

Pathways towards more sustainable growth



Epping North East

Local Structure Plan Incorporated Plan

May 2008



City of Whittlesea



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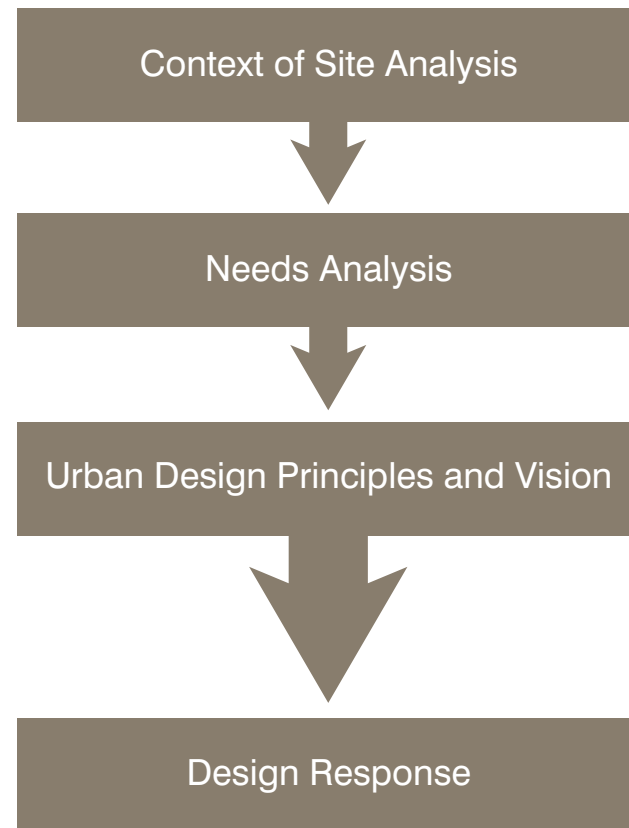
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Executive Summary

The Epping North Strategic Plan sought as its fundamental objective to make a significant change to the form and composition of urban development in Epping North.

At the heart of this objective was a desire to respond to the criticisms associated with the form of fringe development that has occurred over the last 30-50 years.

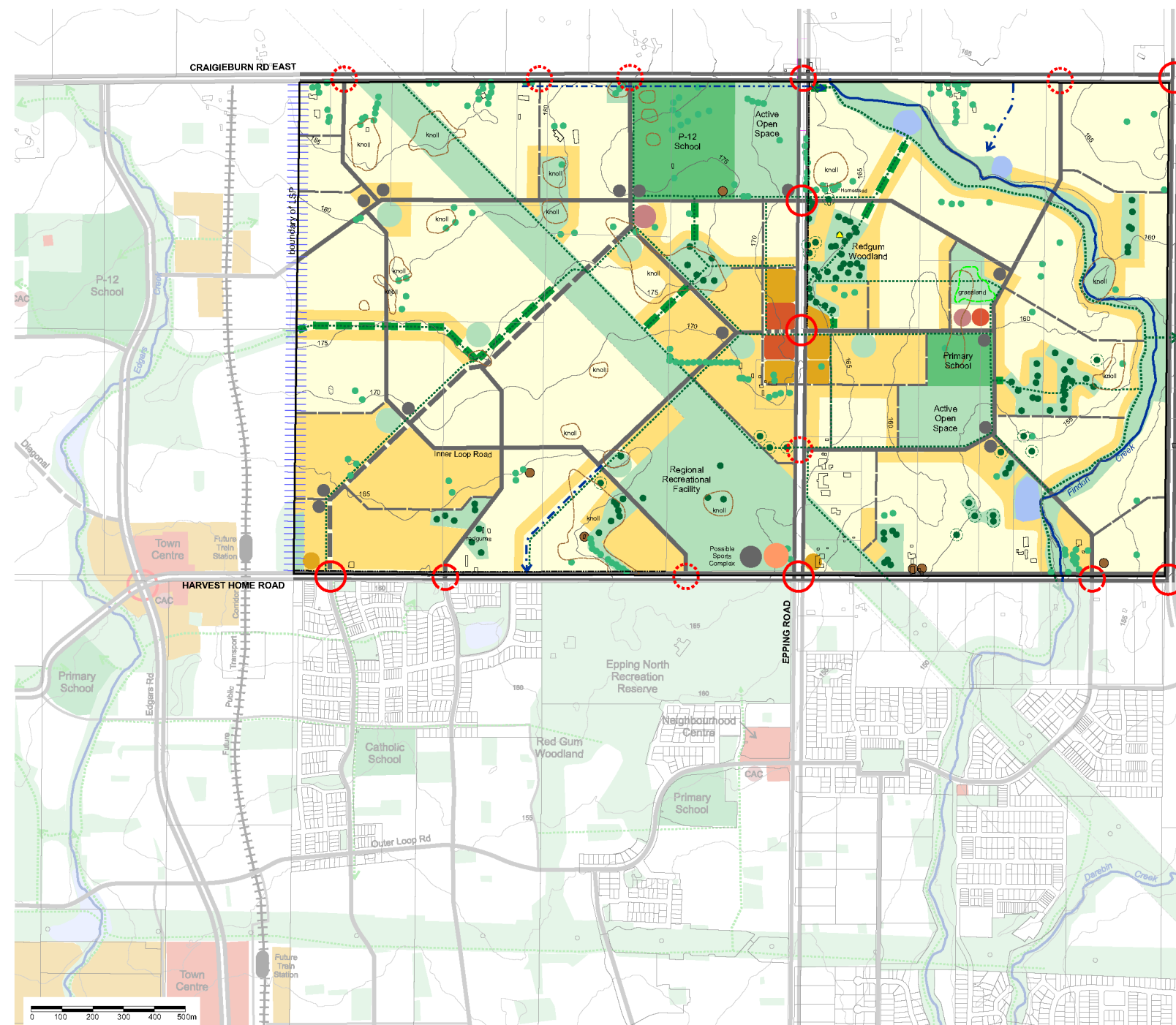
The Epping North East Local Structure Plan (ENE LSP) furthers this objective through adoption of an integrated, balanced approach to the composition of the ENE LSP that focuses on three key phases of analysis to arrive at an informed design response.



In undertaking this process, the ENE LSP moves beyond aspirational statements or objectives, and incorporates a well resolved plan that will guide development in Epping North East. This approach is consistent with the City of Whittlesea's commitment to excellence in planning for growth areas.

The vision for Epping North East is to deliver an urban structure based on traditional neighbourhood design principles that will support a healthy, diverse, distinctive and ultimately more sustainable community.

In working toward this vision the LSP endeavours to provide a clear, implementable framework in the form of a series of well founded plans that will provide certainty to the development community and all stakeholders.



Drawing Key

- River Red Gums
- Specific design response to River Red Gum required
- Other Trees (non River Red Gums)
- Stony Knolls
- Native Grassland
- Potential European Historic Sites
- Aboriginal Scar Tree (indicative location)
- Wetland / Retarding Basin
- Watercourse / Creek
- Floodway Reserve
- Preferred Drainage Reserve Realignment
- Existing Buildings
- Open Space
- Linear Open Space Link (30m av. width - incorporates a shared path)
- Neighbourhood Park
- School
- Key Building Location
- Community Activity Centre
- Potential Restaurant Site
- Residential - Standard Density
- Residential - Medium Density / Smaller Lots
- Mixed Use
- Commercial Site / Mixed Use Opportunity
- Activity Centre - Neighbourhood
- Activity Centre - Local
- Arterial Road
- Boulevard Connector Street
- Diagonal Boulevard
- Key Local Road (incorporating shared path & diverse streetscape)
- Road Widening
- Off-road Shared Path Network
- Intersection - signalised
- Intersection - roundabout
- Intersection - type C
- Interface with Aurora
- Contours (5m interval)

Note:

All arterial roads, diagonal boulevards & connector streets accommodate buses and on-road bicycle lanes.

All road alignments shown are a graphic representation only, they do not depict the full width of existing or proposed reservations.

Alignment of E6 is indicative only. Final alignment to be determined by VicRoads in consultation with Council.

This plan presents the expected land use and design patterns for the ENE LSP area at the time of publication. The area is subject to the Epping North Strategic Plan and Development Plan.

River Red Gums are shown symbolically only, they do not depict the canopy or Tree Protection Zone.



Part 1 Introduction and Objectives



City of Whittlesea

1.0 Introduction and objectives

1.1 Overview

The purpose of Part 1 is to outline the status of Epping North, to explain the components of the planning framework with the Epping North growth area and to set out the purpose of the Epping North East Local Structure Plan.

This Part also includes a summary of the overriding objectives of the ENE LSP and a description of the basis of the ENE LSP, and how the various documents comprising the ENE LSP operate.

1.2 Document

Epping North is a growth area of Metropolitan significance (refer Figure 2). The Whittlesea Municipal Strategic Statement states:

'The Epping North Strategic Plan sets the broad directions for urban development within Epping North covering issues such as the pattern of urban development, a neighbourhood based approach to more detailed local structure planning, open space, provision for a broad transport network, protection of environmental features, servicing, and provision for community, commercial and recreational facilities'.

Further, the MSS states:

'Additional Local Structure Plans must accompany further urban rezonings within the Epping North Area'.

The Epping North Strategic Plan comprises an overview and description of the area to which it applies. It describes the key features of the area and sets out the overall layout and design principles for the development of the subject land.

The Strategic Plan contains a land use component, illustrating the various land uses proposed throughout the specified area, inclusive of transport networks, residential development of various densities, open space networks, and recreation nodes. In summary, the Epping North Strategic Plan provides a planning framework to guide all future development in Epping North.

According to the Strategic Plan it is anticipated that Local Structure Plans (Incorporated Plans) would be prepared for one or more of the residential precincts proposed within Epping North. In this context the Local Structure Plan applies and furthers the objectives of the Strategic Plan for one or more neighbourhoods. This approach is detailed in Figure 1 and depicts the Whittlesea Growth Areas Framework.

1.3 Purpose of the Local Structure Plan

The Local Structure Plan (LSP) outlines the planning and development framework for approximately 450ha of land referred to as Epping North East (refer Figure 2).

In accordance with the Whittlesea Growth Areas Framework, the LSP will then in turn inform preparation of more detailed Development Plans.

This LSP defines a vision and preferred outcomes relating to a range of land uses and defines the necessary transport and other infrastructure that will be required to support the new community in Epping North East.

In this context the fundamental role of the LSP is to define the land use and transport framework that will guide preparation of more detailed Development Plans.

Figure 1 Whittlesea Growth Areas Framework

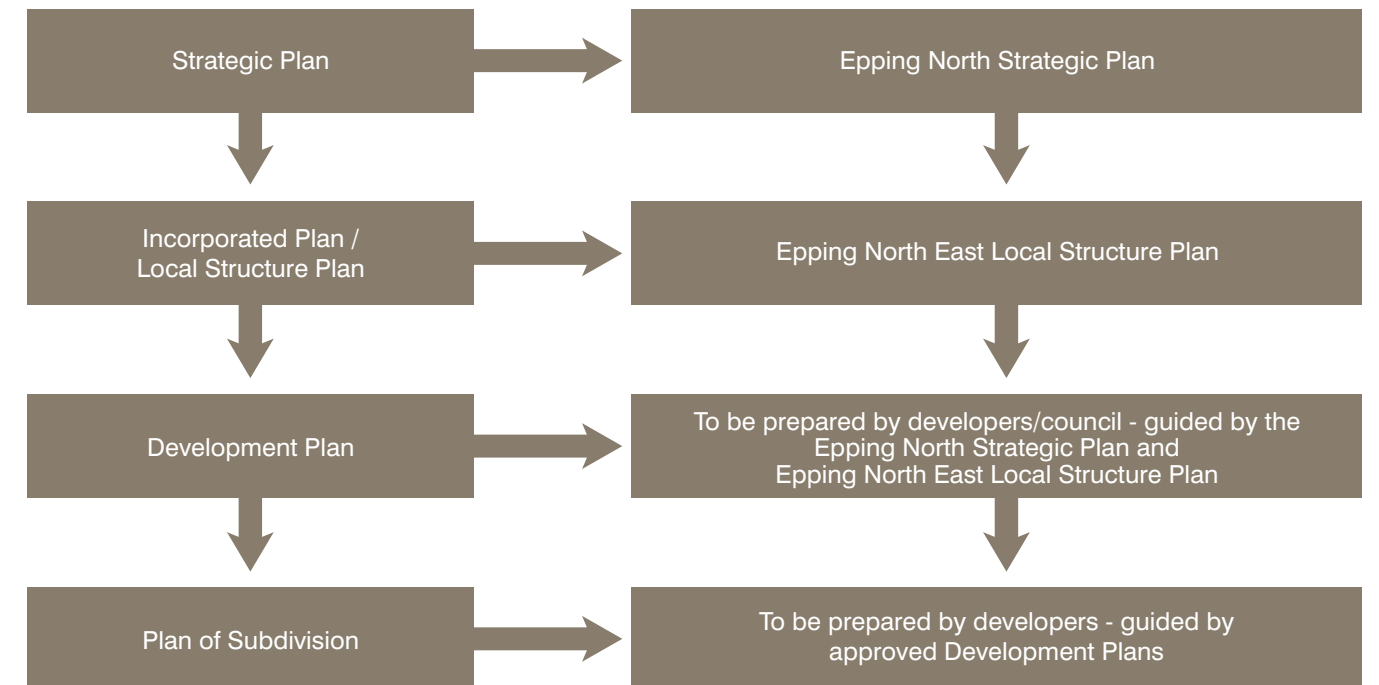
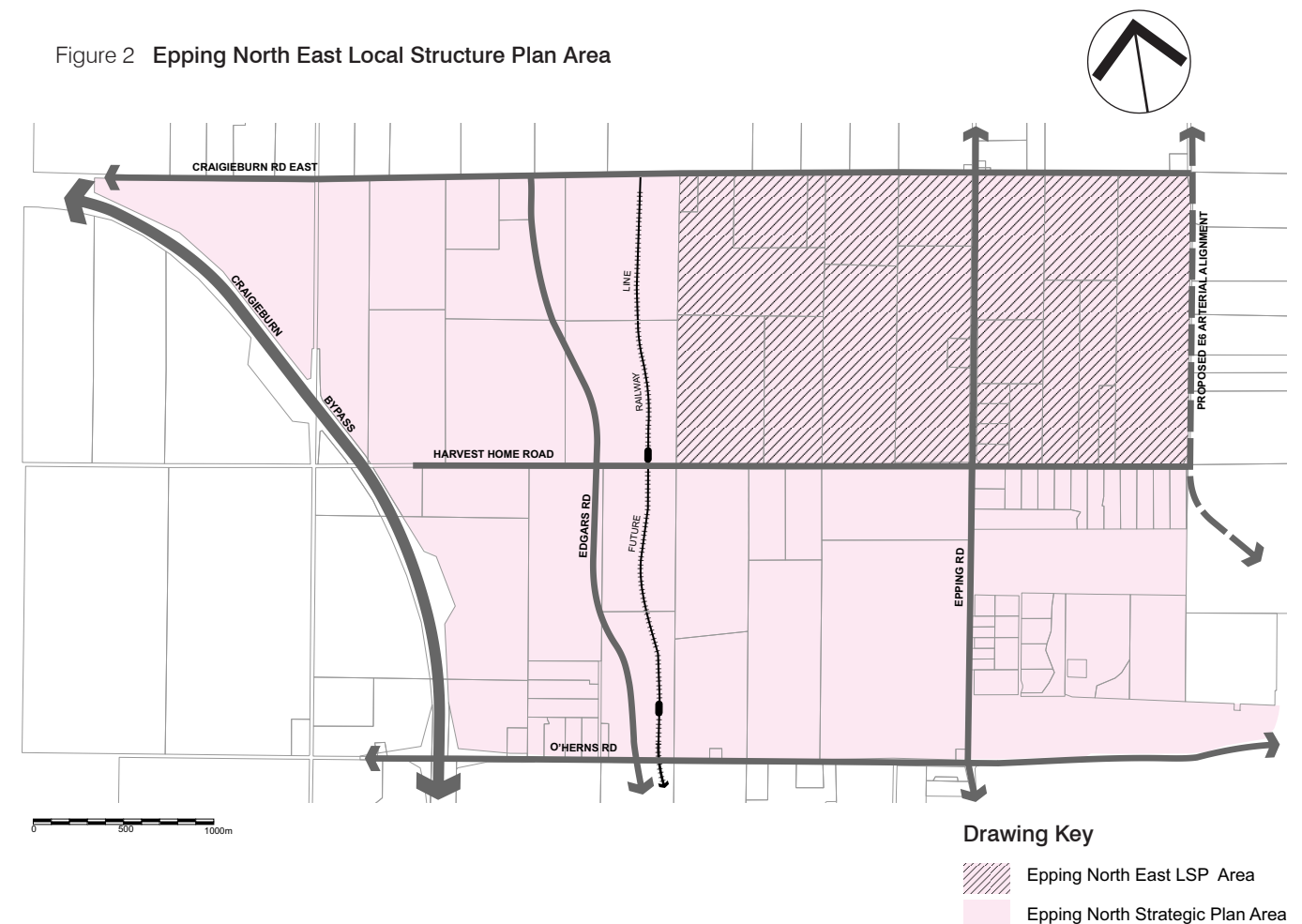


Figure 2 Epping North East Local Structure Plan Area



1.4 Objectives of the Epping North East Local Structure Plan

The objectives for the Local Structure Plan are:

- To implement the vision and framework for Epping North as outlined within the Epping North Strategic Plan.
- To provide plan based certainty for development in the LSP area in accordance with the vision as outlined in the Epping North Strategic Plan.
- To establish the basis for a co-ordinated approach to the provision of necessary infrastructure including transport, open space, community services and facilities, and physical services including water and sewer.



Residential Development and Built Form

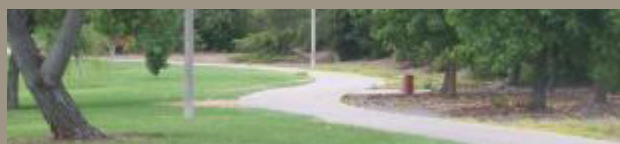
- To apply traditional neighbourhood design techniques and philosophy in the distribution of land uses and establishment of the transport network.
- To allow for a series of identifiable neighbourhoods, each with their own identity, character and central community focus within walking distance.
- To overcome land fragmentation problems through definition of preferred land use and transport patterns.
- To ensure co-ordinated and integrated development within the LSP area and between adjoining and nearby residential neighbourhoods.
- To ensure the community of Epping North East is integrated with the existing and developing communities of Epping North, particularly within the Harvest Home LSP area, Epping North LSP area and the Aurora development site.
- To provide for a diversity of residential allotment sizes and housing forms to respond to anticipated demographic change and to provide housing options for a range of household sizes and income groups.

- To encourage higher density residential development in appropriate locations with high quality streetscapes and other urban design treatments.
- To preserve sites of ecological, archaeological and heritage importance.
- To provide opportunities to move between residential neighbourhoods by modes of transport other than private vehicles.
- To provide for interconnected open space areas, and include areas for both passive and active recreation.
- To facilitate and promote provision of affordable housing.
- To positively provide for and establish diverse high quality streetscapes that will define the future character of neighbourhoods.



Infrastructure

- To provide a framework for the co-ordinated and timely provision of physical infrastructure.
- To establish a framework for the identification, apportionment and collection, of development contributions for necessary social and physical infrastructure.



Open Space and Recreation

- To retain the natural and cultural features of the LSP area primarily within areas of open space.
- To incorporate River Red Gums and other significant vegetation primarily within open spaces as a feature of residential neighbourhoods.
- To provide diverse recreational opportunities within the LSP area that are consistent with the context of Epping North.

- Provide a wide range of public open spaces, ranging from small and local to neighbourhood and regional to provide for a range of active and passive purposes.
- Provide open space consistent with Council's Open Space Strategy.



Community and Commercial Facilities

- To support establishment of commercial centres that incorporate a 'street based' urban form with supporting higher density, mixed use development.
- To identify and provide community service and facility requirements early in the life of development to meet the needs of the community.
- To focus and cluster community facilities and uses together, and locate them at key neighbourhood centres.



Traffic, Transport and Access

- To facilitate a high level of permeability through the LSP area for pedestrians, cyclists and vehicles.
- To reduce dependency on car based transport by providing greater modal choice of transport such as improved public transport and pedestrian/cycle options.
- To establish a high level of interconnectivity and accessibility for all forms of transport within and between neighbourhoods in order to reduce dependency on the arterial, sub-arterial and collector road network.
- Increase the level of accessibility within urban areas by encouraging permeable road and pedestrian/cycle networks.
- To provide for connectivity to potential future and existing urban areas.

- To protect the opportunity for provision of a range of transport options.
- Support the establishment and viability of commercial centres through the alignment and pattern of transport routes.



Sustainability

- To establish a more sustainable form of development that supports:
 - Healthier Communities.
 - Social interaction.
 - Reduced greenhouse gas emissions.
 - High capacity transit options.
 - Local employment and service provision.
 - Walkable neighbourhoods.
 - Identity and character.
 - Diverse housing options.
- To provide for energy efficient residential subdivisions that connect positively with open space networks and surrounding residential areas.
- To encourage urban design techniques that reflect a high level of sustainability and flexibility in order to incorporate future advances in technology.
- To encourage the development of energy efficient housing through subdivision design.
- To reduce energy requirements in the LSP area through the introduction of solar hot water heaters and energy efficient street lights.
- To reduce the potable water consumption for garden irrigation and internal water demand through implementation of demand management measures and water recycling.
- To encourage the use of environmentally sustainable building material.
- To encourage waste reduction at the construction phase within the LSP area.

1.5 Basis for the Epping North East Local Structure Plan

The ENE LSP is derived from a detailed site analysis and responds to a range of contemporary urban development issues and challenges.

The ENE LSP has been informed by a number of specialist investigations, including: ecological, archaeological, contamination, arboriculture, social/community and traffic/transport. All specialist reports should be read in conjunction with this report.

These investigations and findings have been carefully weighed against the principles of Traditional Neighbourhood Design, to ensure a balanced and community based approach to the design of the LSP.

The LSP is divided into three documents:

Epping North East Local Structure Plan - Incorporated Plan (Incorporated Document)

- Part 1 - Introduction and objectives
- Part 2 - Background overview
- Part 3 - Local Structure Plan
- Part 4 - Physical Infrastructure, Services and Drainage

Epping North East Local Structure Plan (Reference Document)

- Part 1 - Introduction
- Part 2 - Site Context & Analysis
- Part 3 - Forecast Population
- Part 4 - Needs Analysis
- Part 5 - Urban Design Principles and Vision

Epping North East Development Contributions Plan (Incorporated Document)

- Part 1 - Principles and Assumptions
- Part 2 - Description of Projects
- Part 3 - Interpreting the Calculation of Charges Tables
- Part 4 - Open Space Percentages and Funding
- Part 5 - What is "Developable Land"?
- Part 6 - Distinction between Community and Development Infrastructure
- Part 7 - Administration of the Epping North East DCP

1.6 Development Contributions

Development Contributions are an essential component in the provision of social and physical infrastructure. In basic terms the level of Development Contributions are derived from the nexus between the extent of new development and the increased pressure likely to be placed on existing infrastructure and the demand for new infrastructure.

In addition to the nexus between development and infrastructure in terms of need, there is also a direct nexus between the 'type' of community that the Local Structure Plan is endeavouring to achieve. In this regard the form of neighbourhoods is of critical importance as are initiatives to preserve components of the natural or cultural environment or initiatives to foster a positive character or sense of place. Where these initiatives translate into the Development Contributions Plan, appropriate standards and costing information will be provided in addition to supporting rationale.

The contribution level required per hectare of Net Developable Land, is specified in a separate document '*The Epping North East Local Structure Plan Development Contributions Plan*' and should be read in conjunction with the ENE LSP.

1.7 Land to which this Plan applies

The ENE LSP applies to all land contained within the Local Structure Plan Boundary, identified in Figure 2.



Part 2 Background Overview



City of Whittlesea

2.0 Background Overview

2.1 Introduction

The purpose of this chapter is to provide a brief overview of the background that underlies the preparation of the ENE LSP, including a brief summary of the site context and analysis undertaken, the forecast population analysis and the needs analysis. Further detailed background information used to inform preparation of the ENE LSP can be found in the ENE LSP Reference Document and the underpinning consultant's reports.

2.2 Regional Context

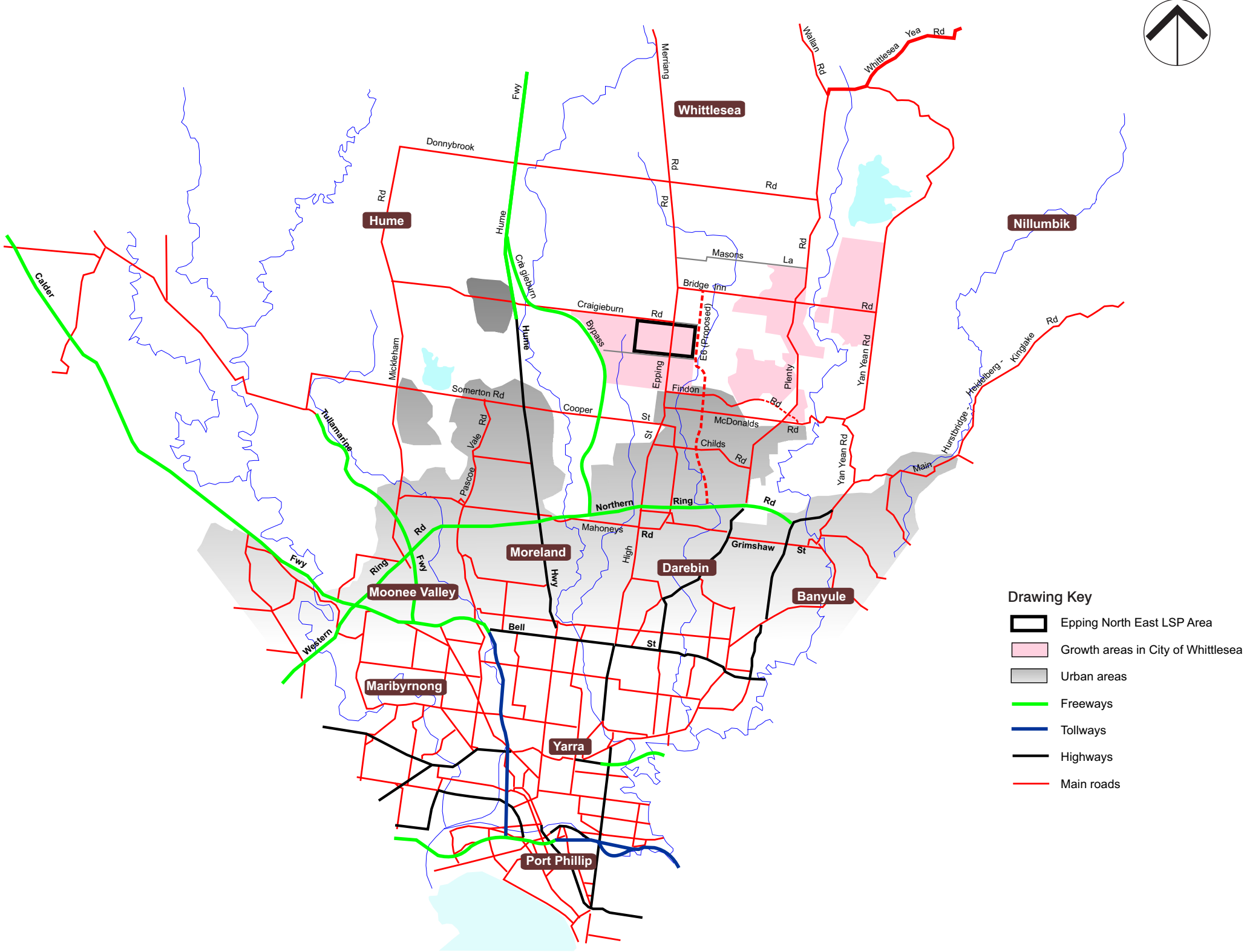
The City of Whittlesea is located on the northern metropolitan fringe of Melbourne and has traditionally been characterised by its rapidly expanding residential areas, range of employment centres, and its continuing focus as a residential growth area.

