

Pakenham East



Background Report

January 2018

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1 INTRODUCTION

The Victorian Planning Authority (VPA) in consultation with Cardinia Shire Council (CSC) has prepared a draft precinct structure plan (PSPs) for the Pakenham East precinct. A PSP is a 'big picture' plan that sets the vision for developing new communities and is the primary plan for guiding urban development in the growth areas of Melbourne.

The precinct was included in the Urban Growth Boundary as part of the Logical Inclusions process in 2012.

The area will undergo a full transition of land use as part of large scale residential development, with considerable population increase and demographic change.

Cardinia Shire Council commissioned a number of background technical studies to inform the future urban form of the precinct. The purpose of this document is to provide a summary of the findings of these studies and to highlight issues and opportunities that were considered in the preparation of the PSP.

1.1 Purpose

This report summarises the key findings presented by the technical reports and analysis that informed the preparation of the Pakenham East Precinct Structure Plan (PSP); and explains how this information guided the preparation of the proposed future urban structure. More specifically, this report:

- Summarises the strategic context of the precinct;
- Outlines the physical context of the site including topography, vegetation, waterways and contamination. Identifies the land use and development needs for the precinct; and
- Explains how the PSP responds to the key findings of the above.

The technical reports listed in section 1.3 provide specific detail on the key elements outlined by this report.

1.2 Summary of PSP

In summary, the Pakenham East precinct:

- Will be a residential precinct as guided by strategic planning policy;
- Will provide a total of 435.94 hectares of residential, with 6.43 hectares for a local town centre. The local town centre will serve a largely local catchment;
- Will provide a small and local enterprise precinct within the Local Town Centre to encourage lower-cost, flexible space for a range of small local enterprises, to ensure these centres have an ability to adapt and evolve over time;
- Plans for a population of between 20,000-22,200 people at various residential densities in response to walkable catchments within the urban structure;
- Comprises an urban structure that draws upon and integrates the site's existing physical features including undulating topography, significant native and exotic vegetation, a natural waterway system and an area of biodiversity significance;
- Will set aside a conservation and drainage area adjacent to Deep Creek;
- Provides an extensive open space network designed with the site's topography and natural features;
- Requires the following infrastructure:
 - Road and path network;
 - Integrated Water;
 - Government and non-government primary Schools;
 - Government secondary School.

- Community facilities;
- Sports reserve and local park;
- Utility services.

2 METROPOLITAN AND REGIONAL CONTEXT

The metropolitan and regional context for the Precinct is shown in the PSP on *Plan 1 – Regional Context*.

2.1 Metropolitan and Regional Context

The Pakenham East precinct is an existing rural area in the South Eastern Growth Corridor in the Cardinia Shire and covers the localities of Pakenham, Nar Nar Goon and Nar Nar Goon North. The precinct sits amongst the southern extent of the Dandenong Ranges and is characterised by foothills and valleys with defined ridgelines. It is located 56km southeast of Melbourne, 20km east of the Narre Warren-Fountain Gate Principal Activity Centre, and 6km east of the Pakenham town centre. The precinct is bounded by the Princes Freeway to the south, Ryan Road and Deep Creek to the west, the electricity transmission easement area to the north, and Mt Ararat Road and Mt Ararat Road North to the east.

The area will undergo a full transition of land use as part of large scale residential development with considerable population increase and demographic change, with commercial areas and community facilities to support it. Pakenham East will be home to between 20,000-22,200 residents in the next 20-30 years, contributing to the projected population increase to 161,700 within the Cardinia Shire by 2031.

Pakenham is a Major Activity Centre (MAC) that services areas both within and beyond the municipal boundary. The *Cardinia Road Employment Precinct (CREP)* is an emerging employment area 7km to the south-west of the Pakenham AC and is envisaged to be a multi-functional regional employment area that provides a greater mix of jobs. The *South East Business Park (SEBP)*, located approximately 2 to 3km to the south west of Pakenham East PSP will provide approximately 1,500ha of future employment land.

The Pakenham East study area was only included within the urban growth boundary following the 'logical inclusion' process in 2012, which means that the area was not identified in the south east growth corridor plan, a high level integrated land use and transport plan that provides a strategy for long term development in the south-eastern growth area corridor of Melbourne. The Logical Inclusions Advisory Committee supported the inclusion of the Pakenham East area due to a need to increase land supply for housing in the growth corridor, but having landscape constraints to the north and the south.

The Pakenham East precinct will contribute to a residential community for the south east. The location adjacent to Pakenham maximises the use of existing infrastructure and supports the Pakenham MAC. It will also play a role in providing necessary community facilities for the greater area.

The precinct will be serviced by a Local Town Centre (LTC) and a Local Convenience Centre (LCC) that incorporates retail, specialty retail, and a mix of commercial areas. It will provide local employment for the community and reduce the need to travel outside of the precinct for daily shopping needs.

The Deep Creek corridor that runs north-south through the western part of the precinct is identified as having areas of biodiversity and landscape values. Appropriate reserves and planning controls will ensure the long term protection of the native vegetation and habitat. Much of the rest of the precinct is cleared, agricultural land with little native vegetation to be retained.

2.2 Surrounding Areas

A number of new settlements are currently planned, being developed or development has recently finalised around Pakenham East. Surrounding land uses and developments relevant to the precinct include:

Pakenham South Employment Precinct Structure Plan

Pakenham South Employment precinct lies to the south-west of Pakenham East. The precinct comprises approximately 190 hectares of existing employment land, and is bordered by the Princes Freeway to the north, McGregor Road to the west, Koo Wee Rup Road to the east, and the Urban Growth Boundary to the south. The precinct is planned to provide opportunities for industries to operate in a defined employment hub.

Cardinia Road Precinct Structure Plan

The Cardinia Road PSP was approved in November 2008. The precinct lies to the west of Pakenham East and the Pakenham Township. The Princes Highway runs east-west through the centre of the precinct, with the railway line running through the southern area. The 1051 hectare precinct is planned to be largely residential, with a large Neighbourhood Activity Centre (NAC), a small NAC and a Neighbourhood Convenience Centre (NCC).

Cardinia Road Employment Precinct Structure Plan

Cardinia Road Employment PSP is located to the south-west of Pakenham East. The PSP was approved in October, 2010 and will guide the development of a 595 hectare integrated business and industrial park, supported by a neighbourhood activity centre and some high density housing.

