

Guidelines for Urban Development



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Co-ordinating Council Department:
 Development Engineering

Project Working Group:
 Development Engineering
 Strategic Planning and Design
 Parks and Open Space
 Infrastructure
 Engineering and Transportation
 Health, Access and Bushfire Recovery
 Sustainability Planning
 Growth Areas Development Assessment
 Leisure and Community Inclusion
 Established Areas Planning

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G MELBOURNE WATER / COUNCIL MAINTENANCE AGREEMENT KIT

H WASTE MANAGEMENT GUIDELINE FOR MULTI UNIT DEVELOPMENTS

1 INTRODUCTION

1.1 BACKGROUND

The content of this document is based upon current practice for the Planning, Design and Construction of new infrastructure within the City of Whittlesea, including refinements recently made to accommodate common standards adopted by Melbourne's six Growth Area Councils in partnership with the Metropolitan Planning Authority.

This document replaces the issues based Development Guidelines and associated Council standards prepared by relevant Council departments, with an integrated sustainable planning, landscaping and engineering framework for the preparation of subdivision layouts and the creation of infrastructure by the development industry. Key aspects of this approach are:

- The introduction of all City of Whittlesea objectives and requirements for subdivision and development of land, including the processes and standards to be followed, in a single document;
- Documentation of the context within which individual disciplines combine at every level to create new urban development;
- Guidance on the design and delivery of sustainable communities through adherence to Traditional Neighbourhood Design principles and Water Sensitive Urban Design practices;
- Provision of cross references to other publications, including the Metropolitan Planning Authority *Engineering Design and Construction Manual* (referred to as "the EDCM").

Where the Guidelines for Urban Development document applies:

- To the preparation of Structure Plans where responsibility for this phase of development rests with Council;
- To the design and assessment of subdivision and development of land within Council's planning framework for redevelopment of established areas, subdivision of greenfield sites and new growth areas of the municipality;
- To the design of town centres, retirement villages, multi-unit and other major development applications.

Relationship with other policies and standards:

- The document has been prepared with careful attention to the understanding and incorporation of requirements that are well co-ordinated across all policy areas. In the event of any conflict arising between this document and another applicable Council policy or practice, the content of this document will take precedence;
- In the event of any conflict arising between this document and an incorporated document in the Whittlesea Planning Scheme, the incorporated document will take precedence, unless otherwise agreed by Council.

Use of document:

- The use of this document will become effective immediately upon electronic publication on Council's web site. Appropriate advance notice will be provided of initial publication and any subsequent revisions via the web site;
- Printed copies of the document will be uncontrolled.
- The document will be updated by Council periodically to include any revisions to the existing or new Council policies, strategies and guidelines.

Content Statement:

The City of Whittlesea has recognised the complex challenges involved in the process of planning and delivering new communities whether in newly developing and existing urban areas.

This process generally involves a range of disciplines with their own and sometimes competing, objectives and requirements. This is also matched by the number of internal and external stakeholders involved in the process. It is the City of Whittlesea's experience that implementation of improved outcomes has the greatest potential of success where all the stakeholders co-operate in a partnership approach. For this to be achieved there has to be an understanding and acceptance of the need to balance all of these competing interests / issues to achieve the desired outcome.

Further, the impact of the complexity within the statutory approvals system cannot be underestimated. The sheer weight and breadth of the statutory approvals process can often lead to a risk averse, conservative implementation approach.

So what is the preferred tangible outcome of the planning and delivery process that is of common interest? The outcome that is of common interest is the importance of "place". The clear objective is to ensure that this preferred outcome is achieved via the process of urban development rather than as a series of unintended consequences.

It is therefore of critical importance to ensure that all those involved in the delivery of communities both recognise this common goal and understand their part in its delivery / implementation.

1.2 OBJECTIVES

The primary objectives of this document are:

- To provide guidance for urban planning, engineering design, landscaping and civil construction within the context of a multi-disciplinary approach to delivering sustainable communities;
- To document minimum Council requirements for the design and construction of infrastructure associated with the subdivision of land;
- To allow for standardised development submissions as much as possible to assist Council officers in the expedition of the approval process;
- To facilitate an understanding, by all stakeholders in the process, of the relationships between the various disciplines required for development of new urban neighbourhoods;

- To apply the same criteria, to buildings and other development on individual property, where the design and construction of infrastructure is a requirement of a planning permit;
- To establish a sound framework upon which to negotiate approvals of unique, innovative and / or special case designs.

1.3 STRUCTURE OF THE DOCUMENT

Sections 1, 2 and 3 provide key principles and Council's requirements for neighbourhood design, community development, open space and the public realm.

Section 4 explains the application, approvals and delivery processes to be followed by developers, consultants, constructors and Council.

Sections 5, 6 and 7 cover the requirements for the content of plans of subdivision, water sensitive urban design and movement network principles, including typical street cross sections and traffic management objectives.

Sections 8, 9, 10, 11, 12 and 13 provide the key elements of utility infrastructure, landscaping and engineering design responses required in the City of Whittlesea for aspects not contained in the EDCM.

Section 14 provides an outline of construction processes and standards applicable to the creation of civil infrastructure and landscaping for subdivisions and other developments where the construction of engineering works is a condition of the planning permit.

Section 15 covers requirements for asset handover to Council upon Practical Completion and Statement of Compliance.

Where appropriate and for reasons of clarity, sections of the EDCM have been reproduced in this document. Standards and procedures not specifically clarified herein shall comply with those in the EDCM.

Appendices to this document contain relevant Council procedures, checklist forms and standard drawings. For clarity and convenience the Standard Drawings Section contains "Engineering Details" from the EDCM, "Engineering Details" from the City of Whittlesea and "Landscape Details".

1.4 PLANNING FRAMEWORK

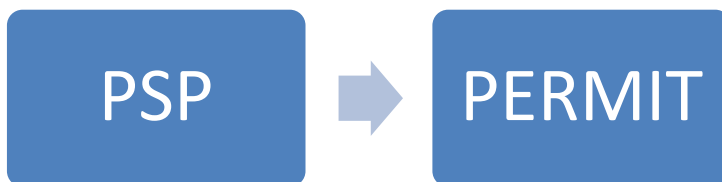
Planning Permits can be issued in response to an application for a planning permit to subdivide, develop and / or use of land. Sections of this document relate to the framework within which the subdivision of land for new urban areas is undertaken but when a planning permit for other forms of development contains requirements for the design and construction of infrastructure the applicable standards herein shall be applied.

In terms of the growth areas it is important to note that they are the subject of two distinct planning frameworks. The first affects growth areas recently introduced as part of the State Government's Urban Growth Boundary Review and Growth Corridor Plan processes for areas such as: Quarry Hills, Wollert, Woodstock, Donnybrook, Beveridge, etc. These areas are affected by the Urban Growth Zone (UGZ) and the requirement to prepare Precinct Structure Plans (PSPs). Once prepared, PSPs are incorporated into the Planning Scheme and guide the use and development of land within their boundaries. PSPs cover a very large area of land and are therefore fairly general and strategic in nature. For PSP areas there is no additional

Development Plan Overlay requirement to provide for a more detailed resolution of the structure within parts of the PSP area prior to the issue of planning permits for subdivision.

A permit application, under a PSP must meet particular objectives, including the standards set out in Clause 56 of the Whittlesea Planning Scheme, as appropriate. A planning permit must be generally in accordance with the PSP and meet the requirements set out in the PSP and Schedule to the Urban Growth Zone.

The planning framework for existing growth areas such as South Morang, Mernda / Doreen and Epping North, differ from that of the PSP / UGZ regime noted above in that it does require preparation of more detailed Development Plans as an intermediate step between the Structure Plan and subdivision permit processes. As such, the subdivision structure / layout is generally resolved to a far greater degree prior to the issue of a subdivision permit in this planning framework. This has implications for the level of design analysis / justification required between the two different planning frameworks.



Planning process for growth areas recently introduced as part of the State Government's Urban Growth Boundary Review and Growth Corridor Plan



Planning process for existing growth areas

2 DEVELOPMENT OF SUSTAINABLE COMMUNITIES

The City of Whittlesea's approach to development of new neighbourhoods is to address the broader sustainability issues, by setting the conditions and framework for sustainable, liveable communities. The basic urban form of development sets the sustainability agenda well ahead of individual building siting and built form techniques. Sustainable design must consider the triple bottom line approach which recognises not only environmental but social and economic sustainability.

The City of Whittlesea promotes the development of sustainable, liveable communities based on current Urban Design best practice as the basic philosophy which underpins the design of all new subdivisions. There has been a paradigm shift within Victorian State Planning Policy, as evidenced by “Melbourne at 5 Million”, “Melbourne 2030”, “Plan Melbourne” and the provisions of Clause 56 of the Planning Scheme, away from the typical “sprawl” of suburban development to a more site-responsive neighbourhood design approach. This approach has grown out of a response to criticisms and deficiencies identified in many parts of the developed world, including Whittlesea and Metropolitan Melbourne, regarding the form of car dominated suburban development that has occurred over the last 30-50 years.

The shift to a more site-responsive Traditional Neighbourhood Design (TND) approach is fundamentally about making places more sustainable, vibrant, safe, attractive and liveable. This can be achieved by ensuring that developments have an affinity with the context and space from which they grow; provide increased levels of amenity, safety and diversity; encourage walking and cycling and reduced car dependency and enhance local identity and community. Site constraints (land ownership, fragmented titles, environmental and cultural features) must be balanced with the overarching objectives listed below to promote sustainability at all levels.

The key benefits of TND:

- By bringing most of the activities of daily living into walking distance, everyone gains independence of movement, especially the elderly and young;
- By reducing the number and length of vehicle trips, traffic congestion is minimised, the expenses of road construction are limited, and air pollution is reduced;
- By providing streets and public spaces of comfortable scale with defined spatial quality, neighbours can meet and watch over their collective security increasing safety;
- By providing appropriate densities at easy walking distance to public transport stops, public transport becomes a viable alternative to motor vehicles;
- By providing a full range of housing types and work places, people of all ages and economic status are integrated and the bonds of an authentic community are formed;
- By providing suitable civic buildings and spaces, community cohesion is encouraged;
- By providing an interconnected grid, connectivity and permeability are enhanced; making it easier to get around, reducing length and time of trips, promoting links to internal and external community uses and encouraging walking and cycling;
- By providing a series of smaller linked neighbourhoods of a walkable scale, each with a strong sense of character and “heart”, a sense of local community and feeling of safety are created.

2.1 TRADITIONAL NEIGHBOURHOOD DESIGN

The key objectives underpinning planning of new neighbourhoods in City of Whittlesea are:

Walkable Local Centres

- Creating walkable neighbourhoods as the main building block of the community, defined by a 400 metre walk to daily needs including employment, retail, community and leisure facilities, open space and public transport.

Distinct Local Character

- Ensuring the intrinsic character and unique natural, cultural and environmental features of the site are protected and used to enhance the sense of identity, community and place;
- Locating community buildings where they can serve as a civic focus and landmark;
- Aligning streets to take advantage of views and create vistas to important buildings and spaces.

Connected, Permeable Movement Network

- Using an interconnected grid based street network designed to disperse traffic and maximise connectivity, accessibility, choice and legibility;
- Prioritising non-vehicular modes of transport including public transport, walking and cycling;
- Providing high quality public spaces;
- Providing housing and buildings with strong street frontage, uninterrupted by car-parking lots, to define the street edge and create safe, interactive streets;
- Providing a diversity of open space in a manner that suits the local context; e.g. urban square in a local centre, wetland along a creek, conservation park protecting remnant grassland.

Lot and Dwelling Diversity

- Providing increased density in key locations where there is high amenity and supportive uses such as proximity to retail, services, transport and open space;
- Providing variation in lot width and depth; front, rear and side setbacks, to support a range of buildings and densities.

Mixed Use and Co-location

- Clustering community facilities, retail, schools and parks together to create nodes of mixed use activity where the community can gather, social interaction can occur and where daily needs can be met with a reduction in the need for motorised trips;
- Providing opportunities for local employment and providing a strong local economic base catering for the varying recreational, retail, sporting, educational etc. needs of the community to promote a degree of self-containment.

Universal Access

- Providing universal access for all citizens in both the built environment and the public realm.

2.2 LOT DENSITY AND DIVERSITY

Traditional Neighbourhood Design provides the flexibility to accommodate increased development densities in conjunction with enhanced lot and dwelling diversity.

2.2.1 General Principles

The City of Whittlesea generally 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 open space, proximity to shops services and transport.

2.2.2 Design Considerations

The siting of new lots and design and construction of new homes will seek to reduce greenhouse gas emissions, adapt to climate change, reduce water use, protect waterways, use materials efficiently and minimise waste.

2.2.3 Medium Density Housing Development

Medium density housing should be designed so that it is responsive to the site and the neighbourhood. It should respect the existing neighbourhood context and contribute to a preferred neighbourhood character and provide high standards of amenity for existing and new residents.

When designing medium density housing proposals within the City of Whittlesea, the mandatory starting point for any proposal is Clause 55 (ResCode) of the Whittlesea Planning Scheme. Notwithstanding, proposals such as large medium density housing developments which require the provision of internal access roads must follow the design principles outlined below:

- All public roads must be designed in accordance with Council's standards outlined in this document;
- Internal private streets must be designed to provide adequate access for service and emergency vehicles and appropriate DDA compliant internal pedestrian access;
- All drainage and the composition of internal road pavements shall be designed to Council standards outlined in applicable sections of this document;

- A Waste Management Strategy must be prepared in accordance with Council's Municipal Waste Management and Resource Recovery Strategy which incorporates an appendix on "Servicing Multi-dwellings Guidelines" (Refer Appendix H);
- Where a residential development does not benefit from a road frontage for primary pedestrian access, a 4.0 metre wide "Paper Road" will be required along and within the property boundary;
- Adequate easements shall be provided within the first stage of a development for all future utility servicing requirements without any reliance upon obtaining such easements over adjacent Council land.

2.3 EARLY PROVISION OF COMMUNITY FACILITIES

Traditional Neighbourhood Design encourages the early provision of community facilities and services such as schools, kindergartens, child care, and other similar facilities in clusters with other mixed uses such as local convenience retail and services within easy walking distance of residences. Location of such facilities at major crossroads, as terminations to key views and other similar techniques assists in creating walking and cycling routes with clear destinations and points of interest. This also encourages children to walk or cycle to schools.

2.3.1 General Principles

Where possible, kindergartens and / or early learning centres are co-located onto school sites, preferably under the same roof line and delivered simultaneously.

Where it is not possible for kindergartens or early learning centres to be on a school site, a strong preference exists for co-location into an integrated service model / hub (one stop shop), incorporating partnership with like family service, community agencies and early years' programs and activities; for example, early intervention, occasional care, playgroups, maternal and child health and allied health services. Refer to Council's Early Years' Service Model for more information on practice philosophy and principles.

2.3.2 Objectives and Design Requirements

Land allocated for provision of a community facility should be typically located on the north side of the road with the longer dimension in a predominantly east-west direction.

Design requirements for provision of early years' service centres shall be in accordance with the recommendations outlined in the *Education and Care National Law Act 2010* and *The Education and Care National Regulations 2011* and the *Design Guide for Victorian Children's Services*.

Playgrounds associated with an early learning centre shall be located with a northerly aspect as per Council's agreed practice.

The built form of these facilities shall demonstrate Council's commitment to environmental sustainability by incorporating best practice sustainable design features wherever possible.

2.4 SUSTAINABLE BUILDINGS

The ways in which our houses and commercial buildings are constructed can have a long lasting impact on the amount of resources used by a community. To ensure that buildings are

sustainable, the City of Whittlesea may ask for development applications to address a list of key sustainability criteria.

The level of detail and benchmarks for acceptable levels of sustainable design will vary depending on the size and nature of the development, but all building designs should consider the following factors:

- Indoor environment quality
- Energy efficiency
- Water resources
- Stormwater management
- Building materials
- Transport
- Waste management
- Urban ecology
- Innovation
- Ongoing building and site management

For more information please refer to our website, at www.whittlesea.vic.gov.au/building-planning-and-transport/planning-and-development/planning-permits/sustainable-design-assessment-in-the-planning-process

3 THE PUBLIC REALM

The public realm is the most democratic space in a municipality as access is available to all.

The public realm in the City of Whittlesea has been designed to serve the community on several levels including open space designed to protect natural and cultural features, open space to meet the active recreational and sporting needs of the local and regional community, neighbourhood parks and town squares with a more urban character and scale to meet the passive recreational and social needs of a local neighbourhood, linear open space which links the various open spaces together in a contiguous network and public streets which provide a community focus.

3.1 GENERAL PRINCIPLES

By definition, the public realm refers to all land within the boundaries of the City of Whittlesea accessible to the public and managed by Council and / or other public authorities. The public realm therefore comprises streets, lanes, parks, reserves, gardens, creek corridors, pipe tracks, easements, streetscapes, civic spaces and land temporarily reclaimed and transformed into temporary parks and gathering areas (i.e. “pop-up” parks).

The overall planning by Council also gives due consideration to “borrowed” landscapes (privately owned lot frontages and body corporate land) which contribute significantly to the overall amenity of streetscapes and the municipality as a whole. To ensure sufficient open space is provided within or in close proximity to new developments Council seeks to utilise Clause 52.01, Public Open Space Contribution and Subdivision, (Schedule 1) of the Whittlesea Planning Scheme as effectively as possible.

The municipality contains significant environmental attributes, some of which are protected by regional parks such as Quarry Hills Parkland, Plenty Gorge Parkland, Yan Yean Reservoir Park and Toorourrong Reservoir Park, and they include nationally significant grasslands, stony knoll shrub lands, River Red Gum woodlands and numerous creek corridors, all of which in totality contribute significantly to the distinctive character and amenity of the city.

3.2 OBJECTIVES

To ensure that public open space and streets are of appropriate quality and quantity, are provided in a timely manner and contribute towards the recreational and social needs of the community in appropriate locations the following general principles shall be applied:

- Integrate urban water management functions with public open space;
- Ensure water management functions do not compromise open space which is set aside for recreation purposes;
- Facilitate the provision of land for community facilities for sports clubs and other community use where appropriate, as part of land ceded for public open space as set out in structure plans;
- Ensure adequate land to protect and conserve margins of watercourses, water bodies and wetlands and establish public access where these are adjacent to urban development;

- Provide public open space that is safe and overlooked by nearby buildings to provide passive surveillance;
- Facilitate the provision and development of dedicated public open space to enhance local amenity;
- Ensure that public open space is integrated into the urban structure to produce both land use efficiency and long-term sustainability;
- Provide a practical cash-in-lieu mechanism for open space allocation and improvements, including circumstances where planned open space is subsequently disadvantaged by the provision of drainage or utility services;
- Provide for regional variations best reflecting the requirements and expectations of the local community;

3.3 STREET DESIGN

Whilst there is often a tendency to focus on the open space network as a key component of the public realm it is the City of Whittlesea's view that streets are arguably the most important component of the public realm and contribute substantially to the creation of a sense of space. People interact with streets everyday whether as pedestrians, cyclists or vehicular passengers. Streetscapes are the product of the relationship between the surrounding built form / architecture, landscaping, footpaths, nature strips and road pavement. It is within streetscapes that the disciplines of urban design, architecture, engineering design and landscape design intersect and it is how these elements are brought together that strongly defines the character of an area.

As a starting point a **detailed site analysis** highlighting unique topographical, environmental or locational attributes of the site should be undertaken to inform the design response.

The design response should also consider the following issues that affect the streetscape:

Built Form/Land Use

- What density is proposed?
- What are the allotment dimensions?
- What setbacks are proposed?
- What housing product is proposed?
- What vehicular / pedestrian access arrangements are proposed?
- Is it within a non-residential area e.g. Town centre / commercial or industrial?

Road Pavement

- What is the function of a road / street?
- What traffic is it accommodating?
- What is the parking typology required? On-street? Off street? Indented bays? One-side only?
- Should it accommodate public transport?

- Should it accommodate on road bicycle lanes?

Nature Strips

- Width to accommodate planting, to soften and / or frame the streetscape, taking into account limited opportunity for landscaping within front setbacks of allotments?
- Width required for accommodating facilities – including parking and / or trunk services?
- Does nature strip (or median) need to accommodate WSUD elements?

Footpath

- Width of footpath required for pedestrian travel and other uses (outdoor dining, seating)?
- Does path form part of shared path network or principal path network?

The above list is not exhaustive and it is important to note that good urban design does not necessarily evolve in a linear fashion but rather all elements contribute to influence the final outcome depending on the specific location / circumstances.

Separate sections of this document will deal with the specific requirements relating to the individual elements that contribute to the creation of a streetscape.

The City of Whittlesea is very conscious that adopting minimal functional standards for every element may result in the roll-out of streetscapes across its growth areas which lack diversity and do not contribute to any unique sense of place. So whilst there is often a focus on individual elements within a cross-section, its impact on the relationship with the broader streetscape should always be considered.

To this end, within the framework of these minimum standards, the City of Whittlesea will encourage the implementation of diverse streetscapes. To assist with encouraging this diversity and sense of place creation, an emphasis will be placed on ensuring that unique topographical, environmental or locational attributes of particular sites are identified via a detailed site analysis as a starting point and design response and implemented through the subdivision design process.

3.4 OPEN SPACE

All open spaces should mesh together to create an interconnected, equitable and diverse network that responds specifically to the site and provides all residents with access to a local park within a short walking distance of their home.

3.4.1 Open Space Network

The key points that influence the provision of the various types of open space are summarised below:

- Good urban design practice advocates a hierarchy of open space, from local play spaces to regional active open space, with local open space accessible to residents by being within 400 metres walking distance of all dwellings;
- The open space should not only connect the various open space types but also intersect with the transport network, activity centres, community and educational facilities to integrate various elements and parts of the LSP/PSP area together;

- The open space should be integrated with the overall development to help instil a sense of place and to highlight the natural qualities of a given location by connecting open spaces along natural linear features where possible;
- The open space should be the building block which defines neighbourhoods and provides a context within which a diversity of housing types and medium density responses can be created;
- Open space should not be backed onto by the rear or sides of lots. Preference is given to streets of any type, paper roads, and other access ways abutting open spaces to provide opportunities for passive surveillance;
- Open space should not be the undevelopable left over land.

3.4.2 Local Active Open Space

The rationale behind the location of local active open space is as follows:

- To co-locate local active recreation reserves with schools and community activity centres to support other community functions;
- To locate active recreation reserves in high profile locations adjacent to and on major road networks to create “green windows” into sites;
- To provide containment and definition to core Neighbourhood Activity Centre areas;
- To provide direct access to reserves from the surrounding arterial road / collector network and minimise disruption and amenity impacts on the local community.

