Plan 3: Local Context Plan

LEGEND
- Urban Growth Boundary
- Railway & Transport Interchanges (Provision of 3rd track within railway reservation)
- Principal Public Transport Network
- Waterways
- Arterial Roads
- Cardinia Rd Precinct Structure Plan Area
- Existing Employment
- Proposed Employment
- Existing Residential
- Existing Schools & Community Facilities
- Neighbourhood Activity Centre (NAC)
- Major Activity Centre (MAC)
- 60m Contour
- Open Space and Drainage Corridors
1.6 Site Features
Plan 4 shows the key site features of the Cardinia Road Precinct.

1.6.1 Topography, landscape and landform
The land to the north of the Princes Highway is known as ‘Foothill Ranges’ and is characterised by undulating topography with significant east-west ridgelines. The ridgelines define the south-western extent of the Eastern Victorian Uplands, the southern formation of the Great Dividing Range. There are also a number of hilltops associated with this Upland formation.

Land on the ridgelines and hilltops, north of Princes Highway (particularly above the 60 metre contour), are a ‘visually prominent landscape element’ within the region. This area is the general elevation at which the ‘flatlands’ rise noticeably to form the ridges and these ‘high points’ are very visible from many locations within the PSP. The ridgelines and hilltops provide a distinct and familiar point of reference in the landscape.

The land to the south of the Princes Highway is generally flat with few landscape features.

Lines of vegetation along creeks, roads and paddock boundaries provide a sense of local visual containment. The Toomuc and Gum Scrub Creek corridors provide the opportunity to define a strong landscape character and sense of place for the precinct.

1.6.2 Biodiversity

Flora
The broad vegetation types existing prior to European settlement in the precinct is as follows:

- Grass Forest (generally on the higher land north of the Princes Highway);
- Damp Heathy Woodland (generally along Thewlis Road and Cardinia Road corridors);
- Plains Grassland (generally in the southern part and eastern part of the precinct around the Purton Road industrial area and Toomuc Reserve);
- Swamp Riparian Complex (generally south of Princes Highway and along Gum Scrub Creek corridor); and,
- Swamp Riparian Woodland (along Toomuc Creek Corridor).

Land in the Cardinia Road Precinct has largely been cleared of indigenous vegetation as part of the previous use of the land for grazing purposes. Very little remnant native vegetation remains, although small patches of remnant vegetation occur primarily along roadsides, railways, Toomuc Creek, Gum Scrub Creek, at the corner of Thewlis and Peck Roads, and north of Mulcahy Road.

Of the broad vegetation types identified in Victoria’s Native Vegetation Management Framework, only isolated remnants exist in the following locations:

- Grass Forest—north of Mulcahy Road to the east of Thewlis Road;
- Grass Forest and Damp Heathy Woodland—the south west corner of Thewlis Road and Peck Road;
- Swamp Riparian Woodland and Swampy Woodland—along the Toomuc Creek (generally north of the railway line); and,
- Swamp Scrub—patches located along the Gum Scrub Creek.

Fauna
The overall value of most habitats within the study area for fauna is low as the study area had been highly modified and dominated by exotic pasture grasses of low ecological value.

Remnant vegetation, roadside vegetation and planted vegetation provides habitat for many species (primarily birds). Roadside vegetation in the study area also provides linkages to larger areas of woodland and forest to the north of the study area. Overall, a small number of common and introduced birds are likely to use habitats within the study area, while ground dwelling fauna are expected to be depleted.

No fauna species of national or state significance were recorded within the study area, however one nationally threatened fauna species (Growling Grass Frog) is known to reside in the study area.
The nationally endangered Growling Grass Frog (GGF) has been recorded south of the Princes Highway. Ecological advice prepared as part of the development of the CRPSP confirmed that it is important that as many occupied and adjacent unoccupied waterbodies are conserved as possible to assist in GGF conservation.

In relation to the CRPSP area:

- Likely frog movement corridors are located south of the railway line reservation and within Gum Scrub Creek.
- Habitat protection/connectivity and investigation areas for habitat creation/augmentation are located within the proposed Melbourne Water stormwater treatment wetland, Gum Scrub Creek and Toomuc Creek.