Officer Precinct Structure Plan

Officer PSP lies to the west of Cardinia Road PSP, and was approved in December 2011. The precinct is based around a transit-oriented Major Activity Centre and is further supported by a Neighbourhood Activity Centre and multiple Neighbourhood Convenience Centres, with predominantly residential areas.

3 LOCAL CONTEXT

The geographic region is low lying alluvial plains. The area is situated at the foothills of the Dandenong Ranges, where they meet the low lying alluvial plains of the Koo Wee Rup Swamp.

The majority of land is currently zoned Farming Zone (FZ), with small areas zoned Low Density Residential along Ryan Road. Deep Creek and Hancocks Gully are covered by the Land Subject to Inundation overlay and the Floodway overlay. The northern hills area are covered by an Environmental Significance Overlay (ESO).

Pakenham East is largely comprised of pastoral land uses, primarily used for grazing, that have highly modified and dominated the character of the area. Isolated patches of vegetation occur generally along the Deep Creek corridor and within the Princes Highway road reserve. Some scattered indigenous trees have been recorded in the study area.

Pakenham East is well placed to deliver a new community and provide a diversity of housing options and local services. At full development, Pakenham East will accommodate in excess of 7,100 dwellings based upon an average density of 16.40 lots per hectare. It will be of a scale in which local and higher level facilities can be delivered to service new communities and will include Pakenham East Local Town Centre.

Given its proximity and access to major arterial roads, Pakenham East will be well connected to surrounding facilities and connections to Pakenham train station.

3.1 PSP Size, Lot Size and Ownership Pattern

The Pakenham East PSP applies to approximately 629 hectares

There are 50 properties in total. Lot sizes across the precinct range from .30 hectare to approx. 72 hectares. Most parcels have 1 house on the site.

Landholdings are generally medium to large, corresponding with the use of the land for pastoral purposes, hobby farms and rural residential subdivision. Parcels towards Ryan Road are generally smaller than 2 hectares and currently provide rural lifestyle lots.

3.2 Topography, Geology and Waterways

The dominant landform within Pakenham East is foothills and valleys with defined ridgelines. The area has been substantially modified with agricultural and pastoral land use. The majority of the Pakenham East PSP is currently used for pastoral activities. Landforms within Pakenham East include a ridgeline that extends through the centre of the precinct, a deep creek line running along the western boundary and Hancocks Gully in the eastern area of the precinct. A ridgeline and the prominent peak of Mt Ararat sit to the eastern border of the precinct, and form a natural break between urban and rural landscapes.

The Deep Creek is a narrow, meandering creek that runs north-south along the western boundary. Slope gradients are steep at points in the precinct. The majority of the Pakenham East PSP is currently used for sheep, cattle, and horse grazing as well as residential uses.

4 ABORIGINAL CULTURAL HERITAGE

Cardinia Shire Council engaged with Ecology & Heritage Partners Pty Ltd (EHP) to complete an Aboriginal and Historical Heritage Assessment (AHHA) for the proposed Pakenham East PSP area.

At the time of European contact, the Pakenham area and surrounding region was bordered by the traditional lands of two language groups, the Woi wurrung to the north and the Bun wurrung to the south. The consultant undertook a process of consultation with representatives of the Wurundjeri Tribe Land and Cultural Heritage Compensation Council, the Boon Wurrung Foundation and the Bunurong Land Aboriginal Council. There are no Registered Aboriginal Parties currently recognised within the precinct areas. There are no Registered Aboriginal Parties currently recognised within the precinct areas. Aboriginal Victoria (AV) is the statutory authority responsible for evaluating Cultural Heritage Management Plans (CHMPs) and has endorsed the AHHA.

The AHHA focused on identifying areas of sensitivity in the precinct by producing a predictive model. The predictive model was created through GIS analysis of known patterns of Aboriginal land occupation (including variables such as topography, vegetation, and land use) to determine levels of archaeological sensitivity. For the purposes of the predictive model, the term 'archaeological sensitivity' was defined as a combination of density, integrity and research value of archaeological deposits within any given area.

As a part of the AHHA, the desktop assessment identified a total of 28 Aboriginal places within a 2km radius of the Pakenham East precinct. Seven Aboriginal sites were located in the study area. The assessment concluded that artefact scatters and Low Density Artefact Distributions (LDADs) are the types of Aboriginal places that are most likely to occur within the study area.

An initial field survey was undertaken with representatives of the Wurundjeri Tribe Land and Cultural Heritage Compensation Council, the Boon Wurrung Foundation, and the Bunurong Land Aboriginal Council. All previously recorded Aboriginal archaeological places were inspected during the initial field assessment, yet due to reduced ground surface visibility, no Aboriginal archaeological material was identified at these places. One Aboriginal place, an isolated artefact, was identified during the initial survey (VAHR 8021-0380).

The subsequent field inspection identified some areas of Aboriginal likelihood. This included low-lying areas, comprising seasonally inundated flood plains and former marshlands (low likelihood), areas of steep slopes, (>10% slope) (low likelihood), elevated areas that have flat to gentle slopes (<10%) on ridges/hills (moderate likelihood), and areas of cultural heritage sensitivity (high likelihood).

No historical heritage places or areas of historical likelihood were located.

4.1 Cultural Values

The subsequent field inspection identified some areas of Aboriginal likelihood. These include low-lying areas comprising seasonally inundated flood plains and former marshlands (low likelihood), areas of steep slopes, (>10% slope) (low likelihood), elevated areas that have flat to gentle slopes (<10%) on ridges/hills (moderate likelihood), and areas of cultural heritage sensitivity (CHS) (high likelihood). These areas of high likelihood include areas that were previously mapped CHS, which include the 200m Deep Creek buffer and 50m buffers around previously recorded Aboriginal places.

In development of the assessment, AV and the Bunurong Land Aboriginal Council highlighted the sensitivity of the ridgeline landform that extends from the north through to the south of the study area, as ridgelines were often utilised as transit routes in the surrounding area and should be considered as having cultural heritage sensitivity.