3.4.3 Conservation Open Space

Conservation open space is to be allocated in areas where significant natural and cultural features require protection. These remnant attributes may include significant stands of River Red Gums, threatened plants, Aboriginal scar trees, native grassland, stony knolls, creeks, floodways and wetlands. These open space areas can become part of the broader linear open space network and highlight important historic and cultural remnants of sites.

3.4.4 Neighbourhood Parks

Neighbourhood parks are smaller scale parks with a more “urban” character, usually centrally located within the various neighbourhoods that comprise a LSP/PSP. These parks form the focal point and core of the local community and set the context for medium density housing.

The neighbourhood parks should be designed with the following characteristics:

- Co-located with community facilities, schools and activity centres where appropriate, typically located at prominent locations at the confluence of the connector street network;
- The connector streets should be designed to deflect around the edge of the Neighbourhood Parks in order to direct view lines towards the parks and structures within them;
- Located at the junction of where connector streets converge at different angles, and as such vary in shape and size to respond to these alignments and to create a more regular local street pattern;

- Positioned to create a sense of openness and relief within the neighbourhoods and along the connector streets;
- “Take Home” policy for waste generated in parks.

3.4.5 Linear Open Space Connectors

Linear open spaces along natural features, such as waterways, ridges and stony rises, and in conjunction with infrastructure, such as major road corridors, drainage lines, pipe tracks and transmission lines, form important linking elements for the open space network. They can link different open space elements with bicycle and walking trails as well as providing vital habitat corridors across the municipality.

3.4.6 Pathway Reserves – Pedestrian and Bicycle Paths

Provision shall be made within open space reserves for pedestrian and bicycle paths. Locations shall be chosen to address the objectives of Council’s Open Space and Bicycle Strategies to the satisfaction of Council.

Where pathways are required between two allotments to connect a road and open space the Pathway Reserve width shall provide for both infrastructure and landscape amenity. Where the provision of additional access for postal services and utilities to allotments fronting open space is required a suitable easement or right of way shall be created for this purpose. See also Paper Road and Cul-de-Sac requirements elsewhere in the document.

Where pathways are delivered via a pedestrian bridge or boardwalk structures, located over a major waterway managed by Melbourne Water, approval of the bridge location and concept design must be obtained from Melbourne Water prior to submission to Council.

4 SUBDIVISION APPROVAL PROCESSES

The land subdivision process is depicted, broadly, in Appendix A – “Procedures and Flow Charts”. Prior to preparing a planning permit application, it is necessary to become familiar with any restrictions or requirements of the Whittlesea Planning Scheme such as an approved Precinct Structure Plan or Development Plan and any other relevant endorsed Council policy. Applications made for development in a UGZ with an approved Growth Area Precinct Structure Plan must be generally in accordance with that Precinct Structure Plan and comply with the strategic intent and detailed design outlined in that plan first and foremost.

With applications for a single stage of a subdivision, Council encourages and typically requires the use of a Functional Layout Plan as the subdivision layout plan endorsed under that permit plan. This enables documentation for planning permit applications to provide an appropriate context to the engineering and landscaping design and construction requirements of the estate without revisiting spatial issues after the plan of subdivision is lodged. This process also provides the permit holder greater clarity about what has been approved in accordance with the permit while minimising potential ambiguity about information shown on the endorsed plan that remains subject to further detailed engineering and landscaping assessment.

4.1 COUNCIL CO-ORDINATION

4.1.1 Introduction

Planning, in its broadest sense, requires a holistic approach to the assembly of relevant information and requirements.

The City of Whittlesea has a collaborative approach to the way development applications are processed and decisions are made which requires the involvement of staff members chosen according to the disciplines appropriate for the particular development. During the planning phase these staff members constitute the Planning Approval Team (PAT). For the subsequent approval of infrastructure throughout the design, construction and handover a Construction Approval Team (CAT) is established.

The internal Council methodology in processing and decision making for development proposals is based on sound project management techniques which are used to ensure balanced and fully coordinated outcomes are provided.

4.1.2 Planning Approval Team (PAT) Process

This process is used for review and assessment of planning applications as well as permit layout plans / FLP's for individual stages of a development. Further details are provided in Appendix A3 – FLP Approval and Subdivision Plan Certification Process and Appendix A8 - Functional Layout Plan (FLP) Approval Process.

- Upon a submission, Council will establish a Planning Approval Team (PAT), and undertake a co-ordinated assessment of the submitted documents / plans across it's multiple disciplines.
- A Planner will be nominated as Project Co-Ordinator (PC) and representatives required from other departments will be part of the PAT as appropriate;
- All related correspondence sent to Council will be directed to the PC for PAT attention;

- The referral process will be initiated by the PC and an internal PAT meeting will be organised to undertake a co-ordinated assessment of the application. A single comprehensive response by Council will be provided to the applicant through the PC;
- Approved FLP's will be endorsed by Council, through the PC, in accordance with the requirements of the planning permit.

4.1.3 Construction Approval Team (CAT) Process

Once an FLP is endorsed the subsequent approvals of infrastructure throughout the design, construction and handover processes are managed by a Construction Approval Team (CAT) established for that development.

- A Development (Subdivision) Engineer will be nominated as Engineering Co-ordinator (EC) at the time of the initial submission of an FLP or Engineering Plans. The EC will co-ordinate the assessment of the engineering plans with the CAT and provide single comprehensive response to the applicant. Representatives required from other departments will be part of the CAT as appropriate;
- Once Engineering Plans (Civil and Landscape Works Plans) have been approved the various roles and responsibilities undertaken during construction, maintenance and handover of works will change according to requirements. Council's review and approval system can be seen in this document in Appendix A5 – Engineering Works Construction and Compliance Process and Appendix A7 - Construction Works and Compliance Process.

4.2 PRE-APPLICATION

The City of Whittlesea encourages applicants to hold preliminary consultation with its Growth Area Development Assessment Department, or other relevant Planning Department nominated by Council, prior to preparation of any subdivision permit application. During these discussions information will be provided on the zoning status, including whether a PSP / DP (or other controls) have been approved or require further attention and whether any matters specific to a project require attention.

4.3 PLANNING APPLICATION

All subdivision proposals will require an application for subdivision, except where the planning scheme or PSP or Schedule to Urban Growth Zone provides an exemption.

The information that should be lodged with a planning permit application for subdivision is set out in Clause 56 of the planning scheme. The Precinct Structure Plan or the Schedule to the Urban Growth Zone may modify the information required. Generally the information required will show how the permit application implements the Precinct Structure Plan.

The following documentation requirements for Planning Permit Applications are presented to provide a broad context to the matters included in the document. These issues should be addressed with Council and / or referral authority prior to progressing with any design.

- a) A copy of the title;
- b) A written report including information on:
 - Compliance with strategic and Precinct Structure Plans for the area;
 - The number of lots, including the existing supply and demand for lots;

- Lot size details (preferably in table format) including the range of lot sizes and average lot size details;
 - Existing road and drainage infrastructure;
 - The utility services to be provided and, where applicable a strategy for staging trunk distribution;
 - The adequacy of community services and facilities such as schools, health facilities and shopping centres; and
 - How the subdivision complies with the objectives of Clause 56 and other relevant sections of the Municipal Planning Scheme.
- c) An appropriate permit application plan showing:
- The location of the proposed lots and table of approximate lot areas;
 - The proposed internal road network (including traffic control devices);
 - Public open space (prescribed) and reserves for other purposes;
 - Community facilities (i.e. schools, activity centres, etc.);
 - How the subdivision connects with surrounding streets, regional path network, upstream drainage and open spaces proposed for adjoining estates;
 - The physical attributes of the land and affected adjacent land;
 - The Gross Development Area;
 - The Net Development Area;
 - Any existing and proposed easements;
 - Approximate road reserve widths as per the Traffic Report below;
 - Adjoining roads, including interim and ultimate intersection types at arterial roads;
 - Pedestrian footpath, shared path and cycle path networks;
 - Bus routes;
 - Identification by survey of all native vegetation on or overhanging the site;
 - Details of tree protection zones for trees to be retained and designation of trees proposed for removal recommended in a Native Vegetation Report prepared by a suitably qualified and experienced consultant; (Native Vegetation Report to include species, tree height, tree width, if the tree is planted or remnant, condition, health and structure, DBH, retention value, useful life expectancy).
 - The major drainage system, including large pipes, silt ponds, wetlands and waterways;
 - Overland flow paths for the 100 year ARI;

- Drainage outfall system, interim and ultimate, from the land to defined outlets;
 - Location of works required external to the subdivision, including any access and trunk services identified.
- d) An overall drainage management strategy including any proposed staging of the works and the methodology for satisfying Clause 56.07 of the Municipal Planning Scheme.
- e) A traffic engineering report designating street hierarchy, maximum predicted traffic volumes, traffic management methods, public transport routes, bicycle routes, typical cross section elements and other relevant information.
- f) A traffic plan showing sufficient notional (unmarked) on-street parking spaces, at the rate of one space per lot, traffic control devices and large vehicle turning overlays to show that such vehicles can negotiate bends, laneways, nonstandard intersections and temporary “dead ends” with clearance from parked cars.
- g) Environmental assessment reports (where appropriate) including Native Flora and Fauna (which may also include an existing vegetation survey), Net Gain Offset Plan, Aboriginal and Cultural Heritage studies, and any other investigations required to be undertaken on the site.
- h) Management reports to be prepared for any heritage listed infrastructure (on the CoW Heritage Overlay, Victorian Heritage Inventory and Register) which will be affected by the proposed development works. The report will be referred to Council’s heritage advisor for comment and approval.
- i) An overall utility servicing strategy identifying works relevant and required external to the subdivision and the indicative alignment of major/trunk mains within the proposed street network.
- j) Waste Management Plans.

Dependant on the proposed development, additional information may be required as deemed necessary by Council (eg. Contamination Report).

A planning permit application pursuant to a Precinct Structure Plan must meet the Objectives set out in Clause 56 and should meet the standards of Clause 56, as appropriate. If a development proposal is not generally consistent with a Precinct Structure Plan it is prohibited. Council’s review and approval system can be seen in this document at Appendix A2 - Planning Permit Approval Process.

4.4 FUNCTIONAL LAYOUT PLAN

The City of Whittlesea has adopted a multi-disciplinary approach to delivering sustainable communities. This means there is a different expectation for the role of a Functional Layout Plan to that described in the Metropolitan Planning Authority *Engineering Design and Construction Manual* where the FLP is prepared, after the issue of a planning permit, as a precursor to the submission of Engineering Plans. Council usually requires the FLP to be prepared and endorsed as a first condition of the Planning Permit and in doing so expects urban neighbourhood design aspects, including River Red Gum preservation and landscaping, to be addressed in addition to the predominantly engineering aspects listed in the EDCM.

The procedures followed by Council for the assessment and approval of the FLP are described in Appendix A8 - Functional Layout Plan (FLP) Approval Process and the information required for a submission is described in Appendix B1 – Functional Layout Plan Checklist.

Where the FLP is in accordance with an endorsed permit plan Council will respond to its submission within 21 calendar days of receipt. If additional information or an alteration to the FLP is required the time for consideration and response is suspended until the resubmission is received by Council.

4.5 PLAN OF SUBDIVISION

The City of Whittlesea prefers plans of subdivision to be lodged electronically using the SPEAR process. The plan will not be certified if a functional layout plan for that stage has not been endorsed as required under the planning permit. Council's review and approval system can be seen in this document at Appendix A3 – FLP Approval and Subdivision Plan Certification Process.

Street names must be approved by Council's Subdivision Officer prior to the plan of subdivision being submitted. Street numbering will be issued by Council's Subdivision Officer prior to certification of the plan.

4.6 ENGINEERING PLANS

4.6.1 Civil Works Plans (Internal Subdivision Works)

The requirement for construction of works in accordance with approved engineering plans will be detailed in the planning permit as appropriate for the type of development proposed.

Submissions for the development of subdivisions in the City of Whittlesea shall follow the requirements contained in the EDCM, Section 6 – Engineering Design Plans and any other procedural requirements in the permit.

Attention is drawn to the flow chart at Figure 2 of the EDCM (Clause 6.6) which indicates that the submission of engineering plans shall follow the acceptance by Council of the plan of subdivision. This is usually reinforced by the planning permit condition and Council will not accept any submission pursuant to the Subdivision Act prior to any prerequisites having been met.

In accordance with the EDCM, Clause 6.8.3 – Limitation of Approval Life Engineering Plan, approval shall lapse if the permanent works on these plans have not commenced within 12 months of the date of approval. Where design / construction standards have changed or come into effect prior to the anniversary of plan approval, to the extent that revisions to the plans are necessary, Council will charge a further plan checking fee for the reconsideration of lapsed approvals. This fee will be commensurate with the extent of re-checking involved.

4.6.2 Signalised Intersections

Council process for submission and approval of signalised intersections on Council roads is described in Appendix A9 – Approval and Delivery Process for Signalised Intersections on Council Roads (Council to Council Road Intersections).

For approval processes related to intersections on declared arterial roads refer to VicRoads for advice. It is noted that Council review and acceptance of intersection design is required for all intersection works proposed within City of Whittlesea prior to VicRoads approval of the design.

Therefore, all intersection functional layouts and design submissions, including any consequent revisions, must be forwarded to both Council and VicRoads for comments.

4.6.3 Melbourne Water Drainage Scheme Works

Pipe drains and associated works provided under Melbourne Water Drainage Services Schemes (DSS) which are to be handed over to Council after Melbourne Water processes are satisfactorily completed may be incorporated into Engineering Plans prepared for Council roads and drains provided DSS extent is shown. Main drains and other infrastructure remaining under Melbourne Water responsibility, prepared on separate drawings, must also be submitted to Council for comment.

For submission requirements for all drainage works refer to this document, Section 13.13 – Drawing Submissions.

4.7 LANDSCAPE WORKS PLANS

Landscaping requirements will be detailed in the planning permit as appropriate for the type of development proposed.

Standard procedures for a Landscape Master Plan and Stage Landscape Works Plans for subdivisions can be summarised as follows:

- A fee of 0.75% will be charged for plan checking and a fee of 2.5% for surveillance based on the estimated landscape project cost as per the *Subdivision Act 1988* and *Subdivision Fees Interim Regulations 2012*;
- Before the approval of any civil works plans a Landscape Master Plan for the entire subdivision must be submitted to and approved by the responsible authority;
- Before the approval of civil works plans for each stage a draft Stage Landscape Plan must be submitted for comparison against the civil works plans;
- The final Stage Landscape Plan must be submitted to and approved by the responsible authority prior to Statement of Compliance and prior to commencement of construction. The plan will be endorsed and will then form part of the permit.

For other forms of development not involving subdivision Council provides Landscape Guidelines on its web site for the following:

- Industrial Developments;
- Medium Density Housing Developments, and
- Non-Residential Developments.

4.8 CONSTRUCTION PROCESS

The processes associated with the construction of works for subdivisions shall be in accordance with the framework and procedures contained in the EDCM, Part B, Section 9.4.1 and Part D, Construction Section 17-25. Council's system for surveillance and approvals can be seen in this document at Appendix A5 – Engineering Works – Construction and Compliance Process and particular milestones are described in Appendix A7 – Construction Works and Compliance Process.

4.8.1 Civil Works Construction

Council, as the responsible authority under the planning permit, wishes to co-ordinate all site activity associated with a subdivision and will not permit any construction activity on a development property during the period of approvals assessment unless such activity is specifically allowed in a permit condition and by the Subdivision Act. Works for other authorities acting independently of Council are not exempted.

Requests for a pre-commencement meeting can be made by contacting the CAT Engineering Co-ordinator for the development directly.

Other requirements for construction in the City of Whittlesea include:-

- A mandatory requirement for all wearing course asphalt to be deferred (with the provision of security) for a period of 12 months after practical completion of the road works;
- The specifications for preparation and planting out of the vegetative elements of Water Sensitive Urban Design (WSUD), such as rain gardens, bio-retention swales, wetlands, etc., will be the same as those used for landscaping;
- All “soft engineering” associated with WSUD may have a different Practical Completion date to other works (see Section 4.9.1 below).

4.8.2 Landscape Works Construction

The construction framework and processes that apply to construction and maintenance of landscaping approved for subdivision development are managed by the City of Whittlesea Parks and Open Space Department.

Requirements for landscape construction in the City of Whittlesea include:-

- No landscape works shall commence on site prior to the endorsement of the Stage Landscape Plans;
- A landscape pre-commencement meeting shall be arranged with Council’s Subdivisions Landscape Surveillance Officer at least five (5) working days prior to the commencement of landscape works;
- A copy of the stamped approved landscape plans must be presented by the applicant or representative at the pre-commencement meeting for verification by Council;
- If the landscape works occur after Statement of Compliance, a copy of the Road Opening Permit and associated Traffic Management Plan must be presented by the applicant or representative at the pre-commencement meeting or prior to works commencing on site;
- Hold points are to be nominated at the landscape pre-commencement meeting to enable Council to inspect all concealed works;
- The applicant or representative shall create a dilapidation report documenting the condition of hard and soft assets within and immediately surrounding the site prior to works commencing.

4.9 STATEMENT OF COMPLIANCE AND MAINTENANCE PERIOD

The City of Whittlesea will only issue a Statement of Compliance (SoC) when:-

- Planning Permit conditions applicable to SoC have been satisfied;
- Practical Completion of Engineering Works and an agreement, with security, for any uncompleted works is in place;
- Agreement, with security, is in place for landscape works and maintenance;
- Landscape works shall be bonded at 150% of the agreed estimated cost of outstanding streetscape / landscape construction plus an agreed amount for the maintenance works (typically 20% of the construction cost). A works program is to be provided setting out the timing of all outstanding landscape works. Works must commence within 3 months of issue of Statement of Compliance for the given stage of the subdivision and must be completed prior to occupancy of any new dwellings within the given stage.-

4.9.1 Civil Works

The determination of the date for commencement of Defects Liability is “the date of issue to Council of the title(s) for roads created on the Plan of subdivision ...or on Practical Completion of (all) works ...whichever is the later”.

- All works on the civil engineering plans, except for any Water Sensitive Urban Design (WSUD) elements which are the subject of separate agreement, are considered by Council to be a single requirement irrespective of the number of contractors engaged to carry out the works.
- WSUD facilities which may be subject to damage by building activity once a Statement of Compliance has been issued shall be fully protected until the risk of damage has passed.
- When protection of “soft engineering” associated with WSUD is not feasible consideration shall be given to the works being deferred with the provision of security (as for any uncompleted works).
- All components of WSUD facilities, such as civil works, earthworks, bio-mass and vegetation for rain gardens, bio-retention swales, wetlands, etc., shall be maintained for an extended period which includes two full summers plus 3 months and ends on the following 31st May (see document sections 6.2.2 – Maintenance of WSUD Elements and 13.12.3 – Operation of WSUD Elements).
- If Council agrees to bonding of unfinished roadworks, the Defects Liability Period for the whole of the work will not commence until all parts of the required construction are completed to Council’s satisfaction (see document Section 15.5 – Uncompleted Works Bond).

4.9.2 Landscape Works

- Upon completion of the construction of landscape works, the applicant or representative must notify Council’s Landscape Surveillance Officer to enable inspection of the works.

- Subject to satisfactory completion of the landscaping in accordance with the endorsed plan, and relevant Certificates of Compliance being supplied to Council for works (e.g. electrical, water, structural, etc.), a Certificate of Practical Completion for landscaping will be issued, triggering the commencement of the maintenance period.
- All landscaping (except for grass in nature strips of streets abutting private property) shown on the approved stage Landscape Works Plans must be maintained to the satisfaction of Council's Subdivisions Landscape Surveillance Officer for a minimum period ending on 31st May falling after the expiry of 18 months from the date of issue of a Certificate of Practical Completion for landscaping (colloquially known as "two summers maintenance").

To ensure all assets, as identified in the approved stage landscape plans, are retained in a safe and functional state, which will prolong the life of the asset, landscape works shall be maintained in accordance with Council's "*Minimum Landscape Maintenance Specification of Services and Works (May 2010)*". Rectification works must not be deferred until the completion of the maintenance period.

4.10 END OF MAINTENANCE PERIOD AND HANDOVER

4.10.1 Civil Works

During the Defects Liability Period for subdivision roadwork it is the practice of the City of Whittlesea to undertake the usual municipal maintenance of hard infrastructure and to conduct building control activities under local laws.

The Final Inspection, undertaken by Council staff at the end of the Defects Liability Period, will therefore apply only to omissions and defects related to original construction of the works.

4.10.2 Landscape Works

Upon satisfactory completion of the maintenance period for street tree planting and all other landscape works, the developer must notify Council's Landscape Surveillance Officer to undertake an inspection prior to the issue of the Certificate of Final Completion.

5 SUBDIVISION LAYOUT

Subdivision Layout should be seen as more than the division of land into parcels for development. It should be seen as the creation of diverse and interesting places for future residents to live work and play whilst at the same time facilitating the provision of sustainable built form.

5.1 OBJECTIVES

Individual layouts shall conform to the relevant Council and / or Metropolitan Planning Authority Precinct Structure Plan (PSP) for the area. Should no such plan be available for a particular location, the applicant should liaise with the relevant Council officers to determine the most suitable response. All disciplines involved with preparing the permit application plan should be fully aware of the engineering requirements for the various types of roads, and ensure that the road locations proposed are satisfactory. When this is not the case, major alterations to the subdivision layout may be necessary at the Functional Layout Plan stage to enable engineering criteria to be fulfilled. Topographical and environmental information should be available; to enable an accurate assessment of the suitability of the proposed road locations and the manner in which major drainage and utilities will be accommodated within the road reserve.

The layout of subdivision elements such as roads, streets and reserves requires consideration of the following factors:

- Intended character of the neighbourhood;
- Type of residential development;
- Location and interrelationship of schools, shops and open space;
- Hierarchy of roads;
- Ingress and egress from the subdivision;
- Permeability;
- Lot orientation optimised for solar access, for the majority of dwellings;
- Public transport system and routing;
- Conveyance of flood flows and flood prone land;
- Treatment of stormwater flows;
- Nature of the terrain;
- Environmental factors, specifically flora and fauna;
- Heritage elements;
- Special infrastructure requirements; and
- Costs of works.