In addition to this, a small localised cluster of occupied sites, including breeding sites is located within the constructed wetlands of the Delfin housing estate. This small cluster represents an area of high conservation significance due to the large population size. However, the report identifies that the future viability of some of these sites is uncertain, given the lack of movement corridors to occupied sites to the south.

A focus of development in the Cardinia Road Precinct is on the restoration of habitat, particularly along the Toomuc and Gum Scrub Creek corridors and within the stormwater treatment wetlands.

1.6.3 Groundwater / salinity
Land within the urban growth area has high salinity risk based on groundwater depths of 0m – 2.0m and 2.0m – 5.0m.
The high groundwater table is partly caused by the loss of vegetation in the foothills area to the north, particularly geology of Silurian Sedimentary origin.

Sinclair Knight Merz (SKM) undertook a comprehensive review of the available hydrogeological technical documents.
A review of the SKM work was undertaken by Coomes Consulting Group, in consultation with SKM. The Coomes Report concluded that design and construction techniques are available to address and manage watertable issues to ensure that urban development is not impacted by existing watertable constraints.

1.6.4 Waterways
The Cardinia Road Precinct is within the catchment of Western Port.
Western Port is recognised as a site of international importance in terms of its wetlands and as a site for migratory shorebirds. The wellbeing of this ecosystem is directly related to the health of its catchment.

A major threat to the Western Port environment including seagrass beds is the deposition of sediment and pollutants from upstream catchments.

The two major waterways within the precinct are the Toomuc Creek and Gum Scrub Creek.
These waterways have been substantially altered from their natural state and the index of stream conditions show a high proportion of the waterways in the Westernport catchment as being in a poor or degraded condition. The management of the quantity and quality of water discharged from the Precinct (and the Growth Area as a whole) is critical to protecting the environment of the Western Port, and in controlling erosion.
1.6.5 Heritage

Aboriginal Cultural Heritage
Recent archaeological studies within the Shire of Cardinia have revealed evidence of the use of the region by indigenous people. It is apparent that remains of indigenous campsites are likely to occur across the entire Koo Wee Rup floodplain.

Indigenous archaeological sites are associated not only with existing stream channels, but with landform elements such as prior stream channels, levees, sandy alluvium and hills on and to the north of the Koo Wee Rup Plain.

The Aboriginal heritage study for the urban growth corridor, has suggested that:

- intact and deeply buried indigenous archaeological sites, are more likely to survive in sand and sandy alluvium on the Koo Wee Rup Plain and on the floodplains of the upper reaches of Cardinia, Toomuc, Deep and Ararat Creeks and the Bunyip River; and,
- on the shallow alluvial and clay soils, essentially eroded surfaces, which have formed on the Silurian bedrock of the hills in the north of the Urban Growth Corridor, indigenous archaeological sites are more likely to be found within 200mm-300mm from the surface.

In this context, they are more likely to have been disturbed by land use since European settlement and land clearance.

Indigenous archaeological sites are most likely to be located by conducting heritage assessments using a combination of surface archaeological surveys and sub-surface testing.

European Heritage
No sites of European heritage significance are located within the Cardinia Road Precinct Structure Plan area.

However, the Pakenham Cemetery (Thewlis Road) has been identified as requiring further research as to whether a citation should be made.
Plan 4: Site Features Plan

LEGEND
- Structure Plan Area
- Existing Creeks
- Drainage Lines
- Lakes/Waterbodies
- Areas of Elevation & Significant Slope
- Ridgelines
- 5m Contours
- Land above the 60m Contour
- Existing Long Views
- Existing Short Views
- Hill Tops
- Land Subject to Inundation (LSIO)
- Floodway Overlay (FO)
- Slope greater than 20%
- Existing Major Easements
- Existing Vegetation (approx. location)
2.1 Vision
The vision for the Cardinia Road Precinct is to create a new community that is structured to:

• **Reduce greenhouse gas emissions and promote a healthy, active way of life** by reducing car dependency by taking full advantage of the proposed Cardinia Road rail station, with well designed higher density housing, activity centres, and subdivision design to maximise walking and cycling to the station. This will also be achieved by planning for local employment and supporting activity centres along the SmartBus serviced Princes Highway corridor supported by local bus services.