4.2 Recommendations and Outcomes

The results of the desktop and standard assessment informed the archaeological sensitivity map. They clearly show that Aboriginal sites may occur anywhere within the study area except areas previously impacted by development. These areas are mapped as unlikely to contain Aboriginal cultural heritage and therefore do not require further archaeological assessment.

Areas of low-lying floodplains (away from natural water courses) and heavily sloping (>10%) ridges and hills are classified as low likelihood archaeological sensitivity. It is recommended that further assessment be undertaken to confirm the presence or absence of cultural heritage.

Areas of moderate likelihood, comprising relatively flat (<10%) elevated landforms that may contain Aboriginal cultural heritage including artefact scatters and LDADs of greater frequency, are recommended to conduct voluntary CHMPs.

Areas of high likelihood, those of previously mapped CHS, include the 200 m Deep Creek buffer and 50 m buffers around previously recorded Aboriginal places. These areas are sensitive and likely to contain further Aboriginal cultural heritage most likely to be intact artefact scatters associated with long-term occupation. Mandatory CHMPs will be required for these areas that will be impacted as part of the Pakenham East PSP (i.e. not with the set aside open spaces). The assessment also recommended that all attempts are made to locate any open space and parkland in these areas to avoid impacts to Aboriginal cultural heritage.

5 POST CONTACT HERITAGE

Context Project Team (CPT) was engaged by Cardinia Shire Council to prepare a Post-Contact Heritage Assessment for the Pakenham East precinct. The assessment occurred over three major stages:

- Identify and assess heritage places and the elements of significance that comprise them.
- Statutory requirements, appropriate curtilage and management recommendations to protect the identified places of heritage significance.
- Incorporate the findings of the John Patrick report on the significance and amenity value of trees within the study area.

The report focusses on statutory heritage assessment for buildings, trees and landscapes, and has utilised the HERCON Criteria as a means for assessing the sites, and the Cardinia Significant Tree Register Criteria.

A desktop assessment of secondary sources found no post-contact heritage places on any statutory or non-statutory registers, and no places within the Study Area had previously been assessed for their heritage values.

During the 1840s a large number of pastoralists move to the area, and combined with Closer Settlement and Soldier Settlement Schemes, the intensification of small scale farms further affected the landscape. The addition of transport networks to the area from the 1870s, namely the railway and the improvement of the Princes Highway, allowed the area to become better connected to Metropolitan Melbourne and the Shire became less isolated.

5.1 Recommendations and Outcomes

The final recommendations are as follows:

Include on Schedule to the Cardinia Heritage Overlay

The assessment recommended three places within the study area for inclusion in the Schedule to the Heritage Overlay of the Cardinia Planning Scheme as Individually Significant places. These are:

- 40 Dore Rd, Pakenham – Local heritage significance (Pear Tree only)
- 32 Mount Ararat South Rd, Nar Nar Goon – Local heritage significance
- 140 Ryan Rd, Pakenham – Local heritage significance

Significant Trees

Cardinia Shire Council have prepared a Significant Tree Register, utilising a specific set of criteria that is based on the recognised heritage (HERCON) criteria. The approach that Cardinia has adopted is if a tree is assessed to warrant inclusion on the Cardinia Shire Significant Tree Register (CSSTR), then it should be added to the Schedule to the Heritage Overlay, and protected through the mechanism of the Heritage Overlay (HO).

One tree, the Pear Tree at 40 Dore Road, Pakenham was assessed in the John Patrick report as having sufficient historical and representative significance for its outstanding size and age (the largest example of the taxon within the municipality) to warrant inclusion on the Significant Tree Register.

Places of archaeological interest

Three places within the study area were identified as having historical archaeological potential. It is recommended that each of these sites be further investigated through a detailed archaeological site inspection and either recording or monitoring as required.

In the event that artefacts, footings, foundations, sites or any other archaeological remains or features be encountered within the three sites listed below, work should cease immediately and the relevant authorities, namely Heritage Victoria, be notified (under the requirements of the *Heritage Act 1995*).

- 40 Dore Rd, Pakenham – Archaeological interest
- 44-55 Dore Rd, Nar Nar Goon – Archaeological interest
- 1550-1560 Princes Hwy, Pakenham – Archaeological interest

Plantings of historic interest only

Plantings of historic interest identified in this report are considered to have some potential to inform of the range of plantings associated with pastoralism and settlement of the area in the nineteenth and twentieth centuries. These are not considered to be of sufficient integrity, or long term value to retain within the urban context.

The recommendation of the report is that these plantings be recorded through photographic means prior to removal, and the recordings are placed with the local historical society and/or Cardinia Shire Council.

- 40 Dore Rd, Pakenham – Pair of *Cupressus sempervirens* (Italian Cypress)
- 44-55 Dore Rd, Nar Nar Goon – Various exotic trees and shrubs in remnant homestead garden

Trees of amenity value

These are trees that have landscape and aesthetic interest and value, and make a contribution to the surrounding locality. There are four trees within the Study Area that have been assessed as having high amenity value, and are considered to have the ability to contribute in a positive way to the new urban landscape. It is recommended to retain these trees and integrate them into the new Pakenham East development.

- 15 Mount Ararat North Rd, Nar Nar Goon North – *Quercus robur* (English Oak) at north homestead site
- 40 Dore Rd, Pakenham – *Phoenix canariensis* (Canary Island Palm) located in the modern garden
- 45-55 Dore Rd, Nar Nar Goon – *Araucaria cunninghamii* (Hoop Pine) located to the west of the dwelling
- 180 Ryan Rd, Pakenham – *Cedrus deodar* (Deodar Cedar)

6 ENVIRONMENTAL SITE ASSESSMENT

GHD was engaged by Cardinia Shire Council to undertake a desktop environmental, hydrological and geotechnical assessment for the precinct. The aim of the assessment was to determine the suitability of land for sensitive uses (including residential, childcare, kindergartens and primary schools) and identify any assessments or remediation works that may be necessary.

The assessment included two stages:

- Stage 1: Assessment included the gathering of relevant information (including the use of literature sources) for the purpose of identifying potential sources of contamination, hydrogeological and geotechnical issues; and
- Stage 2: Assessment included inspecting the site for potential sources of contamination, and areas of geotechnical and hydrogeological significance (i.e. areas of water logging, existing groundwater bores, etc.).

