdivided beyond the lot size specified in the schedule to the zone and, importantly, prevent any serial excisions eroding the primary agricultural purpose of the zone. The Farming Zone will have greater control over the use and development of land. This will enable the protection of the existing rural character of the area.

5.5 URBAN-RURAL INTERFACES

A number of issues need to be considered in relation to the interface between urban and non-urban land. Table 5.1 overleaf sets out the key issues, potential problems, contributory factors and potential solutions.

TABLE 5.1: URBAN-RURAL INTERFACE ISSUES

Interface issue	Potential problem	Contributory Factors	Potential Solutions
Bushfire/ wildfire	Bushfire/ wildfire most prevalent at the edge between people and fuel load	Slope (fuel load downhill is worse than fuel load uphill) Prevailing wind direction Vegetation cover, (understorey and canopy) Tree species	Fire breaks Fuel reduction zones between development and rural areas Planting and management guidelines to minimise fuel load
Drainage	Changes in hydrology with increased hard surfaces causing erosion, spreading weeds, nutrients and polarising flows affecting wildlife	Steeper slopes Loss of indigenous vegetation along creeklines	Drainage swales Bio-retention systems Detention/ retention systems Rain gardens
Visual impact	Intrusion across skyline Blocking off views Harsh edge of fire trails and breaks Light pollution at night	Slopes Loss of vegetation cover	Implement design guidelines Ensure development occurs after careful consideration of site assets, in particular existing vegetation and slopes
Ecological impacts	Garden 'escapees' Impact of run off from domestic fertilizers Feral and domestic cats and dogs killing native wildlife	Prevalent wind Slope Drainage lines Sensitivity of ecosystem	Careful lot placement WSUD Implement design guidelines Ensure development occurs after careful consideration of site assets, in particular existing vegetation and slopes
Inappropriate uses	Dumping, clearing, removal or killing of trees	Lack of surveillance Accessibility	Management Educational guidelines
Impact on farming	Farming practices often noisy, smelly, conducted in unattractive buildings and can happen at day or night	Intensive farming techniques Pesticides Weed killers	Buffer zones of screening uses or insensitive uses compatible with both adjacent uses
Change in expectations	Peripheral agricultural land may be expected to be developed one day and therefore will be less likely to be maintained	Rapidly growing urban areas Lack of certainty	Sense of commitment to planning restrictions



6 SURROUNDING AREAS

6.1 INTRODUCTION

The development of the UGP has raised a number of issues to do with surrounding lands. These are discussed below.

6.2 NORTH OF RAIL LINE

Land adjoining the growth area near Marshall Station and Rossack Drive will form part of the catchments for Marshall Station and the proposed public transport interchange at Rossack Drive, and the associated local centres. In each case, there are substantial areas of vacant, residential-zoned land within a comfortable walk of the station and centre. It is recommended that, where possible, development of these areas should conform with the minimum densities applied to equivalent areas within the growth area. This will add further support for public transport services and the planned local shops and services.

The UGP proposes a recreational trail alongside Armstrong Creek and its tributaries. The eastern end of this trail is linked to Waurm Ponds Creek via Barwon River. An opportunity exists to complete a highly attractive recreational trail circuit of sub-regional significance by connecting the western end to Waurm Ponds Creek too. The best chance to achieve this is through the development of a tree-lined walking and cycling route—between the public reserve at Mulholland Crescent, Grovedale, and Perennial Rise, which is linked to the Waurm Ponds Creek parkland at its northern end. It is, therefore, recommended that Council pursue the potential for such a link with the landowners.

6.3 NORTHWEST OF GROWTH AREA

An isolated area of rural-zoned land is located north west of the growth area at 151-229 Anglesea Road and 35 Hams Road, Waurm Ponds. The land is between the future quarry area, the railway line and residential land, and is likely to be affected by the link road that will link the Geelong Ring Road to Surf Coast Highway via Anglesea Road.

It is recommended that land on the northern side of the proposed east-west link road that is not required for road purposes be considered for future residential and/or recreation zoning. This may add to the existing residential area to the north and increase the population within the catchment of the proposed Rossack Drive Railway Station and associated local activity centre.

The future of this land should be confirmed after the alignment of the link road is determined by VicRoads and take into account amenity issues created by the road. Land that falls outside (south) of the proposed east-west link should be reviewed at the same time.

6.4 WEST OF GHAZEETPORE ROAD

A large area of land in the Special Use Zone (SUZ7 - Extractive Industry) is located west of Ghazeetpore Road outside the growth area. This land is owned by Blue Circle Cement Quarry which operates a quarry further west near Anglesea Road. It is possible that quarrying activity could eventually move closer to Ghazeetpore Road and the growth area. The UGP provides industrial, sporting and rural land uses to the east of Ghazeetpore Road. These land uses will provide a buffer between future residential areas and quarry activities. This area will also potentially provide for alternate connection to Surf Coast Highway via a realignment of Anglesea Road.