• **Develop a broad social-economic mix** through provision of a range of housing and lifestyle opportunities from higher density housing near the services and amenity of the station, activity centres and landscape responsive open space and lower densities around the northern ridges.

• **Create good transport and community links to surrounding precincts** in the west, east and south, both in terms of road and trail links, and in terms of planning for access to a hierarchy of retailing, employment, open space, community and education facilities.

• **Create well designed development that embraces sustainable urban development practices** such as treed roads and streets, well designed higher density housing and activity centres and provision of recycled water to each home and business.

• **Provide positive environmental outcomes through the provision of a range of open space opportunities**, including natural open space for the conservation of environmental features such as remnant vegetation, prominent hill tops and open corridors along the Toomuc Creek and Gum Scrub Creek for stormwater management, habitat restoration, passive recreation and as a landscape feature.

Development is much more than just the subdivision of land. It is about the development of new neighbourhoods and communities where people will live and interact.
2.2 New Community Structure

The Cardinia Road Precinct Structure Plan is provided in Plan 5.

The components of the Cardinia Road Precinct Structure are as follows:

- A **range in housing densities** that will lead to the creation of a variety of housing types across various levels of affordability, catering for people in different stages of their lives.
  
  Housing densities will be **responsive** to the character of the natural environment and site characteristics.

- **Medium density housing** will be provided in **strategic locations** within close proximity to activity centres, public transport and ‘higher’ amenity areas, such as open space.

- **Neighbourhood Activity Centres** and / or **Neighbourhood Convenience Centres** within walking or cycling distance of each dwelling, and/or located along a legible and safe road network.
  
  The **Activity Centres will be a community focus**, which includes a cluster of community facilities such as community buildings, open space and education purposes.

- A **clear road hierarchy and layout** that includes a local arterial road network that provides a strong and attractive urban environment through landscaping.

- A **grade separated crossing** of Cardinia Road and the railway line is a significant element of the road network to allow safe and efficient north / south bound traffic movement to / from the Pakenham Bypass.

- Direct and accessible **bus routes** will be within 400m of 95% of homes via a PPTN network (Princes Highway) and / or the main / local road network.

- A **train station** located on the Gippsland Railway Line that is an integral part of the adjoining Neighbourhood Activity Centre.

- **Safe walking and cycling paths** are provided via the road network and the open space trail network, which includes pedestrian bridges over the creek network and pedestrian underpasses of the rail network (to be funded by the Development Contributions Plan).

- A **number of open space areas** are provided ranging from local open space, passive open space (conservation/restoration areas and linear open space) and active open space (district sport reserves) to cater for the variety of interest and ages within the community.

- The **protection and enhancement of habitat** of the Growling Grass Frog via the drainage network.

- The **protection of the visually prominent landscape** element north of the Princes Highway by encompassing the land within public open space and limiting the type / density of development.
2.3 Land Use Budget

The Structure Plan area has been divided into six neighbourhoods or “cells”, as shown in Plan 6. The Cardinia Road Precinct covers an area of approximately 1051 ha\(^1\). The Precinct Structure Plan comprises a range of different land use components. The following land use components have been deducted to determine the Net Developable Area for each Cell within the PSP:

- **Encumbered Open Space** includes:
  - Toomuc, Gum Scrub & Quirks Creek
  - drainage easements / stormwater management
  - EVCs
  - Aboriginal Cultural Heritage
  - Growling Grass Frog Habitat Corridor.

- **District Open Space** includes:
  - District Parkland
  - District Sports Reserves
  - Neighbourhood Sports Reserve

- **Major easements**
  - Gas pipeline

- **Local Arterial Roads** includes Local Arterial Roads (Divided and Undivided).