The desktop assessment and site visit identified 'very low' to 'medium' areas of contamination within the precinct. The areas identified as 'low' or 'medium' potential for contamination are localised around past and current farming practices.

6.1 Contamination

The desktop assessment indicated that most properties have been predominantly used for agricultural and stock grazing purposes (particularly for grazing cattle, from 1884 to the present day. Agricultural activities within the Study area usually involved grazing paddocks, however some were identified as potentially housing market gardens. Some properties were identified as potentially containing imported fill material associated with earth works observed in the historical imagery.

Gas pipeline infrastructure occurs on some properties, and has been in use since 1970. Another property has an operation rail electrical substation from the early 1950s.

Other areas of potential concern are properties where agricultural and domestic equipment and scrap has been observed, as well as one property with a truck stop.

The report found that the properties within the precinct with potential sources of contamination are generally consistent with the known historical use for farming and grazing purposes and associated human occupation. Potential sources of contamination were identified on eighteen properties, and one Property sub-area, with a further five properties unable to be accessed and therefore assigned with a conservative medium rating.

GHD recommends that different degrees of additional studies be completed on these properties prior to their redevelopment as part of the Pakenham East PSP.

6.2 Geology

The report indicated that the majority of the area is underlain by Quaternary (Pleistocene to Recent) alluvial deposits of gravels, sand and silt. The precinct is unconformably underlain by micaceous quartz siltstone, with very minor micaceous quartz sandstone.

The intrusive Late Devonian aged Tynon Granite extends from the north through the centre of the Study area and along the eastern boundary. Younger tholeiitic basalt extrusions (Palaeogene age) exist within the Tynning Granite. Overlying topsoil and grass was evident from satellite imagery.

During the agency consultation period, Earth and Energy Resources (EER) within the Department of Economic Development, Jobs, Transport and Resources identified a section of the PSP area (see *Figure 2- Precinct Features*) as being within an Extractive Industry Interest Area (EIIA). A geological analysis of the region will be undertaken to inform a review of the current configuration of the EIIA. Subject to this advice (in particular that there are suitable alternative resource areas in the Cardinia LGA/Pakenham

Corridor), there may be scope to modify the existing EIA to exclude the area overlapping the Pakenham East PSP (and associated buffers).

6.3 Hydrology

The study area is located in a region that includes north-south oriented ridges, associated with intrusive granite running north-south through the central northern section of the precinct, as well as high and low lying pastures adjacent to historical and existing watercourses.

Typically, shallow groundwater flow and local drainage patterns follow surface topography, with local drainage patterns and flows from higher elevations towards lower elevations.

The precinct contains low lying areas that are listed as being at risk of flooding by the Cardinia Shire Council Planning Scheme.

Deep Creek and two small unnamed water courses running north-south through the central eastern and western parts of the precinct are the nearest surface water bodies. These suggest that shallow groundwater beneath the precinct is likely to flow in a south/south westerly direction, toward Deep Creek and eventually the Western Port Bay.

6.4 Hydrogeology

GHD's report indicated that the estimated depth of ground water in the area ranges from less than 5 to 50 metres below ground level. Groundwater bore yield in the area of the precinct is expected to be less than 1 litre per second.

The groundwater salinity is between 3000 and 7000 mg/L for the majority of the precinct, with the parts in the northernmost area of the precinct listed as being between 1001-3000 mg/L.

GHD found that there are three registered groundwater bores listed for properties in the precinct.

6.5 Recommendations

GHD recommended the following:

High risk – a mechanism in the Urban Growth Zone (UGZ) Schedule for the PSP area should be applied to these properties to ensure an environmental audit is carried out at the site prior to redevelopment to sensitive residential or associated land uses.

Medium risk – an environmental site assessment, which may include a detailed property inspection and intrusive works to assess potential contamination of soil and ground water, should be completed on these properties

Low risk – no further works are recommended on these properties.

7 TOPOGRAPHY & LANDFORM

Cardinia Shire Council engaged Hansen Partnership Pty Ltd to conduct a landscape assessment of the Pakenham East precinct.

The Study Area is an irregular shaped parcel of predominantly cleared agricultural land that falls generally from undulating terrain in the north to the valley floor in the south. The pattern is part of a broader land formation characterised by foothills and valleys, characteristic of the southern extents of the Dandenong Ranges.

A clearly defined ridgeline formation of elevated land extends through the central area of the study, from the northern boundary (at its highest point) down towards the low lying land adjacent to the Princes Highway.

A drainage line runs from north to south along the Deep Creek corridor. A small patch of land in the south west corner of the site is slightly elevated above the surrounding land.

The Princes Highway is an engineered major road which has been raised above the surrounding landscape in most locations, with embankments either side of the road reserve. In the central part of the site, the road passes through the elevated ridgeline and the terrain has been excavated to accommodate the road grading. This has created steep embankments either side of the westbound lanes of the highway.

7.1 Viewshed analysis

A viewshed analysis was undertaken to understand the full extent of technically feasible views to the study area from the surrounding landscape. A viewshed is defined as the surface area that is visible from a given viewpoint or series of viewpoints¹. It is also the area from which that viewpoint may be seen, or also known as 'intervisibility' relation. Obstacles can affect the reciprocal vision of the same two points. The report is limited in that it only takes into account obstacles from topography and not from built form.

The analysis mapped areas of different visual exposures. Areas of very high visual exposure are usually found on the upper extents of the ridgeline towards the central part of the site. There are also consistently areas along the south western boundary from the Princes Highway to the southern corner of the study area that have very high visual exposure, though they are often screened or filtered from view by existing vegetation.

7.2 Landscape characterisation

The report identified the main natural, rural and built characteristics of the study area and its different key features. The precinct is in a predominantly rural setting, made up of cleared pasture land of varying topography and use.

The Deep Creek riparian area is where the most densely vegetated and tree lined landscape is located, and is characterised by a more enclosed, shaded landscape experience with less exposed views.

The Princes Highway bisects the site and the associated grading distinguishes itself from the surrounding area. The adjoining roadside vegetation further separates it from the surrounding rural landscape.

A small area of dense remnant bushland and trees exists on an existing property access via Canty Lane, in the south west corner of the study area.

Residential properties along Ryan Road create a 'Rural Living' character, with properties smaller than those throughout the rest of the precinct, with low or no fences and set within large landscaped garden.