Epping North East is located approximately 25 kilometres to the north of the Melbourne Central Business District.

Epping Road is the primary north-south road link between the developed urban areas to the south and developing urban areas of Whittlesea to the north. Land to the north and east of the LSP area is zoned for rural purposes, and land to the south and west is being developed predominantly for residential purposes.

The LSP area is strategically located between the Craigieburn Bypass and the potential northern link of the E6 reservation. An illustration of the site in its regional context is provided in Figure 3.

Figure 3 Metropolitan Context Plan



2.3 Site Context and Analysis

To inform preparation of the ENE LSP, a detailed site analysis process was undertaken. The site analysis included an assessment of

- Existing land uses and development;
- Significant environmental and cultural features;
- Planning context, including a review of the existing zoning and overlay controls and higher level strategic documents that apply to the area;
- Property ownership details.

Figure 4 details a consolidated site analysis of the study area. Further detail regarding the layers that underlie this site analysis can be found in the ENE LSP Reference Document.

The site analysis indicates that the ENE LSP area has a complex representation of environmental, cultural, infrastructure, built form and property ownership issues. In addition, the area is influenced by a range of other factors, most significant of which is the influence of the high voltage power lines and pylons, due to the visual dominance of the wires and pylons, and the diagonal alignment that bisects the plan.

In order to undertake the above assessment, separate consultant reports were commissioned, including

- An ecological assessment;
- An arboricultural assessment;
- A preliminary site environmental assessment; and
- An archaeology and heritage assessment.

A detailed summary of the findings of each of the consultant reports is found in the ENE LSP Reference Document.

Figure 4 Site Analysis Plan

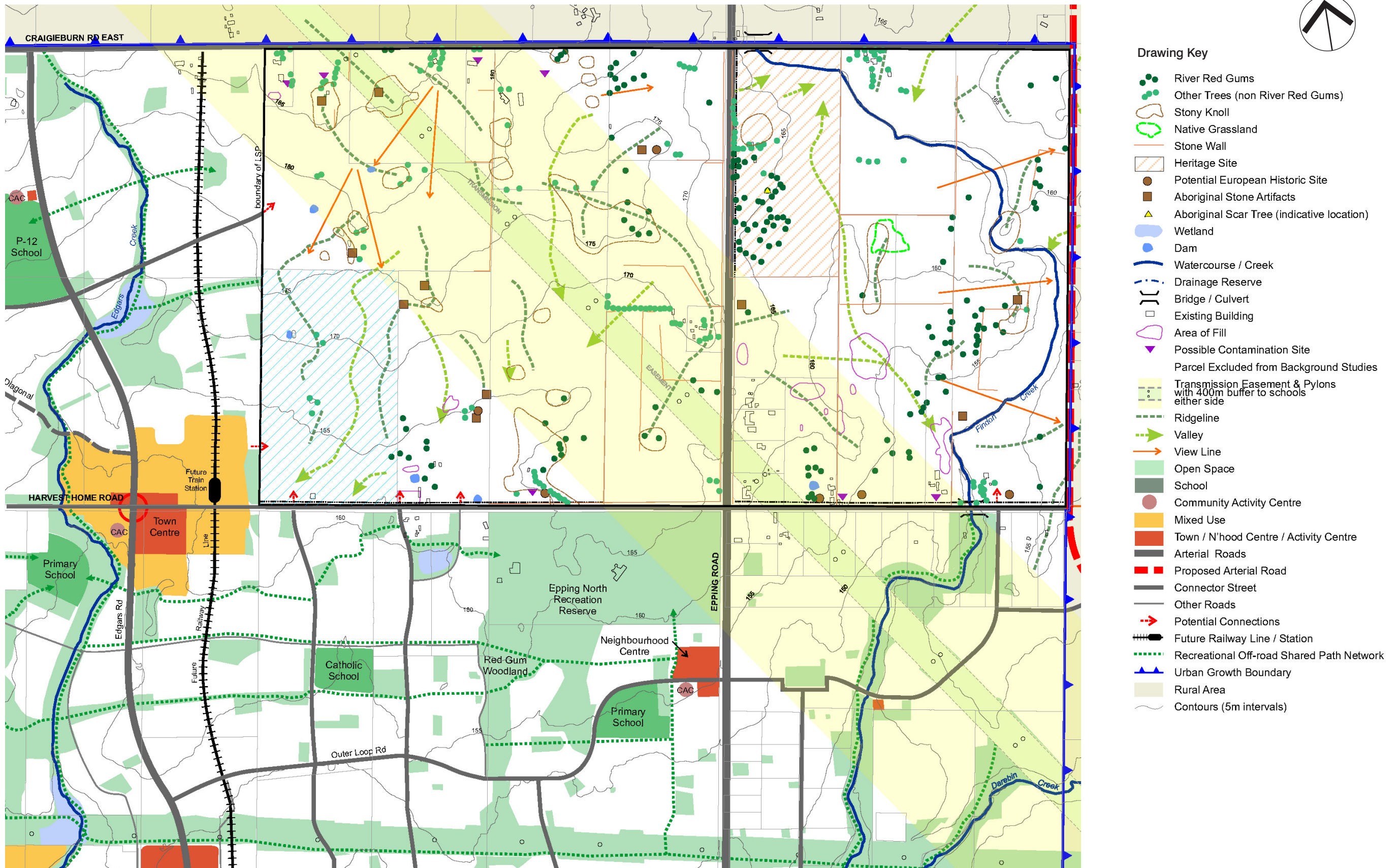
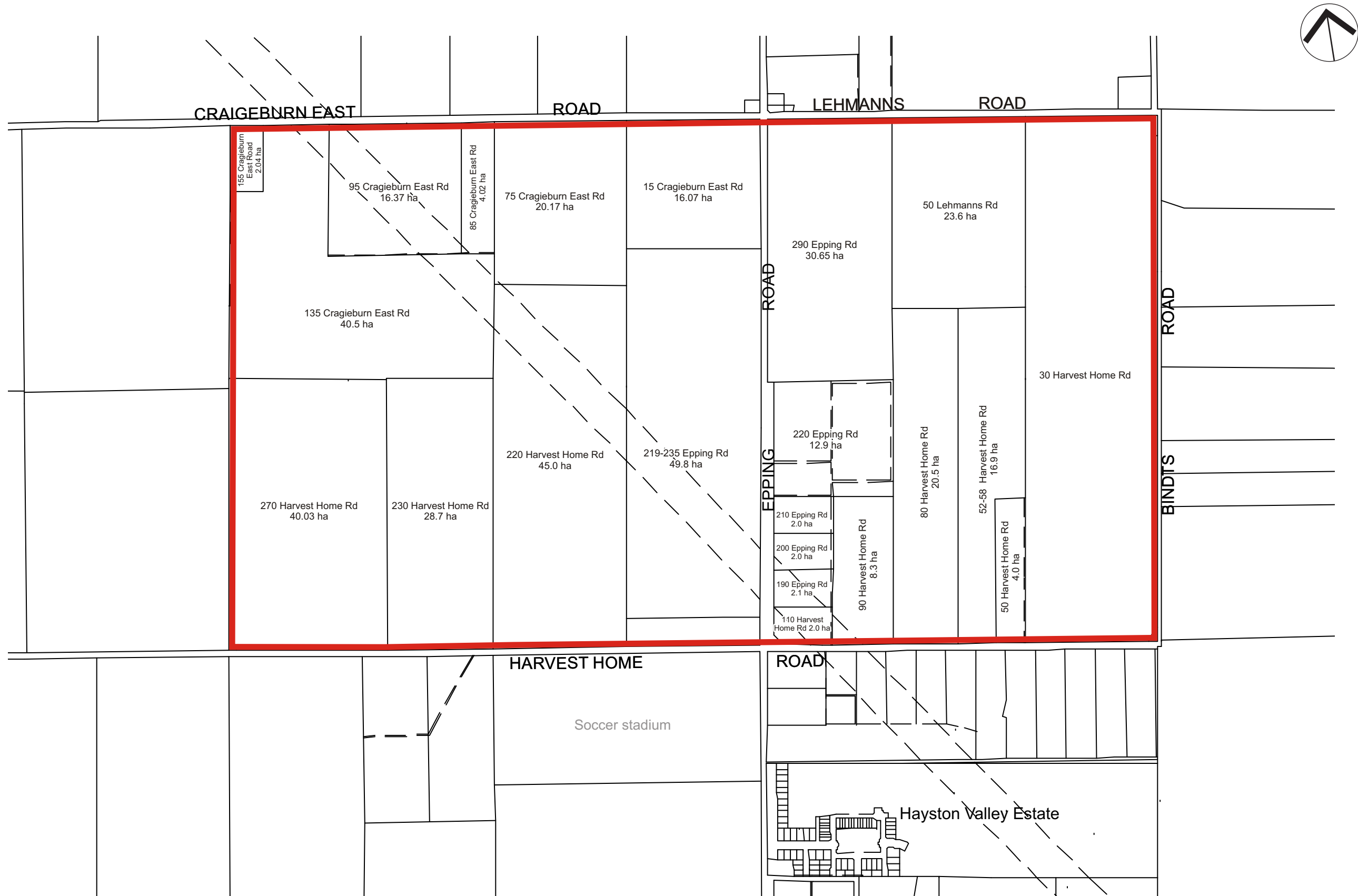


Figure 5 Property Details



2.4 Forecast Population

The land budget for the LSP area has been prepared in accordance with the detailed site assessment of the LSP area.

The LSP area has a gross land area of 449.3 hectares. Some land within the area is not available for development including land within the high voltage electricity transmission easement, the Findon Creek Drainage Scheme and conservation open space. The land budget for the LSP area is provided in Table 1.

Taking into account developable land that will be set aside for other purposes and based on an average density of 15 lots per hectare, there is the capacity to develop approximately 4900 lots within the ENE LSP area. The exact lot yield of individual land holdings will be determined during preparation of Development Plans.

Land Budget and Forecast Population

Detail regarding forecast population growth and the assumptions underpinning the forecast growth and likely profile of the future residential community of ENE are provided within the ENE LSP Reference Document.

In summary, the population forecasting indicates that the ENE LSP area will accommodate approximately 14,900, based on an average household size of 3 people. While it is anticipated ENE will appeal to households with children, as the area matures, it is expected the area will become more diverse, characterised by an increase in empty nesters and an ageing population.

The implications of the projected growth and anticipated profile are significant, and highlight the tension between and challenges associated with planning to meet the needs of a newly emerging community.

Table 1 Land Budget

Gross Area	449.3ha
Encumbered Land	
- Transmission Easement	24ha
- Wetland / Retarding Basins	2.1ha
- Floodway / Drainage Reserve	15.1ha
- Conservation Open Space	18.8ha
Gross Developable Area	389.4ha

2.5 Needs Analysis

As Epping North East forms the northern boundary of urban development in this part of Whittlesea, the siting and provision of open space and recreational facilities must be carefully planned. A number of State and local policies exist in relation to community infrastructure and open space, which assist in informing the types, quantity and location of infrastructure within urban areas and in particular, Epping North East. The planning policies for the provision of community infrastructure, open spaces and recreation are incorporated within a number of documents adopted by the City of Whittlesea. In particular, the City of Whittlesea's Open Space Strategy 1997 provides guidelines and direction for the provision of open space within the City and Epping North specifically.

Further assessments were also commissioned to determine recreation and community infrastructure needs, based on demographic and population forecasts, and a retail assessment was undertaken to assess commercial opportunities and determine the retail and employment needs of the ENE LSP area. Detailed information regarding the needs analysis can be found in the ENE LSP Reference Document.

2.5.1 Recommendations

In summary, the open space, community and retail needs of the ENE LSP population are outlined below:-

Community Infrastructure and Open Space Requirement	Size (ha)
Regional Sports Facility	16.5
Local Sports Facility	7.5
Local Sports Facility	6.0
P-12 School	11.9
Primary School	3.5
Community Activity Centre	0.5
Community Activity Centre	0.7
Neighbourhood Activity Centre	0.3*
Local Activity Centre	0.01*

* Leasable floor area. Additional area required for car parking, landscape etc at a general ratio of 1 to 3.

2.6 Urban Design Principles and Vision

The overall vision for the ENE LSP area has grown as a response to criticisms and identified deficiencies regarding the form of suburban development over the last 30-50 years.

There has been a paradigm shift within Council and state policy, such as Melbourne 2030 and Clause 56, away from conventional suburban development, or 'sprawl' to a more traditional neighbourhood design approach. This approach, termed Traditional Neighbourhood Design (TND) for the purposes of the ENE LSP, has been adopted as the basic philosophy supported by the City, and underpinning the design of the ENE LSP. Further detailed discussion regarding the principles and history of TND and its relevance to Epping North East is provided in the ENE LSP Reference Document.

In summary, TND is fundamentally concerned with making places more sustainable, vibrant, safe, attractive and liveable, and advocates the following key elements:

- Walkable neighbourhoods,
- A sense of community and identity
- Interconnected network of streets
- Active street land use interfaces with building frontages to the streets
- Efficient public transport
- Adaptable, mixed use urban development
- Variety of lot sizes and housing types
- Access for all users
- Avoidance of key environmental and cultural features
- Comprehensive approach to open space and water management
- Promotion of affordable housing
- Variety and diversity of open space.

Table 2 provides a detailed discussion of each of these elements in the context of past experiences of the City of Whittlesea and responses required to address these deficiencies.

Table 2a Traditional Neighbourhood Design Elements, Experience in the City of Whittlesea and Responses to Address Deficiencies

Elements	City of Whittlesea Experience	Responses to Address Deficiencies
Walkable Neighbourhoods	The concept of neighbourhood based planning units is well acknowledged and supported within the Whittlesea Growth Areas Framework. What must be acknowledged, however, is the distinction between planning units as the basis for service catchments (commonly 5,000 - 8,000 persons) and smaller more localised walkable neighbourhoods of 400 - 500m radius.	Application of smaller more localised walkable catchments will require a range of responses including: <ul style="list-style-type: none"> careful definition of neighbourhood boundaries taking into account natural and other barriers; attention to streetscape character to support walkability; deliberate distribution of community and other facilities in high profile locations to support local access and where possible to support more than one neighbourhood; provision for walking/cycling as a high priority in all streets; distribution of lot and dwelling diversity to create and support neighbourhoods; and provision of localised open space areas and meeting points.
Sense of Community and Identity	Recent responses throughout the City of Whittlesea have generally sought to incorporate a 'landscape' driven sense of community and identity through retention of environmental assets. While this approach is supported throughout the City, there has been either an incomplete or absent response in terms of the built form or provision for any genuine streetscape diversity to derive a positive sense of community and identity. Housing forms also lack variety within a tendency toward reproduction or 'off the shelf' typologies. Initiatives to create diversity in the urbanised landscape are limited with greater need for higher quality streetscapes within and between neighbourhoods. Historically community and neighbourhood activity centres have lacked identity and have not been located in prominent locations. This trend is changing with a shift toward early provision in high profile locations.	Progressive development of a positive sense of community and identity will require a range of responses including: <ul style="list-style-type: none"> incorporation of a diverse range of streetscapes with variation in internal composition; a focus on built form to create a point of difference. provision for boulevard treatments to link neighbourhoods. early provision of community activity centres and other community facilities co-located with commercial centres; and leadership in the design and location of public buildings and spaces with a positive address to the street
Interconnected Network of Streets	Grid based designs have typically been provided in recent times however, levels of internal and external connectivity have varied significantly and there is a continuing over reliance on a small number of collector or higher order routes for the majority of trips. Approaches to traffic engineering have also sought to avoid uncontrolled cross intersections in most circumstances to the detriment of connectivity.	Effective application of an interconnected grid based design will require: <ul style="list-style-type: none"> a deliberate effort to support a transport network that distributes traffic rather than focussing it on a few collector or higher order roads; incorporation of road/street cross-sections that more equally account for and distribute traffic without compromising amenity; and provision of a range of intersections and traffic management techniques to support connectivity.
Active Street Land Use Interfaces with Building Frontages to Streets	In both residential and commercial examples, standard front setbacks have typically been applied. In some locations setbacks have been reduced but in such instances 'cottage' lots have been utilised with 'off the shelf' home designs that lack the proportions and architectural interest to create streetscapes with an urban edge. In commercial locations, separation of land uses has generally occurred with a focus on private car based access and parking requirements.	Development of active streets with variation in land use interfaces with building frontages to streets will require a significant shift in approach via: <ul style="list-style-type: none"> application of revised building setback requirements; careful location of non-residential buildings in commercially viable locations with detailed design guidelines to support street based outcomes; incorporation of a range of allotment sizes including variation of lot width and depth within streets rather than pockets of development; incorporation of diverse road/street cross-sections that have the proportion and scale to support reduced front setbacks and a well defined urban edge; encouragement to developers to provide built form to lead the market early in the life of new developments rather than landscaping; lobbying of volume home builders to develop and provide new housing products; and encouraging lanes to provide rear access to smaller lots with a street at the front for pedestrians and general accessibility and legibility.

Table 2b Traditional Neighbourhood Design Elements, Experience in the City of Whittlesea and Responses to Address Deficiencies

Elements	City of Whittlesea Experience	Responses to Address Deficiencies
<p>Efficiency of Public Transport Systems</p>	<p>The City incorporates both positive and negative examples of land use outcomes and transport systems that support or effectively work against the efficiency of public transport systems. The examples directly correlate with the period of subdivision and development between the eastern and western halves of the City.</p>	<p>Efficiency of public transport systems will need to be encouraged via:</p> <ul style="list-style-type: none"> • application of increased development densities; • provision of road/street cross-sections with sufficient pavement width to accommodate bus access; • protection of reservations for high capacity public transport systems; • provision for pedestrians and cyclists; • use of a grid based transport network that supports access to public transport routes to the highest proportion of households; • provision of direct connectivity to the Aurora town centres and future transport corridor; and • provision for and access to local employment.
<p>Mixed Use Adaptable Urban Development</p>	<p>In the older parts of the City there are examples of adaptable mixed use development. In more recently developed commercial locations land uses have become more segregated. Lack of adaptability in housing forms is a key issue both in terms of diversity and capacity to meet changing needs over time wherein the majority of housing is detached - 3 to 4 bedroom.</p>	<p>Achievement of mixed use adaptable urban development will require:</p> <ul style="list-style-type: none"> • identification of commercially viable locations for mixed use development that will support neighbourhoods and create the focus for more diverse housing outcomes; • an integrated design response with strict adherence to fundamental design requirements; • provision for adaptable building structures that can support a range of land uses over time; • provision for community based land uses such as specialised accommodation, community activity centres, schools and other uses in proximity to non-residential land uses; • provision of higher development densities within the walkable catchment of neighbourhood centres; • incorporation of high quality streetscapes that provide for car based access and parking in locations that support economic viability but that do not destroy the amenity of mixed use developments; • provision for multi level buildings; and • provision of rear lanes.
<p>Variety of Lot Sizes and Housing Types</p>	<p>While significant variation in subdivision layout styles can be found throughout the City, the overwhelming majority of housing is detached 3 to 4 bedrooms on a standard lot size, with an average area of 500 700m². Where variation in lot size and housing type has occurred, it has generally been provided in isolated pockets rather than throughout residential areas on a broader scale. Lack of diversity in architecture is a key issue throughout the existing and newly emerging areas. Local streets also lack diversity in internal cross section details and proportion to create identity and to support more diverse housing options.</p>	<p>Variation in lot size and housing types will require:</p> <ul style="list-style-type: none"> • deliberate provision for a range of lot sizes in terms of width and depth during the subdivision design phase in all streets rather than in discreet 'pockets' of higher or lower density development; • incorporation of high quality, well proportioned streetscapes that can accommodate parking and other requirements in a range of configurations; • wider scale application of reduced front setbacks in key locations to create a more well defined 'urban' outcome; • preparation and enforcement of design guidelines to prescribe preferred outcomes; and • negotiation with developers and volume home builders to provide more diverse housing products.

Table 2c Traditional Neighbourhood Design Elements, Experience in the City of Whittlesea and Responses to Address Deficiencies

Elements	City of Whittlesea Experience	Responses to Address Deficiencies
<p>Access for All Users</p>	<p>Attention to physical access for all users has been acknowledged by the City of Whittlesea in preparing the Disability Action Plan. To date the focus has been on provision of pram crossings, footpaths at a suitable grade and unimpeded paths of travel. With increased emphasis on street based activities and increased development densities, it will be necessary to resolve the relationship between vehicle and pedestrian/cycle/disabled access.</p> <p>Typically approaches to pedestrian access have not sought to favour the pedestrian ahead of the motorist.</p> <p>Attention to the relationship between components of street/road cross section details such as pavement width, width for street tree planting, kerb type and footpath width lacks variability as does provision for boulevards with an appropriate scale.</p>	<p>In addition to continuing to implement the Disability Action Plan, it will be necessary to give greater prominence to pedestrian, cyclist, disabled and elderly access by:</p> <ul style="list-style-type: none"> • providing footpaths on both sides of all streets; • making provision for both recreational and commuter cycle paths; • giving priority to pedestrians in higher density locations; • designing local parks and meeting spaces with attention to access considerations; • removing or relocating vehicle crossovers from street frontages in high density locations; • creating streetscape character that supports pedestrian access; and • controlling traffic speeds through development of the street kerb types, intersection radii, on street parking, pavement widths and streetscape planting lots.
<p>Avoidance of Key Environmental and Cultural Features</p>	<p>The rigour in analysis, understanding and retention of environmental and cultural assets has significantly increased throughout the City in the recent past. It is generally acknowledged that retention of such features offer the ability to create identity and a positive sense of place.</p>	<p>Avoidance of key environmental and cultural features will require:</p> <ul style="list-style-type: none"> • continued application of comprehensive site analysis requirements; • site responsive design that incorporates significant features in locations that will contribute to biodiversity objectives and a positive sense of place; and • a balanced response that successfully incorporates other necessary elements to support the desired urban form and social outcomes.
<p>Comprehensive Approach to Open Space and Water Management</p>	<p>In the older parts of the City, approaches to open space and water management tend to be disparate. Water management responses, in particular, focussed on engineered drainage solutions rather than a whole of water cycle approach. More recently however, there have been significant public and private sector attempts to apply a more comprehensive, integrated approach to open space and water management.</p>	<p>A comprehensive approach to open space and water management will require:</p> <ul style="list-style-type: none"> • a detailed understanding of sites of environmental sensitivity; • a comprehensive understanding of recreation needs; • a balanced approach to use of water sensitive urban design techniques taking into account the desired form of development; • a catchment based approach to drainage with regard to opportunities for use of undevelopable land for drainage purposes; • consideration of demand management/reduction techniques for use of potable water; • resolution of the role of natural water courses as opposed to constructed drainage systems; • incorporation of the relative benefits and disbenefits of a distributed or 'end of pipe' drainage solution; • early regard to conveyance and water treatment requirements; • consistent education based initiatives throughout the development process.
<p>Promotion of Affordable Housing</p>	<p>The City is fortunate to have older established areas that offer more affordable housing options however, affordability in Greenfield locations is a significant issue where the price of both land and housing has dramatically increased in recent years.</p>	<p>Promotion of affordable housing is a complex matter that will require:</p> <ul style="list-style-type: none"> • variation in lot sizes and housing forms; • encouragement to developers to provide adaptable housing that can be extended/upgraded over time; • partnerships with major developers to deliver affordable house and land packages and other programs to increase the level of affordability; • provision for alternative modes of transport; • provision for local employment; and • support from other levels of Government.

Table 2d Traditional Neighbourhood Design Elements, Experience in the City of Whittlesea and Responses to Address Deficiencies

Elements	City of Whittlesea Experience	Responses to Address Deficiencies
<p>Variety and Diversity of Open Space</p>	<p>Developers have embraced open space and landscaping as a method of creating a sense of differentiation in the market.</p> <p>The location, form, planting of open space has to a large extent been marketing driven (i.e. located at entries to estates as 'gateways'), or a direct response to retaining features of conservation significance (knolls, red gums, creeks etc.)</p> <p>A more comprehensive approach to open space is required with the needs of the neighbourhood and community to be balanced and integrated with needs of the environment.</p>	<ul style="list-style-type: none"> • a comprehensive approach to open space will require provision of a range of open space types including passive, active, conservation, cultural and urban spaces that link communities or that create local identity and character.

From this analysis the key challenges that confront formulation of the Epping North East Local Structure Plan relate to:

- subdivision design and layout;
- diversity in land uses, housing and built form outcomes and streetscapes;
- transport outcomes;
- the type, form and location of commercial and community activity centres;
- protection of natural, cultural and environmental values; and
- producing community based outcomes that supports a sense of place and development of neighbourhoods.

The following section defines the way in which the Local Structure Plan responds to the site features and the fundamental design requirements of Traditional Neighbourhood Design.

It is necessary for more detailed planning of the Development Plan and Planning Permit stage to further this response, based on the philosophy of TND.



Part 3 Local Structure Plan

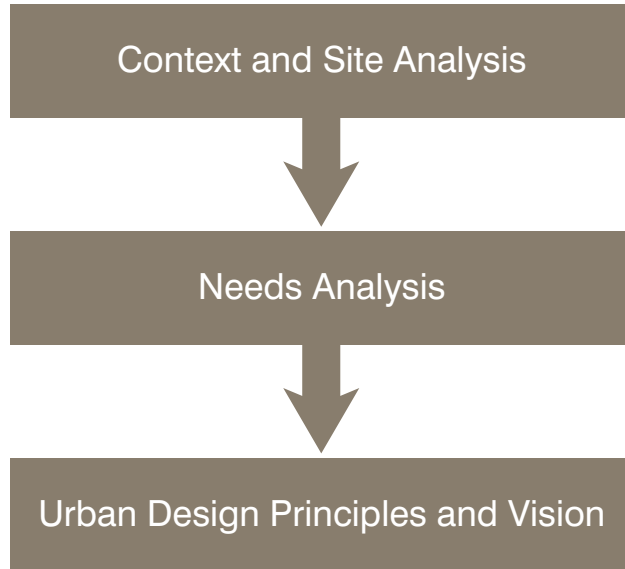


City of Whittlesea

3.0 Local Structure Plan

3.1 Introduction

The design process for preparing the Local Structure Plan for Epping North East was involved, iterative, collaborative and stemmed from three phases of analysis, in order to arrive at a design response grounded in traditional neighbourhood design principles, these include:-



The Local Structure Plan for Epping North East was further underpinned by a range of objectives including the desire to:-

- create strong links to the Aurora Town Centre and train station;
- locate an externally positioned main street based activity centre along Epping Road;
- create a linked network of identifiable neighbourhoods with centres of commercial, social and community activity;

- support and connect to development to the west (Aurora) and south;
- integrate natural features;
- create a positive sense of character and place;
- integrate communities east and west of Epping Road;
- support a range of transport alternatives including public transport, walking and cycling;
- apply and further the objectives of the Epping North Strategic Plan;
- reduce the impact of the diagonal transmission easement; and
- balance site constraints (land ownership, fragmented titles, transmission line, environmental and cultural features) with Traditional Neighbourhood Design objectives.

This chapter will provide an overview of the ENE LSP, outline the design response and present the design rationale and intent of the ENE LSP.