- **Community Facilities** includes:
  - Railway Station Land
  - State Primary School
  - State Post Primary School
  - Regional Community Facilities (Cardinia Cultural Centre)
  - Local Community Facilities
  - Pakenham Cemetery
  - Emergency Services

In order to calculate the Residential Net Developable Area for each Cell within the PSP commercial land components were deducted.

- **Commercial Land** includes:
  - Neighbourhood Activity Centres/Core Business
  - Peripheral commercial
  - Pakenham Homemaker Precinct
  - Neighbourhood Convenience Centres

A local public open space contribution of 8% has also been excluded from each cell within the PSP to determine the Net Residential Developable Area.

The Land Use Budget is outlined in Table 1: Land Use Budget and depicted in Plan 7: Land Use Budget Plan.

---

\(^1\) This excludes the industrial area adjacent to Cell 2, the railway reservation, Princes Highway & Cardinia Road (including land required for road widening).
# Table 1: Land Use Budget

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Cell 1</th>
<th>Cell 2</th>
<th>Cell 3</th>
<th>Cell 4 (1)</th>
<th>Cell 5</th>
<th>Cell 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Area (ha) (2)</strong></td>
<td>284.4</td>
<td>121.3</td>
<td>68.8</td>
<td>257.1</td>
<td>147.4</td>
<td>171.8</td>
<td>1050.8</td>
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<tr>
<td><strong>Deductions (3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encumbered Open Space (ha)</td>
<td>39.0</td>
<td>6.4</td>
<td>6.4</td>
<td>21.6</td>
<td>18.4</td>
<td>9.7</td>
<td>101.5</td>
</tr>
<tr>
<td>District Open Space (ha)</td>
<td>16.2</td>
<td>0.0</td>
<td>8.0</td>
<td>34.4</td>
<td>8.0</td>
<td>8.0</td>
<td>74.6</td>
</tr>
<tr>
<td>Major Easements</td>
<td>4.5</td>
<td>3.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>7.8</td>
</tr>
<tr>
<td>Local Arterial Roads (ha)</td>
<td>8.8</td>
<td>1.5</td>
<td>0.0</td>
<td>2.1</td>
<td>6.0</td>
<td>7.0</td>
<td>25.4</td>
</tr>
<tr>
<td>Community Facilities (ha)</td>
<td>3.9</td>
<td>2.2</td>
<td>0.3</td>
<td>9.4</td>
<td>3.9</td>
<td>13.9</td>
<td>33.6</td>
</tr>
<tr>
<td><strong>Net Developable Area (ha)</strong></td>
<td>212.0</td>
<td>107.9</td>
<td>54.1</td>
<td>189.6</td>
<td>111.1</td>
<td>133.2</td>
<td>807.9</td>
</tr>
<tr>
<td><strong>Breakdown of Net Developable Area (ha)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core Retail &amp; Peripheral Commercial (ha)</td>
<td>0.5</td>
<td>19.2</td>
<td>3.8</td>
<td>9.8</td>
<td>3.7</td>
<td>8.1</td>
<td>45.1</td>
</tr>
<tr>
<td>Residential land (ha)</td>
<td>211.5</td>
<td>88.7</td>
<td>50.3</td>
<td>179.8</td>
<td>107.4</td>
<td>125.1</td>
<td>762.8</td>
</tr>
<tr>
<td><strong>Net Residential Developable Area (ha)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8% Local Public Open Space of Residential land (ha)</td>
<td>16.9</td>
<td>7.1</td>
<td>4.0</td>
<td>14.4</td>
<td>8.6</td>
<td>10.0</td>
<td>61.0</td>
</tr>
<tr>
<td><strong>Total Net Residential Developable Area</strong></td>
<td>194.6</td>
<td>81.6</td>
<td>46.3</td>
<td>165.4</td>
<td>98.8</td>
<td>115.1</td>
<td>701.8</td>
</tr>
</tbody>
</table>