7.3 Landscape values

This section of the report looks at identifying which landscape areas need to be considered in the development of the PSP through categorising those landscape values that are most preferred and least preferred. It is recognised that landscape values vary from person to person, and has used a set of broad landscape character preference indicators.

The assessment indicated that there are four main areas that have a moderate landscape value, with no areas having a high value. These areas are:

- The upper extents of the central ridgeline formation proximate to Dores Road and the northern study area boundary.
- The elevated knoll located towards the centre of the study area, just south of the Princes Highway.
- The land associated with Deep Creek and Deep Creek Road which runs in a north south direction along the western study area boundary.
- The relatively small patch of existing area of suspected remnant bushland located within a private property on Canty Lane.

7.4 Visually sensitive landscapes

Through combining these two assessments, areas have been identified for their potential for visual exposure and landscape value. The following areas have been categorised as high visually sensitive:

- The land associated with the ridgeline formation in the vicinity of Dores Road at the centre of the study area.
- The elevated knoll located to the south of the Princes Highway.
- The land associated with Deep Creek.

7.5 Slope constraints

As there are areas with a slope of greater than 10% within the Study Area, guidelines have been prepared by the Cardinia Shire Council to ensure that development of the land on the hillsides appropriately responds to its context, particularly related to identified view sheds, minimising the amount of disturbance to the natural topography, and the construction of roads and associated infrastructure. These guidelines will apply to any area zoned for residential purposes with a pre-development slope greater than 10%. These will require that a Slope Management Plan is submitted with any planning permit application for subdivision on any land in this area.

8 BIODIVERSITY

The south eastern growth corridor has significant biodiversity values including threatened fauna species that include Growling grass Frog, Southern Brown Bandicoot, Southern Toadlet, Australian Grayling and Dwarf Galaxia and threatened flora species that include Matted Flax-lily, Veined Spear Grass and Green Scentbark. The Pakenham East precinct lies within a landscape which is well documented for its association with significant biodiversity values and comprises areas of native vegetation and habitat for national and state significant flora and fauna species.

The study area is highly modified within private land and is dominated by introduced pasture grasses. Good quality patches of native vegetation are present although in most instances are restricted to road side reserves and riparian/creek lines.

8.1 Native Vegetation Precinct Plan

The Pakenham East Native Vegetation Precinct Plan (NVPP) has been prepared concurrently with the Precinct Structure Plan. The NVPP identifies:

- Native vegetation to be protected and the native vegetation that can be removed, destroyed or lopped without a planning permit; and
- The offsets that must be provided by landowners wishing to commence works prior to removing the native vegetation which can be removed. The NVPP is a separate document.

The statutory basis of the NVPP is Clause 52.16 of the Cardinia Planning Scheme.

The NVPP will be incorporated into the Cardinia Planning Scheme Plan under Clause 81.01 (Incorporated documents) and is a separate document to the Precinct Structure Plan.

8.2 Retention and Offset Requirements

The NVPP will clearly set out the offset requirement, determined in accordance with the Guidelines for the Removal, Destruction or Lopping of Native Vegetation, for native vegetation that can be removed, destroyed or lopped. The NVPP should clearly describe the type and amount of vegetation loss that must be offset, the type and location of offsets to be provided and the timeframe for implementing the offsets.

8.3 Growling Grass Frog Conservation Reserve

An open space reserve has been provided at a width varying between 50m and 100m either side of Deep Creek which will provide protection to this waterway from the impacts of urban development.

A referral has been made to the Department of Environment and Energy under Part 7 of the *Environment Protection and Biodiversity Conservation (EPBC) Act (1999)*.

The outcome of the referral will determine the use and planning controls put in place on the land abutting Deep Creek within the PSP.

The Future Urban Structure and PSP has been drafted to accommodate the potential conditions that maybe required if the EPBC Act referral indicates a controlled action has been triggered.

Measures include:

- The land will be zoned Rural Conservation Zone (RCZ2);
- The drainage infrastructure includes the provision of growling grass frog habitat;
- Appropriate setbacks consistent with the Biodiversity Conservation Strategy from Deep Creek have been established; and

A Conservation Area Concept Plan has been included in the PSP for the Deep Creek reserve).

8.4 Aboricultural Report

A number of indigenous ‘scattered trees’ exist within the Pakenham East PSP area as identified in Plan 2 of the PSP. Cardinia Shire Council engaged John Patrick to prepare an Aboricultural report for the precinct to provide advice as to whether other trees found within the precinct were of conservation and retention value. This would provide the VPA with more certainty when identifying areas of natural amenity to be retained. The assessment investigated specific trees that were identified in the *Pakenham East Post Contact Heritage Assessment* prepared by Context Pty Ltd, November 2013 (the context report).

A total of six properties were inspected. A number of trees that were assessed are suitable for retention as part of future urban development within the precinct. These trees are listed in the table below.

Table 1 Trees for retention

PSP Property no.	Address	Name	Trees Protection Zone (TPZ)
6	15 Mount Ararat Road, Nar Nar Goon North	English Oak (<i>Quercus robur</i>)	7.8m
8	40 Dore Rd, Nar Nar Goon	Pear (<i>Pyrus communis</i>); Canary Island Date Palm (<i>Phoenix canariensis</i>)	10.8m 7m
11	45-55 Dore Road, Nar Nar Goon	Hoop Pine (<i>Araucaria cunninghamii</i>)	8.2m
50	180 Ryan Rd, Pakenham	Deodar Cedar (<i>Cedrus deodara</i>)	8.6m

The assessment highlights the high potential for damage to trees that are to be retained as part of a subdivision, and therefore requires careful design and management. This includes considerations throughout the construction phase, but also to ensure that there is sufficient room in the long term for future growth.

The assessment sets out some guidelines to ensure successful retention and integration of the above trees into the future Pakenham East PSP throughout the Planning and Subdivision, Construction and Future Plantings stages.

9 TOWN CENTRES

The Pakenham East Future Urban Structure (FUS) identifies the location for a local town centre and a local convenience centre. As a part of the planning process, Tim Nott has been engaged by Cardinia Shire Council to prepare an Economic Assessment report that provides advice on the appropriate size and location of retail activity centre(s) in the precinct and on the contribution that those centres are likely to make to the provision of jobs for local residents.