Achieving the overall objectives of the PSP / DP will also involve consideration of elements discussed elsewhere in this document. Attention is therefore drawn to sections of the document on Lot Density and Diversity, Early Provision of Community Facilities and Open Space and the Public Realm, because there may be implications for the provision of basic infrastructure that should be taken into account at an early stage.

5.2 FUNCTIONAL LAYOUT PLAN (FLP) - DESIGN & PREPARATION

Council seeks to achieve a computed plan of subdivision which meets urban planning objectives and accommodates, without compromise, the entire civil and landscaping infrastructure required. This is achieved through the preparation and review of a Functional Layout Plan (FLP) as a precursor to lodging the plan of subdivision and the submission of civil works and landscaping works plans.

The FLP shows lot details, typical street cross sections, including provision for street trees, and any engineering planning element, which may influence either the dimensions of the computed plan of subdivision, the functionality of civil infrastructure, the achievement of an acceptable landscaped area or the preservation of prescribed features, for the site.

Basic requirements for the preparation and submission of FLP's are contained in the Metropolitan Planning Authority *Engineering Design and Construction Manual* (EDCM) (Section 5 - Functional layout Plans). In the determination of spatial requirements for the above matters Council standards shall be used without variation unless written approval for a concession is obtained. In the absence of specific information from Council's published guidelines, checklists or standard specifications the relevant authority design standards shall apply.

When a planning permit requires the approval of a Functional Layout Plan (FLP) for any stage of a subdivision the submitted layout shall have no force or effect until it is endorsed as part of the permit.

Once the FLP is endorsed the subdivision layout becomes fixed and the infrastructure shown is expected to be provided. However, the approved FLP is not a definitive statement by Council of all construction requirements. Approval does not provide consent to the omission of infrastructure that is not shown on the FLP nor can it be acceptance of items that are incidental to fixing dimensions on the plan of subdivision or drawn only for the purpose of clarity.

5.2.1 Content

The FLP shall outline the plan of subdivision and associated infrastructure planning for the site by defining the civil infrastructure and landscape areas as necessary. FLP requirements are as follows:

- A fully dimensioned subdivision layout, including proposed street names, lot areas, lot numbers and widths of street reservations;
- Topography and existing features, including contours for the subject land and any affected adjacent land, water bodies, land subject to inundation, vegetation and structures of historic, heritage or cultural significance;
- Identification by survey of all trees (or groups of trees) existing on the site, including dead trees and those on adjoining land that have a tree protection zone (TPZ) encroaching onto the site;
- Details of tree protection zones (TPZs), for all trees to be retained, designed in accordance with the City of Whittlesea tree protection zone guidelines;
- A landscape concept showing trees proposed for removal clearly designated, the footpath network, vehicle exclusion mechanisms, electrical kiosk screening and any significant landscape structures proposed;

- Typical cross-sections for each street type, dimensioning individual elements, services offsets, street tree offsets and any other spatial requirements identified in the Development Plan (e.g. medians, bus lanes, on-road bicycle lanes, shared paths, large drains, Water Sensitive Urban Design (WSUD) elements, distribution / trunk service mains, VicRoads clear zones if relevant, etc.);
- Location and alignment of kerbs, indented parking spaces, footpaths, shared paths, bus stops and traffic controls (signals, roundabouts, splitter islands, slow points, etc.);
- The proposed minor drainage network and any special features requiring access (e.g. structures; gross pollutant traps, swales and rain gardens) which will have a significant spatial impact on the plan of subdivision;
- The major drainage system, including any water course, lake, wetland, silt pond and / or piped elements showing preliminary sizing (from Melbourne Water Drainage Scheme details, etc.);
- Overland flow paths (100 year ARI), supported with sufficient preliminary data to indicate how excess runoff will be safely conveyed to its destination;
- Drainage outfall system (both interim and ultimate), indicating legal point of discharge and any access requirements for construction and maintenance;
- A table of offsets for all utility services (sewer, water, recycled water system, gas, electricity, public lighting poles, telecommunications) and street trees;
- Preliminary location of reserves for electrical kiosks (when choosing suitable locations refer to the criteria in this document at Section 8.5.1 – Electrical Substation Kiosks);
- Traffic management plan showing sufficient notional (unmarked) on-street parking spaces, at the rate of one space per lot, traffic control devices and large vehicle turning overlays to show that such vehicles can negotiate bends, laneways, non-standard intersections and temporary “dead ends” with clearance from parked cars; and
- The submission of an FLP for any stage of a subdivision for endorsement in accordance with a permit shall include a copy of Council’s “Functional Layout Plan Checklist” (see Appendix B1).

5.2.2 Specific Sites

Sites that are not adjacent to existing or approved infrastructure will be required to provide the following information in addition to the above standard requirements:-

- Locality Plan or Development Plan indicating the relationship between the subject subdivision stage and surrounding land;
- Proposed linkages to future streets, open space, regional path network and upstream drainage;
- Works external to the subdivision, including both interim and ultimate access requirements;
- Intersections with VicRoads declared roads or arterial roads showing interim and ultimate treatments; and
- Drainage and sewerage outfalls, including any easements required over other property.

5.2.3 Retention and Protection of Existing Trees

In addition to their heritage and environmental attributes, remnant and existing trees contribute significantly to the landscape amenity of an area and provide instant visual impact in new developments. Where possible, existing trees shall be retained, protected and incorporated into the design of new developments. The retention of juvenile trees is considered equally as important as the preservation of mature specimens.

The requirements of Clause 56, Residential Subdivision, of the Whittlesea Planning Scheme shall apply for site analysis and retention of significant vegetation. Trees identified for preservation shall be prescribed with a “Tree Protection Zone” (TPZ).

TPZ’s are exclusion zones designed to protect all trees and stags identified for retention in a development. The need for TPZ’s shall be minimised by planning for avoidance and any TPZ advantage shall not be applicable for the purpose of justifying tree retention within private lots.

For details of the formula used by Council to determine the appropriate TPZ dimensions see “City of Whittlesea River Red Gum Protection Policy” and “TPZ Diagrams” referred to in Appendix C2 Standard Drawings – Landscape Details (SLD.2 Text – Retention and Protection of Existing Trees).

No works are to be undertaken within tree protection zones. Encroachment into TPZ’s, for “no-dig” footpaths and under boring for the provision of services / utilities may be acceptable to Council subject to proof of feasibility.

5.2.4 Fences Adjoining Reserves

All property boundary fencing adjoining reserves, for any given stage, including walkway extensions of road reserves but otherwise excluding road reserves, shall be erected by the developer (or land owner) at no cost to Council.

5.3 TYPICAL CROSS SECTIONS

Within the framework established by the Precinct Structure Plan, including the appropriate cross sections, for any particular neighbourhood there will be a need to develop specific streetscapes for individual developments.

Council will assess the merits of proposed streetscapes, among other things, on the basis of how well the objectives of its “Key Guiding Principles” have been met and whether the street cross sections proposed, adequately fulfil the spatial requirements of each design element within them.

The FLP shall contain cross sections for each street that are based upon “Road Elements” provided in the EDCM and reproduced in this document at Section 7.4 – Street Types.

5.4 OTHER ELEMENTS

5.4.1 Splays and Arcs

Considerations which assist in the determination of the provision of splays or arcs are as follows:

- Achieving sight distance along roads as a function of vehicle speed / classification / use to maximize safety to public / cyclists / traffic;
- Sight distance for pedestrians;
- Stop and Give-way Statcon warrants;
- Accommodation of geometrical provision of the road pavement and verge infrastructure and allocation dictated by the relevant turning template PLUS kerb, nature strip, and footpath dimensions;
- Approach pavements relative vertical and horizontal geometry;
- Achieving spatial allocation for major service provision around corners;
- Scale of pavement within reservation and road/s hierarchy;
- Nature strip width (symmetrical or offset pavement within reservations);
- Likely fence heights;
- Streetscape objectives and / or consistency.

Whilst splays are a mandatory Council requirement, in some instances (such as where a very wide road verge exists on leg side of Tee or a very wide reserve width for a symmetrical pavement is proposed) it may be possible to justify no splay at all.

As a guide however, the following splay dimensions (minimum at perpendicular legs) are to be specified and / or shown by the surveyor on Plans of Subdivision:-

- 3metres x 3metres at residential street intersections; and
- 2metres x 2metres at laneway entrances.

5.4.2 Drainage Reserves

As mentioned elsewhere in this document drainage reserves may be required for multiple purposes, such as shared pathways, vegetation preservation and WSUD treatment as well as stormwater conveyance and flood protection.

Very often the minimum waterway requirements of Melbourne Water must be provided in addition to the space for these other uses. The FLP shall show the intended uses and spatial requirements for each.

Refer to other sections of the document, including Section 7.3.3 - Shared Paths and Section 9.3.5 – Drainage – Major Systems in Open Space.

5.4.3 Arterial Road Intersections

The provision of land for arterial roads may not always be shown on the planning scheme as a road widening or proposed realignment. Irrespective of the statutory processes involved for land acquisition by VicRoads (or Council) the FLP for any subdivision abutting an existing arterial road shall include typical cross sections and a functional layout for both the current access proposal(s) and the ultimate (long term planning) arrangement(s).

The intersection functional layouts of “ultimate” road planning proposals are primarily for the purpose of determining road reservation requirements on a plan of subdivision and locating, where possible, initial infrastructure to best suit future improvement works. Determination of the timing and financial responsibility for the future works will be a separate process.

For details of design approval processes see the Road Types and Design Criteria Section of this document, including 7.5.4 – Signalised Intersections and 7.5.5 – Road Connections to VicRoads Assets.

5.4.4 Outfall Drainage Provision

Development that is “out of sequence” from a drainage perspective may require works downstream of the initial stage or even beyond the limits of a developer’s land holding. In all such circumstances the FLP shall provide sufficient detail to satisfy Council that those works, either temporary or permanent, can be contained within easements or reserves which will be suitable for the purpose, including access for future maintenance.

6 INTEGRATED WATER MANAGEMENT

An integrated approach to urban water management is the fundamental objective of Water Sensitive Urban Design. Such an approach regards water as a resource rather than a problem and takes into account all aspects of stormwater within a development, including social, cultural, economic and environmental considerations. The City of Whittlesea therefore places significant emphasis upon the benefits of a distributed WSUD system across all new development.

6.1 GENERAL PRINCIPLES

The guiding principles of Water Sensitive Urban Design (WSUD) in the *Australian Runoff Quality – A Guide to Water Sensitive Urban Design (Engineers Australia 2006)* are centred on achieving integrated water cycle management solutions for new urban areas and urban renewal developments linked to an Ecologically Sustainable Development (ESD) focus that is directed at environmental protection of receiving waters and water harvesting catchments for urban areas.

WSUD aims to bring consideration of the water environment and its management opportunities into infrastructure service design at the earliest stage of the decision making process associated with urban planning and neighbourhood design. The application of this approach can occur at a range of scales from strategic city planning down to individual dwelling systems and each requires the support of non-structural techniques such as education, awareness and enforcement measures.

WSUD also supports the integration of elements associated with the three urban water streams through objectives which include:-

- Reducing potable water demand through water efficient appliances, rainwater and grey water reuse;
- Minimising wastewater generation and treating wastewater to a standard suitable for reuse or release to receiving waters;
- Treating urban stormwater to meet water quality objectives for reuse or discharge to surface waters;
- Preserving the natural hydrological regime of catchments.

The increased magnitude and frequency of storm flows from catchment urbanisation can lead to significant changes in the morphology of streams leading to the degradation of aquatic habitats. Urban Stormwater Management is as much about protecting and enhancing environmental values and improving urban amenity as it is about flood protection.

It is important that economic considerations of integrated water management objectives are based upon the holistic assessment of the costs and benefits of options that take into account the inter-relationships at play. They should not be limited to monetary values alone but include social and environmental outcomes through life cycle costing of urban water infrastructure and fair comparison that includes all the impacts of externalities.

6.1.1 Incorporating Best Practice

Beneficial water management outcomes call for a more considered approach to the integration of land and water planning at all levels in the urban development process from strategic planning to site concepts and detailed design.

Fundamental to the philosophy of WSUD is the integrated adoption of Best Planning Practice (BPP) and Best Management Practice (BMP). In this context BPP refers to the site assessment, planning and design component of WSUD and is defined as the best practical approach for achieving water resource management objectives in an urban situation. BMP refers to the structural and non-structural elements that achieve the treatment train functions of a water management scheme.

The intense concentration of human activity in urban areas leads to changes in both the quantity and quality of runoff that eventually reaches our streams, lakes, wetlands, estuaries and coasts. The increasing use of impervious surfaces designed to provide smooth and direct pathways for stormwater run-off, has led to greater runoff volumes and flow velocities in urban waterways. Unmanaged, these changes in the quantity and quality of stormwater can result in considerable damage to the environment.

Improved environmental performance is needed to ensure that the environmental values and beneficial uses of receiving waters are sustained or enhanced. The publication *Urban Stormwater - Best-Practice Environmental Management Guidelines, Victorian Stormwater Committee (CSIRO Publishing, 1999)*, is an important reference document that was designed to meet the needs of people involved in the planning, design and management of urban land uses or stormwater drainage systems. It provides results from collaboration between State government agencies, local government and leading research institutions.

The major gains from WSUD are expected to come from widespread integration of readily available technologies into urban development disciplines together with moderate improvement in the efficiency of water management measures available.

As the technology improves Council will continue to be responsive to the application of “best practice” standards as they emerge, particularly in the following key areas:

- Environmental performance objectives;
- Stormwater management planning;
- Land use planning;
- Water Sensitive Urban Design (WSUD);
- Construction site management;
- Business surveys;
- Education and awareness;
- Enforcement;
- Structural treatment measures;
- Flow management.

6.1.2 Water Conservation

Consideration of water conservation, including matters such as minimising water usage, preserving and enhancing natural wetland values and facilitating conservation of stormwater is a part of early neighbourhood planning. These aspects will usually be addressed during the preparation of Precinct Structure Plans. Council may require additional information such as an urban water management strategy, drainage nutrient management plan and wetland management plan, incorporating drainage water quality, as a means of addressing the impact of a development on water and environmental resources.

Council supports the adoption of water efficiency measures which can be achieved in subdivisions and other urban development by:

- Stormwater harvesting for Council re-use in local parks and sporting precincts;
- aquifer recharge for localised use;
- reducing irrigation requirements; and
- recycling of wastewater (“third pipe” system).

When the developer is involved in dwelling construction or house and land packages the following solutions may also be considered at the lot level:

- water efficient fixtures and appliances;
- waste water re-use systems;
- rainwater tanks; and
- innovative landscaping practices.

6.2 WATER SENSITIVE URBAN DESIGN (WSUD)

6.2.1 Council Policy and Expectations

- WSUD is mandatory for all new development in the City of Whittlesea and a “whole of project” approach to WSUD shall be adopted from the earliest phase of an application;
- That Council be involved in all stages of development of major (Melbourne Water) and minor (Council) wetlands;
- The design of WSUD elements shall be in accordance with: Melbourne Water’s *WSUD Engineering Procedures: Stormwater* and the *Design, Construction and Maintenance of WSUD including the City of Whittlesea Addendum (Jan 2011) – Appendix F*;
- Bio-retention swales are encouraged and are permitted in residential nature-strips provided the width of road reservation is suitable for utility services, street trees, rubbish bin collection and passenger access to parked vehicles. Refer to example cross sections in the document, Section 7.4, Street Types;
- WSUD works in public parks are considered to be drainage infrastructure and not public open space, and must not compromise the function of that open space;
- Council’s standards for construction, maintenance and hand-over procedures will be applicable;

- Vegetation and landscaping shall be planted / constructed and maintained to Council Standards (Parks & Open Space Department specifications).

6.2.2 Maintenance of WSUD Elements

- WSUD elements are first and foremost drainage infrastructure, which is to be constructed and handed over to Council after separable defects liability periods appropriate to the type of installed element (e.g. civil works, earthworks, bio-mass or vegetation);
- The developer shall be responsible for maintenance and protection of all WSUD elements and shall re-set any degraded elements after the defects liability period. A Certificate of Compliance will be issued after resetting is established;
- Wetland elements must be located for ease of maintenance equipment access and operation;
- Access to wetland elements for maintenance shall be based upon the preferred use of suitable smaller excavation equipment;
- Inaccessible locations shall be avoided. Locations under power lines shall be subject to a specific maintenance operation plan to ensure regular maintenance can be carried out with equipment that can operate with safe clearance conditions;
- Details of “Council Specific” maintenance requirements are provided in Table A-3 of the City of Whittlesea addendum to Melbourne Water’s publication “*Design, Construction and Maintenance of WSUD*” (refer Appendix F).

6.2.3 Gross Pollutant Traps

The City of Whittlesea addendum to Melbourne Water’s publication “*Design, Construction and Maintenance of WSUD*” sets out the Council’s requirement for the use of Gross Pollutant Traps (GPT’s) as follows:

- Council requires GPT’s to operate with an outlet that is not submerged and hence suitable for cleaning by truck mounted suction method; and
- An adjacent hard stand area and all weather access for this method of maintenance is required.

For detailed design criteria refer to the document Section 13.12.5 - Gross Pollutant Traps.

7 MOVEMENT NETWORK, ROADS & TRANSPORT

The movement network is a vital element in the design of new neighbourhoods not only for the efficient movement of people, goods and services. The design and layout of infrastructure which supports the movement networks from rail to roads to regional and local pedestrian path and cycle links gives the urban form its underlying structure.

This section of the document sets out the requirements for a standard set of street types and traffic management treatments that satisfy Traditional Neighbourhood Design (TND) objectives. Requirements for public transport, pedestrian and bicycle networks are also included.

7.1 GENERAL

The City of Whittlesea believes that road design must utilise a multi-disciplinary and multi-user approach to create complete streets rather than just “roads”. It has been demonstrated that urban design and the form of streetscape development does influence road user behaviour. A varying, active and attractive road side, with proximity of kerbside parking, can moderate vehicle speed and driver behaviour in terms of acceleration, braking and lane changing. This is a distinct improvement over restrictive methods of control which can increase the level of road user conflict and ultimately, if prolonged, aggression.

An attractive and safe environment, using wide nature strips, tree plantings, attractive built form with active frontages and access spaces in between, can also significantly assist in increasing cyclist and pedestrian activity.

Each land use structure plan will be formed with strategic planning and transport principles in mind that will enable plans to present a development structure which includes:

- Higher density residential development to increase the population within the walkable catchment area of proposed employment, recreational and town centre activities;
- A series of east-west and north-south connector streets at a spacing of around 400 metres within a larger grid of arterial roads based on the old, but well proven, one mile (or 1.6km) spacing;
- Streetscapes accommodating landscape, cyclist facilities and pedestrians within all street types whilst achieving provision for the different road functions, access and varying setbacks;
- Arterial roads and connector streets of appropriate form to accommodate bus services and bus stops whilst providing the appropriate level of access management;
- High quality transport interchanges (hubs) for convenient mode transfers;
- A fine “grained” on and off-road pedestrian / cyclist network to enhance accessibility, social, health and environmental benefits; and
- A grid capable of being “truncated” to allow for variability due to local topography, preservation of significant vegetation, watercourses and other barriers;
- Land banks (reservations) to preserve the future option for high speed / high capacity train services for peak periods and high demand corridors.

The elements described above are inherent in the Traditional Neighbourhood Design approach used by the City of Whittlesea. This promotes several major improvements over conventional suburban curvilinear street systems, including the following characteristics:

- The street system is highly interconnected (allowing users to have a choice of routes for the same trip purpose) and aimed at reducing local travel distances, related emissions and energy use;
- Arterial routes generally form the core or spine of neighbourhoods and towns, rather than being located at the edges;
- Use of services roads or other lot layout techniques to enable development to front arterial routes, rather than back fencing;
- Traffic is distributed more evenly than in older curvilinear sub-divisions (where traffic movements were concentrated onto a smaller number of collector roads) through a flatter hierarchy of streets with a consequent reduction of pressure at major intersections;
- Culs-de-Sac become far less frequent and, if used, are connected through to another street by a wide reserve with path, enabling safe pedestrian and bicycle access;
- More streets per unit area of land, but lower cost per lot with greater lot diversity and smaller lots;
- Use of rear laneways in higher density areas;
- Increased on-street parking capacity and supports changes in land use over time;
- Substantially improved pedestrian access and amenity based on development fronting and overlooking footpaths along both sides of the street, for personal safety through surveillance, rather than segregated linear trails;
- Street layout designed using a 'walkability analysis' to ensure efficient walk routes to centres, schools, public transport stops and other key destinations;
- Detailed footpath and street crossing design suited to users with a disability;
- The street network designed to accommodate and facilitate cyclists;
- Parkland and open spaces fronted by streets;
- Streets designed to provide an integral part of a more sustainable urban water / drainage management system;
- Increased use of four-way junctions to facilitate pedestrian / cycle movement and to enhance legibility and development yield;
- Minor cross roads are detailed to control entry speeds and to minimise the need for roundabouts;
- Traffic signal control, rather than roundabouts, is encouraged on major roads to improve safe vehicle access and pedestrian amenity.

7.2 PUBLIC TRANSPORT

Early provision of public transport is a critical factor in establishing user patterns and patronage. The City of Whittlesea has been proactive in promoting the land banking of transport corridors in the growth areas to ensure future provision of transport is not compromised. Neighbourhood design must consider the provision of access to heavy and light rail corridors as well as local bus routes.

The *Public Transport Guidelines for Land Use and Development* should be considered when planning for land use developments. A copy of these guidelines is available at www.transport.vic.gov.au, or can be requested from the Department of Transport (DoT). For large scale developments it is recommended that consultation is held with the Land Use and Planning Team at the DoT prior to submitting a planning permit application.

Detailed design to support use of the public transport service is achieved in both the Precinct Structure Plan and subdivision processes. This requires adoption of the following objectives when planning the street network, activity centres, arterial and connector street design and lot layout.

- Design all urban areas to support increased use of public transport;
- Ensure efficient and convenient public transit routes with major transit stops located where the street network facilitates ready access by pedestrians, cyclists, buses and cars;
- Accommodate a public transport network that is efficient to operate, comfortable to travel on, and with bus stops that are conveniently and safely accessible by foot from most dwellings.

The location of bus stops is an important issue to consider during the design of neighbourhoods. They need to be located in places with good pedestrian access, have clear site lines from nearby buildings, and located at key destinations. In addition, bus stops need to be located where there are safe pedestrian crossings to and from stops. Design detailing of bus stops should make them a feature in the local area, such as providing identity, with seats and shelters where necessary.