(1) Existing Urban Area
(2) Excludes the industrial land adjacent to cell 2, the railway reserve, Princes Highway and Cardinia Road (Including land required for road widening)
(3) Further detail in relation to the deductions is outlined in the Cardinia Road Precinct Development Contributions Plan, September 2008
Plan 7: Land Use Budget Plan

LEGEND
- Structure Plan Area
- Local Arterial Road
- Railway Line
- Proposed Rail Station Land
- Residential Land
- Low Density Residential Land
- Core Business and Peripheral Commercial
- Community Facilities
- District Open Space
- Open Space (encumbered)
- Major Easements
- Medium Density Residential
  (400m Walkable Distance)

NOTES
- Part encumbered and part unencumbered open space. (For the purpose of Table 1: Land Budget, this has been classified as ‘District Open Space’)
2.4 Demographic Projections

In line with the Community Profile undertaken by ID Consulting, an average household size for calculating the future population in the Cardinia Road Precinct is 2.8 people per dwelling.

A snapshot of the anticipated community for the Cardinia Road Precinct Structure Plan is provided in:
- Table 2: Estimated Future Population in the Cardinia Road Precinct.
- Figure 1: Likely population distribution in the Cardinia Road Precinct.
- Figure 2: Likely proportion of household types with the Cardinia Road Precinct.

<table>
<thead>
<tr>
<th>Cells within PSP</th>
<th>Dwellings(^{(4)})</th>
<th>Population(^{(5)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell 1(^{(1)}) (3)</td>
<td>2,321</td>
<td>6,499</td>
</tr>
<tr>
<td>Cell 2(^{(2)})</td>
<td>979</td>
<td>2,741</td>
</tr>
<tr>
<td>Cell 3(^{(3)})</td>
<td>685</td>
<td>1,918</td>
</tr>
<tr>
<td>Cell 4</td>
<td>2,409</td>
<td>6,745</td>
</tr>
<tr>
<td>Cell 5</td>
<td>1,556</td>
<td>4,357</td>
</tr>
<tr>
<td>Cell 6</td>
<td>1,888</td>
<td>5,286</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9,838</strong></td>
<td><strong>27,546</strong></td>
</tr>
</tbody>
</table>

\(^{(1)}\) Includes 38% Low Density Residential Development
\(^{(2)}\) Includes 36% Low Density Residential Development
\(^{(3)}\) Based on the Approved Development Plan
\(^{(4)}\) Based on the minimum estimate of existing urban development, proposed subdivision layout and estimated development proposed on integrated development sites for Cell 4, 5 dw/ha for low density residential development within Cell 1 and 2, an average 20 dw/ha for medium density locations where an approved Development Plan does not exist, and an average of 15 dw/ha for the balance of the residential land.
\(^{(5)}\) 2.8 people per dwelling is based on Community Profile, 2001 and 1996 Census Information for Growth Area Region, Profile I.D (2006)
Children aged from newborn to preschool age will make up 8.7% of the community within the precinct; 22.6% will be of school age (ranging from 5 years old to 17 years old); and, around 13% of the community will be within the 60+ age bracket.

Source: Based on Community Profile, 2001 and 1996 Census Information for Growth Area Region, Profile i.d (2006).

It is anticipated that at the completion of residential development of the Cardinia Road Precinct (Year 2021):
- the majority of household types will be made up of ‘couples with dependants’ (42%); and,
- smaller households (made up from combining figure of ‘couples without dependants and ‘lone person’ households) are to make up 41% of the households within the community.
This chapter sets out objectives and development principles for the following themes:

- Transport
- Housing & Lot Size Diversity
- Activity centres
- Employment areas
- Community infrastructure
- Open space
- Biodiversity
- Image, character and unique features
- Heritage
- Physical services
- Development staging

Figure 3 sets out how the themes are to be implemented.

Each theme includes:

- **Objectives** – that must be achieved;
- **Development Principles** - that must or should be met.