Prior to launching into a detailed explanation of the ENE LSP and its design components, it is considered worthwhile to first provide an overview of how the plan evolved and developed in the initial concept development phase.

Although this chapter will only provide a brief overview of this phase, it is nonetheless considered important, as it demonstrates the rigour of concept development that was undertaken and provides an insight into how the plan evolved into the Local Structure Plan for Epping North East.

3.2 Concept Development Phase

The concept development phase for Epping North East progressed as a series of layers or overlays that sought to graphically represent a response to the analysis and design objectives. This phase evolved as a series of sketch plans which aimed to test various design solutions.

Because of the iterative nature of the design process, it is difficult to explain the design evolution in a sequential manner. Therefore what is included in this section is a snapshot of the design process, presented as a series of sketch plans (refer Figures 6a and 6b). What these sketch plans seek to do is test and examine the various questions and design issues specific to Epping North East. Some of which are outlined below:-

- the importance of maintaining a radial/diagonal link across the site linking Epping North East with the future Aurora Town Centre and Train Station (as documented in the Epping North Strategic Plan), and how to differentiate this link.
- the importance of providing a direct link between activity centres including Town, Neighbourhood and Local Centres.
- the importance of roads converging and passing directly through at the Neighbourhood Activity Centre.
- the importance of locating the Neighbourhood Activity Centre on Epping Road.
- the importance of connecting Epping North East directly into the broader connector road network and loop.

- the importance, number and location of signalised intersections along the perimeter arterial roads, particularly Epping Road.
- how the LSP could accommodate the location of neighbourhood centres and nodes of activity along the connector road network.
- how the creation of awkward triangular development parcels adjacent to the transmission easement could be minimised.
- the best location of school sites to facilitate community nodes as well as addressing requirements of the Department of Education and Training.
- priority of traffic movement and desire to create internal east-west and north-south links to support the external arterial road network.
- how the road network interfaces with and crosses the transmission easement and Findon Creek; and
- how to design to account for property boundaries, current ownership patterns and staging.

These are only a sample of the questions and issues that were raised and tested as part of the concept development phase.

This concept development phase culminated in the design response which is the ENE LSP.

Figure 6a Concept Development Phase Design Process - Sketch Plans

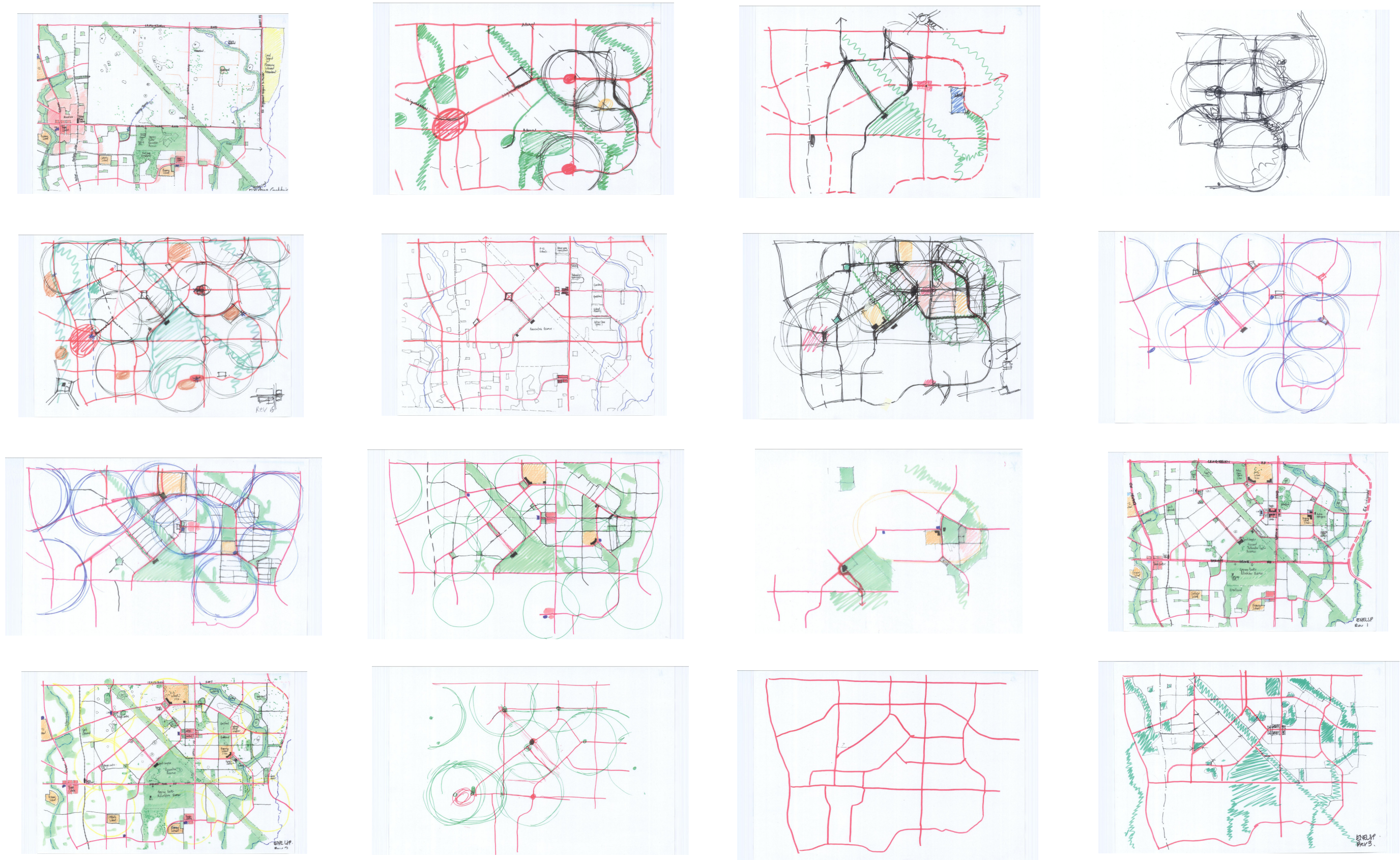
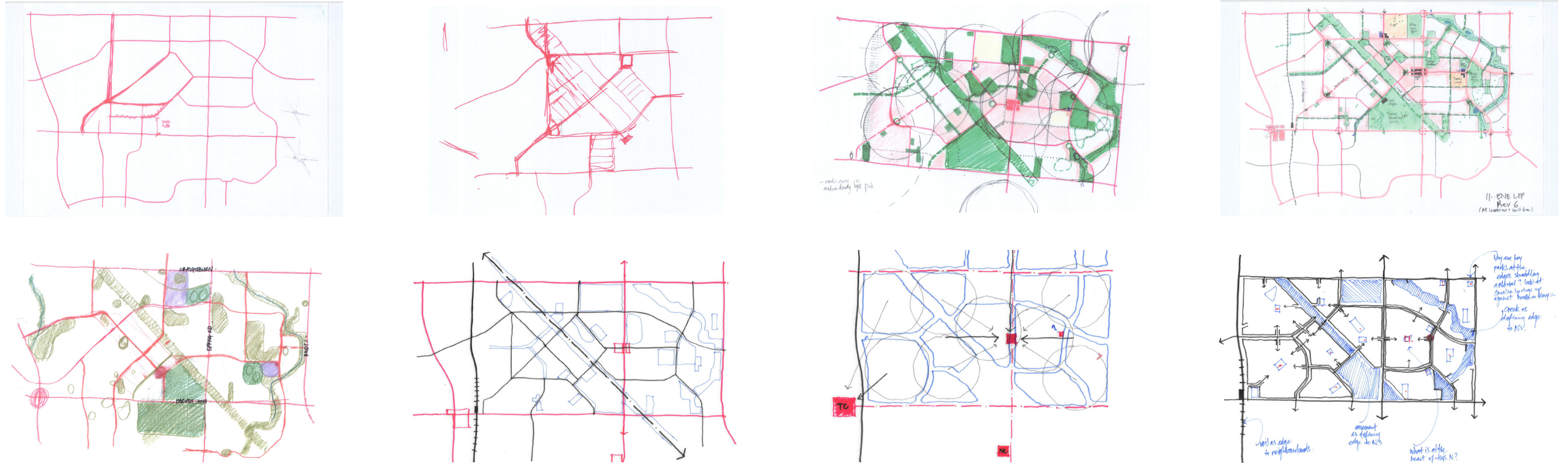


Figure 6b Concept Development Phase Design Process - Sketch Plans



3.3 The Local Structure Plan

The Local Structure Plan for Epping North East depicts a layout for the LSP area that articulates the key land use relationships, preferred form of the activity centres and subdivisional layout supported by the LSP.

It is difficult to define and explain the Local Structure Plan for Epping North East in terms of discrete components, when in reality the response is more fluid, and may be more accurately described as a series of extricably linked layers which overlap and blur into one another.

Notwithstanding, a logical starting point in which to explain Council's response to the ENE LSP, is with the Activity Centres. The Activity Centres present the fundamental building blocks of the design response and most strongly inform and influence the other layers, particularly the surrounding neighbourhoods, community facilities and movement network.

The design response will therefore commence with a description of the Activity Centres and then follow in the following order:

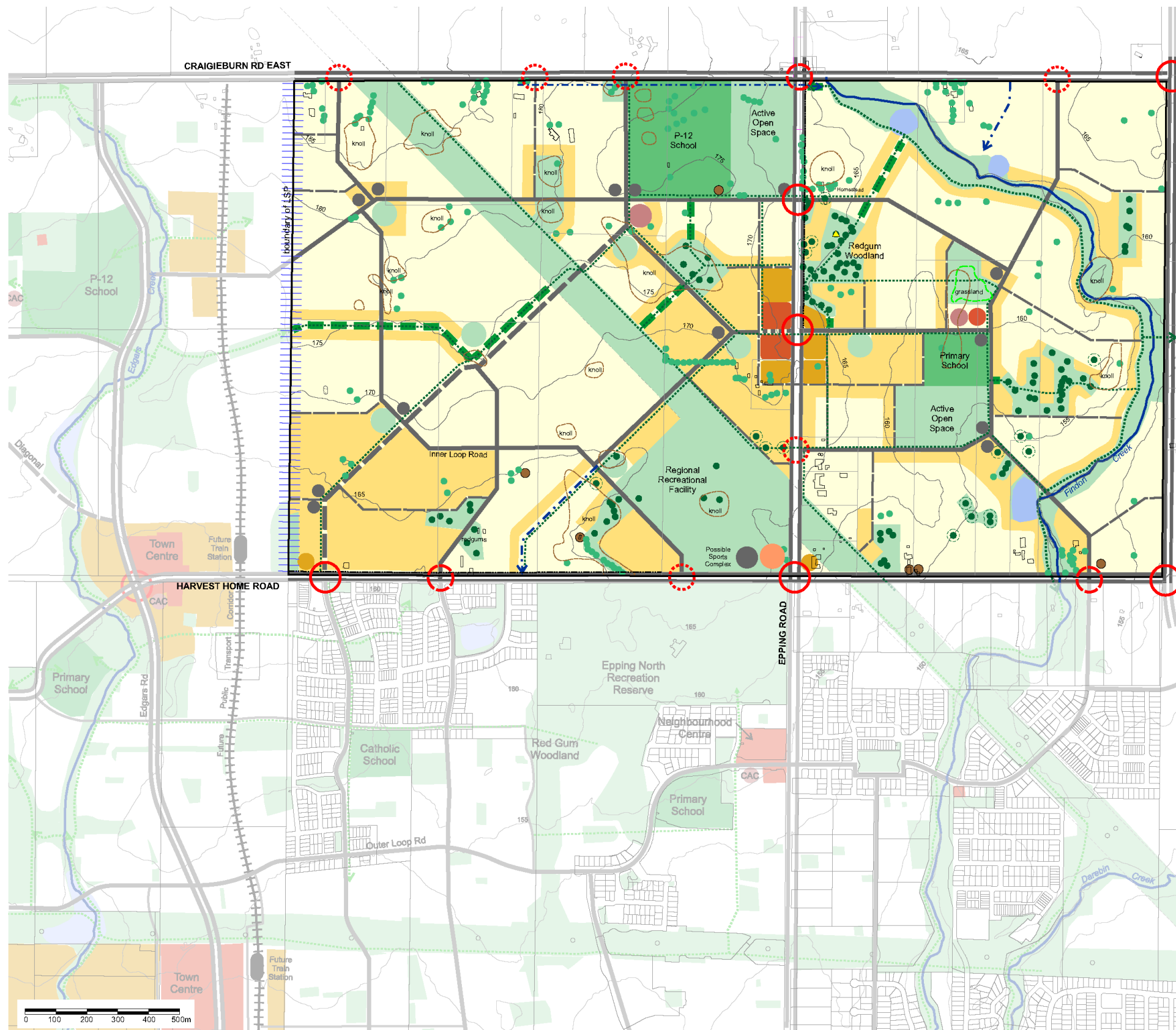
1. Activity Centres
2. Community Facilities
3. Open Space
4. Movement Network
5. Neighbourhoods
6. Sustainability, energy efficiency & solar orientation

3.4 Detailed Land Budget

The detailed land budget for the ENE LSP area is outlined below:

Land Budget		
		figures rounded to 1 decimal point
A	Total Site Area	449.3
B	Encumbered Land	59.9
	Transmission Easement	24.0
	Wetlands	2.1
	Floodway	15.1
	Conservation Open Space <i>(to protect River Red Gums, Stony Knolls and grasslands)</i>	18.78
Gross Developable Area (GDA)		389.4
C	Unencumbered Open Space	39.2
	Active Open Space (regional and local)	28.85
	Passive Open Space	10.3
Net Developable Area (NDA)		350.2
		<i>(total area minus items B - C)</i>
D	Community Facilities	16.7
	Community Activity Centres <i>(0.5 ha and 0.7 ha)</i>	1.2
	Schools <i>(primary and P-12)</i>	15.5
E	Activity Centres	1.5
	Neighbourhood and Local Activity Centre <i>(3000-5000m² for NAC)</i>	
Gross Residential Area (GRA)		332.0
F	Approximate Number of Dwellings	4,980
	<i>based on 15 lots / ha (GRA)</i>	
G	Approximate Projected Total Population	14,941
	<i>based on 3 persons per household</i>	

Figure 7 Local Structure Plan



Drawing Key

- River Red Gums
- Specific design response to River Red Gum required
- Other Trees (non River Red Gums)
- Stony Knolls
- Native Grassland
- Potential European Historic Sites
- Aboriginal Scar Tree (indicative location)
- Wetland / Retarding Basin
- Watercourse / Creek
- Floodway Reserve
- Preferred Drainage Reserve Realignment
- Existing Buildings
- Open Space
- Linear Open Space Link (30m av. width - incorporates a shared path)
- Neighbourhood Park
- School
- Key Building Location
- Community Activity Centre
- Potential Restaurant Site
- Residential - Standard Density
- Residential - Medium Density / Smaller Lots
- Mixed Use
- Commercial Site / Mixed Use Opportunity
- Activity Centre - Neighbourhood
- Activity Centre - Local
- Arterial Road
- Boulevard Connector Street
- Diagonal Boulevard
- Key Local Road (incorporating shared path & diverse streetscape)
- Road Widening
- Off-road Shared Path Network
- Intersection - signalised
- Intersection - roundabout
- Intersection - type C
- Interface with Aurora
- Contours (5m interval)

Note:

All arterial roads, diagonal boulevards & connector streets accommodate buses and on-road bicycle lanes.

All road alignments shown are a graphic representation only, they do not depict the full width of existing or proposed reservations.

Alignment of E6 is indicative only. Final alignment to be determined by VicRoads in consultation with Council.

This plan presents the expected land use and design patterns for the ENE LSP area at the time of publication. The area is subject to the Epping North Strategic Plan and Development Plan.

River Red Gums are shown symbolically only, they do not depict the canopy or Tree Protection Zone.

3.5 Activity Centres

3.5.1 Design Objectives

The distribution of activity centres for Epping North East has been determined in response to a range of objectives including the desire to:-

- identify commercially viable sites for the establishment of 'Main Street' based neighbourhood centres;
- co-locate active open space, community facilities and schools;
- support establishment of walkable neighbourhoods; and
- acknowledge and support the distribution of activity centres in the adjoining Aurora and Harvest Home LSP development.

3.5.2 Neighbourhood Activity Centre

The population of Epping North East can potentially support two activity centres if located in optimal positions. The centres have a gross leasable floor area of 3,000m² and 1,000m² respectively and are located to the west and east of Epping Road (refer Figure 8).

The larger of the two activity centres (the neighbourhood centre) is located on the west side of Epping Road, where the following locational advantages can be achieved:-

- direct access from and exposure to Epping Road without the potential for uncontrolled 'ribbon' style development along Epping Road;
- potential for establishment of a signal controlled intersection to designate entry to the activity centre and to promote access from the east and west side of Epping Road;

- maximum potential for a supporting residential and mixed use catchment within a 400m radius of the centre;
- proximity and direct access to the regional active recreation reserve;
- ability to create street based commercial activities with a northerly aspect;
- potential to create a specific road cross-section to complement the activity centre;
- the ability to designate two sites for standalone commercial / mixed use activities on the east side of Epping Road to complement the activity centre on the west side of Epping Road;
- the ability to service the convenience needs of the enlarged eastern precinct;
- the ability to reduce the barrier effect that Epping Road would otherwise create;
- the ability to create a positive residential built form address to Epping Road where the activity centre provides a context for housing options; and
- potential to integrate a local plaza or 'Urban Park' of formalised open space at the western end of the main street.

The preferred physical form of the neighbourhood activity centre is a 'main street' based form rather than an 'internalised' form. To achieve the preferred form it will be necessary to carefully consider road cross-section details and the scale of the built form in addition to specific design details to create local character, amenity and identity.

It is anticipated that uses on the eastern side of Epping Road, will comprise of standalone uses that don't compromise the function and effectiveness of the 'main street' activity centre on the western side.

3.5.3 Local Activity Centre

The second activity centre (local centre) is located on the east side of Epping Road where the following locational advantages can be achieved:-

- direct access via the connector road network, and multiple other parallel local streets;
- potential to co-locate the activity centre with local active open space, the primary school and a community activity centre;
- potential to provide convenient pedestrian and cycle access to the Findon Creek corridor;
- potential to establish a supportive surrounding residential catchment; and
- potential to create a direct view line and access to the larger activity centre.

The preferred physical form of the local activity centre that will provide for local convenience needs is a street based form however given the scale of this centre, the emphasis is on co-location of community facilities and open space to create a focal point with very localised convenience shopping needs rather than a large amount of retail floorspace.

3.5.4 Other Activity Centres

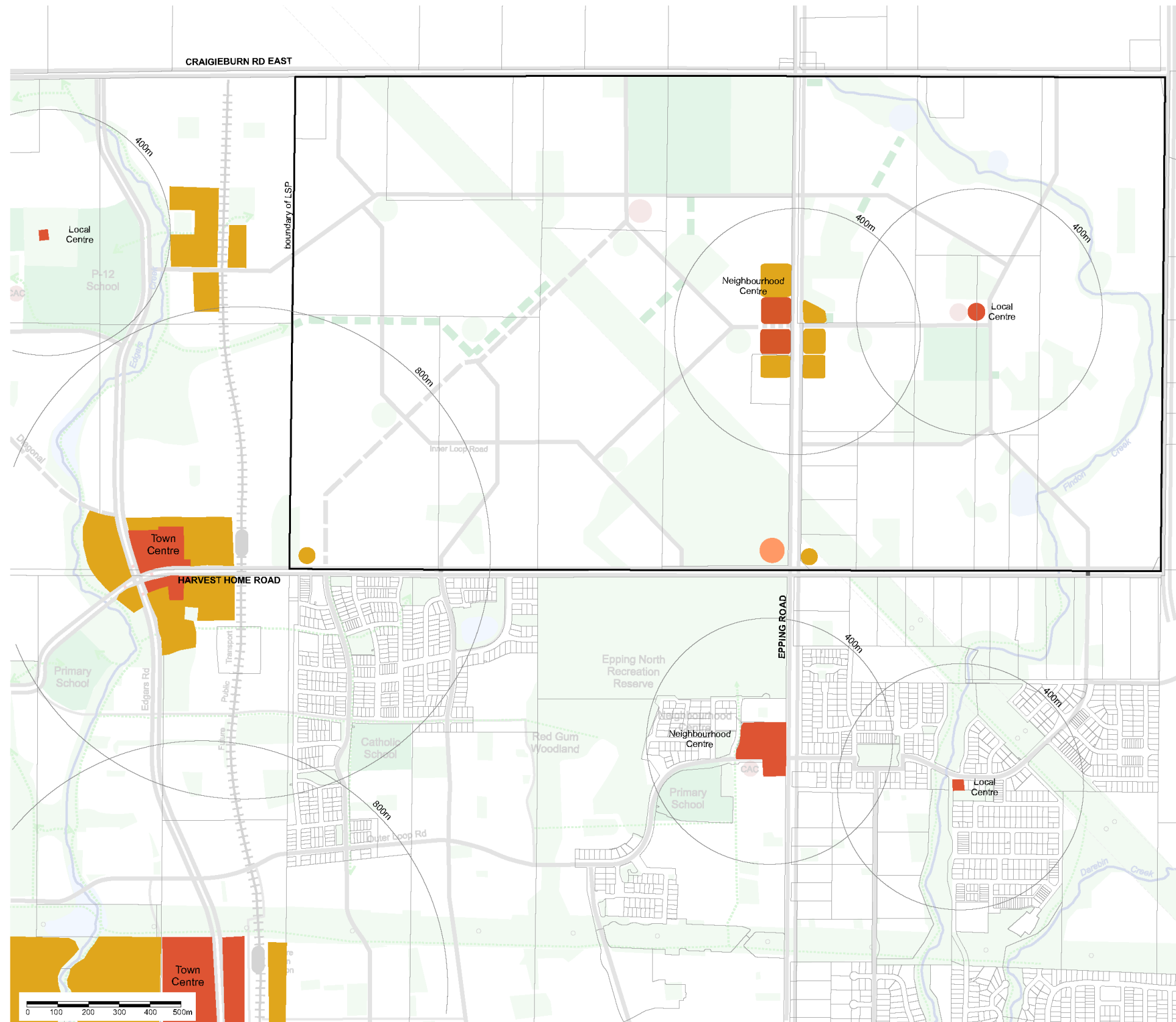
Several other sites have also been nominated for potential mixed use functions. These sites include:

- North-western corner of the intersection of Harvest Home Road and the diagonal boulevard – a small mixed use centre comprising a maximum of 500m² retail floor space, potential child care uses and medium density housing.
- North-western corner of Harvest Home Road and Epping – a potential high-quality restaurant site.
- North-eastern corner of Harvest Home Road and Epping Road – a potential mixed-use/convenience centre.

Noting the prominence and key location of the potential restaurant site, the following specific design objectives apply:

- The building should be architecturally designed and address Epping Road and Harvest Home Road;
- The carpark should be located behind the restaurant; and
- Where possible, the restaurant should share access point/s with the regional open space.

Figure 8 Activity Centres



Drawing Key

- Activity Centres
- Mixed Use
- Commercial Site / Mixed Use Opportunity
- Potential Restaurant Site
- Walkable Catchments

3.6 Community Facilities

This section discusses the design response in relation to the location of community activity centres and schools, which along side the activity centres form nodes of activity or community focus. In order to reinforce and intensify these facilities as nodes and meeting points for the community, where possible these facilities have been co-located or clustered together with strong relationships to the movement network, open space and the supporting Neighbourhood Activity Centre.

3.6.1 Design Objectives

Community facilities including community activity centres (CAC) and schools have the ability to become important parts of the identity and sense of place of the local community. Schools and CAC's should contribute to the creation of vibrant and safe streetscapes, encourage pedestrian activity, cycling and social interaction.

To facilitate these objectives, the design and layout of schools and CAC's must bear a strong presence and outward relationship to the street and surrounding neighbourhoods, they should make a bold architectural statement, contribute to the development of active community nodes and act as a civic landmark for the local community. The design of these facilities should be site responsive and balance educational needs, community and social needs, vegetation protection, sustainability, safety and traffic management with good urban design outcomes.

Specific objectives for schools and CAC's are as follows:-

- cluster community uses, facilities and buildings together to form active 'community nodes' that create attractive and vibrant community destinations;
- locate high use and 'public access' school buildings such as school administration at prominent corners and intersections to increase activity at these locations / intersections;
- ensure school and community buildings have a civic presence at key intersections and prominent corners. The buildings should present windows and building entries to the street, and use tools such as higher built form, vertical elements, glazing, contrasting panels and strong roof forms to make an architectural statement or 'landmark' at this node;

- buildings are required to have an outward appearance, and create a strong relationship with the street in order to promote passive surveillance, a safe and friendly streetscape, pedestrian activity, cycling and social interaction. Setbacks from the street should be kept to a minimum of four metres;
- high fencing, solid blank walls, densely bushed areas or areas of car park should be avoided around the perimeter of the site, as they will adversely impact on perceived levels of safety and discourage pedestrian use of the streetscape. Good planning and design of schools should ensure that the buildings themselves (rather than fencing) become the separation between the internal school grounds and the street;
- car parking for schools and CAC's should be located to the side or behind buildings so as not to dominate the streetscape, interrupt the continuity of school buildings, or force the increased setback of school buildings;
- drop off/ pick up zones should integrate with the streetscape cross sections and be provided as part of the on street parking;
- contemporary and articulated building forms and roof, materials and design are encouraged including corrugated iron, stone, timber and glazing;
- landscaping to compliment buildings, rather than hide or buffer buildings from the street. Landscaping along the front of buildings should be low as not to obscure open lines of sight between the windows and the street, or allow for 'lurking' behind bushes. Indigenous planting that suit the site conditions are encouraged for sustainability and water saving reasons;
- opportunity for the spilling of classrooms to outdoor areas;
- Integrate school and CACs with public transport stops; and
- Provide for bike storage.

3.6.2 Community Activity Centres

The population of Epping North East will require provision of two community activity centres. These centres will be the focus of local community service provision.

The community activity centres are proposed to be located to the east and west of Epping Road where the following locational advantages can be achieved (refer Figure 9):-

- potential to co-locate the community activity centres with schools and open space;
- potential for the community activity centres to occupy prominent locations on or nearby to the intersection of important connector roads; and
- potential to support commercial activities, and be co-located with schools.

The community activity centre located to the east of Epping Road will be slightly larger than the centre located to the west of Epping Road, as it is located significantly further away from the northern town centre within the Aurora development.

The smaller community activity centre located to the west of Epping Road will consist of:-

- dual pre-school;
- small meeting rooms;
- office space for visiting services;
- small hall/multi purpose room;
- storage space; and
- reception/amenities area.