The report estimated that two neighbourhood level activity centres would be required to service the community. This corresponds with the FUS in the draft PSP that shows a local town centre and local convenience centre serving the area.

9.1 Local Town Centres

A catchment analysis shows that, at full development, the local town centre will be serving the the Pakenham East precinct, and the township of Garfield, approximately 14,600 people. The centre will be able to provide the closest full-line supermarket for these residents, as well as other retail, commercial and community services. These residents will support a further small supermarket and a variety of convenience stores expected from a centre of this size. The total retail floorspace of the centre could be around 9,100 square metres.

The FUS identifies a local convenience centre in the south-west corner of the precinct. The report indicates that this would have a trade area of the south western quadrant of the precinct, and little beyond the precinct boundary to the west. The trade area population of 6,600 at full development would support retail provision of 4,100 square metres. This would support a medium-sized supermarket and specialty stores.

The catchment analysis conducted by the report suggests that both town centres will be needed within the current network of activity centres. Furthermore, without the local convenience centre many residents will be greater than 2.5 km distance from a food and grocery service which doesn't align with the 20 minute neighbourhood objective.

A gap in the network is present in the north-western part of the precinct, where some residents are much more than 1 kilometre from any shops. This poses the need for a local activity centre, which could take the form of a convenience store to provide top-up groceries and coffee shop. The assessment indicates that no more than 300 square metres would be necessary, and this size would have a negligible impact on the retail trade of the other centres. The assessment does suggest that this could be dealt with by permit application later on and may not need be part of the PSP planning process.

It's predicted that the residents of Pakenham East at full development will require around 7,900 jobs. To satisfy the objective of one job per dwelling, 5,900 job opportunities need to be created within Cardinia by this time. The assessment estimates that 3,700 new jobs could be expected in order to adequately service the new population, which would be located in the activity centres and schools in the Pakenham town centre and developing industrial areas. 2,200 jobs will need to be found in trade exposed activities and regional services.

10 COMMUNITY FACILITIES

The VPA undertook an *Open Space and Community Infrastructure Needs Assessment* to quantify the demand for and recommend the provision amount of community infrastructure and open space to support the future population of Pakenham East. The assessment used provision ratios currently applied by the VPA and service providers such as Department of Education and Training (DET) from the document *Guide to Social Infrastructure Planning* prepared by Australian Social & Recreation Research Pty Ltd, October 2009. The configuration and locations of centres within the precinct areas take into account the local topography and the barriers to movement or access to community infrastructure.

In addition to natural topographical boundaries such as the Deep Creek corridor, a number of physical infrastructure and public utility easements traverse the precincts and impose some constraints on the location of community infrastructure and open space. These barriers are:

- Princes Freeway
- Princes Highway
- High voltage powerlines easement (and associated buffers)
- Two gas transmission pipelines (and associated buffers)
- Hancocks Gully
- Steep slopes around the central ridgeline

Environmental and topographical constraints generated by creek corridors and biodiversity conversation areas are most prominent in the Pakenham East precinct.

The Pakenham East area will have a significant population to warrant a considerable quantity and range of community infrastructure from public and private, state, council and non-council facilities that will support services and programs for future residents. This infrastructure will include schools, multi-purpose community centres, and an indoor recreation facility, and may include emergency services and residential aged care services. Most of this infrastructure will be located within or proximate to the three main community hubs, generally based around the proposed town centres and convenience centres.

The precinct has a projected future need for two government primary schools and a government secondary. DET has confirmed that Pakenham East should nominate the provision of two government primary school locations and a government secondary school.

The Catholic Education Office of Melbourne (CEOM) is likely to require one primary school. The strategic location of the school site is justified in their report *A Strategic Study of Pakenham East Precinct, Catholic School Provision to 2036*, Sustainable Planning Strategies Pty Ltd, May 2017.

The assessment identified the need for two level 1 multi-purpose community centres and one level 2 neighbourhood house, or two hectares of community facilities required to support the future population of Pakenham East. These facilities should include four kindergarten rooms in the short term and three in the long term, as well as one maternal and child health consulting room.

11 EMERGENCY SERVICES

Planning for Community Infrastructure in Growth Area Communities makes a series of recommendations regarding the recommended service facility model, land area and building footprint requirements for emergency services facilities in growth areas, and key design issues / criteria, as follows (p115):

Recommended service facility model or growth areas:

- Additional population growth in Melbourne's growth areas will generate the need for additional emergency services facilities.
- The number and type of facilities, timing of development and location will be determined by planning process undertaken by the relevant services.
- The preferred facility model is often an integrated emergency services precinct comprising a police station, ambulance station, SES unit and/or fire station.

Land area and building footprint requirements for growth areas:

- Police – 0.4 ha to 0.6 ha
- Fire and SES – 0.4 ha
- Ambulance – 0.4 ha
- SES Unit – 0.35 ha

Key design issues / criteria:

- The integrated emergency services precinct should have main road frontage, be easily accessible and be located so that it can achieve good emergency response times.

No particular facilities have been identified by the emergency services consulted during the PSP process, but these are likely to be identified as the areas start to develop.

12 OPEN SPACE

12.1 Sports Reserves

All proposed sports reserves are to be provided adjacent to the government education facilities, to protect the option for joint use of these sports reserves in future. The sports reserves will include grassed and hard courts and will take various configurations to cater for sports which currently have high participation rates such as Australian Rules football, soccer, cricket, netball and basketball. However, they will be flexible enough to cater for a range of sports which may become more popular in future, or that may be needed in the wider area. The specific type of sports facilities will be determined by future population needs.

12.2 Local Parks

Generally, local parks should be equitably distributed across the precinct, maximising access by the local community and generating high amenity. Most local parks are proposed in sizes ranging from 0.5 hectares to one hectare, cater for a diverse range of functions (i.e. gathering spaces, walking pets, linear connections, community focal points), and be located within convenient walking distance of 95% of all dwellings (400 metres). One large Local Park will be provided on the high point of the central ridge line north of the Princes Highway to protect the landscape amenity of the precinct.

12.3 Linear Open Space

The area will have immediate access to open space via a unique network of linear bike and walking trails that follow the waterway systems and linear open space areas. These aspects of the precinct will serve a key role in linking the community and promoting active transport options.