However, it should be noted that the DoT has accepted full responsibility for the installation of bus stops and they will be provided, by the DoT, only in conjunction with the commencement of an approved bus service.

This does not remove the need for new streets to be designed, at the time of subdivision, to suit the above objectives. The design of streets for buses should consider the comfort of passengers and the efficiency of the route. In connector streets and many arterials buses will normally stop in the roadway, at extended kerbs, rather than use indents. This ensures that the bus has priority in the traffic and also enables the bus to provide a periodic traffic-calming function.

7.3 MOVEMENT NETWORK OBJECTIVES

To ensure that the function and design of new development is sympathetic to the abutting land use, whilst achieving increased network flexibility and accessibility and matching development priorities, the streets within the grid based network shall be defined by the following objectives:

- The street network should provide acceptable levels of safety and convenience for all users in residential areas, whilst ensuring amenity of a high order;

- Walking, cycling and the use of public transport for access to daily activities shall be facilitated and encouraged through good design and amenity;
- Local streets are designed to minimise the negative effects of through traffic by discouraging traffic travelling long distances from passing through;
- Streets are designed to eliminate the need for local area traffic management devices, such as speed humps;
- Provide a managed network of streets with clear physical distinctions, based on function, legibility, convenience, traffic volume and public amenity, between arterial and local routes;
- Streets, including arterials, shall be designed to support all development that fronts them for most of their length as well as overlooking public open space wherever possible;
- Arterial roads through town centres should be designed to provide for on-street parking and restrict vehicular speeds to a level appropriate for the centre;
- Wherever practicable, railway reservations and electrical transmission line easements shall have contiguous streets along them to provide improved visual amenity and opportunities for activities appropriate for that location;
- A local street (service road) shall be provided parallel to any arterial;
- Establish a movement network which is site-responsive and highly interconnected to provide convenient linkages for local traffic moving to activity centres and local facilities within and between neighbourhoods;
- Local streets shall be laid out to spread traffic so as to keep volumes low whilst maximising interconnection between new and existing communities;
- Provide a movement network which is efficient, affordable, and legible, minimises travel time, supports access to public transport and contributes to limiting energy use;
- The choice of movement direction and alternate routes should be maximised, with all streets, lanes and paths designed for public safety with passive surveillance;
- A network of local streets should be identified and detailed to provide a safe and efficient pedestrian and bike access to schools;
- Industrial strength crossovers in dead-end streets and hammerheads to provide a safe turnaround area for waste collection vehicles.

7.3.1 Bicycle Movement Network

In conjunction with the development of the municipal grid road network Council has developed a “Whittlesea Bicycle Plan” for its municipal wide bicycle network that accommodates the differing needs of commuter cyclists and recreational / occasional cyclists. It includes and takes into account the pedestrian and cycle links contained within previously approved development plans as well as existing components of the State’s Principal Bicycle Network.

Council’s “Whittlesea Bicycle Plan” is being used in the preparation of structure plans. Developers define the next layer of pedestrian / bicycle paths that are to serve their development plan areas and to link into the municipal network. There must obviously be a general consistency between the lower plans and the higher order plan.

Bicycle facilities will be developed both on and off-road and every street is to be considered a bicycle street.

In addition to the functional nature of these links is the inherent importance of the attractiveness of the bicycle links. Links that are wide with gentle slopes, attractively landscaped with good sight lines, have convenient stopping points and frequent directional and route signage and lighting will have a positive impact on the behaviour of pedestrian and bicycle users. This will encourage further usage and foster stronger community ties.

Within this framework Council will provide new neighbourhoods with a safe, convenient and legible bicycle movement network to meet the needs of both experienced and less experienced cyclists, including on-road and off-road routes and in addition make provision for major routes which are suitable for cyclists commuting to and from work.

For further assistance in developing bicycle network designs refer Bicycle Network's "Planning Checklist for Cyclists" on the following link: <https://www.bicyclenetwork.com.au/general/for-government-and-business/3372/>

7.3.2 Pedestrian Movement Network

Provide a safe, convenient and clearly defined movement network for all pedestrians.

Providing a rich and varied pedestrian environment is a critical factor in reducing motorised trips – a key sustainability goal. Encouraging walking will also enhance health benefits to residents. To achieve this, pedestrians must experience high levels of amenity, safety and comfort throughout the urban environment.

To obtain these objectives design considerations shall include the following:

- Design street networks which provide pedestrian interest;
- Provide footpaths that are Continuous Accessible Paths of Travel (defined in Australian/New Zealand Standards 1428.1 and 1428.4.1)
- Provide routes which feature high levels of active and passive surveillance;
- Provide footpaths on both sides of all streets, including courts and other forms of Cul-de-Sac, with the exception of streets with an abuttal to open space containing continuous path links;
- Provide footpath links from subdivisions to join up with the nearest Council footpath(s) via existing roads and / or open space;
- Provide a safe, convenient and legible movement network for pedestrians, principally along the street network, to provide excellent accessibility between residences and safe and efficient access to points of attraction in and beyond the development;
- Design street networks which optimise walkable access to community centres, schools, public transport stops, and other destinations within neighbourhoods;
- Design major routes as arterials with extensive and frequent opportunity for pedestrians to move safely along and across them;
- Design and detail new developments to promote and support walking to daily activities;

- Provide footpaths through parks for recreation purposes wherever practicable, including the provision of crossings over physical barriers, such as creeks, main drains and railway rights-of-way at maximum distance of 400 metres.

7.3.3 Shared Paths

Shared paths are generally provided on one side of connector streets, in place of the standard footpath, for slow moving local connectivity and recreational cyclist use. Where these streets abut open space the environment for pedestrians and cyclists can be enhanced by combining the route with the path network within the open space, provided the principal route is not deviated excessively. In these instances the principal shared path shall be constructed to Council's road works standard even if shown as part of the open space landscape works.

Connector streets, containing shared paths, will invariably pass through zones of high pedestrian use, such as schools, neighbourhood activity centres and town centres. In these locations widened paths shall be for pedestrian use only and provision shall be made for cyclists to dismount or share the road pavement with vehicles.

Shared paths are often located within linear drainage reserves and along waterways. Within these zones project proposals and implementation shall be undertaken in accordance with Melbourne Water's "*Shared Pathways Guidelines*".

7.4 STREET TYPES

The established hierarchy of road types used throughout the document are described by their functional and design requirements as described in the following clauses.

7.4.1 Access Lane

Laneways are generally used for small / narrow lot housing that benefit from rear access for vehicles whilst having another street frontage to provide visitor parking, street trees and services. They may also be used in circumstances where vehicle access from the primary lot frontage is not appropriate such as:

- For medium density housing;
- For retail and / or commercial areas;
- For lots fronting streets with very high peak traffic volumes;
- For development fronting open space; and

For improving the amenity on selected streets (such as increasing on-street parking by reducing the number of vehicle crossings) and to enable regular street tree planting forward of dwellings located on smaller lot size. It is important that lanes be safe pleasant places with sufficient "address" to allow for activity and passive surveillance and not be treated as utilitarian spaces by linking to other streets at both ends and being short and straight, (dog-leg and tightly curved alignments must be avoided).

They shall be established in a location and a form with no requirement for parking or garage setbacks so they are not confused with streets and do not create a more direct through-route alternative for vehicles, cycles or pedestrians than the adjoining street network;

Laneways are ideally suited to serve up to ten lots in a grid based network but they should not be used to solve access issues in locations that have inadequate space.

Laneway design shall meet the following requirements:

- Not be longer than 100metres. A mid-lane link shall be provided once the length between ends exceeds 60metres;
- T and H shaped lanes are not supported;
- Include independently occupied studio units or second storey windows at entries and strategic locations as necessary to facilitate surveillance and activity along the lane;
- Be fully paved between property lines without landscape planting;
- Be detailed to enable easy and safe access into and out of garages, (without using tilt-panel or other doors that open into the lane);
- Provide space for Council's standard waste collection operations, including industrial strength concrete pavement for heavy vehicle access;
- Be designed for 25% of fencing to be semi-transparent whilst ensuring rear yards of properties can be fenced for security;
- Ensure that any rear boundary treatment does not create concealed recesses or provide illegal access opportunities;
- Minimise the use of rear lanes for metered services and other facilities requiring recesses;
- Provide adequate sightlines for both pedestrians and cars at junctions without excessive truncations on corners;
- Lighting is essential to achieve safety at night and should be positioned to minimise areas of darkness whilst avoiding light spill to surrounding residences;
- Ensure sufficient space is available for light poles to be both protected and outside reversing vehicle paths;
- The desirable width to accommodate light poles and rubbish bin collection is 8 metres. The absolute minimum width is 7 metres;
- Access to laneways shall be via heavy duty (industrial) vehicular crossings built in accordance with Council standard drawings.
- Access lane pavement shall be designed and constructed as a concrete pavement in accordance with EDCM Section 11.9 – Rigid Pavement Design. Alternative concrete mix, materials, treatments and/or colours may be used subject to Council approval. Refer Section 7.6.3 for more information.

7.4.2 Service Road

Service Roads are generally Access Places, located adjacent to the outer separator (or verge) of an arterial road, to provide frontage access to the adjacent properties.

Design considerations:

- Service Roads should be designed for one-way traffic;
- Lots fronting the street need to be wide enough to accommodate driveways and on-street parking on the property side;
- The nature strip must be wide enough for tree planting and to accommodate all local services, leaving the outer separator available for trunk and distribution mains.

A service road shall be provided parallel to all arterial frontages. To achieve the objectives and maximise the benefits of Traditional Neighbourhood Development (TND) principles, service road design criteria shall take into account the following:

- One-way service roads must be used unless topographic conditions, street junction spacing or other site constraints require an alternative;
- Service roads shall be linked to the arterial, rather than being reliant upon loops to local access streets;
- Service roads shall be designed to ensure that vehicle entry and exit is safe given the nature of the traffic movement on the arterial (see AustRoads Guide to Traffic Management, Part 6: Intersections);
- Typical cross sections shall provide sufficient space adjacent to the outer separator of the arterial road for landscaping including street trees. All service roads require vehicle exclusion fencing in the outer separator. Two-way service roads require screening for headlight glare. Additional space may be necessary to achieve suitable street tree planting along the outer separator within Council’s road reserve.

7.4.3 Service Road – With Bio-Retention Swale

Design considerations

Where water sensitive urban design includes swales, service road cross sections shall provide sufficient additional space without any encroachment into the outer separator.

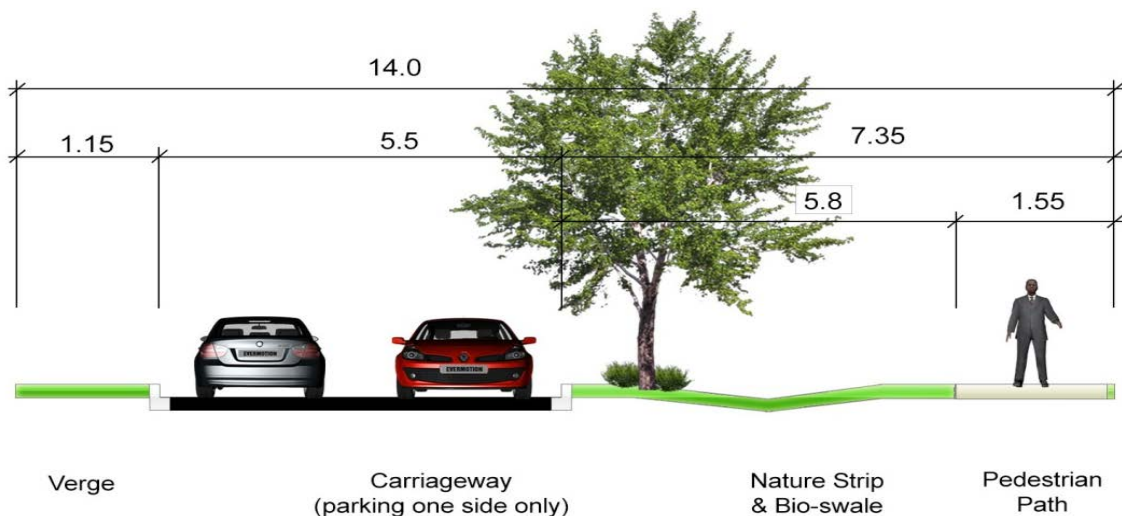


Figure 1 - Demonstration Example – Access Service Road / Local Access (with WSUD bio-swale in Nature strip) 14m <2000 vpd

7.4.4 Culs-de-Sac

Court Bowl and Hammerhead terminations shall be minimised through the application of Traditional Neighbourhood Design solutions. This form of street is supported only where topographic or vegetation considerations or other attribute (i.e. stone wall) limit other design outcomes. No more than 15 per cent of lots in a neighbourhood should be served by Cul-de-Sac.

Where Cul-de-Sac cannot be kept very short, or avoided altogether, they shall be located in through street reservations (as wide as the approaching road reservation) with linking paths for pedestrians and cyclists. This will avoid restricted landscape opportunities, risks from overhanging trees and any safety issues associated with narrow walkways.

Cul-de-Sac shall not be used as a means to depart from normal residential densities and access street design characteristics.

When an approved street network includes a court bowl the dimensions shall be such as to accommodate an unrestricted turning area and standard nature strip (also refer to WorkSafe Victoria reversing vehicle regulations and Council requirements for placement of bins).

For details refer to Section 10.16 - Culs de Sacs and Turning Areas, in the EDCM.

The absolute maximum length of any Cul-de-Sac should be 120metres.

7.4.5 Paper Road

A “Paper Road” is a narrow public road reserve created on a Plan of Subdivision for the purpose of access by pedestrians and cyclists when vehicle access is available from a rear laneway. They are generally located between public open space and the front of residential allotments overlooking public open space and allow for activity and passive surveillance.

Paper roads comprise a 1.5 metre wide concrete footpath offset 50mm from the adjacent residential title boundary and a 2.45 metre wide provision for domestic services and are nominally limited to 4.0 metres in width. They shall be landscaped to ensure an attractive park interface. Additionally, paper roads must be designed to prohibit unauthorised vehicular access whilst controlled access is available for emergency services vehicles and infrastructure maintenance.

Design considerations

- Fences fronting paper roads should either be less than 1200 mm in height or at least 50% transparent;
- Paper roads should not interfere with Tree Protection Zones;
- Paper road should run continuously between two access points of the road network;
- Provision of a paper road must be deducted from developable land and cannot be deducted from the public open space area;
- Enable pedestrian access to the front of dwellings within an acceptable walking distance of visitor parking;
- Enable pedestrian access between private land and public open space where local laws otherwise prevent direct access between a private lot and public open space;

- Provide emergency and postal access to the front of dwellings (street name sign must be provided);
- Provide adequate provision for domestic services;
- Public lighting poles / cables are not to be installed inside paper roads but shall be erected on adjacent open space to Council requirements (see Sections 8.5.5 and 8.5.6 – Lighting for Paper Roads).

7.4.6 Access Streets

Access Streets provide the direct access required for residential, commercial, industrial and farming properties where traffic volumes are relatively lower than Link and Collector Roads and direct access is the primary function of the road.

Design considerations

- Access Streets should prioritise use by pedestrians and cyclists;
- Where smaller lots front the street the design of the street can become an extension of the usable open space and the design can enhance the amenity of those lots;
- Dwellings on corners should address both frontages;
- Nature-strip width shall be minimum 2.5m between back of kerb and edge of path to accommodate tree planting but wider nature-strips are encouraged to accommodate larger trees.

Access Street – Level 1

Street providing local residential access where traffic is subservient, speed and volume are low and pedestrian movements are a priority.

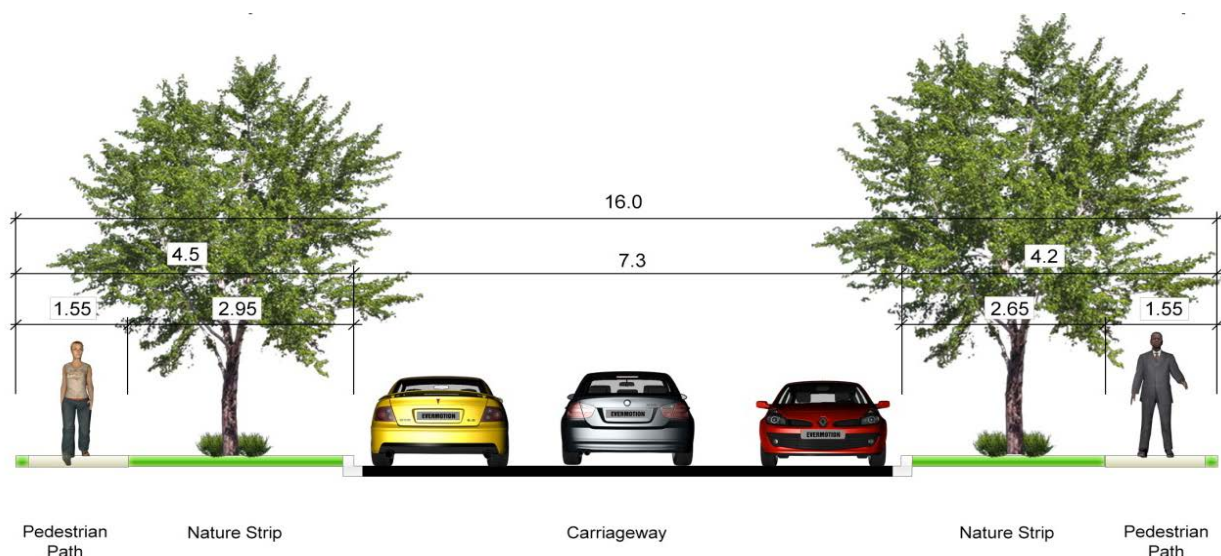


Figure 2 - Demonstration Example – Access Place / Access Street Level 16m <2000 vpd

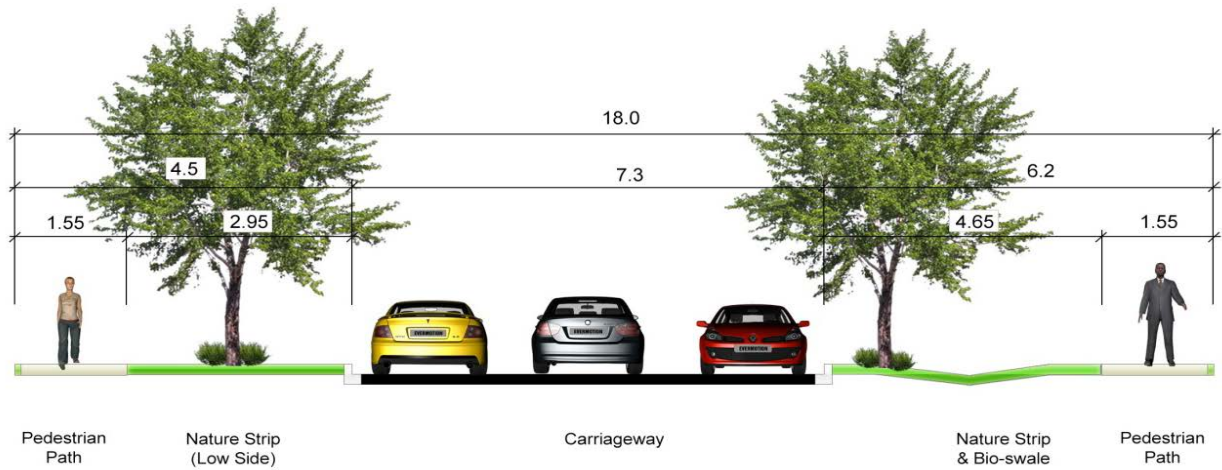


Figure 3 - Demonstration Example – Access Place / Access Street Level 1 (with bio-swale in Nature strip) 18m <2000 vpd

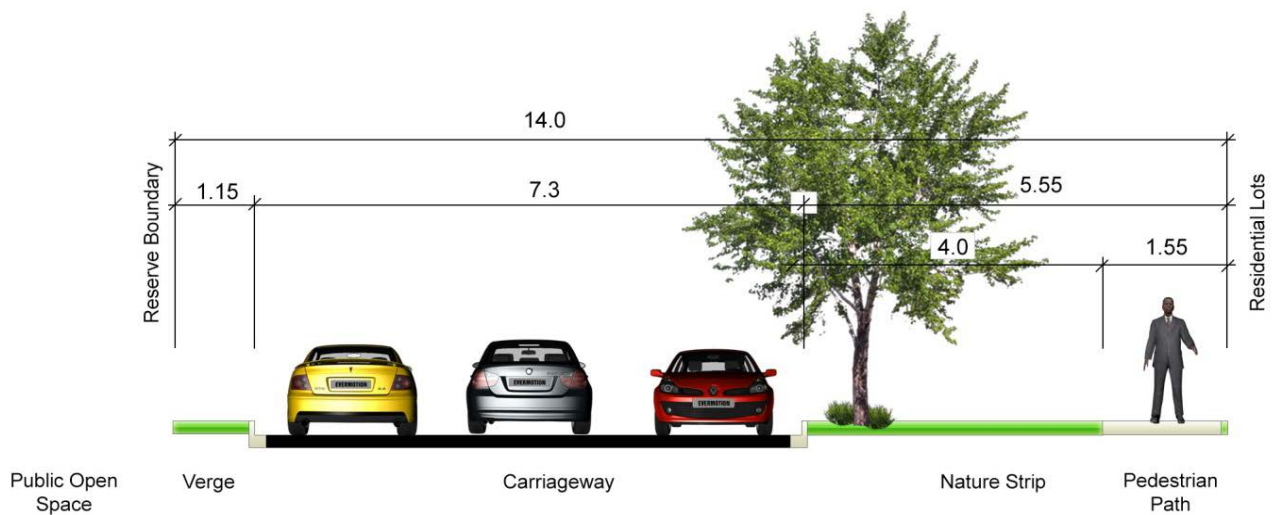


Figure 4 - Demonstration Example – Access Place / Access Street Level 1 (adjacent to open space) 14m <2000 vpd

Access Street – Level 2

Street providing residential access across a local neighbourhood where traffic is subservient, speed is low, cycling is prioritised and pedestrian movements facilitated.