The larger community activity centre located to the east of Epping Road will consist of:-

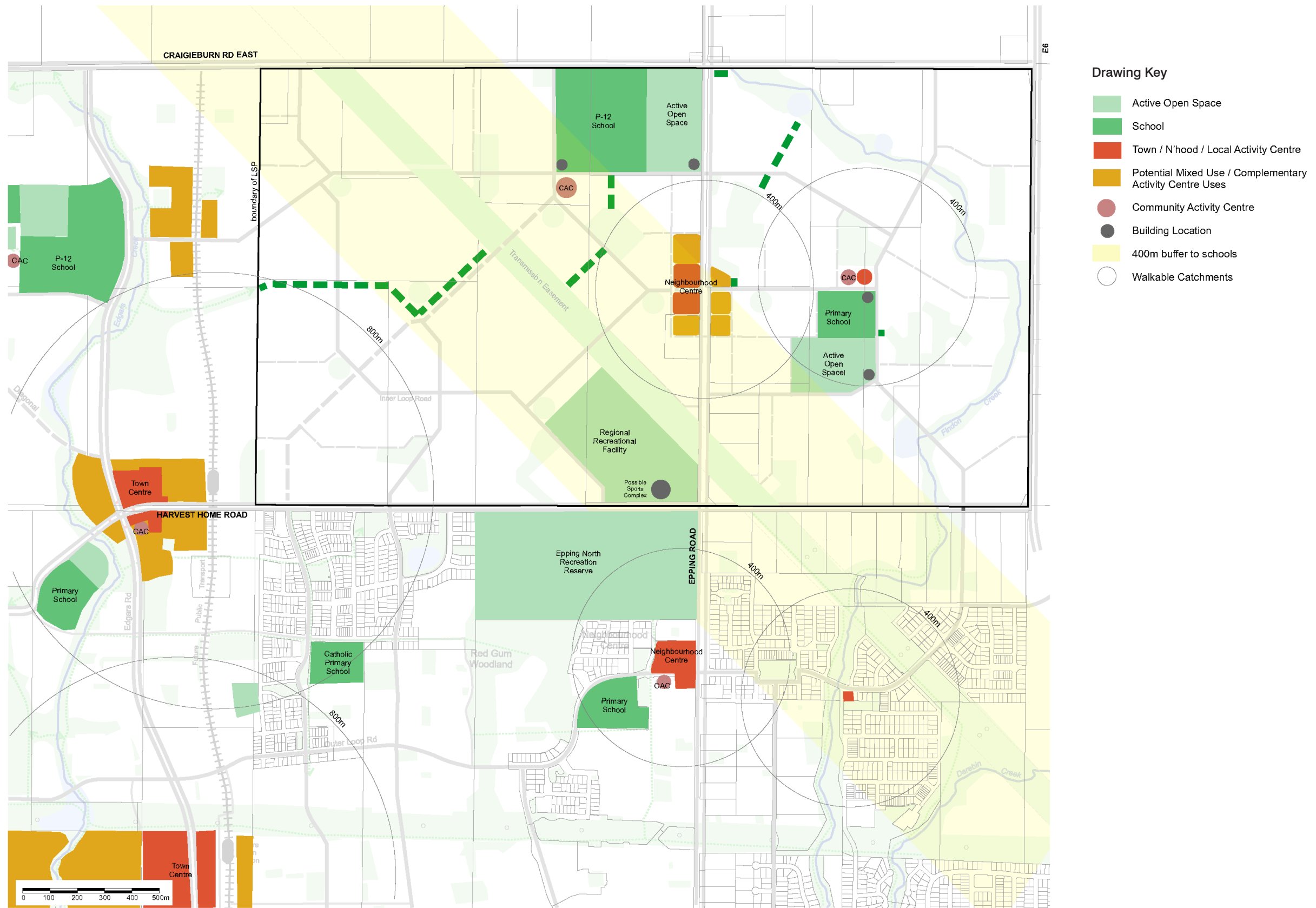
- dual pre-school;
- dual maternal and child health;
- small meeting rooms;
- office space for visiting services;
- small hall/multi purpose room;
- storage space;
- reception/amenities area; and
- neighbourhood house.

3.6.3 Schools

The population of Epping North East will require provision of one P-12 (combined primary and secondary school campus) and one standalone primary school. Taking into account the planning for school sites that has been undertaken within the balance of the strategic plan area, the schools are located to the east (primary school) and west (P-12 school) of Epping Road where the following locational advantages can be achieved:-

- potential for co-location with open space and community activity centres;
- ability to satisfy Department of Education and Training requirements including 400m setback from the transmission easement;
- ability to achieve at least three road frontages;
- potential to locate school buildings at prominent intersections to complement the community activity centres; and
- minimise the impact of the school acting as a 'gap' or barrier within the neighbourhood structure.

Figure 9 Community Facilities



3.7 Open Space

The response to the provision of open space within Epping North East has sought to achieve a balance between conservation and environmental protection, equitable active and passive recreation provision, and 'urban' parks that support the community and activity nodes and neighbourhoods. Together the various open spaces aim to provide for an interconnected, diverse and equitable network of open space which covers the spectrum from conservation to urban, without compromising the objectives of traditional neighbourhood design.

3.7.1 Design Objectives

The open space network for Epping North East has been designed in response to a range of objectives including the desire to:-

- establish an equitable distribution of open spaces that are accessible to the community;
- protect and incorporate sites of archaeological or environmental significance;
- set aside sufficient land to meet the projected demand for active open space;
- establish a linked network of open space that will enable the community to move between neighbourhoods, and to surrounding areas;
- provide a central focus or 'urban park' for each neighbourhood;
- establish an effective hierarchy and distribution of open space that meets relevant benchmarks and achieves the objectives of traditional neighbourhood design;
- create a point of difference through establishment of a positive sense of place and character;
- apply the open space objectives and requirements of the Epping North Strategic Plan; and
- apply the objectives and recommendations of the Whittlesea Open Space Strategy.

3.7.2 Open Space Network

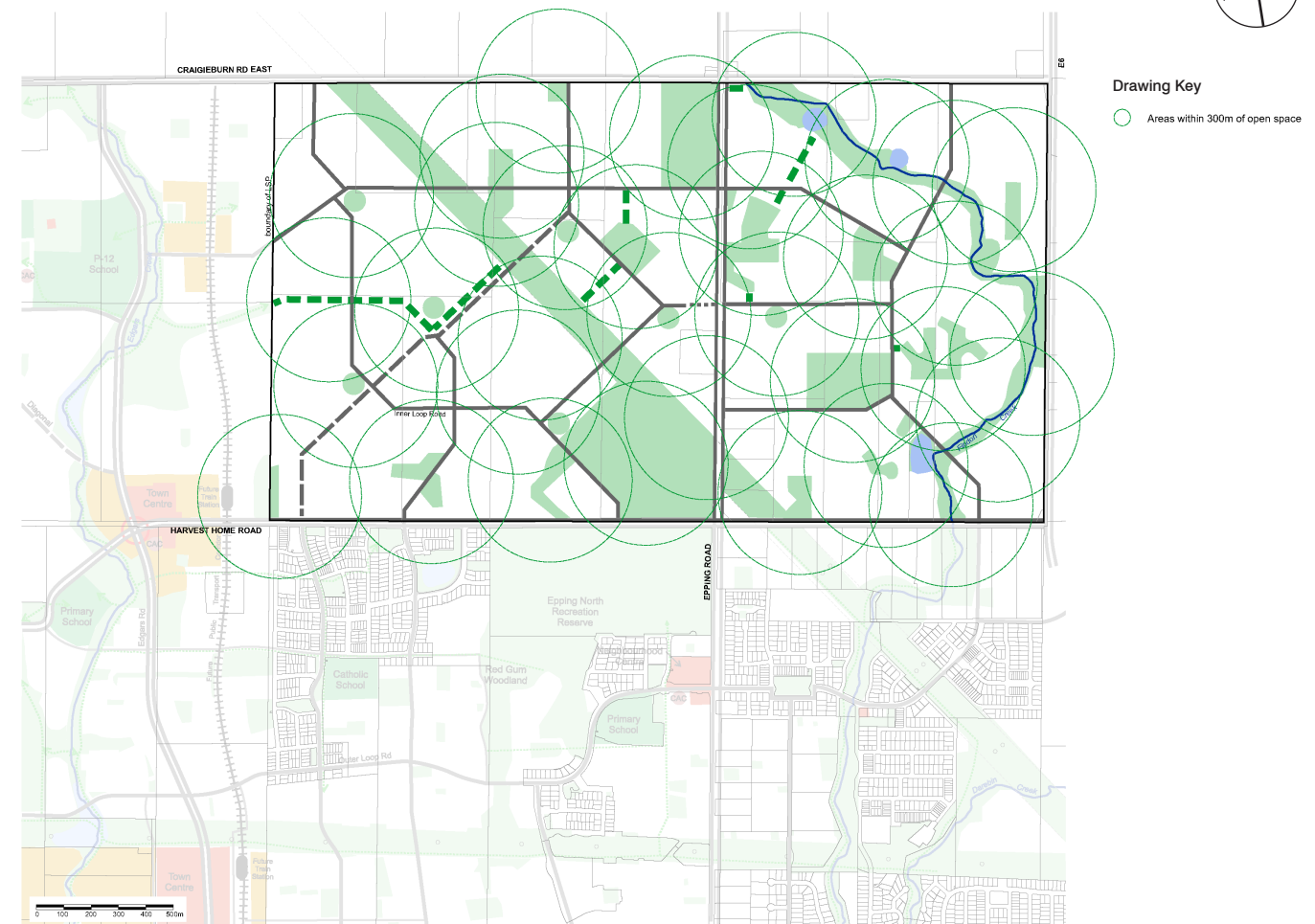
Taking into account the specific design objectives, the open space network for Epping North East has been designed with the following features:-

- incorporation of the regional recreation site on the north-west corner of Harvest Home Road and Epping Road;
- retention of higher value stony knoll areas and significant stands of vegetation and sites of archaeological sensitivity throughout the plan area in viable locations;
- active sporting reserves comprising two football/cricket ovals to the west of Epping Road co-located with the combined P-12 School and two soccer pitches to the east of Epping Road co-located with the Primary School;
- local open space, including unencumbered passive open space, within 400m of all households;
- an interlinked linear open space network that utilises encumbered land such as along the transmission lines and Findon Creek and a linkage to the Aurora development in accordance with the Epping North Strategic Plan; and
- A combination of natural unstructured open space opportunities to protect sites of conservation significance and more structured urban 'plaza' type spaces located in conjunction with neighbourhood centres, community facilities and activity centres.

The open space network for the LSP area includes four categories of open space including:

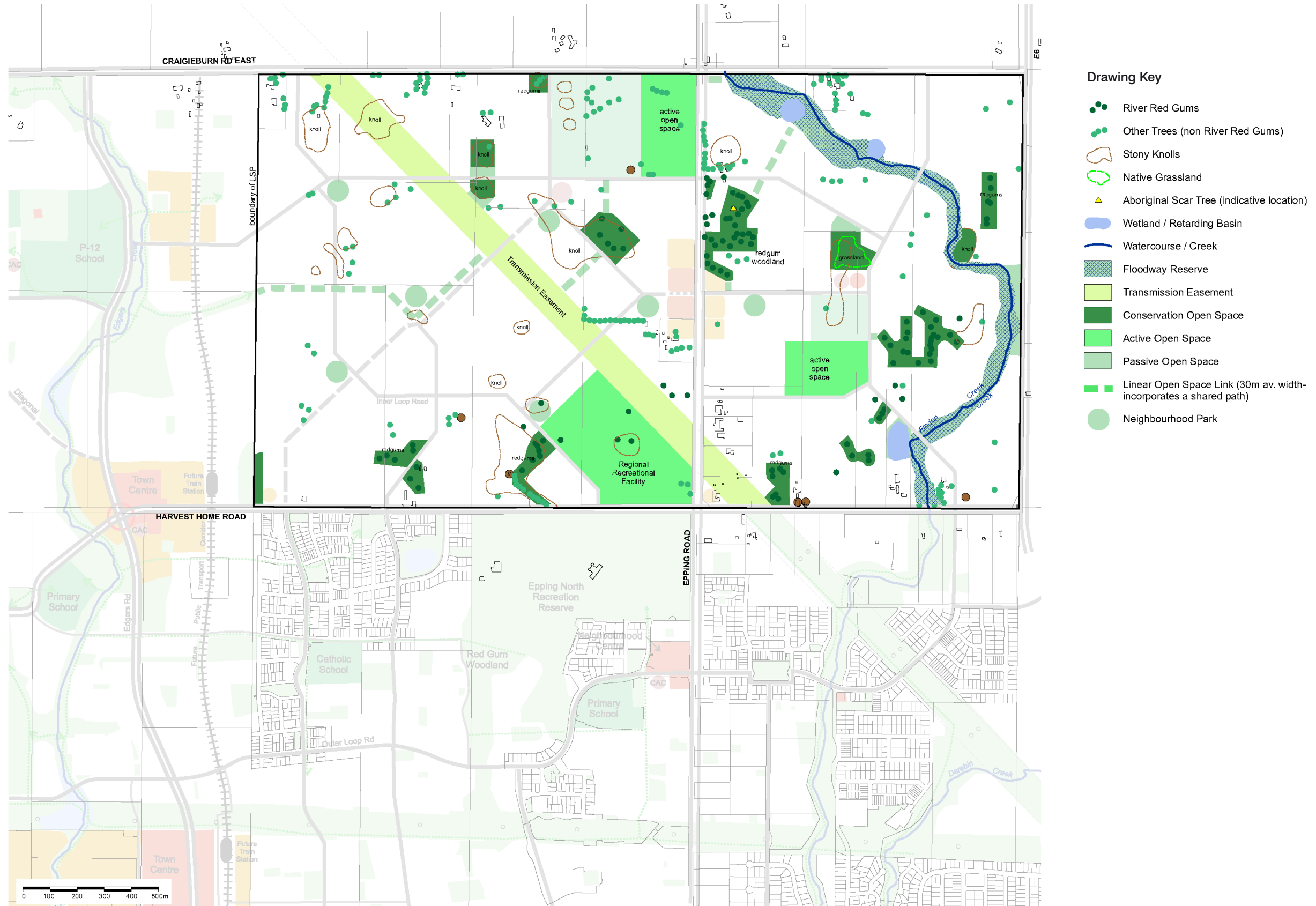
- active open space (local and regional);
- linear open space;
- conservation open space; and
- neighbourhood/passive open space.

Figure 10 300 Metre Walkable Catchment to Open Space



During more detailed planning stages, open space master plans will be required to detail the role, configuration and components of individual open space areas relative to the surrounding environment.

Figure 11 Open Space Network

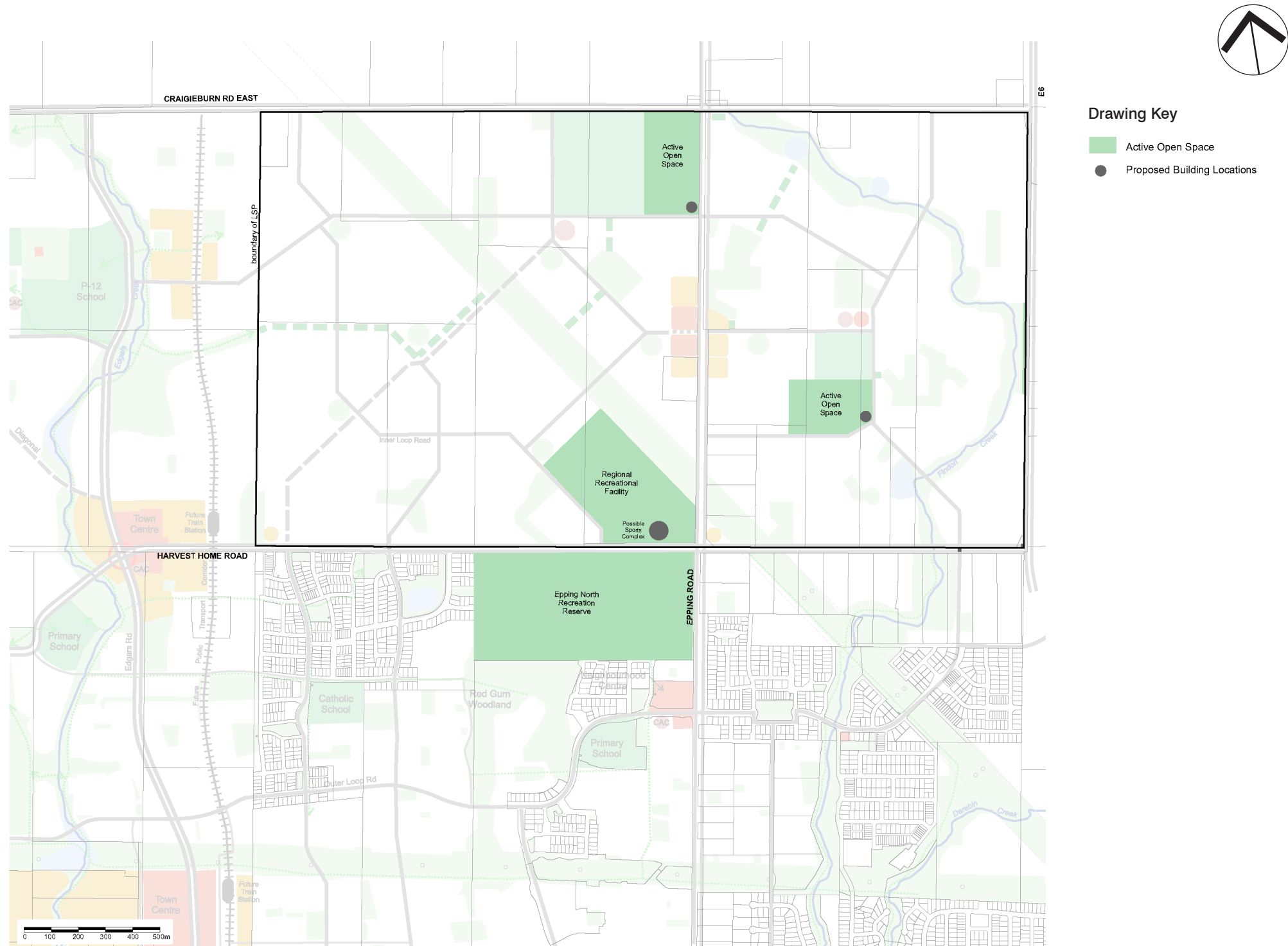


3.7.3 Active Open Space

The first category of open space covered in this section is active open space. The LSP area is fortunate to have ready access to the regional active open space reserve on the north-west corner of Harvest Home Road and Epping Road.

This site has been set aside in accordance with the Epping North Strategic Plan and will incorporate high order regional recreational facilities and playing fields. In addition to the demand that the LSP area will in part create for this facility, the LSP will also create demand for two football/cricket ovals and two soccer pitches. The LSP incorporates provision for those local active facilities on the west side of Epping Road (football/cricket) and on the east side of Epping Road (soccer) (refer Figure 12). In these locations the playing fields have been co-located with schools to support other community functions. Furthermore the playing fields have also been located in high profile locations that are readily accessible and which are unlikely to cause amenity problems to nearby residents.

Figure 12 Active Open Space



3.7.4 Linear Open Space

The Epping North Strategic Plan incorporates a broadly defined circular off-road linear open space network. This network focuses on establishment of a principal linear open space and path system via use of natural features such as the Edgars Creek, Findon Creek and encumbered land such as the transmission easement to link communities. To link communities across the northern section of the Strategic Plan area, the Strategic Plan supports establishment of a linear link between the Aurora development and the LSP area.

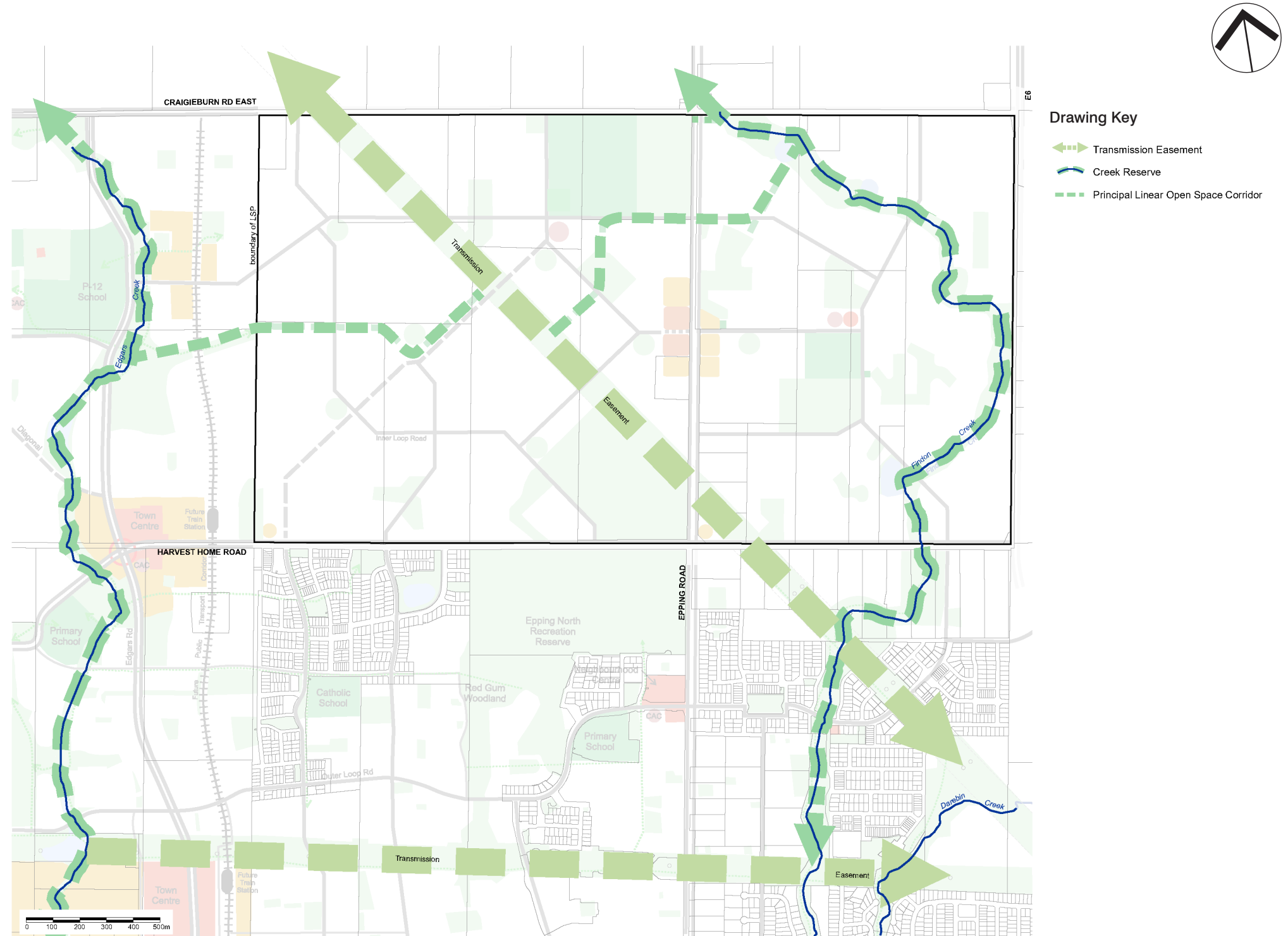
The LSP responds to these objectives by incorporating a linear open space network (refer Figure 13) that:

- establishes a high level of internal connectivity;
- links the Aurora development to the LSP area;
- provides direct links to the Edgars and Findon Creek reserves;
- links sites of conservation significance; and
- incorporates the transmission easement

Importantly this high order linear network will provide the focus for recreational cyclist and pedestrian trips where routes have been designed to incorporate points of interest. Figure 13 shows the principal linear open space network is complimented by other linear open space connections, all at an average width of 30 metres. The needs of commuter cyclists have been taken into account separately and are defined in the movement network design response.

Subdivision design must respond positively to these linear open space reserves, to create a sensitive built form interface with, and to enable direct access to linear open space. To achieve this positive relationship between the residential area and the open space, Development Plans must provide for a continuous 'edge' road treatment along all linear open space reserves, including the transmission easement, the Findon Creek and the linear open space corridor between Edgars Creek and Findon Creek.

Figure 13 Principal Linear Open Space Network



3.7.5 Conservation Open Space

The ENE LSP has been subject to a comprehensive assessment of site values. This assessment process has led to identification of a series of sites of conservation significance. These sites vary in quality, extent and potential to be incorporated within an urban context. According to the site assessment process the underlying 'conservation' values of these sites render them undevelopable for urban purposes. As such, it is intended that the primary purpose of these sites will be to preserve, and where possible enhance, existing conservation/biodiversity values. In this capacity, these sites may ultimately form part of the resolution of net gain requirements and will need to be appropriately managed for conservation purposes. In a similar fashion to other categories of encumbered land, conservation open space has been deducted from the land budget as undevelopable land. In this regard, the use of this land for open space purposes will be determined during detailed design and limited in accordance with the underlying conservation values and management requirements. Importantly however, these sites will provide a context and positive aspect for surrounding/abutting development.

As no sites of state or higher significance were detected, the LSP has sought to integrate the sites of better quality within an integrated open space network (refer Figure 14). It is important to acknowledge in this context that not all sites of conservation significance have been set aside as open space. In this regard a deliberate assessment has taken place with the objective of achieving an appropriate balance between retention of sites of conservation significance and achievement of a viable community and density of development that achieves the objectives of the Epping North Strategic Plan and Melbourne 2030.

In this way the ENE LSP indicates that the remaining land will be developable for urban purposes. This is not to imply however that all remaining site features will be removed as individual trees for example may need to be set aside during preparation of Development Plans and/or individual plans of subdivision. This phase of the planning process will require a detailed assessment of site values and an assessment of the viability of any additional sites/features of significance against the broader objectives of the ENE LSP. Importantly this process must have regard to the potential viability of sites within an urban context.

With regard to remnant vegetation, where this vegetation is worthy of retention and it falls outside of the designated open space network specific design responses will be required. This vegetation should be preserved through the use of tree-reservations, pocket parks and widened nature strips. The removal of native vegetation should only occur as an absolute last resort. All decisions relating to protection and clearance of native vegetation must contribute to the "net gain" goals contained in *Victoria's Native Vegetation Management – A Framework for Action and Clause 52.17 of the Planning Scheme*. The concept of Net Gain is defined as:

Net Gain is the outcome for native vegetation and habitat where overall gains are greater than overall losses and where individual losses are avoided where possible. Losses and gains are determined by a combined quality-quantity measure and over a specified area and period of time. Gains may be either required off-sets for permitted clearing actions or as a result of landholder and government efforts that are not associated with clearing.