Alternative approaches to the Development Principles, that achieve the objectives, can also be considered to the satisfaction of the Responsible Authority.
3.1 Transport

3.1.1 Objectives

- To provide a sustainable transport network that reduces dependence of car use and encourages walking and cycling within neighbourhoods.
- To provide an efficient, legible and safe local road network that:
  - complements the role and function of the arterial road and highway networks; and,
  - provides good internal movement within and between neighbourhoods and good access to external destinations.
- To provide a well planned public transport network that connects to the new railway station, and provides for the safe and efficient operation of bus movements.
- To provide for safe and efficient pedestrian and bicycle movements to connect the station, activity centres and major community facilities.
- To ensure that the new railway station forms the key focus of a new activity centre, and is supported by park and ride facilities.
- To provide for landscaping of roads and streets to create key public spaces, landscape corridors and provide a contribution to the creation of an attractive urban environment.

- To create an attractive and safe interface with major arterial roads and encourage the provision of services roads along arterial roads.
- To plan for the future grade separation of Cardinia Road at the Gippsland Railway line.
- To mitigate impacts of traffic noise from the Pakenham Bypass to an acceptable level.

3.1.2 Development Principles

3.1.2.a Transport Network

The development of the transport network should meet the requirements of:

- Plan 8: Road Network Plan;
- Plan 9: Public Transport Network Plan;
- Plan 10: Walking and Trails Network Plan;
- Table 3: Road Hierarchy; and,
- Figure 4: Cardinia Shire Urban Road Standards (August 2006).
Plan 8: Road Network Plan

LEGEND
- Structure Plan Area
- Primary Arterial Road (VicRoads)
- Local Arterial Road (divided)
- Local Arterial Road (undivided)
- Collector Road
- Cardinia Road under rail
- Signalised intersections
- Other traffic control devices
- Railway Line, Proposed Station & car park
- Neighbourhood Activity Centre (NAC)
- Neighbourhood Convenience Centre (NCC)
- Community & Educational facilities
- Public open space
- Existing Major Easements
- Existing creeks
- Drainage lines
- Lakes/waterbodies
- Pedestrian Crossing to Proposed Station

Cardinia Road Precinct Structure Plan September 2008 25
Table 3: Road Hierarchy

<table>
<thead>
<tr>
<th>Road/Street Type</th>
<th>Indicative VPD(1)</th>
<th>Road Reservation</th>
<th>Function &amp; Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Arterial Road (Vic Roads)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Princes Highway</td>
<td>45,000 vpd</td>
<td>Existing 66m to 96m reservation</td>
<td>• 6 lane divided road</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 2 x 11m carriageways</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 35m median narrowing to 10m at Gum Scrub Creek and Lakeside Boulevard</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• No direct property access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• PPTN bus route</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Arterial Road (Vic Roads)</td>
<td>20,000 – 25,000 vpd</td>
<td>40m reservation</td>
<td>• 6 lane divided road north of the Local Arterial Road, 6 lane divided road south of the Local Arterial Road</td>
</tr>
<tr>
<td>Cardinia Road</td>
<td></td>
<td>20,000 vpd, north of Local Arterial Road</td>
<td>• 4 lane divided road north of the Local Arterial Road, 6 lane divided road south of the Local Arterial Road</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50,000 vpd, south of Local Arterial Road</td>
<td>• 2 x 8m carriageways, 2 x 11m carriageways</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 6m median strip</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• No direct property access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Grade separated at the railway line (underpass preferred option)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Potential local bus route</td>
</tr>
<tr>
<td>Local Arterial Road (Divided)</td>
<td>5,000 – 15,000 vpd</td>
<td>33m reservation</td>
<td>• 4 lane divided road</td>
</tr>
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<td></td>
<td>• 2 x 7.5m carriageways</td>
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<td></td>
<td></td>
<td>• 6m median</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Direct property access limited</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Potential local bus route</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Accommodate mature canopy trees in median strips (where provided) and roadside nature strips</td>
</tr>
<tr>
<td>Local Arterial Road (Undivided)</td>
<td>5,000 – 10,000 vpd</td>
<td>24m reservation</td>
<td>• 1 x 11m carriageway</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Direct property access limited</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Potential local bus route</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Accommodate mature canopy trees in median strips (where provided) and roadside nature strips</td>
</tr>
<tr>
<td>Collector Street</td>
<td>&lt; 5,000 vpd</td>
<td>18.5m reservation</td>
<td>• 1 x 7.5m carriageway</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Direct property access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Potential local bus route</td>
</tr>
<tr>
<td>Local Street</td>
<td>&lt; 2,000 vpd</td>
<td>17m reservation</td>
<td>• 1 x 7.5m carriageway</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Direct property access</td>
</tr>
<tr>
<td>Court</td>
<td>150 vpd</td>
<td>15m reservation</td>
<td>• 1 x 5.5m carriageway</td>
</tr>
</tbody>
</table>