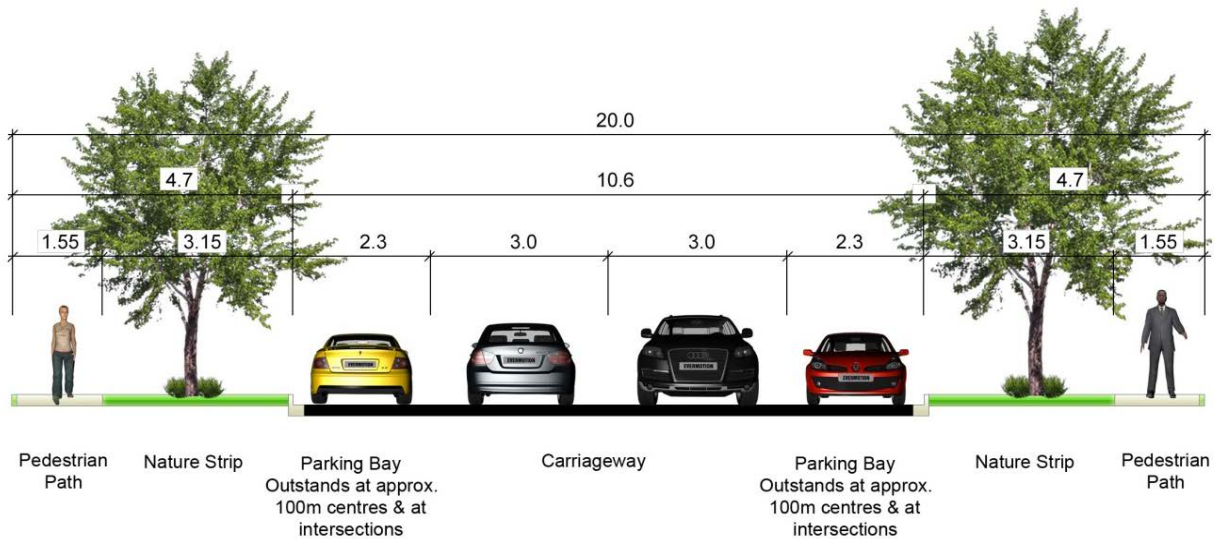


Figure 5 - Demonstration Example – Access Street Level 2
20m
2000 – 3000 vpd

Access Street – Industrial

Street that carries a high proportion of large vehicles, on street parking is minimised and pedestrian movements facilitated.

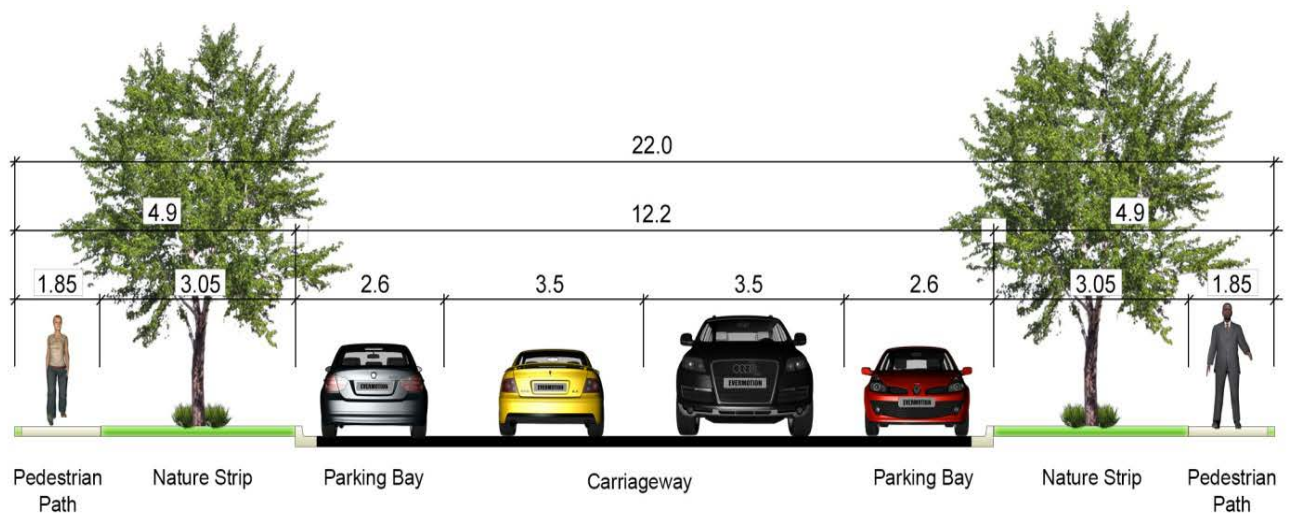


Figure 6 - Demonstration Example – Access Street – Industrial
22m
up to 3000 vpd

7.4.7 Connector Streets

Connector Streets generally have the highest traffic volume and link other roads to arterial roads. These roads have frequent connections (Collector Roads) to local streets. They are generally used for major bus routes. Shops, schools and community facilities will often be located on link roads.

The general location of Connector Streets should provide traffic routes as direct as possible between each “pocket” of a subdivision and nearby arterial roads, neighbourhood shopping centres, neighbourhood sporting facilities etc. These streets are the neighbourhood “arrival” streets so design character is important to establish a local “sense of place”.

Design Considerations for all Connector Streets

- These streets must be designed to assist with easy way-finding;
- These streets need to be designed to control vehicle speeds and provide a pleasant environment for pedestrians and cyclists;
- They should not be designed to attract long-distance through-traffic;
- Link roads should be designed for use by buses;
- Entry statements should be avoided or used temporarily for the sales period. As an alternative to entry statements public art or unique landscaping can be used to signify a point of arrival;
- Bus stops should be located where there is passive surveillance throughout the day and night; and
- Dwellings should face the road to increase passive surveillance;
- Dwellings on connector streets may require separation from the carriageway with service roads;
- Significant street trees should be provided in the interest of developing full avenues of large trees.

Connector Street – Level 1 (Residential)

Street that carries higher volumes of traffic than Access Streets. It connects Access Places and Access Streets through and between neighbourhoods.

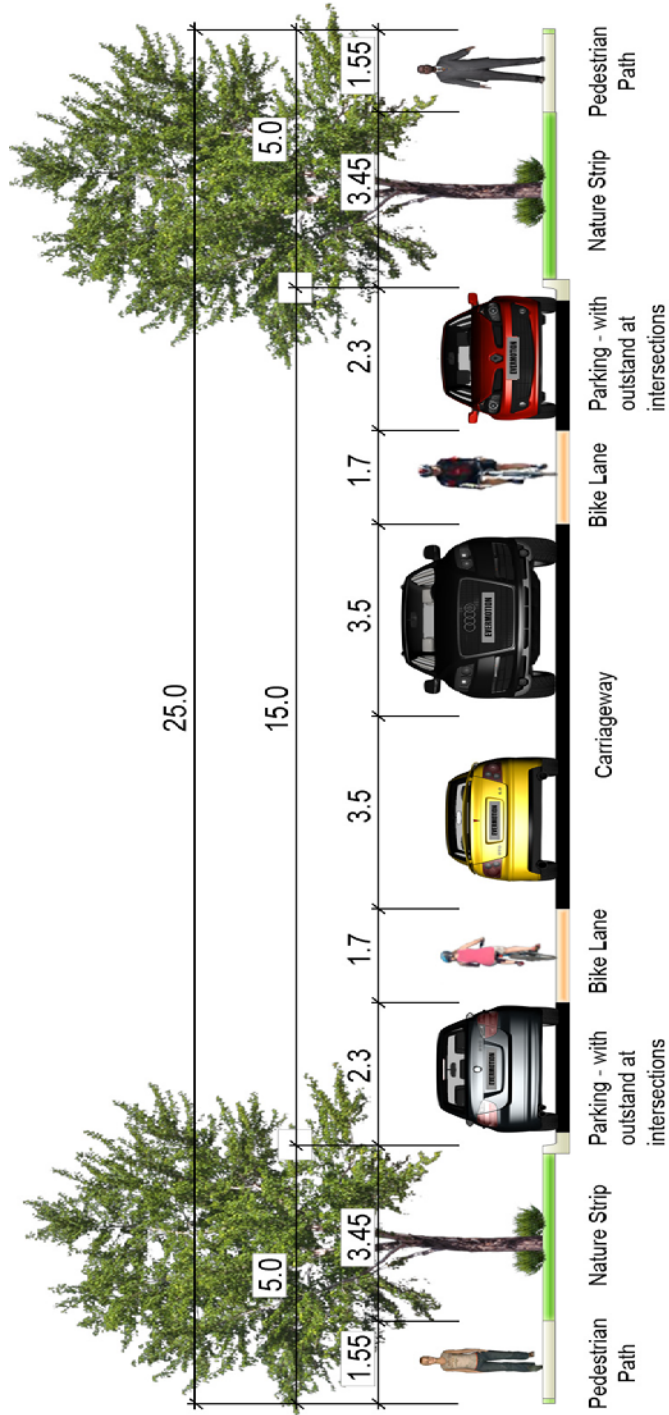


Figure 7 - Demonstration Example – Connector Street – Residential
25m Typically 3000-7000 vpd

Connector Street – Industrial

Street that carries a very high proportion of large vehicles and on-street parking is influenced by the type of adjacent businesses.

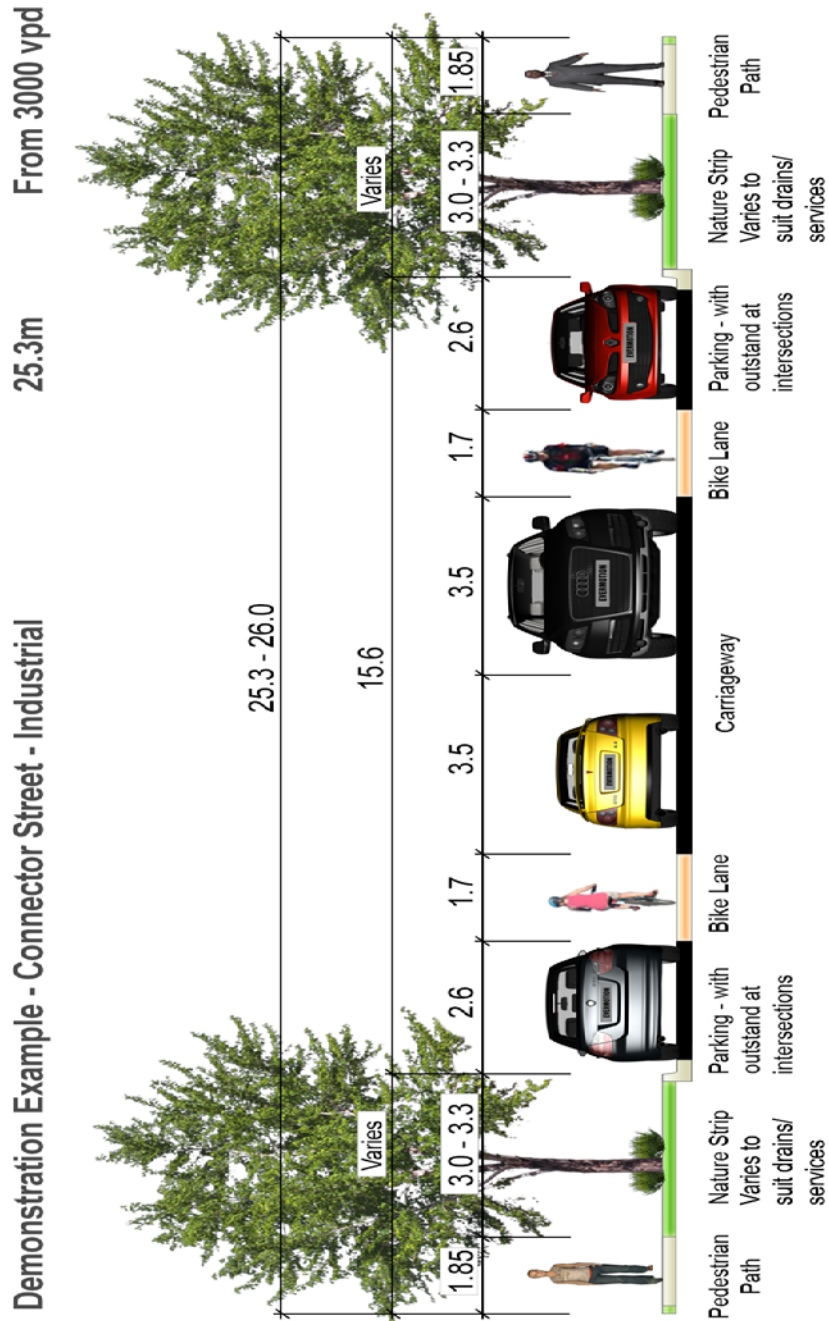


Figure 8 - Demonstration Example – Connector Street – Industrial
25m from 3000 vpd

Connector Street – Level 1 (With Median Suitable for Water Sensitive Urban Design)

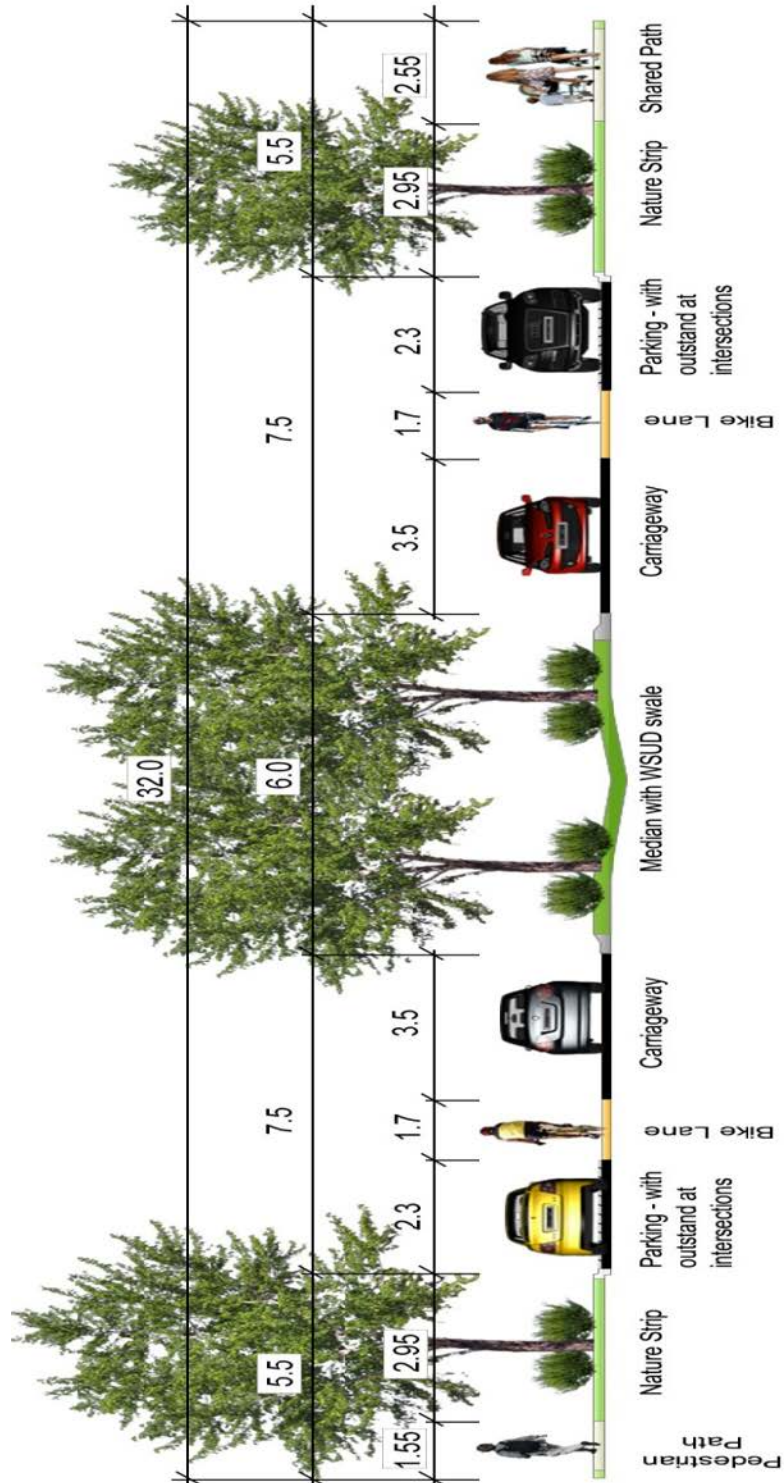


Figure 9 - Demonstration Example – Connector Street with Median Typically 3000 – 7000 vpd

Connector Street – Level 2

Street that carries high volumes of traffic. It connects Access Places and Access Streets through and between neighbourhoods.

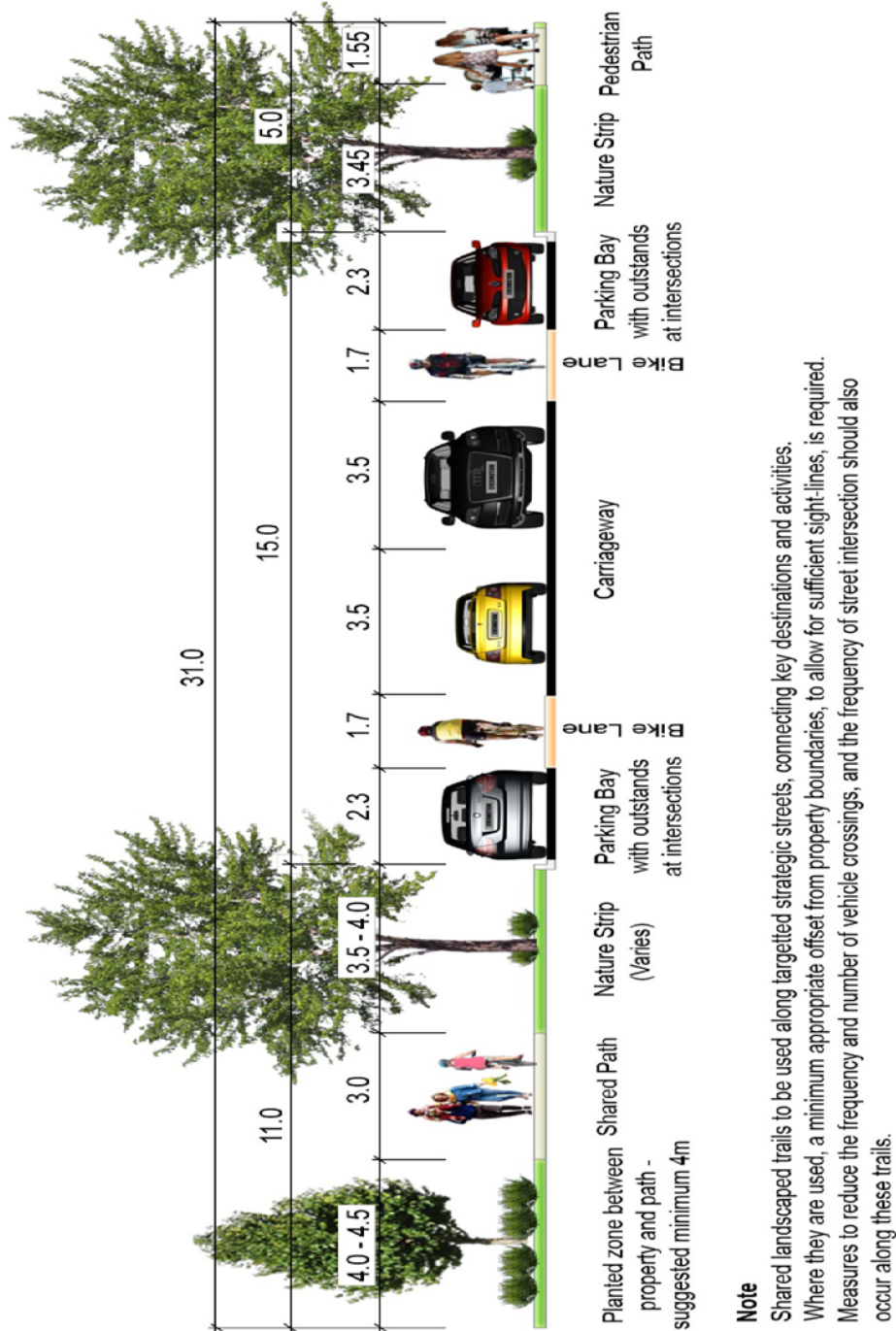


Figure 10 - Demonstration Example – Connector Street – Level 2, 31m Typically 3000 – 7000 vpd Residential with Shared Landscape Trail

Connector Street – Level 2 (Town Centre Main Street)

Street that carries high volumes of traffic through a Neighbourhood Activity Centre. It provides a low speed environment where on street parking is maximised and pedestrian activity prioritised.