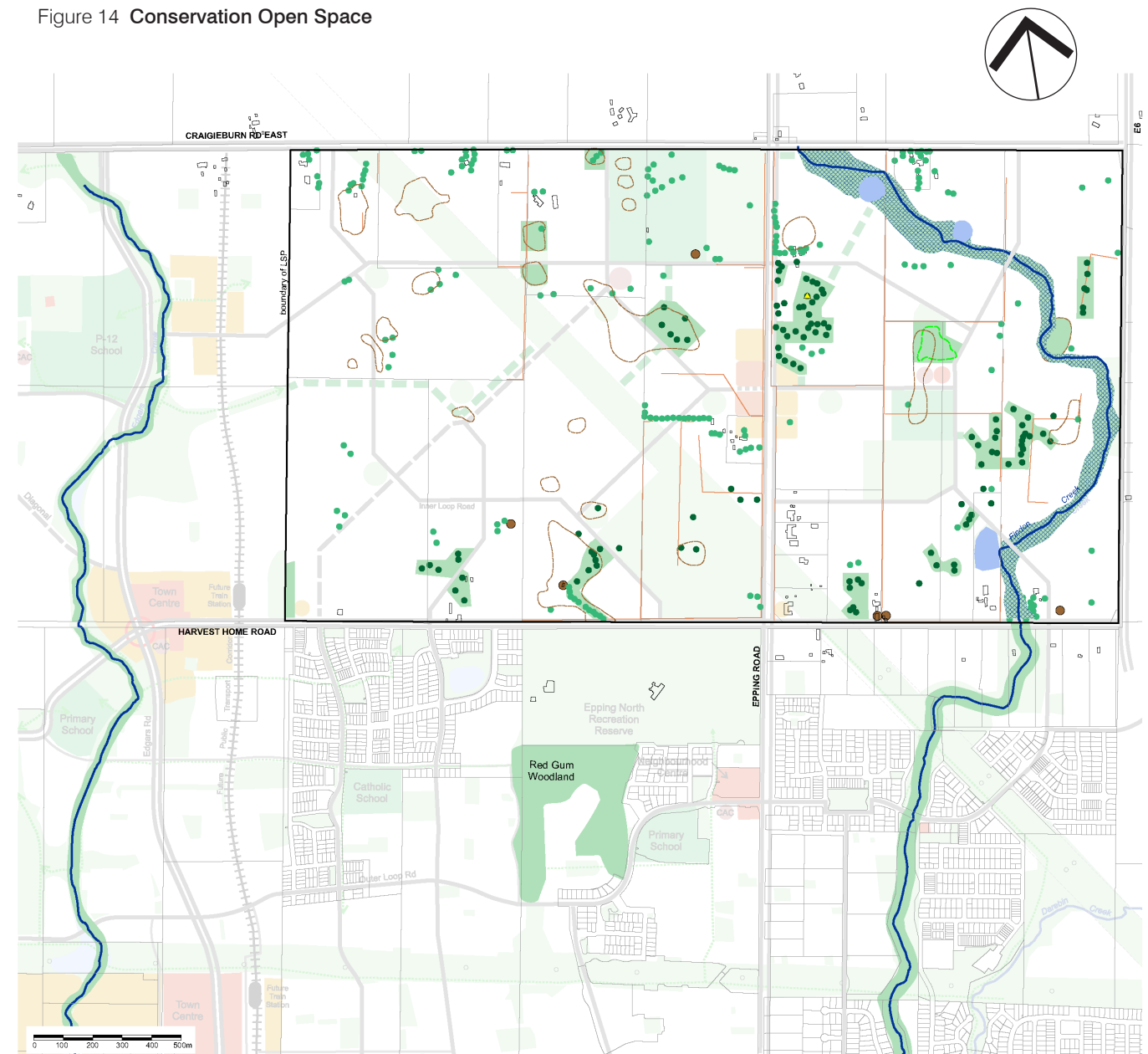
To achieve Net Gain outcomes in Epping North East, it is required that Development Plans/ Planning Permit applications include:

- an appropriate assessment of any potential impacts on native vegetation and management options that avoid clearing;
- consideration of clearing in the context of sustainable land-use change; and
- complete explanation of any losses associated with clearing are mitigated by commensurate gains through appropriate offsets.

Development Plans/ Planning Permit applications must follow a three-step approach to native vegetation management and Net Gain as per Clause 52.17:

- to avoid adverse impacts, particularly through vegetation clearance;
- if impacts cannot be avoided, to minimize impacts through appropriate consideration in planning processes and expert input to project design or management; and
- identify appropriate off-set options.

Figure 14 Conservation Open Space



Drawing Key

- River Red Gums
- Other Trees (non River Red Gums)
- Stony Knolls
- Native Grassland
- Stone Walls
- Potential European Historic Sites
- Aboriginal Scar Tree (indicative location)
- Wetland / Retarding Basin
- Creek / Watercourse
- Floodway Reserve
- Conservation Reserve

The desire to provide some degree of certainty at the Local Structure Plan stage with regard to native vegetation conservation has required several assumptions to be made.

With regard to stony knolls and grasslands identified as to be retained, the surveyed area of the stony knoll/grassland, plus a reasonable buffer has been nominated as conservation open space. Any sites nominated as to be removed, must be offset pursuant to Clause 52.17.

With regard to native scattered trees, such as River Red Gums, groups of trees have been nominated within conservation open space areas. DSE have advised that in order to ensure a tree is protected for conservation purposes, it is necessary to protect an area twice the diameter of the canopy. Given it is not feasible to determine canopy dimensions at the Local Structure Planning stage, it has been necessary to adopt a generalised figure across the LSP area to define conservation open space required for tree protection. A nominal figure of 20m has been adopted for this purpose. It will be necessary to refine the area required for tree protection, pursuant to the DSE guidelines, at the Development Plan/planning permit application stage when tree survey details are available.

3.7.6 Neighbourhood Parks / Urban Parks

Following definition of the conservation and linear open space network an assessment of local passive open space accessibility was undertaken. This assessment indicated that not all households would be provided with open space within a walkable catchment. To redress this issue the LSP makes provision for a number of neighbourhood parks (refer Figure 15). These parks have been located at important intersections, at the confluence of connector roads and other high profile locations where they will serve to create a community focal point. Importantly these parks will have the capacity to incorporate a more urban open space context rather than preserving sites of conservation significance.

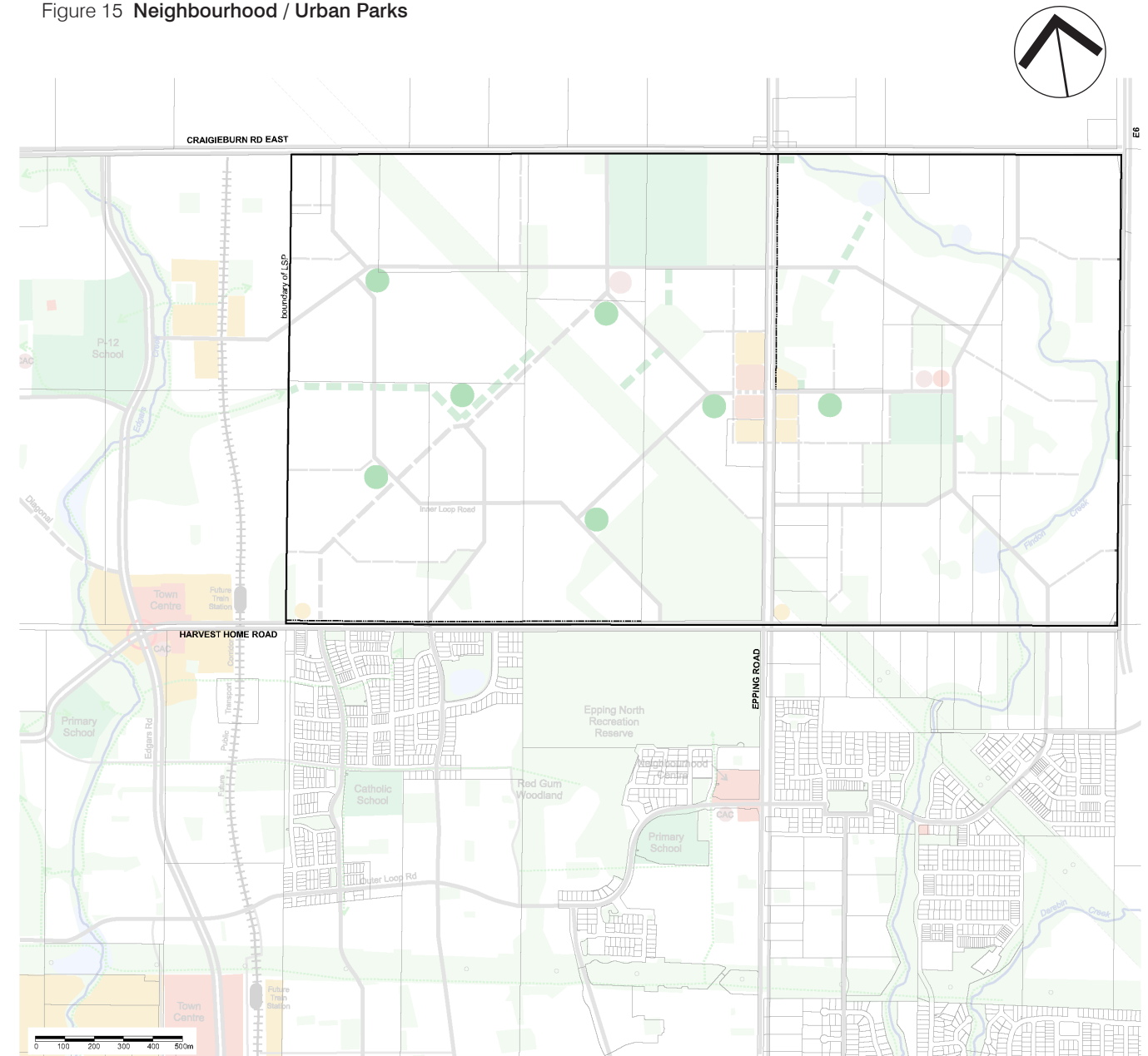
These parks have a general area of 0.5 hectares and will be subject to detailed design at the Development Plan/Planning Permit application stage.

Passive open space as nominated within the ENE LSP, including neighbourhood parks and linear open space, is to be provided as part of each landholding's open space contribution. This contribution is calculated as 5% of Gross Developable Area (GDA). Where less than 5% of the GDA is nominated on the LSP, a cash contribution up to 5% of the land value is required.

3.7.7 Encumbered Land

Whilst land that is undevelopable due to an encumbrance, such as land required for drainage purposes, has been incorporated in terms of opportunities to create linkages, such land has been excluded from the open space network and calculation of development contributions.

Figure 15 Neighbourhood / Urban Parks



Drawing Key

● Neighbourhood Park / Urban Park

3.8 Movement Network

The movement network and circulation pattern for Epping North East has been fundamental in establishing the structure for Epping North East, and in consolidating and linking the various components including the activity centres, community facilities, open space and neighbourhoods. The design of the road network has been responsive to these elements as well as defining in nature.

3.8.1 Design Objectives

The movement network for Epping North East (refer Figure 16 and 17) has been designed in response to a range of objectives including the desire to:-

- support a range of transport alternatives including public transport, walking and cycling;
- support increased patronage of public transport with emphasis on buses as the most viable short to medium term form of public transport;
- integrate communities located to the east and west of Epping Road;
- support increased development densities and diversity in housing options;
- address the impact of the diagonal alignment of the transmission tower easement, and Findon Creek reserve;
- support establishment of an evenly spaced grid based network of streets and roads that distribute rather than focus traffic;
- support key community, commercial and neighbourhood centre focal points;
- support streetscape diversity and character;
- provide for both commuter and recreational cyclists;
- ensure there is equity in access for all users;
- to support future establishment of a range of public transport services within the transport corridor;
- support direct and efficient access to the northern town centre within the Aurora development;
- define the location and type of controlled intersection points that support access for all modes of transport;
- slow, control and manage traffic at neighbourhood centres;

- provide a framework for long vistas and landmarks to be established;
- allow for innovative traffic, open space and built form treatments at the intersection of boulevards, connector roads and neighbourhood centres;
- align roads parallel and perpendicular to existing site features to maximize the developability of land parcels and creation of regular street blocks;
- Incorporate natural and cultural elements.
- accommodate the requirements of service and emergency vehicles;
- provide efficient and equitable access within and beyond Epping North East;
- establish a clear and equitable basis for distribution of the cost of establishing the movement network;
- apply and further the objectives and recommendations of the Whittlesea Strategic Transport Infrastructure Study; and
- apply and further the objectives and recommendations of the Epping North Strategic Plan.

Taking into account the specific objectives, the movement network for Epping North East has been designed with the following features:-

- an equally spaced road network that will support and give structure to the walkable neighbourhoods;
- a diagonal connector road/boulevard in accordance with the Epping North Strategic Plan to:-
 - support the viability of the northern town centre and train station within the Aurora development;
 - provide ready and direct access to the northern town centre and future transport interchange;
 - create a right angle, regular crossing point of the transmission easement;
- an inner and outer 'loop' road network that:-
 - provides ready access to internal and external focal points;
 - distributes traffic;
 - provides equally spaced intersection points along Epping Road;
 - provides limited intersection points along Harvest Home Road;

- links neighbourhoods within and beyond the LSP area;
- provides appropriate access to the regional recreation reserve;
- a high level of north south and east west connectivity that will distribute trips and provide direct access to key community focal points and external high order roads;
- regularly spaced signalized intersections along Epping Road that will support establishment of the neighbourhood centre;

- an integrated recreational and commuter cycle and pedestrian network;
- road/street cross-sections that incorporate limitations that will assist in creating diversity and character; and
- a connector road network that will reduce the divisive impact of Epping Road.

Figure 16 Primary Movement Network

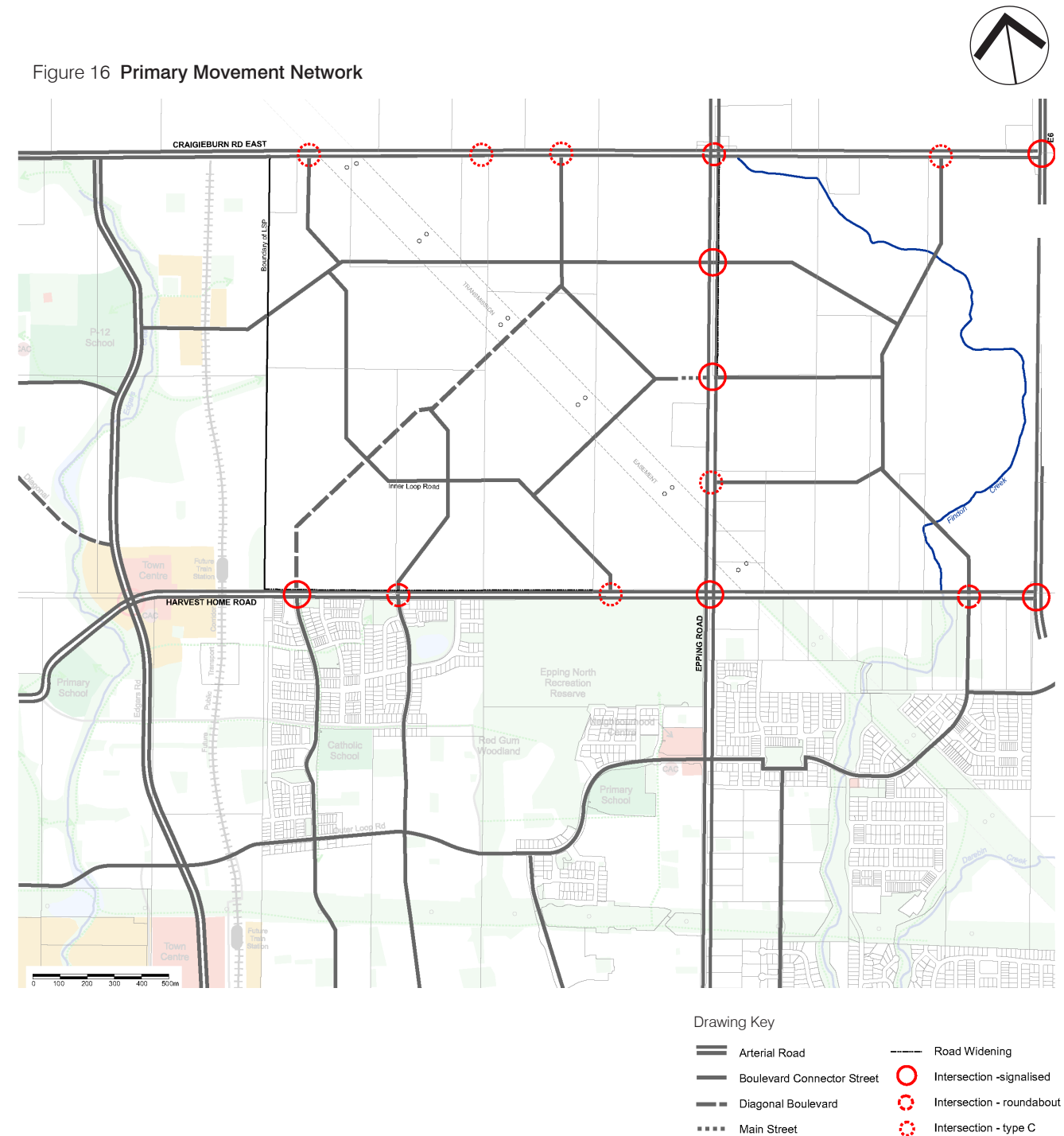
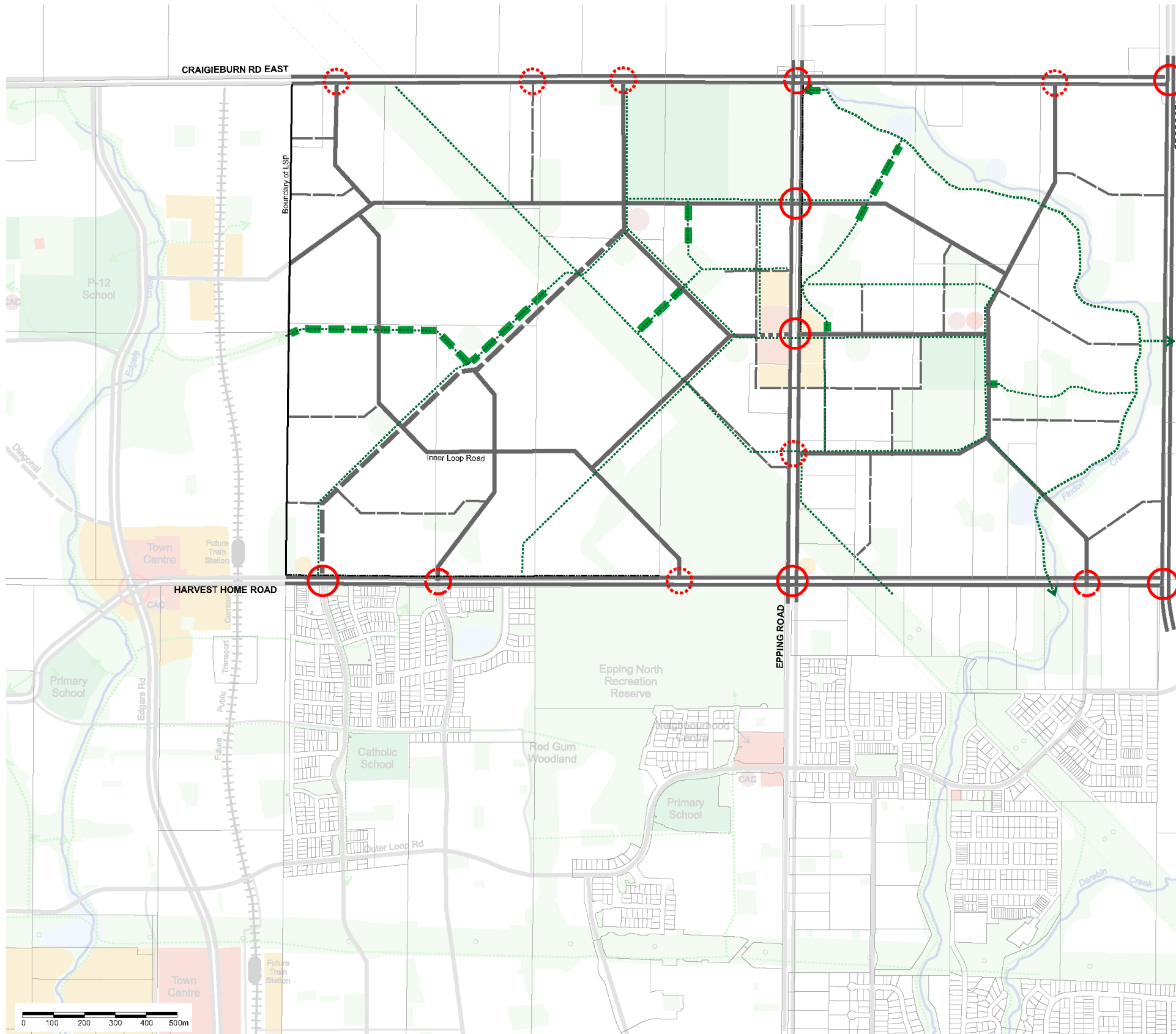


Figure 17 Primary and Secondary Movement Network



Drawing Key

- Arterial Road
- Boulevard Connector Street
- Diagonal Boulevard
- Main Street
- Key Local Roads (incorporating shared path and diverse streetscape)
- Road Widening
- Intersection - signalised
- Intersection - roundabout
- Intersection - type C
- Off-road Shared Path Network
- Linear Open Space (30m av. width - incorporates a shared path)

Note: All arterial roads & connector streets accommodate bus and bicycle lanes

3.8.2 Movement Network Road Hierarchy

In accordance with the principles of traditional neighbourhood design the movement network has been deliberately designed with a high level of internal and external connectivity and potential to distribute trips on a number of routes rather than focusing the majority of trips on a small number of higher order roads. Notwithstanding this the LSP area has five categories of roads/streets including:

- arterial roads;
- boulevard connector streets;
- key local streets;
- public transport; and
- shared path network and alternative transport modes.

Table 3 provides a description of the categories of roads/streets within the hierarchy and defines the role, access management objectives and design criteria for each category. Figure 18 depicts the location of each of the roads/streets.

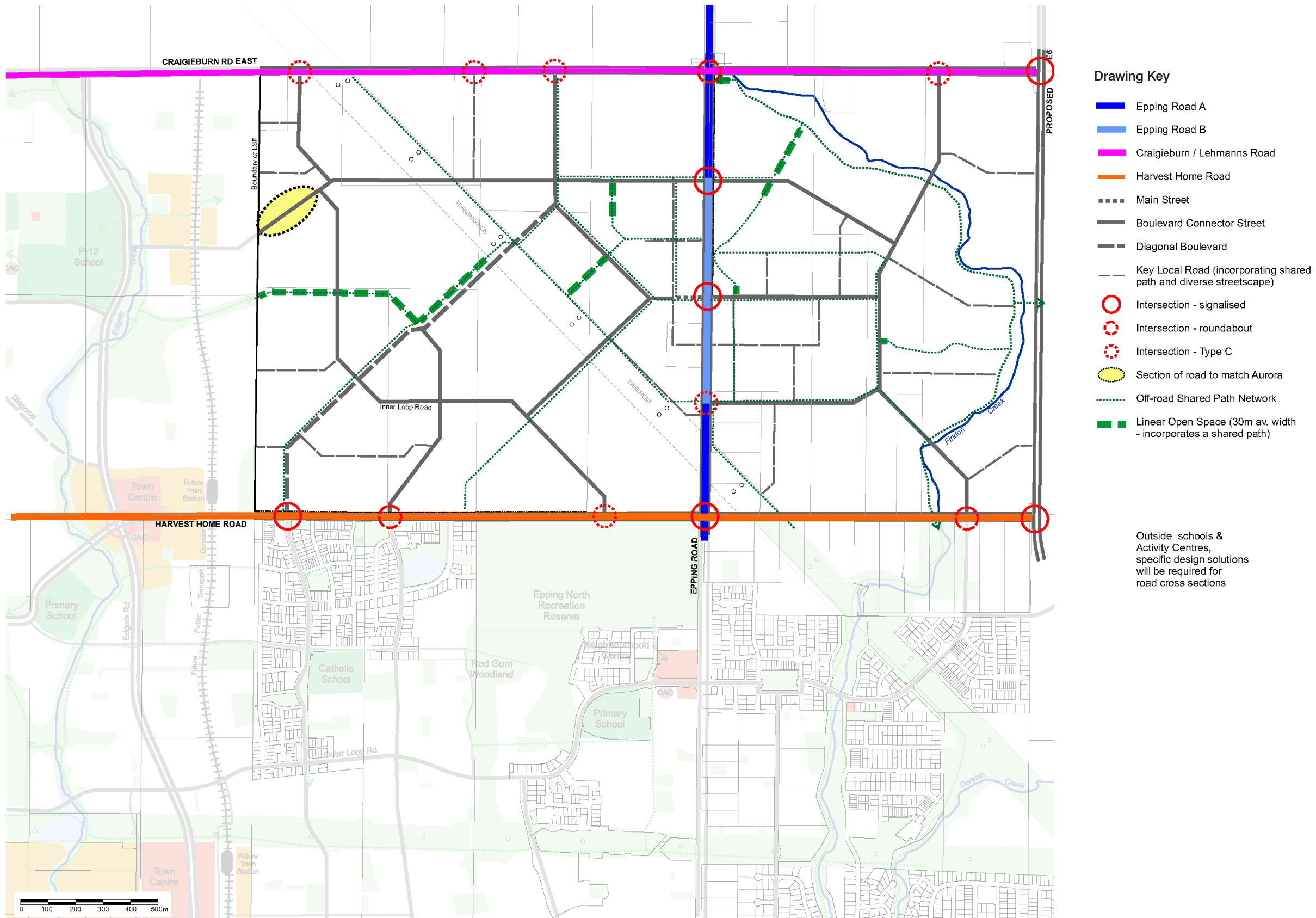
The simplified movement network road/street hierarchy is in accordance with the objective of distributing rather than concentrating road based trips. Importantly, however, significant variation is sought in the connector and local street categories to assist in creating a positive sense of place and diversity within streetscapes whilst supporting increased development densities. In this regard the lack of distinction between higher and lower order connector roads is deliberate as is the desire to move away from reduced road reserve and pavement widths in local streets. In this context the important role that connector streets play in linking neighbourhoods and creating identity is acknowledged as is the apparent lack of diversity and capacity to support increased densities elsewhere in the City. The next section defines the components and diversity objectives for each of the road/street categories.

Table 3 Movement Network - Road Hierarchy

CATEGORY	ROLE	ACCESS MANAGEMENT OBJECTIVES	DESIGN CRITERIA
Arterial Roads <ul style="list-style-type: none"> • E6 Extension • Epping Road • Craigieburn Road East/Lehmans Road 	<p>North-south link to provide direct access to the Ring Road to relieve longer term pressure on Plenty Road and High Street.</p> <p>North-south link to provide access to the south of the City and the rural north.</p> <p>East west link with potential to establish regional link to the City of Hume to the west; and the Shire of Nillumbik to the east via Bridge Inn Road.</p>	<p>No direct property access, limited controlled intersections with maximum spacing.</p> <p>No direct property access, evenly spaced signal controlled intersections and potential for left in left out service roads in appropriate locations.</p> <p>No direct property access on the south side. If duplicated in the longer term, no direct property access on both sides with limited controlled intersections.</p>	<p>4 lanes divided with provision for dedicated bicycle lanes, landscaping and potential public transport.* Built form to address the E6 via range of treatments including possible use of parallel access streets.</p> <p>4 lanes divided with provision for dedicated bicycle lanes, bus access and landscaping.* Built form to address Epping Road via a range of treatments including use of service roads, parallel access streets or rear lanes.</p> <p>Short term 2 lanes undivided with potential for longer term duplication. Provision for landscape treatment to designate urban - rural interface. Provision for dedicated bicycle lanes on the south side with connection to the Craigieburn By-Pass. Built form to address Craigieburn Road East/Lehmans Road.</p>
Boulevard Connector Streets <ul style="list-style-type: none"> • Diagonal Boulevard • Internal Boulevard Connector Streets 	<p>Diagonal link to provide direct access to the northern town centre, future transport interchange, P-12 school, active open space and community facility.</p> <p>Internal north-south and east-west boulevard connector streets to provide access to regional recreation reserve, community facilities, schools, neighbourhood centres, activity centres, and structure for internal street network.</p>	<p>Direct property access discouraged on north east side to limit number of cross-overs, and to facilitate a more contiguous shared path and streetscape treatment. Alternative access to lots in the form of rear lane or equivalent encouraged. Direct property access permitted on south east side.</p> <p>Direct property access permitted, however, access control conditions may be modified to suit specific housing products and intended design outcomes.</p>	<p>2 lanes divided with provision for landscaped median, on road bicycle lanes, shared path on north west side and bus access. Landscaped median of 6m.</p> <p>2 lanes divided with provision for landscaped median, on road bicycle lanes, and bus access. Landscaped median of 3m.</p>
<ul style="list-style-type: none"> • Main Street 	<p>Internal east west road to form the main street through the neighbourhood activity centre.</p>	<p>Access to properties including retail, business and residential from the rear via rear lane or internal local network.</p>	<p>2 lanes undivided or divided with parallel or angled on-street parking and shared use of the road pavement. Paved verge to accommodate pedestrian movements, outdoor chairs and tables, bicycle racks and tree planting. Off-street car parking to be provided in 'sleeved' locations behind buildings.</p>
Local Street <ul style="list-style-type: none"> • Key Local Road 	<p>Key internal local roads that provide important links within the LSP area.</p>	<p>Direct property access permitted, however access conditions may be modified to suit specific housing products and intended design outcomes. Restricted driveway access to one side of the road (shared path side) to facilitate a contiguous shared path and streetscape treatment. Alternative access to lots required to the shared path side of road in the form of rear lane or equivalent.</p>	<p>Generally 2 lanes undivided, however, significant variation sought in cross-section details to support local character and identity and to support increased development densities. Parking generally provided on street in parallel configuration however, diversity in parking conditions supported, where in keeping with character and density objectives. Shared path to be provided on one side of road in some instances.</p>
<ul style="list-style-type: none"> • Access Streets • Laneways 	<p>Internal street network to provide property access with potential to distribute internal trips via multiple routes to reduce pressure on connector road network.</p> <p>To provide access to properties.</p>	<p>Direct property access permitted, however, access conditions may be modified to suit specific housing products and intended design outcomes.</p> <p>Single or double garage rear access opportunity.</p>	<p>Generally 2 lanes undivided, however, significant variation sought in cross-section details to support local character and identity and to support increased development densities. Parking generally provided on street in parallel configuration however, diversity in parking conditions supported, where in keeping with character and density objectives.</p> <p>Generally concrete form with central invert for drainage purposes. Width to be kept to 6-8m with minimal or no provision for embellishments such as tree planting. Laneways to service access purpose only with provision for public lighting and with sufficient width for services as required.</p>

*Subject to review by VicRoads.