Hancocks Gully and Deep Creek will act as linear trails, with off-road shared paths connecting the communities north and south of Princes Highway, and also some of the important destinations of the precinct such as Local Town Centre, schools, community facilities, sports reserves and local parks. Deep Creek is a connective and distinguishing feature which presents the densest native vegetation in the precinct, and contrasts against the surrounding open, pastoral areas. The corridor will shape the structure of the Pakenham East PSP and will be used as a place of respite for local residents, whilst also allowing people to move actively with ease through the area.

A gas pipeline easement that runs north-south through the precinct will become a combination of off-road bicycle and shared path running its extent, linking with other transport routes and open space areas.

13 WHOLE OF WATER CYCLE ASSESSMENT, WATERWAYS AND DRAINAGE

The Victorian Government released a new water policy framework, *Melbourne's Water Future* (Office of the Living Victoria) in 2013. Melbourne's Water Future (MWF) focuses on a holistic approach to managing the different components of the water cycle including water services infrastructure, natural waterways and the built environment. The policy is aimed at achieving a more resilient water cycle, improved security of supply and water quality, lowered costs, improved value for money in meeting the State's water needs, greater environmental and amenity benefits and increase innovation across the water sector. More specifically, the policy refers to treated wastewater, stormwater and rainwater harvesting as future supply sources, with the aspiration that investing in these sources will substantially reduce the need for large scale additions to our drinking water supplies. The preparation of Whole of Water Cycle Assessments for growth areas is a priority initiative in MWF.

Cardinia Shire Council commissioned GHD to undertake a Whole of Water Cycle Assessment (WoWCA) for the Pakenham East PSP area.

Specifically, WoWCA objectives for Pakenham East are to:

- Investigate reliable water supply sources based on identifying opportunities to diversify water supply aiming to reduce conventional use and reduce the costs of centralised systems
- Protect and enhance the values of urban waterways, including minimising stormwater volumes and improving quality
- Manage flooding and minimise risk
- Improve liveability and community health
- Provide efficiencies and benefits to managing of all the elements of the water cycle mentioned above from a holistic point of view

The WoWCA modelling was based on high-level servicing strategies for water supply and sewer services prepared by South East Water who owns the services within the PSP area, and draft preliminary Development Services Schemes (DSS) for the catchment areas within the PSP area, prepared by Melbourne Water.

Melbourne Water is responsible for defining drainage and flood mitigation infrastructure requirements within new developments and management of drainage assets in catchment areas larger than 60 hectares. Cardinia Shire Council generally manages drainage assets in catchment areas of less than 60 hectares.

GHD produced a short list of five options which were discussed by various stakeholders and concluded that two options were the most attractive. Following the completion of that work, GHD were further engaged to undertake more detailed analysis into Options 2 (Pakenham WWTP recycled water) and 3 (Bald Hill stormwater harvesting with recycled water).

Overall, the analysis of these two options (after Option 3 had been split into 3A and 3B), suggests that Stormwater harvesting is a viable innovative alternative. However, it is around neutral on a whole of community NPV basis. Therefore, pursuing this option will be based on factors other than the analysis and require negotiation between stakeholders.

14 TRANSPORT AND MOVEMENT

14.1 Road Network

Road networks are generally based on one mile grids, meaning arterial roads (six and four lane roads) are provided in grids spaced at 1.6 kilometres with connector streets (two lane roads) sitting generally every 800 metres in between. The existing and proposed road network is based on these principles.

The annual average daily traffic (AADT) approach was adopted to define the intersection configuration within the PSP, based on NSW RMS' Guide to Traffic Generating Developments. The Guide sets out the following trip calculations:

- Standard density residential area – daily vehicle trips = 9 per dwelling
- Medium density residential area – daily vehicle trips = 5 per dwelling
- Primary School – daily vehicle trips = 400 per 100 m² gross floor area
- Private School – daily vehicle trips = 350 per 100 m² gross floor area

As part of the background work, a study was prepared by SMEC to review an option for an interchange from the PSP area to the Princess Freeway, east of Ryan Road. The review found that the interchange would result in marginal localised benefits, including slight reductions in travel time from approximately 1 minute, and increased travel speeds of approximately 3km/hr across the local network. To proceed without the interchange vehicles would predominately access the freeway via Racecourse and McGregor Roads. The Princes Freeway would operate at a higher level of service, with higher speeds and lower traffic demands east of Cardinia Road. The benefits and costs of the interchange have been considered and the PSP road network plan has proceeded without the interchange. SMEC are in the process of updating a traffic report prepared in 2015 in consultation with VicRoads. The traffic report is being finalised between Cardinia Council, VPA and VicRoads and will be provided when available.

A SIDRA analysis report was also conducted to review the performance of four proposed intersections at Ryan, Connector A, Connector B and Connector C along Princes Highway using split phasing as recommended by VicRoads.

The assessment recommended that intersections at Ryan, Connector A and Connector B require modified intersection layout arrangements (as shown in the report) to operate at minimum acceptable level.

14.2 Bus Services

A bus capable road network is provided to allow for access within 400 metres of the residential areas. The high frequency bus route will be capable of delivering 'SmartBus' type services to the community.

14.3 Pedestrian and Cycle Network

The PSP incorporates an extensive road and trail network that links to key destinations within and outside of the PSP area, including to schools, sports reserves, community centres and waterways. A combination of on and off road routes allow for commuter cycle trips as well as recreational cycling and walking.

15 UTILITY AND SERVICE INFRASTRUCTURE

The subject area has availability and access for connection to all necessary services, but that future development within the majority of the PSP area will require significant upgrading and extension of all services, particularly sewerage and water supply. Development from the western boundary appears to be the most logical starting area for development, although the provision of a gas supply will need to be determined for early developments.

15.1 Sewerage

South East Water (SEW) is the responsible authority for the provision of sewerage facilities. There are currently no existing reticulation or branch sewers in the PSP area.

Major sewer works for the PSP are will require:

- Extend 450mm and 375mm diameter branch sewers from the existing 525mm diameter Peel Street Branch Sewer in Bald Hill Road near Embrey Close, resulting in 1.3 km of sewer to reach the south western corner of the precinct and an additional 3.4km to reach the northern precinct
- The final location of temporary and permanent pump stations, Rising Sewer Mains, and Branch Sewers will depend on the layout and staging of any development.