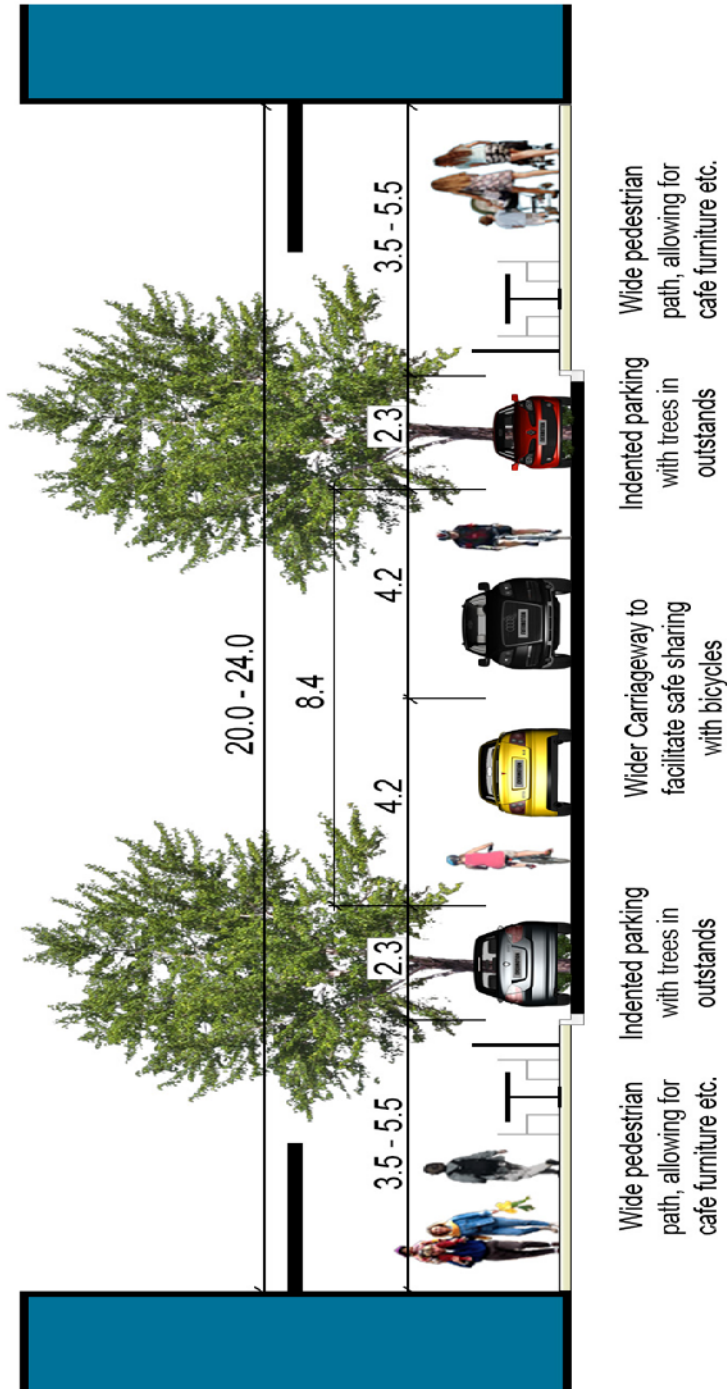


Figure 11 - Demonstration Example – Connector Street – Level 2, 20-24m 3000 – 7000 vpd Town Centre Main Street

7.4.8 Arterial Roads

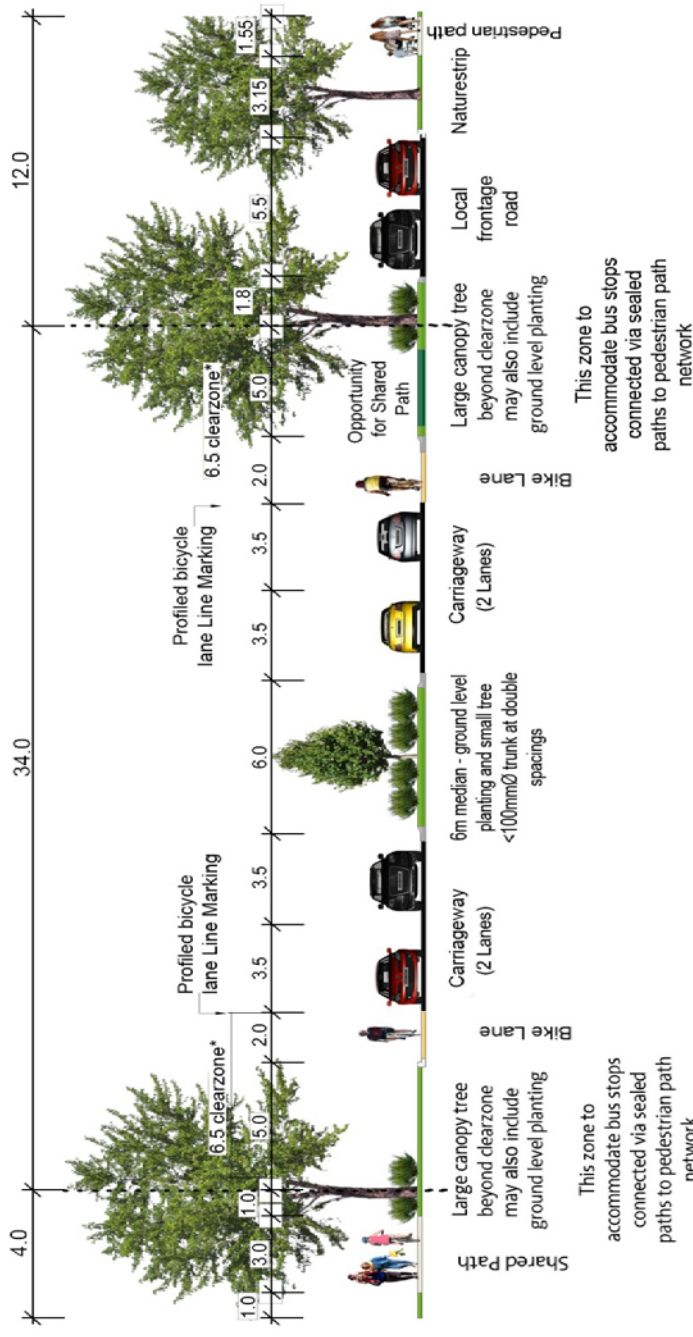
An arterial road is one that provides direct access from one district to another. Generally speaking, arterial roads have restricted frontage development and will ultimately have dual carriageway pavements. In addition to their primary traffic function arterial roads can provide a significant opportunity to be developed as tree lined boulevards subject to planning for clear zones in the cross section. For metropolitan expansion, the location of new arterial roads will be determined by Growth Area Framework Plans.

The Victorian State Government, through its road authority VicRoads, is responsible for all maintenance, road safety and traffic measures on those arterials nominated as “declared arterial roads” (formerly called main roads). VicRoads is both the co-ordinating and responsible road authority for declared arterial roads.

A new arterial road need not necessarily become a “declared arterial road” and will therefore remain a Council responsibility. However, both existing “declared arterial roads” and roads identified on a Precinct Structure Plan as arterial roads must be designed and constructed to VicRoads standards.

Four (4) Lane Secondary Arterial

High order road providing links between districts with properties fronting an adjacent service road. Centre medians have an ability to include water sensitive design elements.



Note

- Includes typical residential frontage service road(s) as required
- Investigation and use of physical barriers such as wire rope fencing is encouraged to enable more extensive canopy tree planting.
- *Clearzone assumes 80km/h speed limit >5,000 VPD
- Reservation width will be affected by clearzone & service infrastructure clearance requirements

Figure 12 - Demonstration Example – 4 Lane Secondary Arterial
34m 12000 – 40000 vpd

Six (6) Lane Primary Arterial

High order road providing links between districts with provision for future expansion and abutting service roads, as determined by Growth Area Framework Plans.

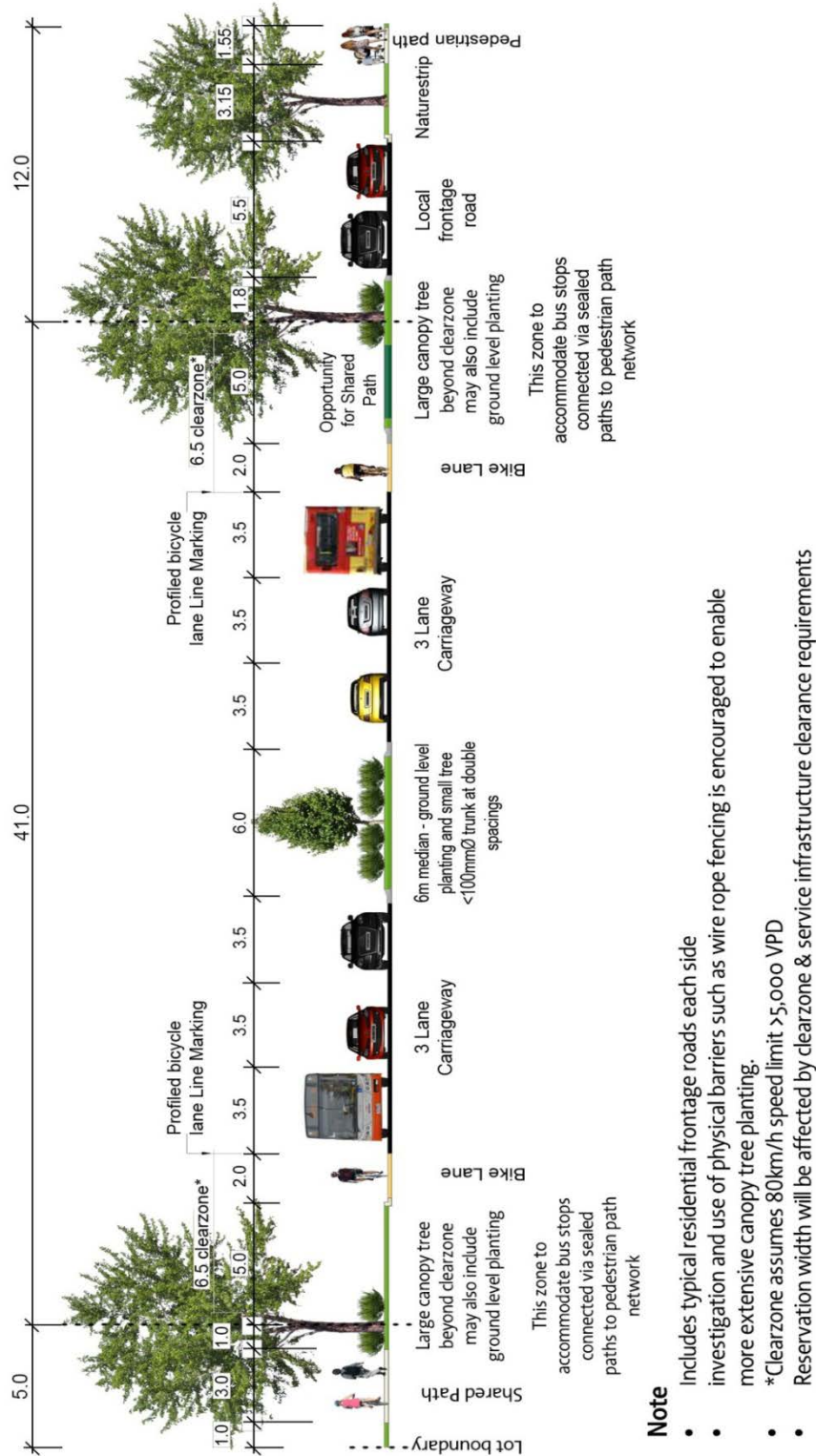


Figure 13 - Demonstration Example – 6 Lane Primary Arterial 41m >40000 vpd

7.5 ROAD NETWORK AND INTERSECTION CRITERIA

Municipal Roads are the public suburban thoroughfares on which most residents live or access property. Council is responsible for all maintenance, road safety and traffic measures on local roads in the municipality. New roads are being provided all the time as part of new subdivisions. Programs exist to manage traffic, parking and pedestrian movements to increase safety and improve the flow of traffic.

The Road Management Plan and the Register of Public Roads both describe a hierarchy of importance for Municipal Roads, based on traffic volume and function; however these documents are maintained by Council in compliance with the relevant legislation for existing roads and may not contain the same terms and definitions found in this document.

The classification, function and general composition of roads (or streets) within any new residential development should be in accordance with Clause 56 of the Municipal Planning Scheme or the Precinct Structure Plan (PSP), unless otherwise specified by Council. The various categories of street are defined in this clause and further specifications for design are included in Section 4.9 – “Design Requirements” of the document.

Whilst it is acknowledged that PSP’s (and Development Plans (DP’s)) in the older zones) may prescribe standard cross sections and reservation widths, the City of Whittlesea expects the elements within individual street reserves on a plan of subdivision to be performance based and only finalised at the time of preparing a Functional Layout Plan.

7.5.1 Traffic Management

Neighbourhood permeability should be provided by using street block lengths of not more than 240metres, and predominately around 150-180metres in length. Street block lengths should generally be shorter closer to town and neighbourhood centres.

The street network at schools should be designed to provide safe conditions for school buses, and spaces for set-down and pick-up from cars.

Street extensions for adjacent future subdivision shall be provided at a spacing of no more than 200metres, to facilitate a future legible network. The location of these connection points should consider the overall network requirements of the neighbourhood contemplated in the PSP.

Street connections to existing areas should ensure that traffic volumes on connected local residential streets remain commensurate with their design.

The arterial street network should be designed in accordance with the design speed parameters adopted by Council and VicRoads.

The local street network should be planned to normally produce the target operating speeds referenced in the Metropolitan Planning Authority *Engineering Design and Construction Manual EDCM (Table 4: Road Elements)*. Geometric design shall be in accordance with the maximum operating speed outlined in the *EDCM (Table 2: Operating Speeds)*.

The street layout, street width, trees and parked cars on the standard street cross-sections contribute to achieving target operating speeds. Additional measures to constrain speeds may be introduced, where warranted.

Slow points should be designed so that they do not interfere with bus access around schools or create pinch-points for cyclists. Speed humps are inappropriate for greenfield development and are not supported. (Refer to *AustRoads Guide to Traffic Management, Part 8: Local Area Traffic Management*).

On-street parking should be maximised, in accordance with the principles of Traditional Neighbourhood Design (TND), to give effect to the above objectives. The minimum provision in urban streets shall be one (1) car space per residential lot.

7.5.2 Intersection Spacing

Intersections between local streets and arterial routes and the spacing between intersections should be to reduce overloading on major intersections and to contribute to shortened vehicle trips.

Junctions between local streets should be located to achieve a safe and permeable local network.

Traffic signals should be located to balance movement for through traffic with local street access where traffic volumes are high and uneven on some legs. Signals also facilitate bus stop access and pedestrian crossing ease, by creating crossing opportunities, both at the lights and in breaks of flow mid-block.

7.5.3 Cross Intersections

Consistent with Traditional Neighbourhood Design principles, Cross Intersections will be encouraged on all Arterial, Connector and Local Roads (Access Streets and Lanes).

The use of Cross Intersections on Arterial and Connector Roads will promote connectivity for vehicles and pedestrians. Roundabouts are considered appropriate treatment for Connector / Connector Intersections, unless traffic volumes are uneven on some legs or pedestrian volumes require higher order traffic management techniques. Traffic signals will be required on Arterial / Arterial and Arterial / Connector intersections.

The use of Cross Intersections in Local Streets shall be designed primarily to promote connectivity for pedestrians Where “Stop” and “Give Way” treatments (Statcon) will be encouraged.

Offset kerbing at intersections will not be supported except in the event of exceptional circumstance and as agreed with Council.

For Disability Discrimination Act (DDA) compliance pedestrians must at all times have access to Continuous Accessible Paths of Travel (CAPT). For further details refer to the “Disability Access” clause of the document.

Council Standards

The treatment at cross intersections can vary according to local traffic movement and other factors. Council has developed the following matrix to be used as the basis for determining the most desirable traffic management method(s) for a given combination of intersection streets.

Table 1 - Recommended Traffic Management at Cross Intersections

	Arterial Road	Connector 2	Connector 1	Access 2	Access 1	Place	Lane
Signals							
Arterial Road	✓	O	O	X	X	X	X
Connector Street Level 2	O	O	O	X	X	X	X
Connector Street Level 1	O	O	O	X	X	X	X
Access Street Level 2	X	X	X	X	X	X	X
Access Street Level 1	X	X	X	X	X	X	X
Access Place	X	X	X	X	X	X	X
Access Lane	X	X	X	X	X	X	X
Roundabout							
Arterial Road	O	O	X	X	X	X	X
Connector Street Level 2	O	✓	✓	O	O	X	X
Connector Street Level 1	X	✓	✓	✓	O	O	O
Access Street Level 2	X	O	O	O	O	X	X
Access Street Level 1	X	O	O	O	O	X	X
Access Place	X	X	X	X	X	X	X
Access Lane	X	X	X	X	X	X	X
Intersection Modifications / splitters							
Arterial Road	X	X	X	X	X	X	X
Connector Street Level 2	O	O	O	O	X	X	X
Connector Street Level 1	O	O	O	O	X	X	X
Access Street Level 2	O	O	O	O	O	X	X
Access Street Level 1	O	O	O	O	O	O	O
Access Place	O	O	O	O	O	O	O
Access Lane	O	O	O	O	O	O	O
Stop or Give Way signs							
Arterial Road	X	X	X	X	X	X	X
Connector Street Level 2	O	O	X	X	X	X	X
Connector Street Level 1	O	O	O	X	X	X	X
Access Street Level 2	✓	✓	✓	✓	O	X	X
Access Street Level 1	✓	✓	✓	✓	O	O	X
Access Place	✓	✓	✓	✓	✓	✓	O
Access Lane	✓	✓	✓	✓	✓	✓	✓

Legend: ✓= Most likely to be an appropriate treatment O= May be an appropriate treatment X= Usually not an appropriate treatment

7.5.4 Signalised Intersections

In growth areas traffic signals may be required at the intersection of two Council roads where neither road is likely to become a VicRoads responsibility. These installations, being “Major Traffic Control devices”, still require VicRoads design and construction approval but will become Council assets under terms and conditions determined in accordance with the planning permit.

The approval process is depicted by the flow charts in Appendix A9 and A10 and requires the concurrent involvement of both Council and VicRoads jointly. The steps to be taken by the applicant shall be as follows:

- Analysis and functional layout to be undertaken by the applicant and submitted jointly to VicRoads and Council;
- Council will provide comments and discuss with VicRoads whether revised plans are necessary and agreement formulated for their responses;
- VicRoads will require a desktop Road Safety Audit;
- The Functional Layout is approved;
- Detailed traffic signal plans are prepared and submitted to both VicRoads and Council;
- Council will discuss with VicRoads whether revised plans are necessary and agreement is reached for their responses;
- VicRoads issue Memorandum of Approval;
- Detailed civil construction plans are prepared and submitted to both VicRoads and Council;
- Council will require a desktop Road Safety Audit;
- Council will discuss with VicRoads whether revised plans are necessary and agreement is reached for their responses;
- Civil Plans are approved by Council and VicRoads;
- Works are undertaken by an approved contractor with Council inspection in accordance with the planning permit;
- Road Safety Audit is undertaken;
- As constructed data and traffic signal maintenance details provided to Council;
- Traffic signals switched on;
- Maintenance period and financial arrangements concluded.

7.5.5 Road Connections to VicRoads Assets

Wherever the street network connects to existing arterial roads under the responsibility of VicRoads (Declared Main Roads) or other roads which Council anticipates will be handed over to VicRoads at some future date, the proposed works shall be designed and constructed to the approval of both VicRoads and the City of Whittlesea.

There are formal processes, through which VicRoads and Council co-ordinate their responses to proposals, functional layouts and detailed designs, all of which need to be followed by consultants acting for the developer.

The process for distinguishing the assets of each road authority is depicted by the flow chart in Appendix A10 (VicRoads Asset Demarcation Approval Process) and requires the concurrent involvement of both Council and VicRoads.

7.5.6 Roundabouts

Roundabouts may be appropriate in circumstances where traffic speeds and volumes are low or the roundabout is so located and designed that it will not discourage pedestrian movement.

Roundabouts will be supported on Connector / Connector Road intersections.

Roundabouts will also be supported on selected Connector / Local Road and Local / Local Road intersections having regard to particular local circumstances, such as the proximity of activity nodes (i.e. schools or local shopping facilities).

Roundabouts and their associated splitter islands will be designed to:-

- Facilitate the orderly flow of traffic, including large vehicles, reduce speeds, and meet relevant sight line and safety standards;
- Have regard to local traffic characteristics, including continuation of bike lanes provided on approach roads;
- Break up the streetscape and contribute positively to the urban design of the streetscape;
- Include landscaping. The use of canopy trees will be supported where sightline requirements are maintained. Under-storey planting must not exceed 500mm in height to maintain lines of sight;
- Avoid signage other than that associated with the safe operation of the roundabout in accordance with the relevant Australian Standard;
- Avoid lighting poles. The only lighting permitted within roundabouts is feature up lighting included as part of a co-ordinated urban landscape design approach approved by Council. This type of lighting requires independently metered supply which must have written approval from the power distribution authority;
- Ensure adequate drainage has been provided and overland flows are managed according to Council standards;
- Major roundabouts occupying significant land area must be enhanced by an approved landscape design;
- Comply with AustRoads Guidelines in the “Road Design” and “Traffic Management” series.

7.5.7 Unsignalised Intersections

Modified T Intersections

The use of modified tee intersections is not encouraged, particularly as these have the potential to create access challenges for people with disabilities, and must be avoided.

Subdivision design will seek to eliminate the need for modified T intersections by reducing block lengths where T intersections are required, hence reducing the speed of vehicles, and improving the network to eliminate the need for diversions.

Retrofitting existing intersections will be considered only where other means of traffic management have been exhausted.

Where the use of a modified T intersection is unavoidable, the space allocation and design for the intersection must include the provision of measures to enforce a noticeable change in vehicle direction. Islands, medians, roundabouts and adjacent nature strips must be designed with adequate space, which maximises their contribution to the urban streetscape.

A “Seagull” treatment is not appropriate for this purpose. Turning vehicles crossing a centre-line is considered acceptable on Access Streets provided sight lines are adequate.

Where Modified T Intersections are approved particular attention shall be given to elements supporting access for people with disabilities.

For DDA compliance pedestrians must at all times have access to Continuous Accessible Paths of Travel (CAPT). For further details refer to the “Disability Access” clause of the document above.

Intersection Design - Kerb Radius

Having regard to TND objectives Council will encourage the use of kerb radii less than 8.0metres for Access Street / Access Street order intersections, subject to the following:

- For DDA compliance pedestrians must at all times have access to Continuous Accessible Paths of Travel (CAPT). For further details refer to the ‘Disability Access’ clause of these guidelines above;
- Spatial requirements for turning vehicles (standard rigid truck may cross carriageway centreline).

Intersection Design - Splitter Islands

The use of splitter islands (traffic islands) in access / access street intersections is to be avoided.

Where used, the design, use and selection of splitter islands must be DDA compliant including provision of Continuous Accessible Paths of Travel (CAPT). For further details refer to ‘Disability Access’ at Clause 11.4 of the document.

Use of cut throughs at road pavement level will assist with provision of the CAPT.

7.6 STREET ELEMENTS

7.6.1 Cross Section Elements

Typical cross sections used for various street types will be nominated in the relevant PSP for the area. Detailed design of the street composition shall be undertaken in accordance with the Metropolitan Planning Authority *Engineering Design and Construction Manual (EDCM) Clause 10.6.1, Cross Section Elements*, which assigns typical elements to the various street types (see

Table 4: Road Elements) and provides minimum dimensions for those elements (see Table 5: Additional Road Elements).

The above Tables are reproduced below for convenience and context. They are to be used in conjunction with the explanatory notes that follow for developing the appropriate width of street reservations.