Figure 18 Movement Hierarchy



3.8.3 Cross-section Details and Objectives

In accordance with the preferred road hierarchy, specific cross-sections have been prepared. These cross-sections reflect the access and design objectives set out in Table 3.

3.8.4 Arterial Roads

Epping Road

Taking into account the status of Epping Road (both now and in the future), the desire to support establishment of a viable Commercial Centre and to promote east-west connectivity, two cross-sections have been prepared for Epping Road.

These cross-sections are described as Epping Road A and Epping Road B (refer Figure 20a).

In both cross-sections the through lane capacity of Epping Road has been maintained with two travel lanes in either direction and an on road bicycle lane in either direction. Where the 42.0m road reserve is utilised, there is provision for a 14.0m central median however, in the mid section a 36.0m road reservation is recommended. This narrowing of the road reserve is recommended to achieve a road reserve scale that is in keeping with the neighbourhood centre design objectives and to enable communities on the east and west side of Epping Road to be visually and physically integrated. It is acknowledged that use of the 6.0m median may require a suitable form of protection to be installed to achieve Vic Roads' clear zone requirements if tree planting is located in the median as recommended.

Craigieburn Road East/Lehmans Road

The cross-section for Craigieburn Road East / Lehmans Road incorporated in the Epping North and Harvest Home Local Structure Plans has been included for reference (refer Figure 20b).

3.8.5 Boulevard Connector Streets

Elsewhere within the City it is apparent that designated connector roads partially fulfill the role of linking communities but there are a range of issues associated with their alignment, spacing, design speeds and capacity. In addition to these functional aspects of the connector road network, it is also apparent that there is a lack of diversity in streetscape, character and quality as the existing connector streets are generally only distinguished by generally higher traffic volumes and widened pavements that incorporate two uninterrupted through lanes and on-pavement parking on both sides of the road. Beyond these internal conditions, the remainder of the connector street cross-sections are the same as most other local streets. That is, 2.5m – 3.5m nature strips and pedestrian paths of 1.5m – 2.0m on both sides with equally spaced vehicle crossovers. As a result, existing connector streets generally do not display an identifiable positive character nor do they adequately provide for a range of transport alternatives or diverse housing options.

To redress these issues, the LSP incorporates provision for an evenly spaced and connected boulevard connector street network that will serve the following purposes to:-

- link neighbourhoods;
- provide for a range of transport alternatives including cycling, walking and buses;
- create positive view lines to internal and external points of interest;
- support the commercial viability of activity centres.
- create an identifiable positive sense of place and character; and
- distribute rather than focus traffic.

In terms of alignment, the boulevard connector street network (refer Figure 18) establishes a modified grid based pattern. The modified grid based pattern is generally aligned on a north-south, east-west axis however, the grid has been deliberately modified or 'offset' to take into account two significant site features; firstly, the Findon Creek and secondly, the transmission easement.

To the east of Epping Road, the grid has been slightly offset to achieve a parallel alignment of the connector roads to the creek corridor. This will enable a low order boulevard type road to be introduced during detailed design with a regular street block format that will provide direct access and view lines to the creek corridor and trail network. In addition, more efficient right angle crossing points will be possible at two locations along the creek corridor. Further detail on indicative internal design on the interface to the creek corridor can be found following.

To the west of Epping Road the grid has been offset to run parallel and perpendicular to the transmission easement. The grid has been distorted in this manner to recognise and incorporate the influence of the transmission easement and more importantly, to create a diagonal link across the western precinct. This diagonal road will create direct access to the future transport interchange and northern town centre located within the Aurora development.

In this location, and on this alignment, the diagonal link mirrors the link that is incorporated within the western half of the Aurora development that also provides access to the northern town centre. This alignment also promotes establishment of a view line and access to the proposed P-12 School. It is also important to note that the diagonal link has been designed with the same cross section as the other internal connector roads, but with the provision of a shared path on the north west side and wider median. On this side, direct driveway access onto the diagonal link will be limited in order to facilitate a more contiguous streetscape and limit interruptions to the shared path.

In the location around the diagonal link, the ENE LSP supports establishment of 'street based' higher density outcomes where the street and linear open space network become the focus for public amenity. Options to provide rear access in this area should be investigated in key locations to support streetscape based objectives and improvements.

3.8.7 Local Streets

As has been documented earlier, the City generally lacks diversity in local street conditions. This lack of diversity in local street cross-section details is mirrored by the lack of diversity in housing options. To address this significant issue and to achieve increased diversity in local streetscape conditions, the ENE LSP supports two key initiatives:

- introduction of a range of local street cross-sections; and
- introduction of a range of lot sizes and diversity in terms of area, width and depth.

As is characteristic of inner and middle ring suburbs of Melbourne, the desired diversity will be achieved through careful consideration of the individual components and collective appearance and functionality of streetscapes.

In this regard the components of streetscapes that require review within the context of the proposed development are:

- kerb type;
- pavement width;
- parking location and configuration;
- naturestrip width;
- location and width of pedestrian paths;
- front setback to dwellings;
- lot width and side setbacks;
- street tree species;
- use and dimensions of median treatments;
- street block length; and
- access control and provision of rear laneways.

Examples are provided (refer Figure 19) that illustrate the type of diversity that is sought. Importantly in each of the examples provided, the scale and proportion of the streetscape is maintained and the street has the capacity to accommodate a diverse range of lot sizes and housing outcomes, whilst also incorporating adequate provision for car parking and street tree planting.

In the examples provided, the width of the road reserve is a fundamental consideration where it is evident that widened road reserves have generally been utilised to accommodate more diverse streetscapes, whilst maintaining appropriate scale and proportion.

In this regard, particularly in medium to high density locations, the ENE LSP does not support use of narrowed local street cross-sections and/or pavements wherein the normal requirement will be a 16.0m road reserve with a 7.3m pavement that can accommodate an uninterrupted through lane with parking on-street on both sides.

The neighbourhood design response section following provides an indicative design for the ENE LSP with further explanation of design objectives.

3.8.8 Rear Lanes

A component of the access and movement network that is often absent from fringe locations is provision for rear lane access. The ENE LSP seeks to incorporate provision for rear lane access as a fundamental component of the access and movement network.

Incorporation of rear lanes have significant benefits in managing access conditions in high traffic locations but more importantly offer the opportunity to pursue enhanced streetscape outcomes in key locations. That is incorporation of rear lanes removes the necessity to provide vehicle crossovers and garages in the frontage of lots. Removal of crossovers and garages produces a number of benefits including:-

- more 'direct' relationship of the built form to the street;
- uninterrupted path of travel for pedestrians and cyclists;
- greater streetscape variation and diversity;
- enhanced potential for public transport access;
- ability to develop boulevards; and
- greater permeability generally.

The ENE LSP seeks to incorporate provision for rear lanes in accordance with the specific design interface areas as depicted in the following section. Where rear lanes are provided this treatment is not to be implemented in place of the street as the street has a different function to that of the land. In recognition of the role of rear lanes, the fundamental purpose of which is to provide access, the ENE LSP generally does not support highly landscaped or detailed laneway treatments. Laneways should incorporate sufficient width for turning movements, services and public lighting.

Figure 19 Streetscapes



The photos depict existing diverse streetscape conditions that successfully incorporate provision for parking, street tree planting and public amenity with a scale and proportion that supports increased development densities and diverse housing options. The photos are supplied for illustrative purposes only and should not be used literally.

Figure 20a Road Cross Sections

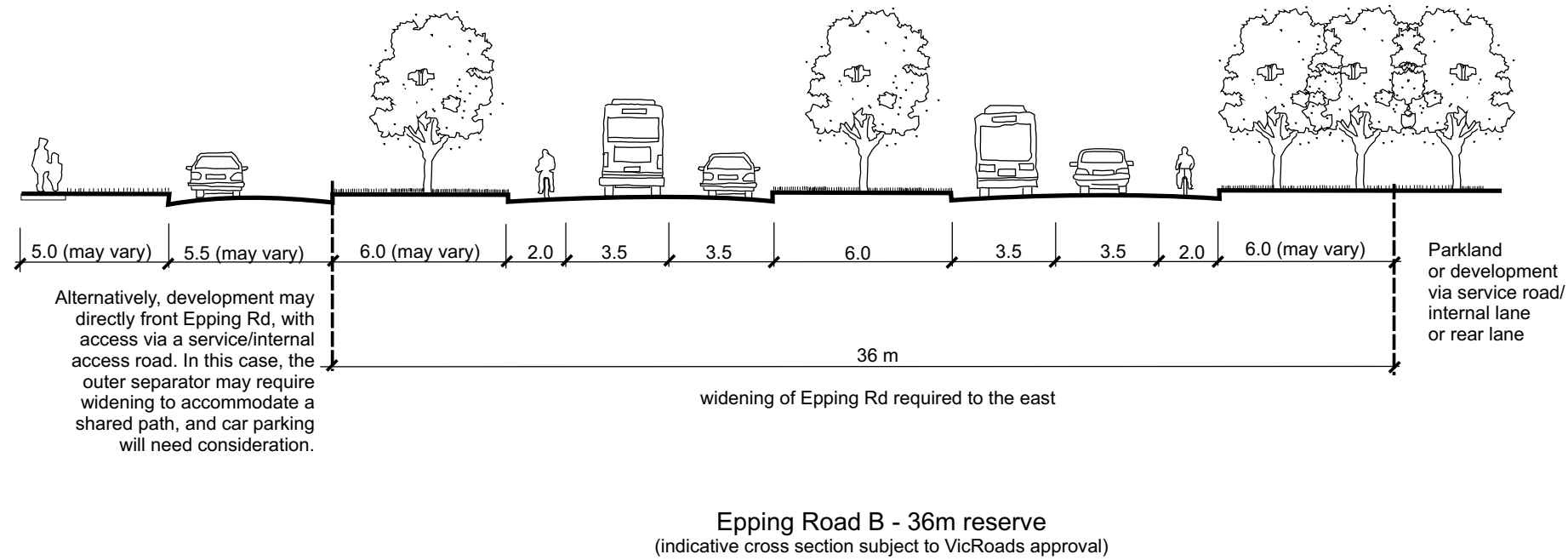
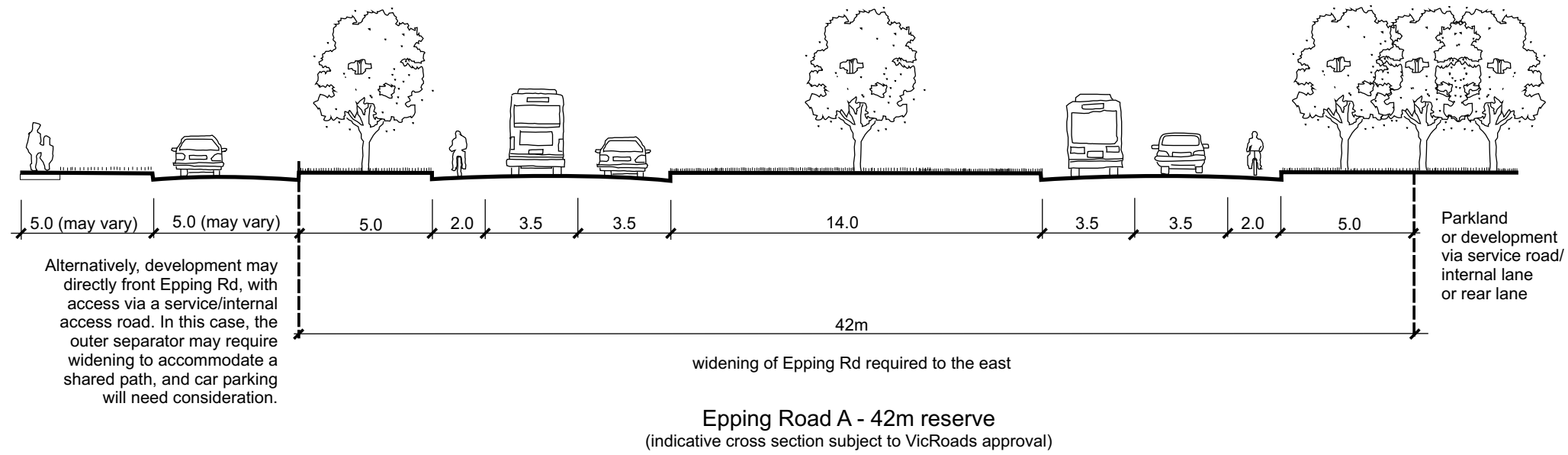
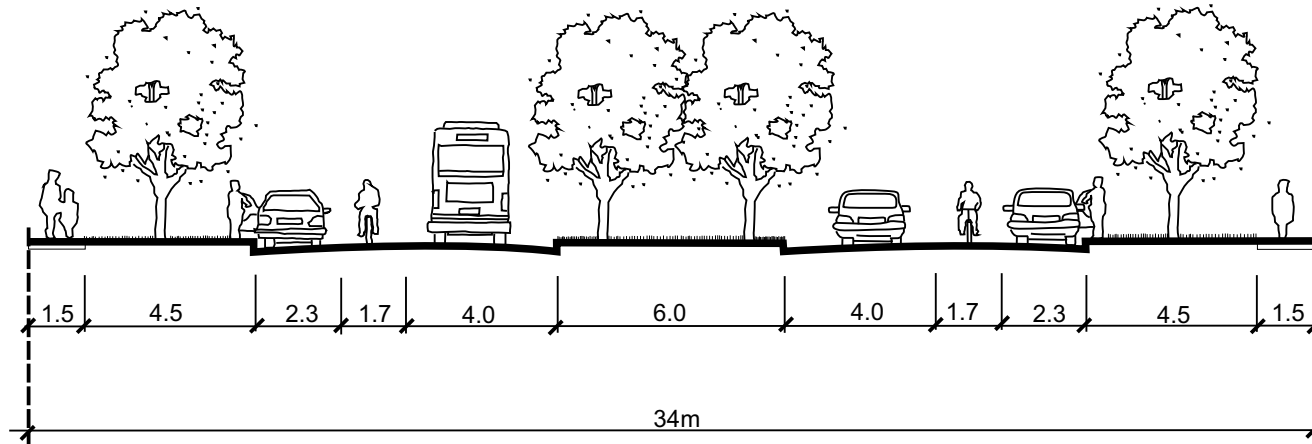
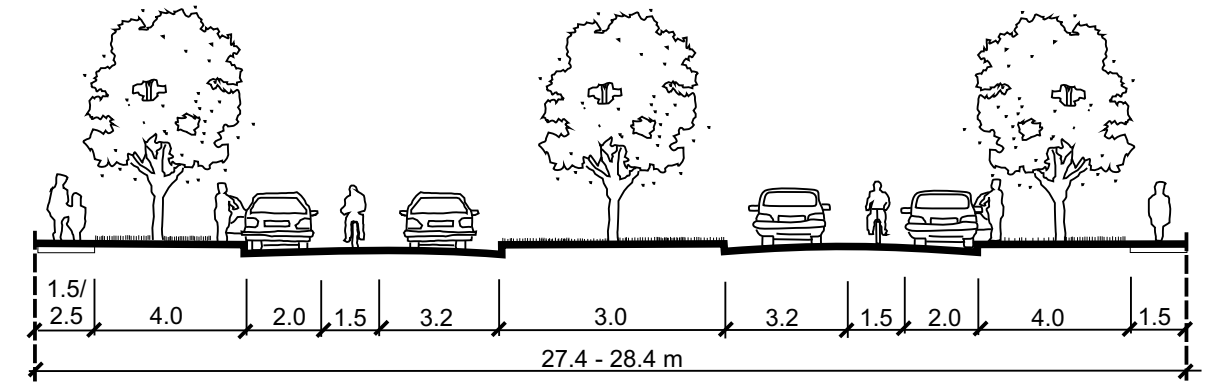


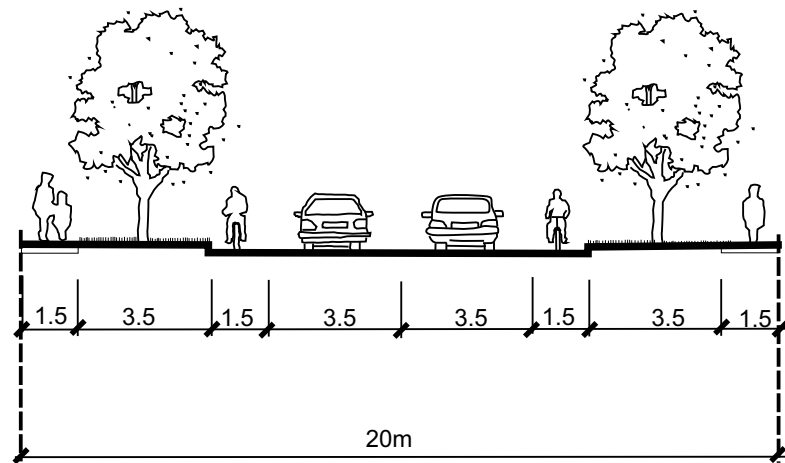
Figure 20b Road Cross Sections



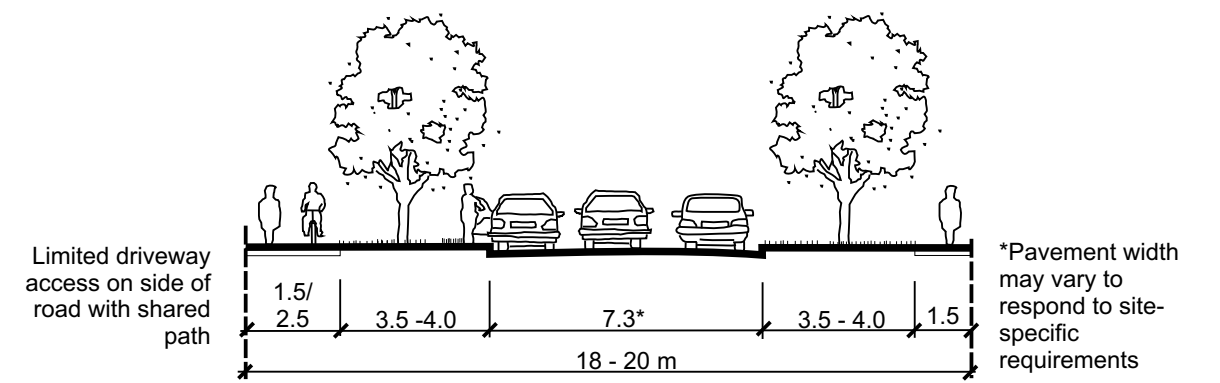
Harvest Home Road
(cross section as per Harvest Home and Aurora LSP)



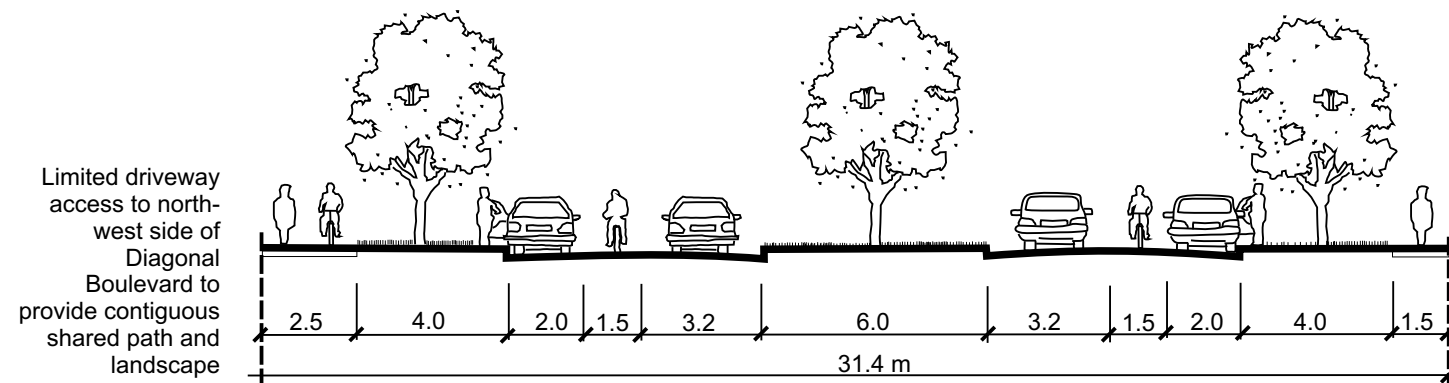
Boulevard Connector



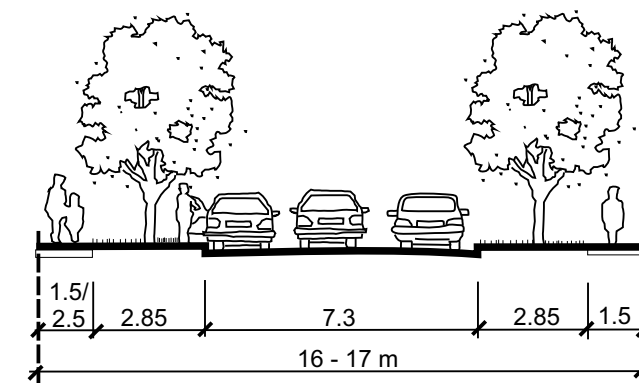
Craigieburn Road East / Lehmanns Road
(cross section as per Epping North Strategic Plan)



Key Local Road



Diagonal Boulevard



Typical Access Street (yield or give way)

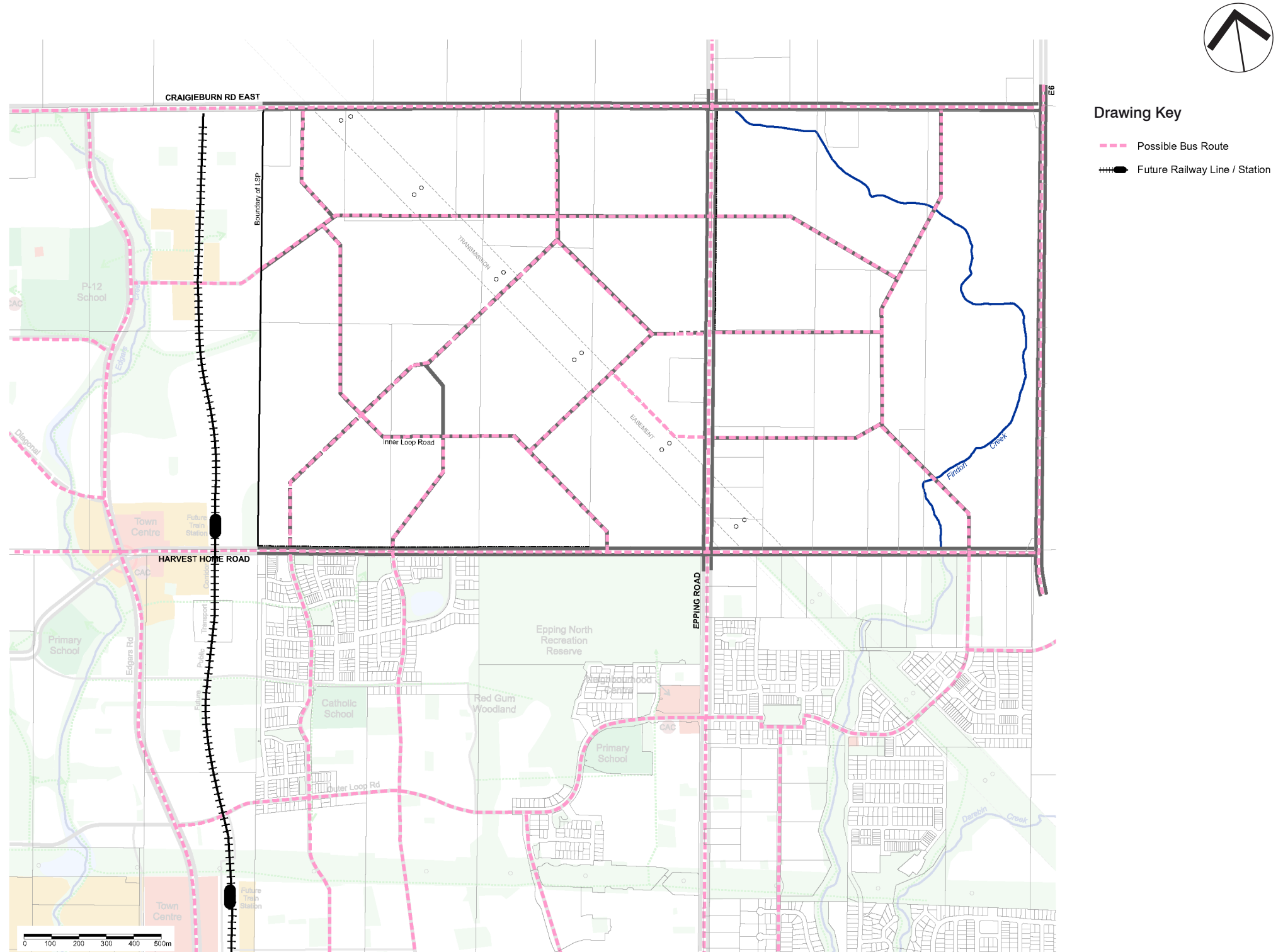
3.8.9 Public Transport

A fundamental component of traditional neighbourhood design is increased provision for various forms of public transport. The ENE LSP supports this objective by incorporating a highly permeable transport network that distributes rather than concentrates traffic across the plan area.

The connector streets and arterial road network makes provision for bus access in terms of pavement width in all cross-sections to ensure that all households will have access to a potential bus route within a short walking distance (refer Figure 21). Beyond this general level of permeability for future bus access, the ENE LSP supports introduction of future high capacity fixed rail (or other options) services in Epping North through:-

- allocation of increased development densities within 800m of the future transport interchange within the Aurora Development;
- incorporation of a diagonal link to the future transport interchange; and
- provision for enhanced streetscapes and dwelling diversity that support public transport.