(1) VPD = Vehicles per day
Figure 4: Cardinia Shire Urban Road Standards (August 2006)
Local Arterial Road (Undivided)

Local Arterial Road (Divided)

Figure 4: Cardinia Shire Urban Road Standards (August 2006) (Continued)
3.1.2.b Arterial Roads

Arterial Roads and Service Roads
A combination of design treatments should be used along arterial roads to add visual interest.

Long sections of rear fencing along arterial roads will not be supported.

Provision is to be made for points of pedestrian permeability between the arterial and local arterial roads, with landscape treatment.

The design of service roads may include the following design solutions:
- Short sections of side or rear fencing incorporated in the overall design layout.
- Housing separated from, but still addressing the arterial road.
- A reserve that allows for dense tree plantations.
- Open-ended courts, with associated landscape treatment.
- Limited access points to arterial roads to key points where traffic can be managed.
- Links and connections into the local road networks within residential development.

Have regard to:
- Figure 5: Typical cross-section of a service road;
- Figure 6: Landscape treatment of open ended courts; and,
- Figure 7: Use of Service Roads and Tree Reserves along arterial road.

Signalised Intersections
Signalised intersections should be:
- provided where there is an intersection of a primary arterial road with another primary arterial road, local arterial road or an access point to a high traffic generating use (eg: industrial precinct, activity centre).
- provide a direct and safe crossing point of the primary arterial road for pedestrians and cyclists.

Freeway Noise Attenuation
The developer will be required to attenuate traffic noise from the Freeway to a level of 63 dB (or level determined in consultation with Council and Vic Roads) to the satisfaction of Vic Roads.

Noise attenuation measures should be designed and constructed (at the cost of developers) to the standards outlined in the Noise Mitigation Report undertaken by Marshall Day Acoustics and LandDesign in consultation with VicRoads and Council.

Cardinia Road Grade Separation
The Cardinia Road Grade Separation must be designed to ensure:
- efficient north and south bound traffic movement to and from the Pakenham Bypass;
- an appropriate interface with surrounding commercial or retail development;
- physical and visual connectivity between the Station, Activity centre, and surrounding development;
- provision is made for a bridge for a collector road which runs parallel to the railway line reservation, on the south side; and,
- provision is made for a bridge for a pedestrian / cycle link across Cardinia Road on the north side.

The preferred urban design outcome for the Cardinia Road Grade Separation is for an underpass.

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12 The Noise Mitigation Report is to be funded by the Cardinia Road Precinct Development Contributions Plan, September 2008

13 The grade separation of Cardinia Road and the Gippsland Railway line is partly funded by the Cardinia Road Precinct Development Contributions Plan, September 2008
3.1.2.c Public Transport

Cardinia Road Railway Station
Cardinia Road Railway Station must be designed to:

- be integrated with the Neighbourhood Activity Centre on the south side of the railway line;
- provide for bus access, taxi facilities and include pedestrian and bicycle access;
- incorporate features to help to identify the station as key facility in the area;
- provide a park and ride role for the Cardinia Road Precinct and wider region;
- incorporate significant car parking spaces, including 1.4ha on the north and 1.6ha south side of the railway line; and,
- provide options for multi deck parking to meet potential future car parking demand.

Bus Network
Roads designated as potential bus routes should be designed to:

- accommodate bus movements;
- provide bus stop facilities at strategic locations along the Princes Highway PPTN bus route and local bus route; and,
- provide controlled means of pedestrian access across the Princes Highway.