EDCM Table 4: Road Elements

		ACCESS LANE	ACCESS PLACE	ACCESS STREET 1	ACCESS STREET 2	CONNECTOR STREET	TRUNK CONNECTOR	ARTERIAL
Traffic Volume (vpd)		300	300-1000	1000-2000	2000-3000	3000-7000	7000-12000	12000-60000
Target Operating Speed (kph)		10	15	30	40	50	60	60-80
Carriageway Width (m) ¹		6.0	5.5 ²	7.3	6.0	7.0	3.5 lane each way	2*10.5 ⁷
Parking Street	Within	None	Unmarked	Unmarked	2.3 marked lanes both sides	2.3 marked lanes both sides	2.3 marked lanes	None
Verge Width (m) ³		Only required if servicing	4.50 and 4.20 ⁹	4.50 and 4.20 ⁹	4.7 min each side	5.0 min each side	5.25 min each side	5.0 min
Kerbing		Subject to pavement cross fall	B2, SM2 ¹⁰	B2, SM2 ¹⁰	B2, SM2 ¹⁰	B2, SM2 ¹⁰	B2, SM2 ¹⁰	B2, SM2 ¹⁰
Footpath Provision ⁸		None	2 * 1.5 ⁴	2 * 1.5	2 * 1.5	2 * 1.5	2 * 1.5	2*1.5 min - opportunity for shared paths

Notes:

- 1 Carriageway Width is line of kerb to line of kerb.
- 2 For parking both sides increase to 7.3m.
- 3 Verge Width includes nature strip, kerb and footpath (where required).
- 4 For <300vpd, may be reduced to 1 subject to Council approval.
- 5 B2 and SM2 for standard cross fall, refer to Standard Drawings.
- 6 Carriageway designed as a shared zone and appropriately signed.
- 7 6 lane arterial; if 4 lane arterial is adopted reduce to 2*7.0.
- 8 Refer Table 5 when shared path required.
- 9 Verge width is different for each side to accommodate services (each side).
- 10 SM2 kerb and channel may be used subject to Council approval.
- 11 Refer to the relevant PSP for individual road reserve widths.

EDCM Table 5: Additional Road Elements

ELEMENT	CRITERIA	DIMENSION
Travel Lane	absolute minimum	3.0m
	standard	3.5m
	one-way	4.0m
Parking Lane	minor road	2.3m
	major road	2.6m
	Connector Street (Indented parking)	2.3m ²
Turn Lane	minimum	3.0m
	standard	3.5m
Bicycle lane (on road)	desirable lane width	1.5m on Access Street, 1.7m on all others
	Shared path	minimum
Shoulders ¹	Access Road	1.20m
	Collector Road	1.20m
	Arterial Road	2.00m
Carriageway	Service Road	5.5 m
Nature strip	minimum for street trees	3.5m ⁴
Footpath	standard	1.5m
Footpath offset	from property line	0.05m
Services	standard spacing	Std. Dwg. – Figs. 003/004
Median	absolute minimum	1.2m (paved)
	desirable minimum	2.5m (paved)
	Incorporating turn lane	5.2m ³
	Minimum (for minor street tree planting)	3.0m (grassed) ⁴

Notes:

- 1 Permanent, rural roads or interim urban streets
- 2 2.1m is acceptable in low volume collector streets with an on road bicycle lane.
3. 6.0m is desirable for full protection of turning vehicles and for opposing lanes.
4. Clear of concrete kerb or other hard edge.

In the City of Whittlesea streets adjacent to open space or the outer separator of an arterial road (service road) where lots and services are on one side of the street require:

- Nature strip shall be minimum 3.5metres wide (from edge of footpath to back of kerb) to accommodate all services;
- Nature strip adjacent to the open space shall be a minimum of 1.0metres to back of kerb (open space must not be encumbered by roads and services).

7.6.2 Medians

Medians will be encouraged on a range of roads as a means of avoiding long stretches of uninterrupted two-way carriageway and / or the need for traffic control devices at cross intersections, whilst achieving streetscape diversity and aesthetic value.

For the purpose of the document, medians are defined as centrally located areas, between opposing travel lanes that are set aside for amenity, traffic management or on-street parking. They need not be continuous unless required (e.g. a series of individual planter bays may suffice).

Medians shall be a minimum 2.5metres wide between backs of kerb (or other form of hard edge) to enable tree planting. Greater widths should be considered on higher order roads having regard to the benefits of boulevard trees, the function of the road, and the width of road reserve available.

Narrow non-vegetated medians shall provide adequate space for pedestrian safety refuge and any necessary signage.

Cross sections shall take account of the role of medians in accommodating Water Sensitive Urban Design.

For DDA compliance pedestrians must at all times have access to Continuous Accessible Paths of Travel (CAPT). For further details refer to the “Disability Access” clause of the document above.

7.6.3 Threshold Treatment and Footpath Materials

In general sub-division areas traditional (standard) paving materials must be used. Where raised pavements are approved for traffic management purposes at intersections some subtle pavement edging will be allowed. Alternate materials, treatments and colours, including coloured concrete and coloured bitumen, will not be approved in these locations.

In activity nodes and open space, alternate materials, treatments and colours may be used, but only as part of a traffic management / control device, way-finding, an approved urban design element or as part of landscaping, subject to the following criteria:

- Alternate materials, treatments and colours shall have a design life equal to or greater than that of the usual standard material;
- Paths in Council maintained open space may be of different material and / or colour except where they form part of the principal path network;
- All Paths in Council maintained open space shall be DDA compliant;
- Construction standards must meet acceptable life cycle performance and maintenance objectives;
- The use and suitability of alternate materials, treatments and colours shall be subject to Council’s approval;
- The use and suitability of alternate materials, treatments and colours shall not compromise DDA objectives for pedestrians including the provision of a Continuous Accessible Path of Travel (CAPT). For further details refer to the “Disability Access” clause of the document;

- Use of paving stones, bricks, tiles or pressed patterned concrete proposed for trafficable pavements must comply with DDA objectives and will be subject to separate approval;
- Where approved by Council any alternate materials, treatments or colour additives must be used for construction strictly in accordance with any applicable manufacturers' recommendations and / or practice notes.

7.6.4 Vehicle Crossings

Refer EDCM's Appendix D - Standard Drawing for Vehicular Crossing details. This standard is applicable, without exception, to all subdivisions having normal lot frontages and building setbacks.

For corner lots only one crossing at the front (narrow boundary) of the lot is to be provided.

For irregular shaped lots, requests to adopt non-standard crossing locations will be considered on their merit. In such instances a crossing may be angled across the nature strip and need not be parallel to the side boundary. However, narrow frontages limit opportunities for street trees of any size so the absolute minimum area of nature-strip between crossings, unencumbered by pits or light poles, shall be 2.5metres x 2.5metres.

Industrial strength concreting, as shown in Standard Drawings, will be required for use by waste collection vehicles in dead-ends, hammerheads, court bowls and for access to laneways and Council reserves.

7.6.5 Retaining Walls

Retaining walls along street boundaries shall be of grouted rock masonry construction located entirely within the property. For walls up to one metre in height Council's Standard Drawing shall be used. For walls between one metre and two metres *VicRoads Standard Drawing, SD 5011B – Grouted Random Rubble Retaining Wall (Two Metre High)*, shall be used.

Walls along boundaries between allotments shall be of long lasting durable materials and retaining structures shall be subject to the provisions of the Building Code of Australia.

Where required in cut, walls shall be designed to extend in height to match the level of the existing surface and battering to natural surface above the top of a retaining wall within allotments, as a means of reducing wall height, will not be permitted.

7.6.6 Kerb Types

Barrier kerbs (VicRoads Type B2) are required throughout the minor street network. Transitions to match existing profiles shall be made within the shortest possible distance and no further than the next intersection.

Footnote 5, Table C1, Clause 56 shall be applied to justify the use of B2 kerbs as a means of discouraging parking on medians and nature strips.

Mountable and semi-mountable kerbs will only be adopted where traffic safety considerations support their use (such as roundabouts, medians and traffic islands).

Mountable and semi mountable kerbs are not a permitted component of kerb ramps, which shall be designed to AS 1428.1.

Construction of kerb ramps shall ensure compliance with Council construction standards and include the use of dowelling between kerb ramps and adjacent components, including footpaths and gutter inverts.

7.6.7 Tree Retention in Roundabouts

In exceptional circumstances the inclusion of significant existing vegetation as a part of a streetscape or roundabout will be supported. The design must be undertaken in consultation with Council officers to reflect the particular needs of the vegetation in question. Relevant design considerations will include:

- Significantly increasing space occupied by the roundabout;
- Adopting non-standard design to reflect the character of tree(s), particularly in the lower order street network where traffic function is a secondary consideration;
- Development of site-specific drainage solutions;
- Avoiding alteration to existing surface levels.

7.6.8 Swales

- Swales are permitted in RZ1 Zones;
- Swales in nature strips must have walkable slopes and be a maximum 1 in 6;
- WSUD principles incorporating smaller wetlands, swales, rain gardens etc. may be substituted for conventional wetlands;
- Swales shall not be located in the streets of Town Centres other than centre medians where it is not required for pedestrian access.

8 UTILITY INFRASTRUCTURE

Timely infrastructure provision, utilising good technology to best practice standards is a key element in the successful delivery of new communities. Coordination of planning, design and implementation is a vital aspect in which this Council expects to be involved. Infrastructure design must be considered in the integration and protection of the urban design, aesthetic and environmental impacts of works.

This section of the document requires that each new lot be provided with a standard of utility services appropriate for its intended use. The required level of servicing for a subdivision needs to account for the proposed lot size and its use, local servicing capability, provisions of the Planning Scheme and any other relevant published policy.

Street verges / nature-strips must be of sufficient width to contain all of the anticipated services, including provision for street lighting, adequate space for large canopy street trees, footpaths and, where appropriate, car parking indents or other landscaping.

Mandatory (minimum) nature-strip widths will apply where services are distributed on both sides of the street. Minimum clearances for services are shown in the EDCM (Section 10.13). Departure from this standard may be permitted on a case-by-case basis, subject to the following criteria:

- Where the developer wishes to locate additional services on one side of the street, the nature strip on that side shall be increased in width to the satisfaction of the Council;
- The nature strip on the non-services side may only be reduced where it abuts open space of a continuous nature.

Provision for utility services below or adjacent to water sensitive urban design swales and / or rain gardens must take into account requirements for minimum cover and utility access covers to properly match finished surface slopes. Further details can be found in this document at Section 6.2 Water Sensitive Urban Design and Section 7.4, Street Types.

Rear laneways may be used to accommodate drainage and sewerage services to individual lots but shall not include the placement of metered services. Servicing authorities should be consulted at an early stage in the planning process so that these requirements can be accommodated elsewhere in the road network (e.g. in a Paper Road).

Where trunk / distribution services are required within road reserves provision shall be made within a widened cross section to be clear of Council's infrastructure. Locating large pipes / conduits longitudinally beneath flexible pavements is not appropriate and will only be considered as a solution of last resort for existing reservations having an inadequate nature strip width. Similarly, services (other than sewers) should not be located beneath footpaths.

The key points that influence the provision of the various types of utility services infrastructure are summarised below.

8.1 POTABLE WATER SUPPLY

Subdivision for residential and industrial / commercial purposes can only occur in locations where there is access to an adequate reticulated water supply for domestic use and fire fighting purposes. Rural subdivisions in the City of Whittlesea may have alternative requirements prescribed in the planning permit.

With respect to the provision of fire hydrants, the City of Whittlesea has made arrangements with the County Fire Authority (CFA) under which Council conducts the assessment and approval of hydrant locations (and fire fighting access) together with the subsequent inspection of installation and marking. Where deemed appropriate, some subdivision plans may be referred by Council to the CFA in which case the CFA may remain the approval authority.

In all instances water reticulation plans shall be submitted to Council, as the coordinating authority, for their approval.

8.2 RECYCLED WATER SUPPLY

Council supports the reticulation of Class A treated water for reuse and fire fighting purposes. In areas where this option is available provision of space for reticulation mains and distribution infrastructure shall be required. However, Council does not support the irrigation of street trees and landscaping which is often requested when a water reuse system is available.

The assessment, approval and inspection of plans by Council is the same as for potable reticulation designs in the preceding clause.

8.3 SEWERAGE

Subdivision for residential and industrial / commercial purposes can only occur in locations where there is access to adequate sewerage reticulation and treatment facilities. Rural subdivisions in the City of Whittlesea where sewerage facilities are not available will have alternative requirements prescribed in the planning permit appropriate for the long-term, efficient and ecologically sustainable disposal of effluent on-site.

Sewerage reticulation layouts shall be designed to minimise the number of maintenance access covers within footpaths and maintain prescribed clearances from other services. Branch sewers must not be constructed longitudinally beneath road pavements in greenfield developments and space shall be provided within proposed cross sections for this to be achieved without compromising standard clearances from other services.

In all instances sewer reticulation plans shall be submitted to Council, as the coordinating authority, for their approval.

8.4 GAS

Council supports the reticulation of natural gas in all urban areas. Where this service is not currently available, including Whittlesea Township development zones, the provision of space for reticulation mains and distribution infrastructure shall be required to facilitate future installation and standard under road conduits shall be installed during roadworks.

8.5 ELECTRICITY

Underground reticulation of power cabling is a mandatory requirement in areas where development can be readily connected to the existing distribution system and the proposed reticulation is technically and economically acceptable to the service provider.

Public lighting in new subdivisions may be either standard facilities provided by the service provider or by the installation of non-standard public lighting hardware which is the subject of an agreement between Council and the service provider.

Non-standard public lighting shall be designed with regard to energy efficient practices and technologies in accordance with the Council requirements in Clauses 8.5.2 to 8.5.5 below.

Lighting in council reserves, including landscape feature lights, shall be designed and installed as a metered service in accordance with the document Clause 9.3.3, Public Lighting in Open Space. Obtrusive and upwards waste lighting should be minimised in accordance with AS 4282 (1997).

8.5.1 Electrical Substation Kiosks

The City of Whittlesea provides the following advice, having regard to AusNet Services requirements, for locating electrical substation kiosks in subdivisions and minimizing their visual impact.

Electrical substation sites must be discussed with the supply authority as early as possible and identified on the Functional Layout Plan as part of planning considerations. AusNet Services is confident that preliminary advice given early in the planning of estates will be sufficiently accurate to avoid major relocation during the detailed design phase.

Electrical substations should be located so that they do not interfere with the use of Council's open space reserves or impact on the amenity of residential properties. They must not be placed in conservation reserves set aside for the protection of remnant attributes.

Preference shall be given to locations on the edge of open space, or reserve, where:

- The open space is of such a scale and location that the substations can be easily screened or "absorbed" and accessed by the electricity supply authority;
- Substations are located at or close to the title boundary and do not impede the functionality or visual amenity of the open space, or reserve.

Where the above objectives cannot be met, locations which are not visually sensitive and are easily accessed by AusNet Services are to be chosen. Possible siting includes at the rear of a corner allotment or on the corner of a laneway (these may coincide). Wherever possible substation sites indented between two residential lots should be avoided, as these tend to be a haven for graffiti and a nuisance to neighboring properties.

Substations are not to be sited in small reserves or walkways, where they will dominate the use of these small or narrow open spaces. (As a guide, the kiosk reservation should occupy less than 2% of the open space area and use less than 10% of the front boundary dimension).

When kiosks are sited within open space they shall generally be concealed using architectural screens designed and approved as part of landscaping plans and not screened by the use of soft landscaping alone.

Land area of substations should be kept to the minimum possible and will not be considered part of the Public Open Space area.

Having regard to issues of access, amenity and maximum use of public reserves for recreation purposes, Council and AusNet Services have agreed upon a ranking for kiosk sites (1 is most preferred and 8 is the least) as follows:

RANKING	LOCATION DETAILS
1	Within a widened road reserve with no lot frontages, sited outside the clear zone and other services - no fences required
2	At the road edge of a Council Reserve, adjacent to a lot boundary– no fences required
3	Adjoining the end of a laneway at the rear of a corner lot – fences on lot boundaries only.
4	At the front corner of a large lot – side property boundary fence only; negotiate with future property owner about whether a front fence will be permitted (some restrictions)
5	At the road edge of a Council reserve next to a physical feature which otherwise limits the public use of the reserve (e.g. exposed rock feature) – no fence
6	At the road edge of a Council reserve (not having limiting features affecting its public use) either 10m minimum clear distance from an intersection or boundary of a lot – no fence.
7	Straddle the front corners of two adjacent lots – fence required at rear and sides.
8	Rear of lots on side street boundary – fence required at rear and sides.

8.5.2 Public Lighting Standards

The City of Whittlesea provides the following advice regarding the provision of public lighting for new development.

Lighting design shall be in accordance with the relevant Australian Standards, including the current issue of *AS/NZS 1158 – Lighting for Roads and Public Spaces*. This document now reflects *AS/NZS1158.6 “Lighting for roads and public spaces – Luminaires”*, current version.

Lighting installations for Arterial Roads and associated intersections are reviewed and approved by VicRoads as the responsible coordinating road authority. Copies of drawings shall be forwarded to Council for assessment after which advice will be forwarded to VicRoads prior to approval.

It is Council's preference for P category lighting to be LED lanterns (unless advised otherwise by Council officers), and V category lighting to be 150W HPS lanterns, all on standard galvanized poles. For existing estates it will be necessary to make an application to Council for the continued use of non-standard poles / lanterns. Designees shall seek advice from Council prior to commencement of lighting designs.

Any proposal to install non-standard public lighting in new subdivisions shall comply with the following standard requirements:

- Unless otherwise advised by Council officers at the time of plan submission, LED lanterns must be used for all P category lighting and 150W HPS lanterns must be used for all V category lighting;
- Non-standard poles shall be galvanised Lincoln poles. Black Lincoln poles may be used as an alternative where colour can be justified to Council's satisfaction.

An exemption may be granted where it is logical to continue the existing street lighting design within the estate. However, it is considered appropriate to discontinue the use of MV lanterns and alternative decorative poles within estates at linear reserves, water bodies or higher order roads (where an increased level of illumination is required).

The developer shall contribute an upfront payment equal to the sum of:

- The current replacement cost, including supply and installation, of one (1) non-standard pole for every ten (10) or part thereof; plus
- The current replacement cost, including supply and installation, of one (1) non-standard lantern fitting for every ten (10) or part thereof; plus
- An amount of \$264.43 (being indexed to CPI from 30/06/2015) for every non-standard pole installed.

The developer shall maintain hardware and lodge a refundable security bond for a period of time on each plan of subdivision as set out below:

Number of Lots	Maintenance Period	Bond
1-20	1 year	\$2,000
21-50	2 years	\$3,000
>51	3 years	\$4,000

For major estates comprising more than five stages the above maintenance period(s) shall apply but the security required by Council at any one time will be limited to \$15,000. "Maintenance" includes the supply and replacement of damaged hardware irrespective of the cause.

Allowance for pole locations shall be provided within all road reserves and offsets are to be shown in "Service Location Tables" on FLP's and Road Construction Plans.

A minimum 800mm offset shall be provided from back of kerb to pole for all roads with P category lighting, including laneways and shared zones where kerbing is provided.

A minimum 1000mm clearance is required from face of pole to:-

- Edge of carriageway in laneways, shared zones and extended driveways where no kerb is provided. Kerb outstands may be requested for pole protection in some circumstances;
- Edge of pram crossings and private vehicle crossings within nature-strips.

“Easy Fit” pole bases / foundations are required where maintenance access is restricted (e.g. in laneways, “paper roads” and shared driveways).

With the exception of lighting in speed zones of 50 km/hr or less, frangible poles shall be adopted for roads with V category lighting in accordance with *AS 1158 – Lighting for Roads and Public Places*. The specific pole type (impact absorbing or slip base) shall be determined according to VicRoads standards and must be nominated on the drawings.

Provision of public lighting is required for all principal footpaths and bike paths within parks and reserves of any development. All cabling for this purpose shall be from a metered point of supply at the reserve boundary and Council will accept responsibility for the tariff.

Any feature lighting located within road reserves must be submitted for approval concurrently with the public lighting and cabling submission for the subdivision. For feature lighting requirements in parks and reserves refer to Council’s “Park Lighting Strategy – June 2006”.

Bollard lighting is acceptable only in reserves where vertical illumination is not required for the relevant lighting category and subject to Council’s “Park Lighting Strategy – June 2006”.

Lighting obstructions (e.g. from existing large trees) shall be taken into account when locating poles and assessing luminance requirements.

For location of substations see Section 8.51 - Electrical Substation Kiosks.

Electrical easements in reserves are not acceptable to Council unless it can be demonstrated that there is no alternative network, to electricity authority standards, available. Where approved, cabling within easements must have 600mm cover, 300mm depth FCR backfill and warning tape between the FCR and topsoil layer.

8.5.3 Public Lighting and Electrical Cabling Pre-Submission

Prior to the submission of plans for public lighting and underground electrical cabling of new development the following shall be confirmed with Council:

- Lighting design categories for all roads and pathways;
- Locations of all principal pathways in parks / reserves outside road reserves;
- Locations and type of other items / structures that may require public lighting;
- For any lighting type not previously accepted by Council provide full information on the proposed pole and lantern together with details of the current supply and delivery cost of a single unit and likely availability into the future (i.e. regular stock or limited production line);
- An AusNet Services agreement form (e.g. “Application for Installation of Non Standard Lighting”), signed by the applicant, has been received;
- A Functional Layout Plan has been endorsed in accordance with the planning permit.

8.5.4 Electricity Construction Drawing Submission

Drawing submissions for the installation of public lighting and electrical cabling shall include the following information as a minimum:-

- All drawings, including those amended between initial submission and date of approval, shall have an individual, recognisable and permanent drawing number, revision and date;
- The drawing title shall include the Estate Name, Stage Number and Location of Estate (street name and suburb);
- A schedule of adopted lighting categories (can be added to the services offset tables);
- Spacing tables for each lighting type, each mounting type and each design category. The designer shall ensure that “Lighting Technical Parameters”, relevant to the lighting type used in the subject development, are applied in accordance with AS/NZS 1158;
- Isolux contours to be shown on a plan where required or as requested by Council.

8.5.5 Public Lighting Requirements for Paper Roads

Paper roads shall be illuminated to P4 category and meet all requirements as specified in *AS/NZS 1158 (Lighting for Roads and Public Spaces)*.

Where possible, paper roads shall be illuminated via street lighting located within adjacent road reserves negating the need to install additional lights along the length of the paper road (i.e. strategic placement of street lighting within the road reserve to minimize the need to provide additional lighting infrastructure).

If lighting is required along the length of a paper road, the lighting style shall match the style adopted for the adjacent roads, and the paper road lighting shall be separately metered. At handover the ongoing maintenance and operational costs shall become the sole responsibility of Council.

Lighting and all associated infrastructure along the length of a paper road shall be installed fully within the abutting open space reserve and not within the paper road proper (supply pit and cabling that runs from the paper road to the meter / supply box located within the open space reserve will remain an AusNet Services asset).