Figure 21 Public Transport



3.8.10 Shared Path Network and Alternative Transport Modes

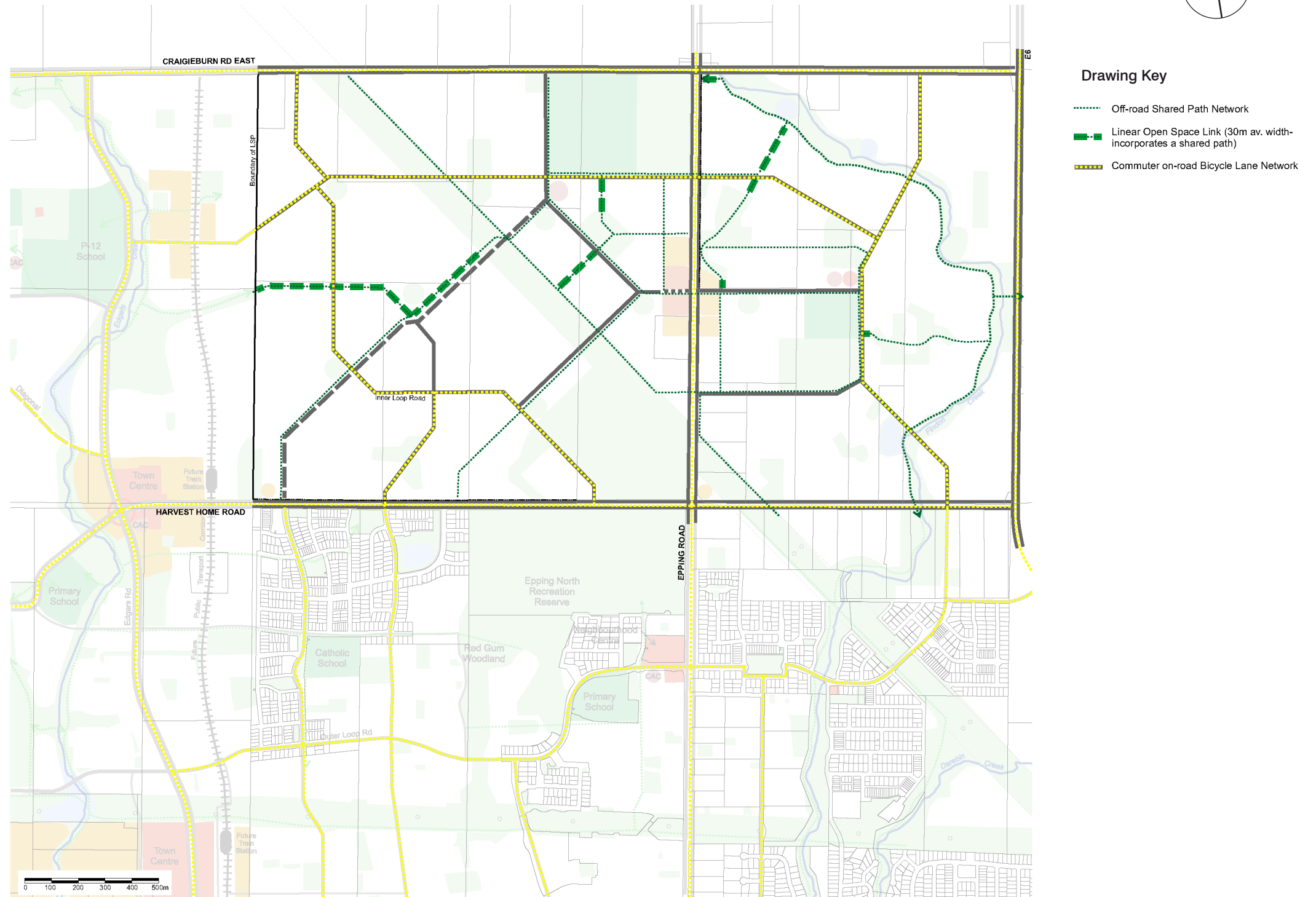
The highly connected and permeable connector road network in Epping North East that will support and efficiently distribute various forms of motorized travel will also accommodate cycle and pedestrian access. Provision for cyclists and pedestrians takes the form of dedicated bicycle lanes on the connector roads and footpaths on both sides of all local streets. In addition the ENE LSP makes provision for a dedicated off-road bicycle/pedestrian network.

In this way the ENE LSP makes provision for both commuter and recreational cyclists and pedestrians. Beyond this general level of provision for cyclists and pedestrians, the ENE LSP supports cycling and walking to reduce car dependency and to promote health and wellbeing by:-

- locating activity centres at the heart of neighbourhoods with associated higher density walkable catchments;
- incorporating provision and a requirement for diverse housing options and streetscapes that will create a sense of place and character; and
- establishing an interlinked open space network.

Additional connections to the off-road bicycle/pedestrian network will need to be determined at the Development Plan stage, by the provision of shared paths within key local and access street cross-sections. As such, the ultimate shared path network will be determined at the Development Plan stage, once the local street network has been defined.

Figure 22 Primary commuter and recreational bicycle network



3.9 Neighbourhoods and Density

3.9.1 Neighbourhoods

The ENE LSP consists generally of ten neighbourhoods (refer Figure 23a and 23b). These neighbourhoods are each defined loosely in extent by a five minute walkable catchment and each are focussed around a central public facility, whether a park, community facility, neighbourhood centre, school or transport stop. Neighbourhoods that can not accommodate a central community or commercial facility are provided with a local neighbourhood park to provide a sense of identity and focus for the community. In accordance with traditional neighbourhood design principles, and taking into account experience within the City to date, significant emphasis needs to be placed upon the following components:-

- identify commercially viable sites for the establishment of 'Main Street' based neighbourhood centres;
- introduction of increased housing and lot diversity within all streets rather than an over-reliance on increased density in discrete 'pockets' or sites; and
- incorporation of deliberate measures to improve the quality, diversity, cohesion and amenity of streetscapes.

3.9.2 Streetscape and Housing Diversity

In accordance with Traditional Neighbourhood Design principles and taking into account experience in the City to date, significant additional emphasis needs to be placed on two critical issues:-

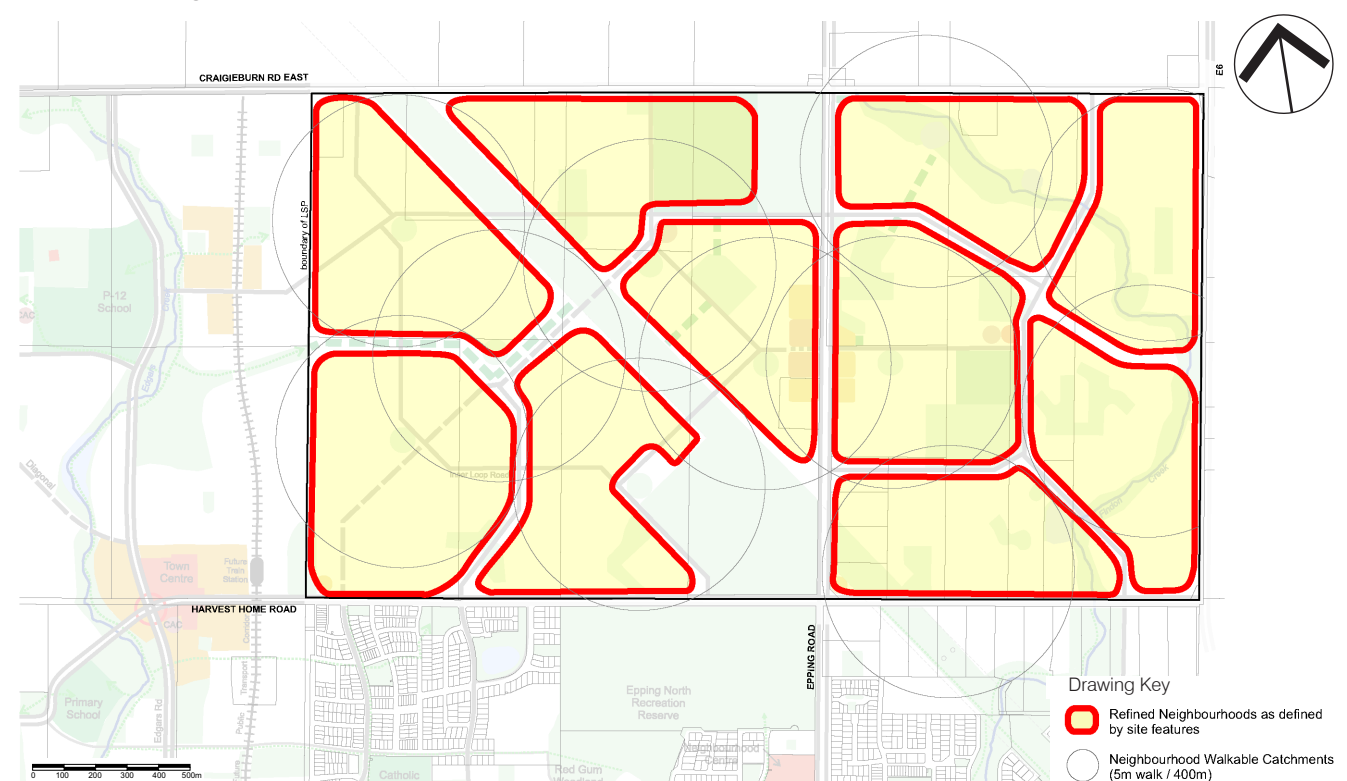
- Introduction of increased housing and lot diversity within all streets rather than an over-reliance on increased density in discrete 'pockets' or medium density sites; and
- Incorporation of deliberate measures to improve the quality, diversity, cohesion and amenity of streetscapes.

By 'sprinkling' lot and housing diversity throughout all streets (as shown in Figure 25), development densities can be increased whilst also adding interest and variety to streetscapes. To ensure that this approach is effective, however, it is essential that adequate attention be given to implementation of improved and coherent streetscapes to enhance the public realm. In this way the public realm becomes the unifying component of the streetscape and associated benefits such as increased amenity for pedestrians and cyclists can be achieved.

Figure 23a Indicative Walkable Catchments to Neighbourhoods



Figure 23b Neighbourhood Precincts



3.9.3 Residential Densities

To accommodate increased development densities and enhanced lot and dwelling diversity, it will be necessary to provide a detailed response during preparation of Development Plans. During this phase the ENE LSP supports:

- variation in lot width and depth;
- variation in front, side and rear setbacks; and
- variation in access conditions for dwellings such as use of rear lanes where narrow frontages are applied or where access control is required.

According to this approach the proportion of smaller lot development will increase in proximity to key community and commercial focal points however, this cannot be the sole location for increased density and/or diversity. Importantly, density and/or diversity must also be provided in key locations to complement a distinctive element such as along a boulevard road.

As is characteristic of inner and middle Melbourne, in these focal point locations as the density increases, streetscape based amenity in the public realm must also increase. In this regard the relationship between pavement width, provision for street tree planting, location and width of footpaths, kerb type, parking provision, driveway locations, access and setbacks must be carefully considered. Reintroduction of median treatments and diverse parking configurations such as 45°, 90° and within medians are also supported to 'offset' increased densities and to create identity, character and diversity (refer Figure 19).

In the examples provided, the scale and proportion of the entire streetscape is the key consideration where a widened pavement for example may have little to do with traffic functionality but may enable increased car parking provision that in turn creates space for plantings and increased amenity.

To enable incorporation of more diverse, coherent, quality streetscapes that can support increased densities without compromising local amenity the ENE LSP requires and supports a shift away from strict adherence to defined road reserve and pavement widths according to a transport hierarchy toward a more integrated streetscape based response.

Figure 24 Densities

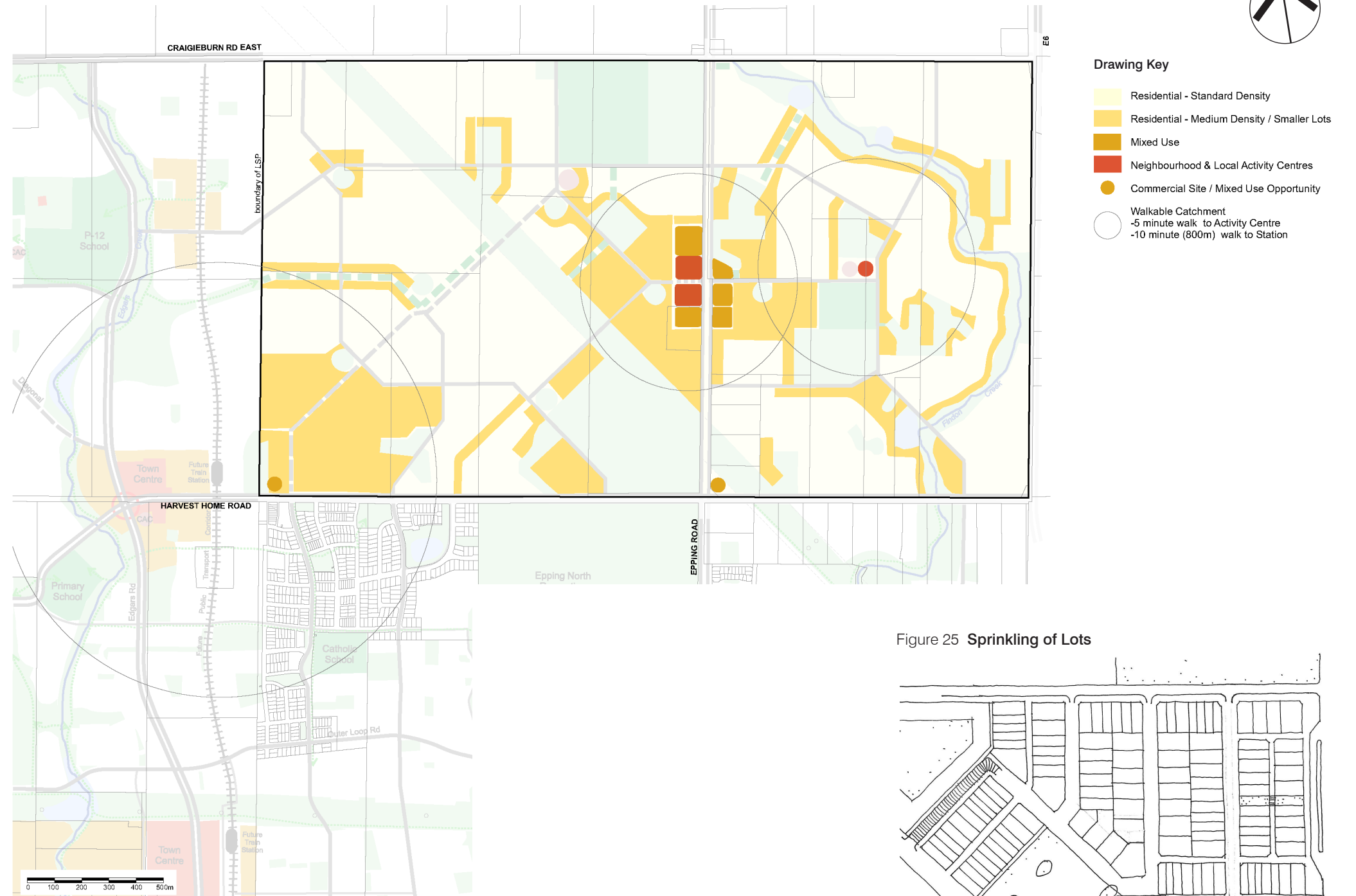
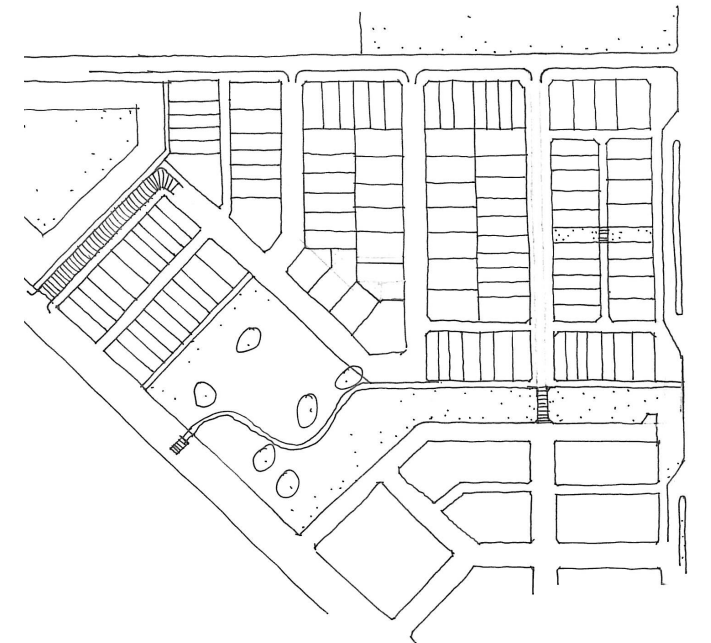


Figure 25 Sprinkling of Lots



3.10 Sustainability, energy efficiency and solar orientation

There are many features which contribute to sustainability of a residential area when preparing a Local Structure Plan.

The approach adopted for ENE has been to address the broader sustainability issue by setting the conditions and framework for a number of sustainable practices to occur. The form, layout and position of the roads, open space, activity centres, neighbourhoods and residential blocks have been designed according to the Traditional Neighbourhood Design model, that promotes better community, employment and environmental sustainability than conventional subdivision design.

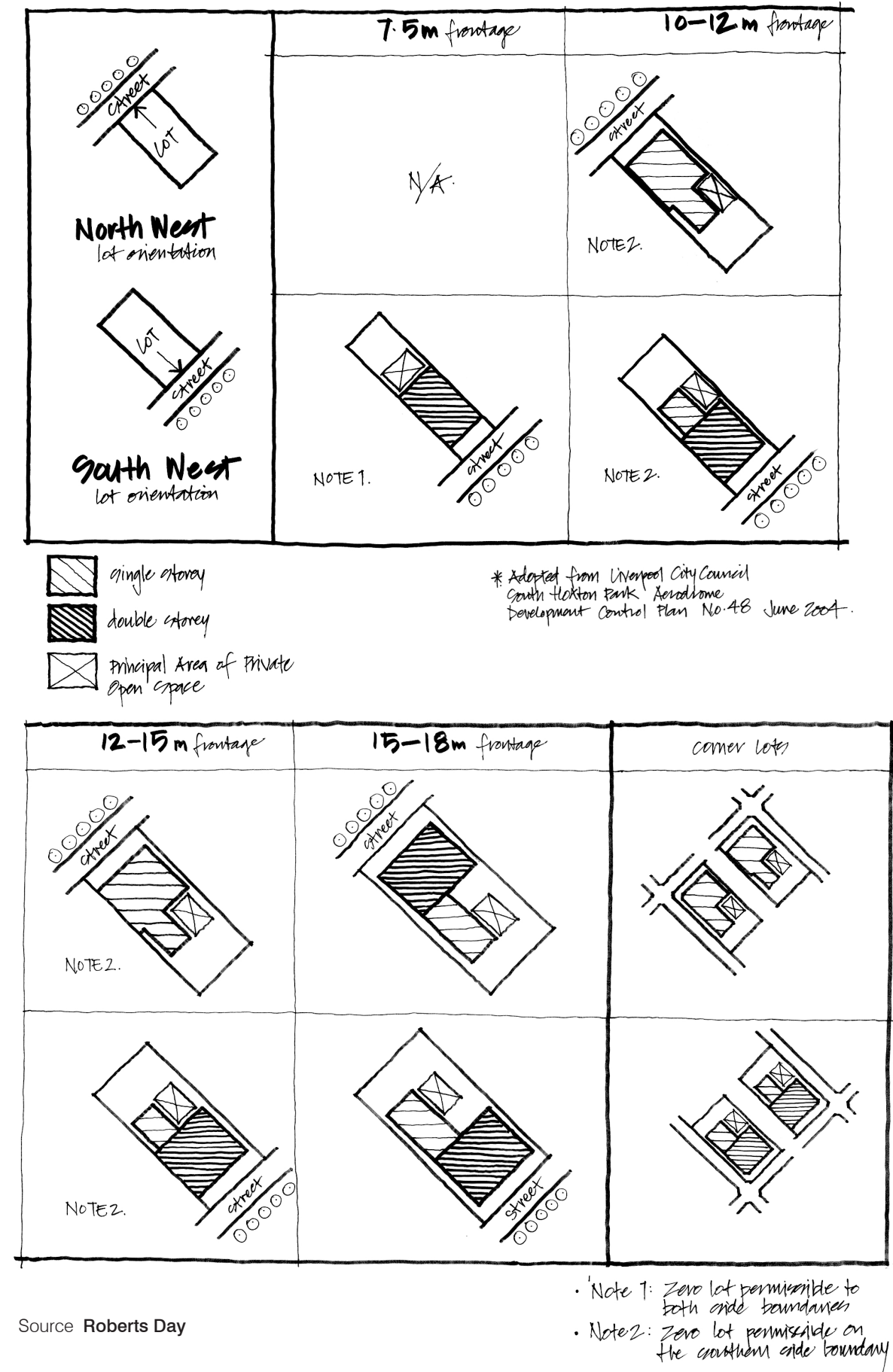
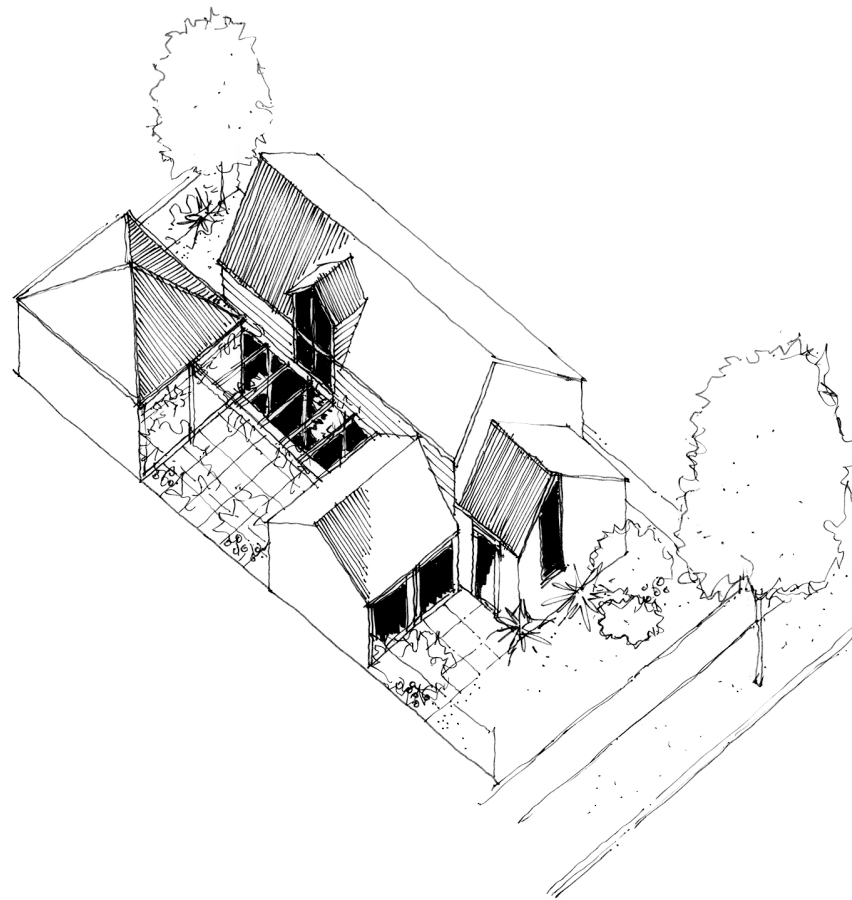
In this model, each feature interrelates with one another to contribute to an overall sustainability agenda, and as such, each feature can only be analysed in isolation to a limited extent.

Notwithstanding, one such important feature is the solar orientation of lots. An analysis of the plan has indicated that across the entire ENE LSP plan area, at least 70% of lots can achieve appropriate solar orientation, as defined by Clause 56. That is, the long axis of the lot is within that range of north 20 degrees west to north 30 degrees east, or east 20 degrees north to east 30 degrees south. At the Development Plan stage it will be necessary to ensure that compliance with the solar orientation provisions of Clause 56 (Standard C9) are met, across the entire ENE LSP area.

For lots located on diagonal streets that do not fall within the range of appropriate solar orientation defined by Clause 56, good solar access will need to be achieved through a variety of lot shapes and frontage/sideage proportions and through detailed dwelling design.

Figure 26 illustrates how lots located on a 45 degree angle can achieve solar access to private open spaces.

Figure 26 Solar orientation



Source Roberts Day

Figure 27 Local Structure Plan shown in context of the Epping North Area





Part 4 Physical Infrastructure, Services and Drainage



City of Whittlesea

4.0 Physical Infrastructure, Services and Drainage

4.1 Introduction

The ENE LSP area will be progressively provided with all necessary physical services to support an ultimate population of approximately 14,100 persons. The approach to provision of physical services and incorporation of existing services forms a significant component of the sustainability agenda for the LSP area.

Opportunities associated with short to medium term treatment of sewerage at the Aurora Treatment Facility and water conservation measures generally are significant and have the potential to influence the form and sustainability of Epping North East.

4.2 Sewer

The local authority for provision of reticulated sewer (Yarra Valley Water) has investigated capacity restrictions and servicing options for the ENE LSP area. Prior to 2011 it will be necessary to connect the subject land to the Aurora Treatment Facility. This facility is located to the west of the Craigieburn By-pass to the south of Craigieburn Road East.

All pump stations, rising mains and main sewers required to service Epping North East were delivered in 2007. A number of branch sewers required to service the area will be delivered progressively as demand requires, and are not expected to limit development. To reduce the demand for potable water, and to reduce the amount of land required for effluent disposal (via irrigation), it is intended that all households within Aurora will be provided with a 'third pipe' system. The purpose of the third pipe system will be to bring recycled water back to the home to be utilised for a range of household purposes. Provision of the third pipe system in Aurora is a central component of the sustainability agenda for Aurora.

4.3 Recycled Water

Given Council's longstanding view that the approach and commitment to sustainability in Aurora should be applied to other development within Epping North, it is intended that a third pipe system will be provided in Epping North East. Provision of the third pipe system will reduce the demand for potable water and provide the opportunity to irrigate Council reserves.

Yarra Valley Water have determined that Epping North East can be serviced with recycled water from an expansion of the recycled network planned to service the Aurora development. This service will provide Class A recycled water to all homes and for watering of active open space areas. Class A is the highest quality of recycled water and regulated by the Environment Protection Agency (EPA) and the Department of Human Services (DHS). A tertiary treatment process combined with pathogen removal is required to produce water of Class A quality. Recycled water of this quality has the widest range of permissible uses, including:

- Residential garden watering;
- Closed system toilet flushing;
- Process/cooling water for industry;
- Fire protection stores and reticulation systems;
- Irrigation of municipal parks and sportsgrounds;
- Water for contained wetlands or ornamental ponds;
- Food crops that are consumed raw or sold to consumers uncooked or processed

Plus all other uses listed as suitable for recycled water of classes B, C and D.

In the long term, recycled water will be pumped from the Aurora Treatment Facility to tanks located in the Quarry Hills, to service Epping North East via gravity. In the interim, recycled water will be pumped directly from the treatment plant into the network, until recycled water demand can be ascertained, and major assets can be sized appropriately.

To service Epping North East and Aurora with recycled water, the following assets are required:

- A recycled water pump station on the Aurora Treatment Facility. An interim pump station will be constructed and augmented once pumping to the reservoir begins.
- A large inlet/outlet main in Harvest Home Road and Bindts Road from the treatment plant site to the tank site in the Quarry Hills. A smaller inlet/outlet main has been constructed in Harvest Home Road initially (in 2007) and will be augmented once pumping to the reservoir begins. This main will then form part of the reticulation system.
- A recycled water storage tank at the Quarry Hills tank site.
- A distribution and reticulation network throughout the development area, including a significant distribution main running east-west through the development.