Bus stops facilities should:

- be located as close as possible to Activity Centres and activity generating land uses;
- have an average stop spacing of 300 metres between each stop;
- be provided with direct and safe pedestrian access connected to an existing pedestrian/shared path.
- include a bus bay, shelter, sealed pathway access and lighting for bus stops along the PPTN and a bus bay, shelter and sealed pathway access for the local bus network; and,
- be to the satisfaction of the Public Transport Division of the Department of Transport.

3.1.2.d Walking and Trails

Shared pathways should be provided:

- along primary arterial and local arterial roads;
- along Toomuc Creek and Gum Scrub Creek (which includes an underpass of the railway line); and,
- adjacent to the Pakenham Bypass.

Shared pathways should be designed and located to maximise passive surveillance and provided in wide road verges with safe crossing points at key locations. The local street network should be designed to provide permeable and safe routes for walking and cycling to activity centres, community facilities, parks and open space, major trail networks and public transport. A pedestrian underpass of the railway line for pedestrians and cyclists should be provided approximately midway between Cardinia Road and Toomuc Creek, and as part of the Toomuc Creek and Gum Scrub Creek trail networks.

Bicycle Parking Facilities
Bicycle parking facilities should be provided in activity centres, at the railway station and at other appropriate locations in accordance with the requirements contained in the planning scheme.

14 8 bus stop facilities along the PPTN and 16 bus stop facilities along the local bus network are funded by the Cardinia Road Precinct Development Contributions Plan, September 2008
15 Detail of works required, timing of provision and allocated cost is outlined in the Cardinia Road Precinct Development Contributions Plan, September 2008
16 Funded by the Cardinia Road Precinct Development Contributions Plan, September 2008
17 Funded by the Cardinia Road Precinct Development Contributions Plan September 2008
Figure 5: Typical cross section of a Service Road

Figure 6: Landscape treatment of open ended courts
Arterial road interface principles - service roads

- Natural features (ie. existing trees) can be integrated into service road design to provide interest along interface with arterial roads.

- Rear fence interface with arterial roads creates an unattractive and unfriendly interface, and promotes disconnected communities. Alternative solutions (such as service roads) are preferred.

To add interest, alternate between lots facing the arterial road and lots siding on (with a landscape buffer between the lots and the road).

Internal service roads with lots oriented to front arterial, but with separation from major traffic route.

Avoid long uninterrupted lengths of service road.

Side fences with space for landscape treatment.

Direct access to service roads from arterial road should be limited to key points for better traffic management.

Figure 7: Use of Service Roads and Tree Reserves along Arterial Roads.
3.2 Housing & Lot Size Diversity

3.2.1 Objectives

- To ensure greater housing choice, diversity and affordability and provide a range of lot sizes, housing types and lifestyle opportunities to satisfy the needs and aspirations of the community and provide for changing needs overtime.
- To provide a range of residential densities across the precinct to respond to local circumstances and housing market conditions, and to support the efficient provision of infrastructure and services.
- To ensure an increase in housing density occurs in the context of a commensurate increase in the standard of urban design and infrastructure delivery.
- To provide residential neighbourhoods with attractive streetscapes and a high quality urban design and distinct urban character.
- To ensure that the dwelling, rather than the garage, is the dominant feature of the streetscape.
- To provide lot sizes and housing types that are responsive to the character of the natural and built environment in the area and respond to principles of environmental sustainability.
- To provide for lower density development in areas with significant slope; significant vegetation; the prominent ridgelines; and/or at the interface with green wedge areas.

- To ensure that, on lower density lots, building envelopes are provided on lower density lots that are located to protect vegetation and visual prominence of ridgelines, maintaining the natural skyline of the ridge.
- To encourage medium density housing within 400m walking distance of an activity centre and/or the proposed railway station.
- To provide integrated housing sites within or at the interface of activity centres, and overlooking local and linear open space.
- To achieve an appropriate interface with open space and between areas of different densities.