15.2 Potable Water Supply

SEW is the responsible authority for the provision of water supply facilities. SEW have developed a servicing strategy. The alignment and sizing of potable water reticulation mains with the Precinct would be in accordance with the Melbourne Retail Water Agencies (MRWA) Edition of the WSAA Water Supply Code.

15.3 Recycled Water Supply

There is potential for the use of recycled water for non-potable uses to be provided throughout the PSP area.

This is generally assessed on a precinct-by-precinct basis by the service provider, being South Easter Water (SEW). Recycled water can be used for irrigation of garden areas, green corridors and sports fields.

SEW has advised that the area is not adjacent to a mandated recycled water area, which currently means that a third-pipe recycled water system will not need to be installed. While recycled water could be provided from Pakenham Treatment Plant, this requires further consideration by SEW.

15.4 Electricity Supply and Transmission Infrastructure

SP-Ausnet controls the electricity supply network across the South East Growth Corridor.

- A new substation has been installed at Officer to meet growth in Pakenham and Officer with the first stage being completed in 2009.
- A new substation commenced construction in Pakenham South in 2016 to meet ongoing growth particularly in the Employment Precinct.
- SP-AusNet also has plans to establish a major new transmission connection terminal station in the Pakenham region in the next 5 to 10 years' time.
- If a zone substation is required in the Pakenham East Precinct, the area required and associated easement requirements will need to be determined.

There are three existing 220 kV overhead transmission lines through the northern end of the site. These lines are owned by SP AusNet and are contained within a Power Transmission Easement which has a total width of approximately 120m. There are also Telstra and Optus Major Optic Fibre Network lines running along the southern boundary of the easement in this area.

SP Austnet have developed subdivision and development guidelines to inform the uses and development that are supported within the easement.

15.5 Gas Supply and High Pressure Gas Transmission Infrastructure

Envestra / APA is the responsible service provider for the provision of gas supply in this area.

Any development east of Deep Creek will require the installation of a new City Gate, which is a pressure regulating kiosk, which reduces the pressure from 10,000 KPa in the transmission pipeline to 550 KPa in the distribution network.

For the planning and implementation of a new City Gate for the Pakenham East Precinct, there would be at least 12-18 month lead time required, and this will need to be taken into account in planning for this area.

Four licenced pipelines, PL75, PL135, PL141 and PL244, intersect the Pakenham East Precinct:

- The T60 pipelines, PL75 which spans Longford to Dandenong and PL135, the pipeline loop between Bunyip and Pakenham lie within a 24.4 m wide easement and have a pipe diameter of 750 mm ND.
- The T61 pipeline between Pakenham and Wollert (PL141) lies within a 27 m wide easement and has a pipe diameter of 750 mm ND.
- PL244 is a DN250 welded steel pipeline, 35.419 km long and originating from the Lang Lang Gas Plant to terminate at the APA operated Pakenham Custody Transfer and Metering Station.

The PSP also contains the Custody Transfer Meter Station (CTMS) owned by APA, housing various equipment (line valves, pig traps, filtering, metering regulating and gas quality monitoring etc.), and an existing gas metering station between the Origin BassGas pipeline and the APA pipelines within the Precinct. There is also a proposed City Gate that will be constructed to service reticulated natural gas to the Precinct. The detail of the location of the City Gate is to be confirmed, but it will be in the vicinity of the existing APA compound (likely on APA owned land).

A Safety Management Study (SMS) has been undertaken to determine the nature of the pipelines, the key aspects of the Precinct, the potential threats and risks, and the actions required to ensure the ongoing safe operation and maintenance of the pipelines in compliance with AS 2885.

15.6 Telecommunications

NBN Co is the responsible agency for the delivery of the National Broadband Network (NBN).

Telecommunication design and installation in all new residential estates greater than 100 lots will be administered through the NBN Co system.

NBN Co has not yet planned how the network will roll out across the Pakenham East Precinct, but will use existing Telstra conduits subject to location and condition.

16 REFERENCES

The following reports have been used to inform this report. Plans have not been included in this report and reference should be made to the original documents when reading this report. The original documents commissions for the Plumpton and Kororoit PSPs are located on the VPA website at www.vpa.vic.gov.au

Organisation name (Year) Title of document

Australian Social and Recreation Research (2009) *Planning for Community Infrastructure in Growth Area Communities*

Beveridge Williams (2013) *Service & Utility Report*

Cardinia Shire Council (2017) *Guidelines for Slope Management*

Context (2017) *Post-Contact Heritage Assessment Pakenham East Precinct*

Ecology & Heritage Partners (2017) *Pakenham East Precinct Structure Plan, Pakenham, Victoria: Aboriginal and Historical Heritage Assessment*

GHD (2013) *Desktop Environmental Site Assessment Report*

GHD (2015) *Options for Whole of Water Cycle Assessment*

GHD (2015) *Whole of Water Cycle Management Plan*

Hansen (2013) *Pakenham East Precinct Landscape Assessment*

John Patrick Pty Ltd (2013) *Significant Tree Assessment*

Tim Nott (2015) *Pakenham East Precinct Structure Plan – Economic Assessment*

LogiCamms (2016) *Pakenham East Precinct Structure Plan AS 2885.1 Safety Management Study Workshop and Report: APA Pipeline and Gas Metering Station*

Origin (2014) *Gas Pipeline Options Assessment*

SMEC (2014) *Interchange Comparative Traffic Modelling Assessment*

SMEC (2015) *Midblock Volume Outputs*

SMEC (2015) *Geotechnical Preliminary Pavement Assessment*

SMEC (2017) *Design Response Options for Electricity Easement*

Sustainable Planning Strategies Pty Ltd for Catholic Education Office Sale (2014) *A Strategic Study of Pakenham East Precinct: Catholic School Provision to 2036*

TFV / VicRoads (2017) *Traffic Analysis Report, Project: Pakenham East PSP: Proposed Intersections along Princes Highway at Ryan Road, Connector A, Connector B, Connector C*

VPA (2017) *Pakenham East Open Space and Community Infrastructure Needs Assessment*