In the long term, Yarra Valley Water will continue treatment of some sewage flows from Epping North East at the Aurora Treatment Facility to ensure sufficient Class A water is available for all household demand and open space irrigation in Epping North East. After 2011, sewage flows from Epping North East not required for treatment to Class A standard will be sent to the Metropolitan sewerage system.

4.4 Potable Water

The local authority for provision of potable water (Yarra Valley Water) has investigated capacity restrictions and servicing options for the LSP area. Provision of potable water to Epping North East and the balance of the Epping North Strategic Plan area will require progressive augmentation of the existing system to provide service up to a specified contour and ultimately construction of water tanks in the Quarry Hills to the east of the LSP area. Once these tanks are commissioned, the whole of Epping North East will be able to be serviced with potable water.

4.5 Drainage Requirements

4.5.1 Stormwater Catchments And Waterways

The LSP is located within the catchments known as Edgars Creek and Findon Creek. The area is divided into the two catchments by a ridge line that runs through 219 Harvest Home Road to the south and 95 Craigieburn Road East to the north. For each of these catchments a Melbourne Water Drainage Scheme has been prepared. Findon Creek flows through the east of the LSP area. As the existing catchment at this location is predominantly undeveloped, the stream flow is usually intermittent. However due to the size of the contributing catchment the open waterway and floodplain will convey large flows during significant storm events. In contrast the portion of the LSP area that contributes to the Edgars Creek catchment does so via a minor tributary located in the upper reaches of the catchment. This tributary is not classified as an open waterway. In fact the drainage line is not clearly distinguishable on the ground and effectively acts as the valley floor or overland flow path during a stormwater runoff event. Based on the Melbourne 2030 growth strategy, the Epping North East LSP will define the most upstream limit of intensive development within the Edgars Creek and Findon Creek catchments. As a result it is essential that the LSP incorporates measures to protect the receiving waters with respect to water quality, flooding and ecosystem diversity. To optimise and deliver the most sustainable outcome, a holistic water sensitive urban design philosophy is recommended.

4.5.2 Drainage Schemes

Melbourne Water has developed Drainage Schemes for the Edgars Creek and Findon Creek catchments. The Edgars Creek and Findon Creek Schemes provide an overall strategy for the implementation of infrastructure to manage and control stormwater quantity and quality issues to satisfy holistic objectives and targets within the catchment. The Drainage Schemes have a schedule of contributions from landowners within its area to contribute towards the overall drainage costs. Contributions cover the cost of land acquisition, restoration, pipeline infrastructure and water quality treatment measures.

4.5.3 Stormwater Quantity

The drainage scheme provides a point of discharge for all properties greater than 0.4 hectares in size.

4.6 Creek Catchments

4.6.1 The Findon Creek Catchment

The Findon Creek floodway reserve width varies between Craigieburn Road East and Harvest Home Road, but is typically in the order of 25 to 30 metres. An overland flow path (valley floor) has been identified through 290 Epping Road and 52-80 Harvest Home Road. The valley floor will convey storm flows in-excess of the underground drainage system and it is anticipated that this will occur via the road network.

No specific retardation requirements exist within the LSP area, as the major retardation basin is located south of Harvest Home Road.

4.6.2 The Edgars Creek Catchment

A 25 metre drainage reserve is required for floodway purposes through 220 and 230 Harvest Home Road. Three overland flow paths (valley floors) have been identified through the LSP area. The first through 270 Harvest Home Road; the second through 135 Craigieburn East Road and 220 Harvest Home Road; the third along the boundary of 219 and 220 Harvest Home Road. The valley floor will convey storm flows in-excess of the underground drainage system and it is anticipated that this will occur via the road network. No specific retardation requirements exist with the LSP area, as the retardation basin is located south of Harvest Home Road.

4.7.3 Construction Control

During construction, "best practice" site management practices should be implemented to reduce sediment export from the site. This would typically include silt fences, ponds, filter socks, straw bales and similar techniques to minimise the transport of sediments to the drainage lines. A site management plan is required to be prepared in accordance with the EPA guidelines for all subdivisions prior to works commencing on site.

4.8 Water Sensitive Urban Design

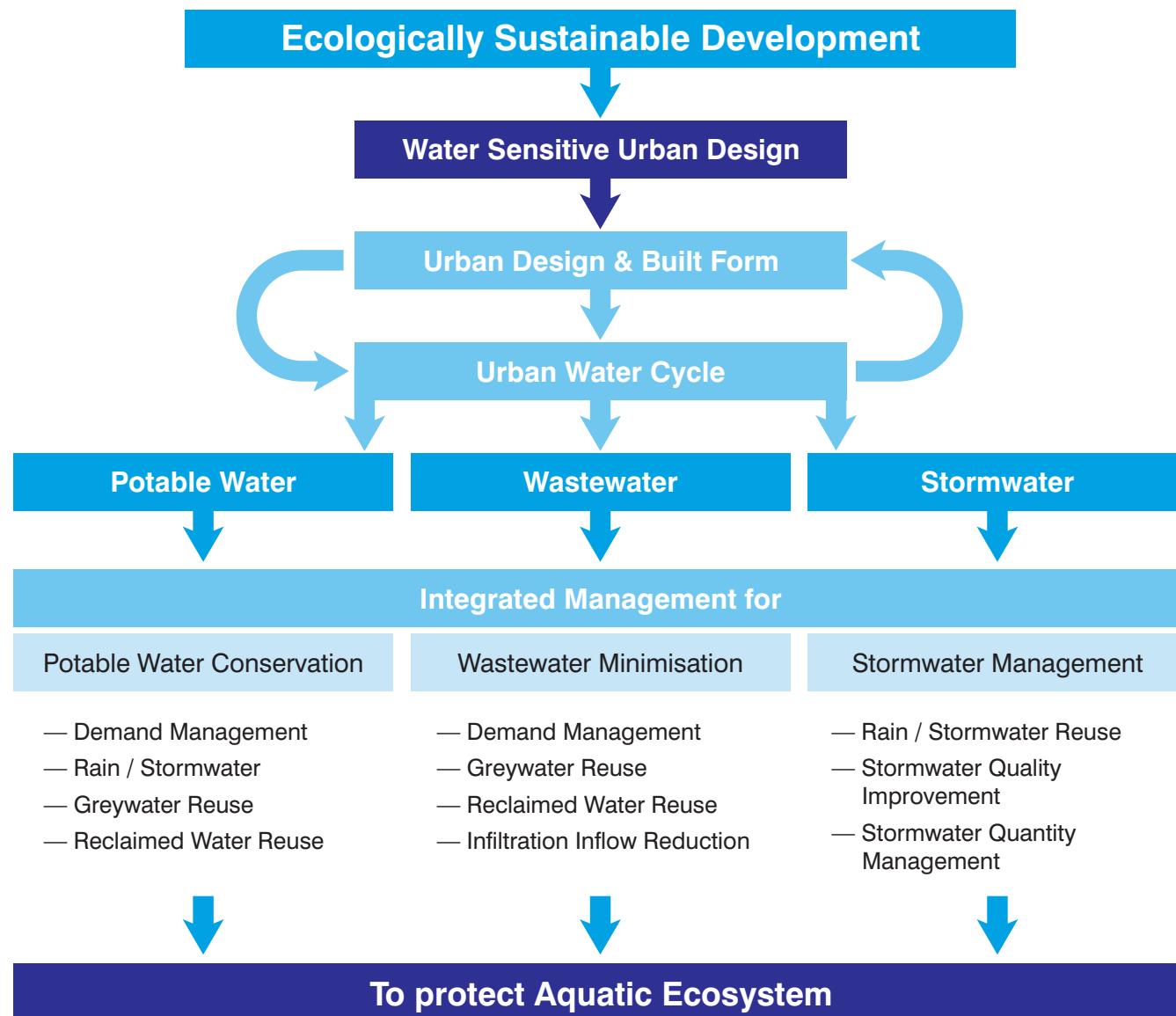
Water Sensitive Urban Design (WSUD) is often confused with the terms Ecologically Sustainable Development (ESD) and Water Cycle Management. In fact, the three terms are all intrinsically linked as shown in Figure 28 (ARQ draft Guidelines, 2003). This forms the framework for best practice for new urban development.

ESD is effectively an umbrella which covers a wide range of issues, of which water is one element (others include transport, waste, energy, social etc). In contrast WSUD specifically focuses on the relationship between the urban built form and the water cycle. The primary focus for this section is stormwater, therefore the following section will concentrate on the issues surrounding this "stream" of the water cycle.

4.9 Guidelines For Treatment

Guidelines for urban stormwater quality management in Victoria are contained in "Urban Stormwater Best Practice Environmental Management Guidelines". Melbourne Water, Municipal Association of Victoria, Victoria's Environment Protection Authority and the Department of Natural Resources and Environment developed this document. The guidelines seek to minimise the detrimental effects of urbanisation on receiving waterways.

Figure 28 Interactions between ESD, WSUD and IWM



Source ARQ Draft Guidelines, 2003

4.7 Stormwater Quality

4.7.1 The Findon Creek Catchment

As part of the treatment train approach for this catchment there are three wetlands proposed in the LSP area. The wetlands are located within 50 Lehmanns Road, 290 Epping Road and 52-80 Harvest Home Road. All Development Plans prepared for land within the LSP area should consider in more detail incorporation of the wetlands into the surrounding environment to maximise the potential of such assets as a feature.

There are also a number of bio-retention systems, bio-retention pads, buffer strips and swales proposed as part of the scheme to meet the water quality objectives.

4.7.2 The Edgars Creek Catchment

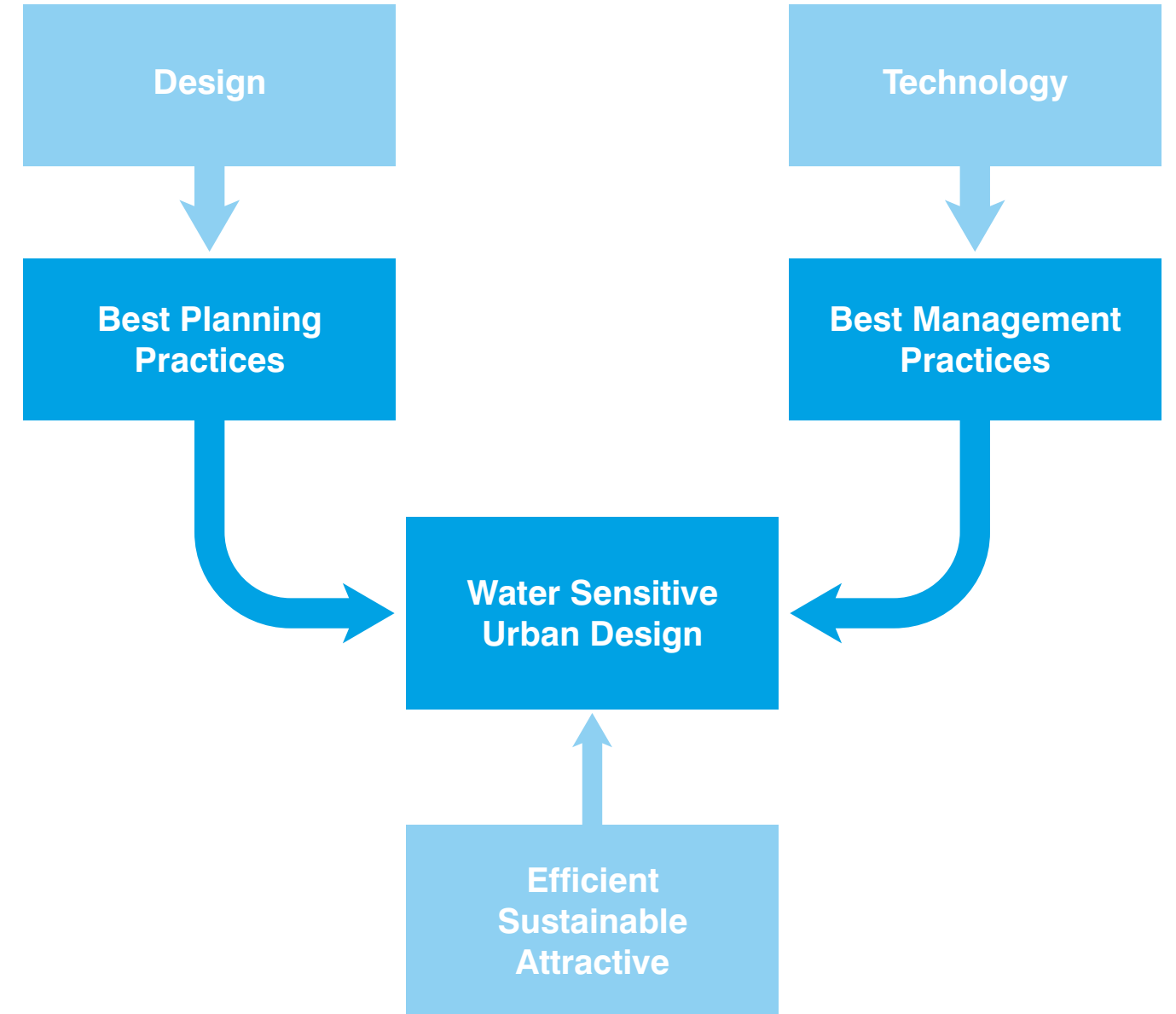
Apart from litter and sediment control, there are no specific requirements for water quality treatment within the LSP area. Treatment of the LSP area within this catchment has been provided for in wetlands downstream of Harvest Home Road.

However the use of other water sensitive urban design techniques at the street scale in high amenity locations should be considered and encouraged within the LSP area

Table 4 Objectives for Environmental Management of Stormwater

Pollutant	Receiving Water Objective	Current Best Practice Performance Objective
Post Construction Phase:		
Suspended solids (SS)	Comply with SEPP (eg. Not exceed the 90th percentile of 80 mg/l) (1)	80% retention of the typical urban load
Total phosphorus (TP)	Comply with SEPP (eg. Base flow concentration not to exceed 0.08 mg/l) (2)	45% retention of the typical urban load
Total Nitrogen (TN)	Comply with SEPP (eg. Base flow concentration not to exceed 0.9 mg/l) (2)	45% retention of the typical urban load
Litter	Comply with SEPP (eg. No litter in waterways) (1)	70% reduction of the typical urban load (3)
Flows	Maintain flows at pre-urbanisation levels	Maintain discharges for the 1.5 ARI at pre-development levels
Construction Phase:		
Suspended solids	Comply with SEPP	Effective treatment of daily run-off events (eg. <4 months ARI). Effective treatment equates to a 50%ile SS concentration of 50 mg/l
Litter	Comply with SEPP (eg. No litter in waterways) (1)	Prevent litter from entering the stormwater system
Other pollutants	Comply with SEPP	Limit the application, generation and migration of toxic substances to the maximum extent practical

Figure 29 Water Sensitive Urban Design (Source: Whelans et al, 1994)



Source Whelans et al, 1994

4.10 Stormwater Treatment Strategy

Water Sensitive Urban Design (WSUD) provides an alternative to the traditional conveyance approach to water, stormwater and wastewater management. WSUD focuses on the integration of urban planning and development with the management, protection and conservation of the water cycle. The design philosophy recognises that it is impractical to replicate the natural system; however it is possible to mitigate changes to the existing water balance. Water sensitive design provides a holistic approach to stormwater management as it seeks to combine the elements of Best Planning Practice (BPP) with Best Management Practice (BMP) to match the site conditions and constraints. This assessment and selection requires input from a multi-disciplinary team including engineers, hydrologists, landscape architects and urban designers.

4.11 Objectives of WSUD

The objectives of WSUD are:

- Provision of stormwater conveyance capacity to provide for safe passage of stormwater runoff to avoid nuisance flooding and flood damages to property
- Provision of on-site stormwater detention to mitigate the increased discharge rates and runoff volumes resulting from urban development. Through flow management WSUD seeks to protect the aquatic ecosystems of receiving waterways and avoid detrimental flooding impacts to the downstream drainage system.
- Provision of stormwater treatment measures to remove pollutants transported within urban stormwater runoff so as to protect the environmental, social and economic values of receiving waterways
- Integration of stormwater conveyance and treatment systems into the overall urban and landscape vision for residential development.
- Recognition of the value of rain that falls within the development as a water resource. Consider optimising the use of stormwater runoff generated by urban development through harvesting for appropriate potable water use substitution.

Water sensitive urban design can involve a combination of stormwater concepts and treatment at three different scales:

- At source.
- Neighbourhood.
- Regional.

4.12 Best Planning Practices

The following land-use planning techniques and concepts (refer Figure 52) need to be considered to optimise the opportunity for implementing water sensitive urban design into urban development:

- Public open space layout
- Road alignments and streetscaping
- Subdivisional lot layouts

4.13 Best Management Practices

There are a number of different “Best Practice” techniques that should be considered as a “tool box” of water sensitive urban design opportunities, which can be tailored and selected to match the site specific conditions. A description of the “tool-kit”, illustrated in Figure 30, is provided below:

The design process for the implementation of a structural treatment measure involves the following process:

- Determine the treatment objectives
- Develop a treatment train
- Identify opportunities within the urban design layout
- Short list potential treatments
- Compare potential treatments
- Detailed design

Regardless of the treatment train selected, the goal is to meet the Best Practice stormwater pollutant removal targets.

4.14 Water Sensitive Urban Design Approach In Epping North East

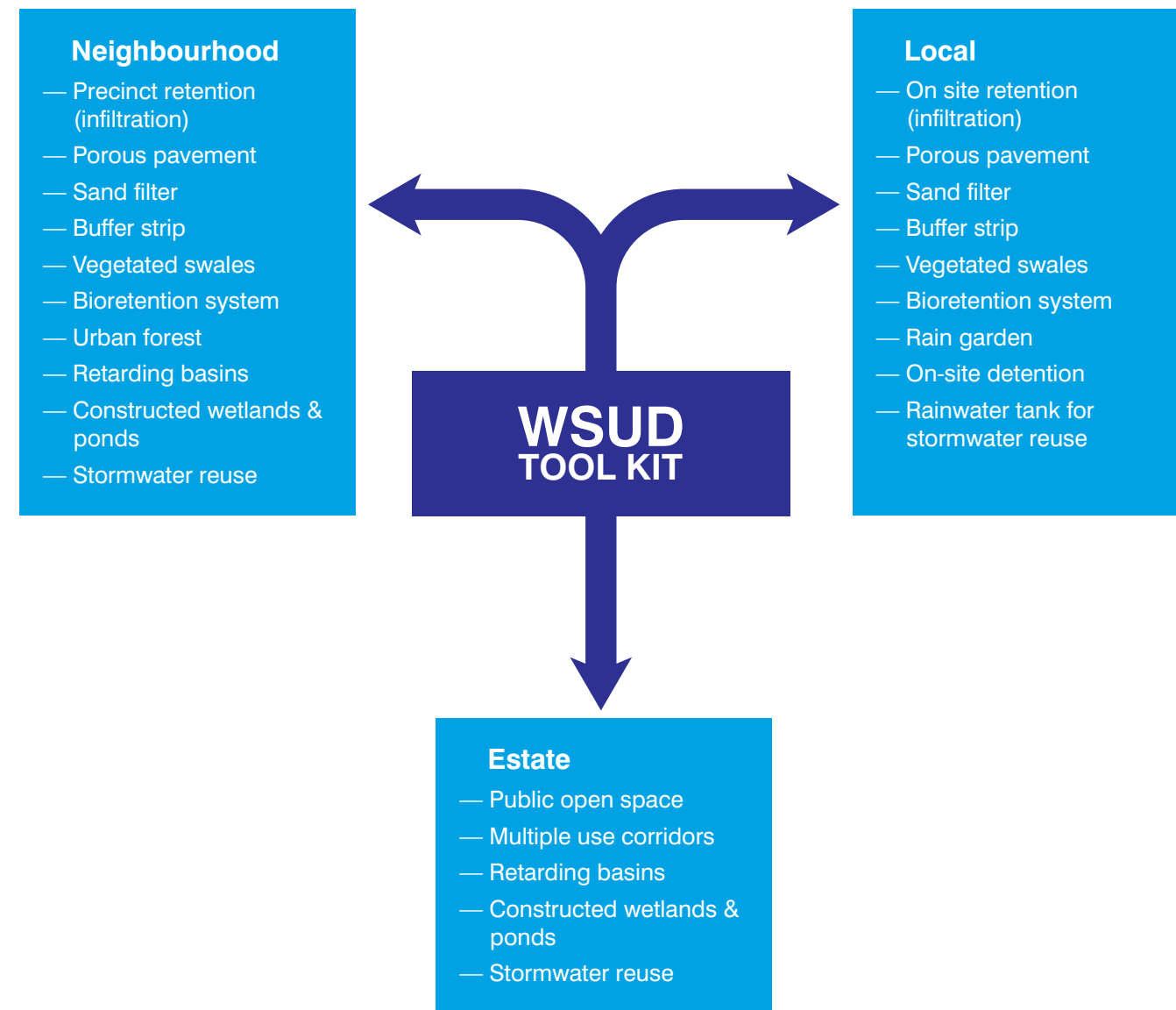
Taking into account the presence of the Findon and Edgars Creek drainage systems and the desire to achieve increased residential densities in accordance with Traditional Neighbourhood Design principles, a ‘regional’ treatment approach will be applied in Epping North East.

The regional treatment approach will focus on

provision of stormwater treatment systems in locations where they can improve stormwater quality and provide local amenity. Suitable locations include:

- Along the Findon and Edgars Creeks and tributaries.
- Within the transmission tower easement.
- Within central median treatments (where possible).
- Along lineal open space links that incorporate existing vegetation (where the WSUD solution does not compromise the health and integrity of the existing vegetation).

Figure 30 WSUD Tool Kit



Source Whelans et al, 1994

According to this regional approach highly distributed treatment and conveyance systems will generally not be supported particularly in local streets. This is due to the potential conflict between treatment and conveyance systems and the other components of streetscapes and the preference to focus distributed treatment and conveyance systems in high amenity locations that can enhance the public realm and in recognition of the level of land fragmentation.

Where a highly distributed treatment and conveyance proposal is sought by a developer/s, careful regard will need to be given to the scale of the development, the form and density of the built form, maintenance issues and the extent to which the proposal requires the same approach to be adopted on adjacent/nearby land holdings. While selective use of rain gardens may be possible for example the LSP does not support a 'total' WSUD based solution to meet Melbourne Water targets at the expense of the regional approach and other desirable urban outcomes.

Other associated initiatives however such as installation of rain water tanks should be explored during the detailed design phase. .

4.15 Power, Gas And Telecommunications

Electricity and telecommunications are all available to the area from the south. There is sufficient capacity to meet the demands of the new development with some minor augmentation of infrastructure.

There are currently no gas assets in the area. Origin Energy has advised that it is in the process of extending a gas main northward along Epping Road then west along Harvest Home Road, which will service the area to the north of Harvest Home Road and west of Epping Road. The area to the east of Epping Road can be serviced via an extension of this infrastructure.

4.16 Transmission Easement

A 110 metre wide transmission easement traverses a small portion of land to the east of Epping Road and bisects land to the west of Epping Road in a diagonal fashion. Due to restrictions associated with the easement, buildings cannot be constructed within the easement.

Further, roads should traverse the easement away from the low mid-span point between the pylons. The LSP supports an 'active' interface to the easement through provision of single fronted parallel local streets in most situations although some limited sideage/rear treatments may be acceptable.

SPI Powernet has prepared a document entitled Guidelines for Subdivision and Development of Land Affected by Easements. A comprehensive list of permitted and prohibited uses of power line easements is incorporated within this document which should be read in conjunction with this LSP.

References

Ashton (2005) – Epping North Traffic Modelling. City of Whittlesea.

Atma Environmental Pty Ltd (2004) "Preliminary Environmental Assessment – Epping North East, Victoria. Coomes Consulting Group Pty Ltd.

ASR Research Pty Ltd (2004) Epping North – Open Space, Recreation and Social Needs Assessment. City Of Whittlesea.

Charter Keck Kramer (2004) Epping North Development Contributions Plan. City of Whittlesea.

City of Whittlesea (1999) Electronic Social Planning Package. City of Whittlesea.

City of Whittlesea (2002) Epping North Local Structure Plan. City of Whittlesea.

City of Whittlesea (2002) Harvest Home Road Local Structure Plan. City of Whittlesea.

City of Whittlesea (2004) Housing Strategy. City of Whittlesea.

City of Whittlesea (2000) Local Conservation Strategy. City of Whittlesea.

City of Whittlesea (2004) Mernda Strategy Plan. City of Whittlesea.

City of Whittlesea (1997) Open Space Strategy. City of Whittlesea.

City of Whittlesea (1998) Sports Facilities Reviews / 2010 Studies.

City of Whittlesea (2000) Sports Field Policy. City of Whittlesea.

City of Whittlesea (2001) Strategic Infrastructure Study. City of Whittlesea.

City of Whittlesea (2000) Municipal Health Promotion Plan. City of Whittlesea.

City of Whittlesea (2000) Sports Field Policy. City of Whittlesea.

Duany Plater – Zyberk & Co (2003) SmartCode – Version 5.2. Miami, USA.

Environmental Resource Management Australia Pty Ltd (2004) Ecological Investigation – Epping North East Local Structure Plan. Coomes Consulting Group Pty Ltd.

Epping North East Local Structure Plan (Draft), (2004) Coomes Consulting Group Pty Ltd.

Essential Economics Pty Ltd (2004) Epping North East Local Structure Plan – Retail Analysis.

GTA Consulting (2004) Traffic and Car Parking Report – Epping North East Local Structure Plan.

Grogan Richards Pty Ltd (1999), Epping North Traffic Analysis.

i.d. Consulting Pty Ltd (2001), City of Whittlesea - Small Areas Population Forecasts City of Whittlesea (2001-2021).

Melbourne Water (2005), Edgars Creek Drainage Scheme.

Terra Culture - Heritage Consultants (2004) An Archaeological and Heritage Investigation – Epping North East Corridor Local Structure Plan.

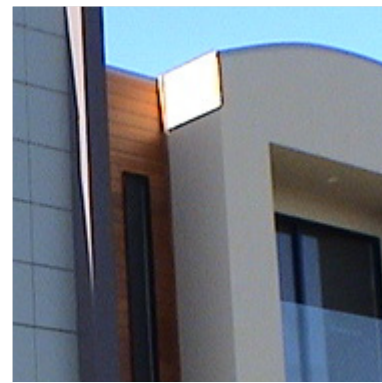
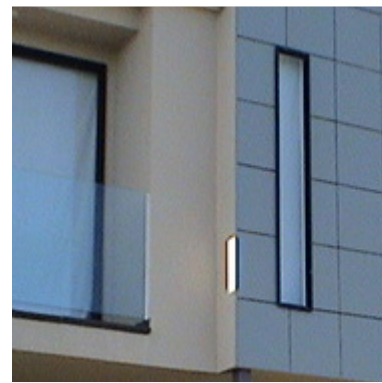
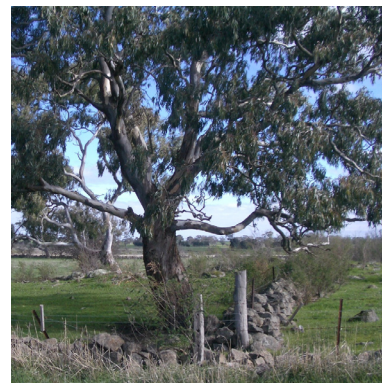
Tree Logic (2004) Preliminary Arboricultural Assessment & Report Epping North East LSP.

Turnbull, D. (1998) International Planning: Theory vs Practice, City of Whittlesea, Melbourne.

Western Australian Government (2000) Liveable Neighbourhoods – Community Design Codes (Edition 1) Western Australian Planning Commission, Perth.



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