6.5 SOUTH OF MT/ LOWER DUNEED ROAD

The UGP proposes that rural land uses be maintained in the area along Mt Duneed/ Lower Duneed Road within the City of Greater Geelong. This will complement the 'green wedge' of rural land provided in the Surf Coast Shire between the northern edge of Torquay and Mount Duneed. A non-urban break or 'green wedge' will help maintain the individual identities of Torquay and Geelong and preserve the rural scenery and agricultural productivity of the area.

The UGP approach complements the Torquay Jan Juc Structure Plan (July 2006), which provides an Urban Growth Boundary limiting the urban expansion of Torquay to Blackgate Road. The distance between the two growth boundaries is approximately 4 to 5 km.

7 PRECINCT STRUCTURE PLANS

Council is committed to accelerating the planning process for Armstrong Creek and is seeking to adopt the simplified approach recently proposed for Urban Growth Zones. Under the simplified approach there will be two planning instruments required to be approved before urban development can occur in the Armstrong Creek Urban Growth Zone:

1. **A Precinct Structure Plan** needs to be prepared and incorporated into the Planning Scheme. The Precinct Structure Plan sets out the vision, future development, infrastructure requirements, developer contributions plan and outcomes for the development of a new community. The Precinct Structure Plans will be publicly exhibited and members of the public will be entitled to make a submission. If a submission is not accepted then it will be referred to an Independent Panel appointed by the Planning Minister.
2. **A Planning Permit** which is a more detailed approval for an individual development site (subdivision). Once a Precinct Structure Plan is approved by the Minister for Planning and incorporated in the Greater Geelong Planning Scheme then Council will be able to issue permits for subdivisions providing they are generally consistent with the PSP and the developer can demonstrate:
 - that the required timely infrastructure will be provided to the subdivision area;
 - that the subdivision layout will achieve integration with existing or future subdivision layouts for surrounding landholdings; and
 - that facilitates orderly development of the precinct.

7.1 PRINCIPLES – PRECINCT STRUCTURE PLANS

Precinct Structure Plans need to be prepared to provide a master plan for the development of an area by showing how the new Armstrong Creek communities will be structured and funded across multiple development sites to deliver the strategic intent of the Framework Plan.

The Armstrong Creek Urban Growth Area has seven precincts (refer figure 7.1) based on:

- drainage catchments;
- land assembly based around key features to provide a level of self containment (e.g. Activity Centres or employment nodes);
- contiguous land interests.

The seven (7) Precinct Structure Plans will be prepared collaboratively with developers (or developer consortiums) providing:

- the developer (or developer consortiums) represent at least 70% of the developable land area in that precinct;
- coordinated and efficient prior provision of essential infrastructure through the roll out of the Armstrong Creek Integrated Infrastructure Delivery Plan (IIDP). (Note that a Precinct that falls outside the sequence nominated in the IDP may still be able to proceed provided the proponent pays the cost of the earlier provision of the infrastructure or delivers acceptable alternate solutions);
- developer (or developer consortiums) planning ensures the development of liveable communities; and

- developer (or developer consortiums) plans are developed in accordance with Council's standards, meet the policies set out in the Local Planning Policy Framework, and will deliver Council's sustainable development strategies for both residential and employment areas of Armstrong Creek including:
 1. In residential/whole of community precincts the preparation of a water (and associated energy) management plan that assumes the average total household water demand (from all sources) of 216 kilolitres per household per year (kL/hh/yr) and;
 - reduces the demand for potable mains water by at least 60% from the base case - that is where mains water is the sole source of water supply for indoor and outdoor use;
 - reduces the delivery of sewerage to Black Rock by at least 50% from the base case - that is a conventional sewerage infrastructure system where all sewerage is delivered direct to Black Rock for treatment;
 - significantly decreases the creation of greenhouse gases compared to the base case - that is where mains water is the sole source of water supply (assuming the same source of energy for all options).
 2. In employment precincts the preparation of a water (and associated energy) management plan for employment areas that achieves similar targets to residential/whole of community precincts, in the reduction of potable mains water, delivery of sewerage to Black Rock and associated reduction in greenhouse gases.
 3. In all precincts the preparation of an energy management plan for energy not associated with water and sewerage that includes both supply and demand strategies to deliver a "state of the art" precinct based approach to minimising the "footprint" of the urban growth and in particular, minimises greenhouse gas emissions (e.g. targets at least 20% total energy as sourced from local renewable energy electricity generation).