The meter / supply box shall be manufactured from heavy gauge galvanised steel, include a vandal proof locking system and be mounted on a concrete support. Specifically, a free standing double-sided cabinet shall house the power supply on one side and a double GPO on the other. The cabinet shall be of a sufficient size to comfortably house the necessary equipment as well as meeting all power supply regulations. The cabinet shall be fitted with heavy duty hasp and staple top and bottom (2) each side. One side to take Council abloy locks, the other side shall be provided with standard power industry locks. Use Swallow Engineering Irrigation Controller Cabinet (10 gauge galvanised steel; 100mm X 500mm X 300mm) or approved equivalent to Council (Parks and Open Space Department) standards.

All cabling from the meter / supply box shall be installed in conduit and shall be installed with a minimum 600mm cover, 300mm depth FCR backfill and warning tape between the FCR and topsoil layer.

Lighting installed within Council reserves must comply with *AS/NZS 3000:2007 - Electrical installations (Australian/New Zealand Wiring Rules)*.

8.5.6 Process for Lighting Paper Roads

Where an FLP identifies the need for a paper road, written advice shall be provided from Council's Planning Department to the developer.

The detailed lighting design for a paper road shall be prepared by a suitably qualified and experienced electrical engineer and shall include the lighting type, conduit location, meter / supply box location and any other relevant information. The submission must also provide an isolux diagram for the entire paper road. The lighting provision shall be approved as a function of the construction / engineering drawings.

On receipt of the lighting submission, Development Engineering shall refer the documentation to both Parks and Open Space and Engineering and Transportation Departments for comment prior to endorsement.

The installation of the lights and associated infrastructure shall occur prior to the issue of Statement of Compliance for the Stage.

All lighting and associated infrastructure shall be installed by a suitably qualified and experienced electrician. Prior to the commencement of the civil defects liability period, a copy of the Electrical Certificate of Compliance shall be provided to Council's Engineering and Transportation Department.

The "As Constructed" civil drawings shall include the electrical documentation and shall be suitable for upload onto Council's GIS.

8.6 TELECOMMUNICATIONS (FTTP)

8.6.1 FTTP Pit and Conduit Network

The City of Whittlesea provides the following information to consultants regarding the design, preparation and submission of construction plans for the City of Whittlesea Fibre to the Premise (FTTP) Conduit Network in subdivisions (as required by Clause 22.13 Telecommunications Conduit Policy of the Whittlesea Planning Scheme and Planning Guidelines for Conduits for Optic Fibre Services).

For developments of applicable size and location where FTTP infrastructure is provided under a "Developer Agreement" with the NBN Co., **or** where an alternative empty conduit network is being installed that is suitable for fibre optic infrastructure **and** the developer has evidence of an access agreement between the carrier installing the conduit and NBN Co., the City of Whittlesea will exempt that subdivision from the requirements of its planning permit conditions for the installation of a telecommunications conduit network.

8.6.2 Drawing Submission Requirements

"City of Whittlesea" logo must be shown on the construction plans for the City of Whittlesea FTTP Pit and Conduit Network.

The drawing title shall include the following heading and details: "FTTP Pit and Conduit Plan", Estate Name, Stage Number and Estate Location (street name and suburb).

All drawings shall have individual, recognizable and permanent drawing number, revision and date. All revised drawings shall have a discreet revision number and date.

Submissions shall include 1xA3 and 2xA1 size hard copy of plans and electronic files in PDF format. PDF files shall be saved to scale nominated on the plan.

8.6.3 Design Requirements

Layout plans are to show an outline functional layout of trees, title boundary, kerbs, footpaths, crossings, drainage, other services and any likely points of conflict.

The minimum number and size of conduits to be provided in each estate is as follows:

Location / Type	Minimum Conduit Provision
Arterial / Distributor abutting estate entry/exit	2 No x 100 mm diam.
Collector / Access Street	1 No x 100 mm diam.
Lateral conduits - local network pit to service pit	50 mm diam.
“Service Drop” conduits – to single dwelling units	23 mm diam.
“Service Drop” conduits – to multi-unit sites	50 mm diam.

Conduit offsets shall be in accordance with the approved Functional Layout Plans for the subdivision. A “Table of Services Offsets” shall be included on the layout plan.

In body corporate subdivisions shared easements shall be provided for FTTP pits / conduits and underground electrical cables between the “local network pit” and each dwelling / site.

Property “service drop” conduits in nature strips and under driveways shall be a minimum 23mm for single dwellings and a minimum 50mm for potential multi-unit sites. Lead-ins shall be from the short wall of pits located on the same side of the road and terminate at a point 500mm inside the property boundary.

Property “service drop” conduits shall be located with not less than 150mm clearance from the vehicle crossing, house drain, and all utility service connections to the property.

Pits shall be located clear of all pedestrian and vehicular pavements (concrete or asphalt).

Pit spacing shall not exceed 250metres.

“Distribution Pits” shall be provided at the entry and exit locations for the development where the future distribution network will be connected.

Conduit entry to pits for all conduits, regardless of size, shall be through short wall pit sides only.

Pit types to be used are defined as follows:

Pit Type	Description
Service Drop Access Pit	Provides an access location between the local network conduit and the service drop conduit. Only used to provide access location for service drop fibre cable. Not to be used for any local network fibre cabling.
Boundary Pit	Provides an access location between the local network conduit and the service drop conduit.
Local Network Pit	Located on the local network duct. Provides an access location between the local network conduit, local lateral conduit and the service drop conduit.
Local Network Connection Pit	Located on the local duct network. Houses a fibre splice closure.
Distribution Pit	Located on the distribution network conduit. Provides mid-point hauling locations. Houses distribution splice closures. Also installed at entry and exit locations of the new development to facilitate cable installation.

Pit types and sizes are to be as indicated on plans in accordance with the following table:

Pit Type	Length	Width	Depth
Service Drop Access Pit	650 mm	280 mm	565 mm
Local Network Pit / Boundary Pit	700 mm	450 mm	650 mm
Local Network Connection Pit	1360 mm	555 mm	860 mm
Distribution Pit	1360 mm	555 mm	860 mm

Note: These sizes are the nominal exterior dimensions of appropriate pits for New Developments.

Where deflections in conduit alignment exceed 22.5° in any one pipe length construction plans shall indicate the prefabricated bend radius. The minimum permitted radius is as follows:

Pipe Size	Minimum Bend Radius
100mm	1000 mm
50mm	300 mm
23mm	350 mm

Where pits occur at downstream junctions and low points the notation “Provide connection to storm water drain” is to be indicated on the plan. At such locations grey 100mm PVC drainage lines, graded at minimum 1 in 100, to the nearest stormwater drainage pit, Ag drain or stormwater drainage line are to be provided. The invert level at the discharge end of the PVC shall be 100mm (minimum) above the overt of the stormwater drainage pipes.

The overall length of 100mm conduit trenches within the subdivision is to be identified and advised to Council. A provisional length of 100mm conduits equating to 20% of the subdivision trench length or 20metres, whichever is the greater, is to be provided to enable linkage beyond the site.

If the proposed design includes shared trenches (horizontal or vertical separation) longitudinally and / or across roads a “Trenching Agreement” is required with other service providers. Such trenching agreements are to be submitted to Council for approval with the plans.

8.6.4 Construction Requirements

The following details, together with Council Standard Drawing No. SD814, shall be the basis for construction of all pits, fittings and terminations for subdivision development within the City of Whittlesea. The notes and tables herein shall be included in plan layouts and specifications for the proposed works.

Conduits, associated fittings, caps, draw wires, haul ropes, installation, trenching, bedding and backfilling are to be provided in accordance with AS/NZS 2032, ACIF C524, AS/ACIF S008, AS/ACIF S009 and relevant manufacturers’ recommendations.

Conduits shall be white, stamped “Communications” and comply with AS/ACIF S008 and ACIF C524.

A corrugated plastic gasket shall be installed under the concrete lid.

To avoid cable damage at conduit to pit connections, conduit ends must be perpendicular to the pit wall and be terminated with “bellmouth ends” which shall be flush with the internal pit wall.

Conduits shall have a minimum cover below the following finished surfaces:

- Nature strips 450mm cover
- Road pavement 600mm cover

PVC duct covers / caps shall be installed on all conduit ends including service drop conduits.

Pits within unpaved nature-strips shall be medium density polyethylene telecommunication pits with concrete lids. Frames and covers shall have a load rating compliant with AS 3996 – Access Covers and Grates.

Conduit to conduit and flanged entry connections to pits shall be free of sharp edges, glued and sealed to prevent ingress of water, gas or silt.

Each conduit shall be provided with 4mm nylon haul rope (white in colour).

Minimum radial clearance between conduits and other underground services shall be maintained in accordance with the following table:

Underground Services		Minimum Radial Clearance
Gas:	Large main (over 50mm dia.) Small main (50mm dia. or less)	300mm 150mm
Electrical:	High Voltage Low Voltage Low Voltage (Note below)	300mm 300mm 150mm
Water:	High capacity main Local reticulation	300mm 150mm
Sewer	Mains House connections	300mm 150mm
Other Telecommunications	Other Telecommunications (Note below)	300mm 150mm
Drainage – Council drains and Ag's – House connections		300mm 150mm

(Note: Only permitted in conjunction with protection barriers)

8.6.5 As Constructed Record Submission

After completion of the construction works “As Constructed” details of conduits, pits and pit drainage for electrical and telecommunication services, verified by on-site measurement, must be submitted to Council in D-Spec data in ESRI shape file / Map Info format on GDA94_MGA55 datum. Reduced levels and depths of conduits / pits are not required.

Electronic copies of the “As Constructed” drawings are to be provided in AutoCAD and PDF formats.

9 LANDSCAPE WORKS DESIGN

9.1 INTRODUCTION

Council's strategic planning for Growth Areas does not look at existing land ownership and property boundaries as its guide. Local character is rarely evident on such a micro scale and planning processes seek to ensure continuity that is seamless across these boundaries on a macro level. To this extent, the use of locally specific landscape themes and design initiatives which attempt to define and market an estate such that it is out of character with its surrounds, is discouraged. Council will only allow entry treatments such as feature walling and estate naming on the basis of them being temporary, to be removed after a clearly defined marketing period.

The requirement of all developers to submit a landscape plan for approval, as well as detail the requirement to plant suitably advanced trees within all streets, has produced some stunningly successful outcomes, where the foundations of high quality, visually integrated and environmentally sustainable streetscapes have been established, with negligible plant failure rates.

9.1.1 Landscape Works Plans

Landscape Master Plan

The landscape master plan must be drawn to scale with dimensions and supplied electronically in a PDF format. The landscape master plan must show:

- The overall landscaping theme to be developed for the subdivision;
- The type or types of species to be used for street tree planting in the subdivision;
- The principles of the proposed treatment of the open space and drainage reserves;
- A management plan for the River Red Gums proposed for retention to ensure their integrity during the site development and landscape maintenance period must be submitted with the landscape master plan.

Further information is contained in Appendix D - Street Tree Planting for Growth Areas.

Stage Landscape Works Plan

A landscape works plan, drawn to scale with dimensions, must be prepared for each subdivision stage. An electronic copy, in PDF format, of the final plan must be provided showing:

- The removal of all existing disused structures, foundations, pipelines or stockpiles and the eradication of weeds;
- All proposed street-tree planting using semi-advanced trees; with maximum container size of 45 litres or equivalent (larger sizes will incur additional establishment and extended maintenance obligations);
- Earth shaping including the supply and spread of sufficient topsoil and sub soil if required on the proposed areas of open space to provide a stable, free draining surface and hydro-seeding of proposed grass areas (including within the drainage reserve if applicable);

- Mechanisms for the exclusion of vehicles;
- All proposed open space and streetscape embellishments such as installation of pathways, park lighting, garden beds, seating, shelters, picnic facilities, boardwalks, tree planting, signage, drinking fountains, irrigation systems, playgrounds, artwork, retaining walls, protective fencing (temporary and permanent), wetlands and ornamental water bodies (including within the drainage reserve if applicable); and
- Hazard reduction pruning of trees to be retained, to the satisfaction of the responsible authority.

Prior to the approval of civil works plans for each stage, a draft landscape works plan for that stage must be submitted to the responsible authority for comparison against the civil works plans. Once approved to the satisfaction of the responsible authority, the landscape plan will be endorsed and will then form part of the permit. Where sufficient detail is shown on the endorsed landscape masterplan, to the satisfaction of the responsible authority, stage landscape works plans may not be required.

Council requirements covering street trees and other aspects of landscaping in open spaces can be found in Appendix C2, Standard Drawings Index – Landscape Details; Appendix D, A Guide to Growth Area Street Tree Planting and Appendix E, Minimum Landscape Maintenance Specification of Services and Works.

9.2 TREE PLANTING

The City of Whittlesea encourages the use of a wide range of trees from its prepared list and although the tried and true are included, developers are discouraged from preferencing their selections based on a more likely guarantee of availability. Nurseries' range of tree and plant species in general are demand based and Council encourages developers to influence that demand, particularly when it comes to cultivation and selection of better forms of Australian native trees.

Refer Appendix D – “A Guide to Growth Area Street Tree Planting” for details on tree planting requirements within streetscapes and open spaces.

9.3 INFRASTRUCTURE IN OPEN SPACE

9.3.1 Vehicle Exclusion Mechanisms and Barriers

Vehicle Exclusion Mechanisms (VEM's) will be used around all open spaces, with regular pedestrian openings provided.

Selection of the type of VEM's, whether they be fences, bollards, high barrier kerbs, etc., shall be made on a case-by-case basis in consultation with Council. Decisions will ensure that VEM's make a positive urban design contribution to their locality.

VEM's will be designed in accordance with the requirements and objects of the DDA such that they contribute to provision of Continuous Accessible Paths of Travel (CAPT). For further details refer to clauses on “Disability Access” elsewhere in the document.

Conservation areas require a higher order of design treatment.

Bollards without horizontal elements shall be at 1.5metre centres to exclude vehicles.

Bollards should have appropriate luminance contrast with their background tones to assist recognition, particularly by people with vision impairment. Luminance contrast may be achieved by using a contrasting colour treatment on the upper third of the bollard.

Retained features, isolated trees, trees in road reserves and smaller reserves may receive individual treatments.

9.3.2 Vehicle and Motorbike (Trail Bike) Barriers / Gates

Guardrails / Wire Rope Fences

VicRoads requirements for type and location shall be met where risk cannot be addressed by network design.

Brifen wire rope fences are preferred on aesthetic grounds.

Motorbike (Trail Bike) Barriers / Gates

Motorbike barriers / gates shall not compromise DDA requirements with respect to accessibility and permeability. For standard barrier and gates details refer to Appendix C2.

Gates and Bollards

Gates are generally preferred except where bollards are required for pedestrian access.

Urban design quality of fences and bollards is important and shall be demonstrated on landscape plans.

Maintenance and emergency vehicle access shall be provided in VEM's and open space fencing.

Gates and / or bollards where used shall not compromise DDA requirements with respect to accessibility and permeability. Bollards may need to be removable at some locations where nominated on the design plans.

9.3.3 Public Lighting in Open Space

Lighting in Open Spaces will be restricted to high-order parks, for ornamental features and artworks and where required for safety reasons. Lighting in Open Spaces will be metered and operating costs paid for by City of Whittlesea under the administration of Parks and Open Space Department. Installation shall comply with AS/NZS 3000 - Electrical installations (known as the Australian / New Zealand Wiring Rules).

Lighting of any principal path network when crossing a Public Open Space Reservation will also be metered and, after handover, the administration and operating costs will become the responsibility of City of Whittlesea Parks and Open Space Department. The lighting of paper roads shall be provided using the same poles and lanterns as approved for the public lighting in adjacent streets. Refer Section 8.5 for more details.

9.3.4 Boardwalks and Decks in Open Space

The City of Whittlesea requires the use of boardwalks across areas requiring preservation / protection as a part of an integrated pedestrian network and supports the use of decks as recreation / observation facilities within that pedestrian network. For DDA compliance pedestrians must at all times have access to Continuous Accessible Paths of Travel (CAPT).

Boardwalks and decks will be designed to:

- Have regard to their likely degree of usage;
- Acknowledge their role as an important component of the visual landscape as well as a safe and viable engineering structure;
- Have a minimum design life of 25 years;
- Use materials, colours and textures to Council's satisfaction;
- Be fully accessible by all users;
- Be subject to the requirements of the Building Act 1993 and be certified for both design and construction when structural design is required;
- Provide a minimum width of 1500 mm;
- Provide 1800 mm wide passing bays where required;
- Provide consistent, trip free and slip-resistant surfaces;
- Provide handrails or kick-rails, where required, to Australian Standards;
- Provide defined kerb edges;
- Provide graded ramp access for a Continuous Accessible Path of Travel.

9.3.5 Drainage - Major Systems in Open Space

Major drainage systems will be designed to minimise any aesthetic impacts or reduction of significant vegetation and will not compromise the use or functionality of dedicated open space. The major drainage system will be regarded as being an encumbrance and not an integral part of the open space area.

Generally the design of major drainage systems beyond the road network shall:

- Maximise opportunities to integrate with and promote environmental features;
- Have regard to the particular functional characteristics of the open space in question;
- Ensure that the open space is useable at all times for its intended purpose, be it active or passive (i.e. co-location of uses will be considered but not substituted just to facilitate drainage function);
- Minimise impacts on significant vegetation;
- Make provision for planned flows which exceed the capacity of the underground pipe system by confining design flows. Design must minimise "constructed channels" and give priority to vegetation retention.

9.3.6 Drainage - Minor Systems in Open Space

Minor piped drainage systems will be designed to minimise any impacts on significant vegetation, and the aesthetics and functionality of active open space.

Generally minor piped drainage systems will be encouraged to be located along the boundary of the open space area unless an alternate path is agreed with Council having regard to:

- Minimising impacts on significant vegetation;
- The particular functional characteristics of the open space in question.

Water Sensitive Urban Design elements can often become aesthetic features in open space but their inclusion needs to be discussed with Council at the FLP planning phase, particularly the following:

- WSUD bio-swales are a part of the drainage infrastructure and require the usual provision of drainage easements;
- Co-location of swales in open space is supported but the area impacted will then be considered as unencumbered open space.

9.3.7 Footpaths in Open Space

Consistent, accessible footpaths are critical to safe pedestrian movement for all users, including people with disabilities. For DDA compliance pedestrians must at all times have access to Continuous Accessible Paths of Travel (CAPT). For further details refer to Clauses on Disability Access elsewhere in the document.

Paths will generally be constructed using grey concrete with a slip resistant surface that is traversable by a person using a wheelchair. The use of textures, other colours and finishes will be considered for public use within open spaces having regard to the following performance criteria:-

- Durability of construction;
- Maintenance and access implications;
- Function of the path (i.e. level of usage, nodal points, etc.);
- Environmental issues and design sustainability;
- Achievability of minimum contrast with TGSI's.

Other access elements:-

- Where there is a defined property line it should be free of any barriers or hazards to provide a consistent reference for all users, particularly for people with vision impairment;
- Consistent, trip free and slip-resistant footpath surfaces;
- A minimum overhead clearance of 2.4 metres is required above the trafficable footpath surface.
- Public lighting is required for all principal footpath and bike path connections located within the open space or reserve

9.3.8 Shared Pathways in Open Space

Shared Pathways will have a minimum width of 2.5 metres.

The CAPT shall have a clearly defined consistent, trip free and slip-resistant surface that is traversable by a person using a wheelchair.

A minimum overhead clearance of 2.4 metres is required above the trafficable path surface.

Public lighting is required for all principal footpath and bike path connections located within the open space or reserve.

10 ART IN PUBLIC PLACES

This Art in Public Places kit has been compiled in order to manage the future acquisition, fabrication, installation, maintenance, decommissioning and removal of public art in new subdivisions within the municipality. Council requires that future public art must be designed and constructed in accordance with the requirements outlined here.

10.1 INTRODUCTION

The City of Whittlesea is embracing the opportunity to build new sustainable communities whilst at the same time preserving the city's environmental significance and cultural heritage. Council is committed to sustainable development in our new communities. Sustainable development is commonly broken down into four pillars of sustainability: ecological; social; economic and cultural. Sustainable development requires improved outcomes in each of these four pillars.

10.1.1 Improved Outcomes in Cultural Sustainability

In order to strive towards cultural sustainability and to shape cohesive and interactive communities, Council aims to foster new communities which value and demonstrate cultural vitality. By introducing initiatives early on within a new development, members of the community can be brought together and encouraged to communicate in an open, friendly environment. Initiatives such as the establishment of a community choir, literary group, heritage group, interest group or play group, opening the local coffee shop and community centre, working with local schools to run short courses and share library facilities; developing projects with local children / adults to produce a community calendar, local art exhibition or local performance based event are all supported by Council as a means of promoting interactive and cohesive communities.

As a result of such communication and interaction, this new community might endeavour to define and strengthen its own identity by:

- Sharing ideas and re-affirming values;
- Seeking solutions to local concerns;
- Recognising, protecting and showing pride in an individuals' own cultural heritage;
- Contributing towards identifying and shaping the cultural landscape of their new locality.

10.1.2 Creating Engaging and Meaningful Public Spaces

Creating engaging and relevant public spaces can contribute to the cultural sustainability of a new precinct. Currently, private developers in our local area are frequently using sculpture, signage and street furniture as a vehicle to enrich and promote the identity of each new estate. With some exceptions, the themes adopted for the public art, mirror the general theme adopted for the new estate.

An opportunity exists here, to create public art which promotes community identity for the whole municipality to experience.

In order to create public places which have meaning in a local context Council encourages artworks which reflect themes and ideas derived from the specific stories and memories which

are unique to that location. This can be achieved by researching history collections, old photographs, oral histories and publications. People living in the immediate vicinity can also be brought together to share memories, relate stories and impart knowledge of the history of the local area. As a result, specific themes can be developed which are particular to that location.

This information can then be conveyed to the artist. In turn, the artist has an opportunity to create public art which is more reflective of the community within its locality. This will lead to the creation of public spaces which are engaging and more relevant to the people who spend time in them, and will contribute to a sense of community. It will also mean that our rich cultural heritage and history will be interpreted into permanent artworks for many generations to enjoy in the future.

The following projects are examples of designing public art in a way which relates specifically to its unique location.

10.1.3 Site Specific Examples

Thomastown Library and Community Centre

A well-known local example includes the public art projects which thread throughout the refurbished library and reflect local cultural events, personalities, heritage buildings and stories.

Mosaics incorporating Aboriginal art designs at Riverside Community Activity Centre

A suite of mosaics reflecting stories of local Aboriginal Heritage and also depicting indigenous flora and fauna of the Plenty Gorge are located inside and outside the Riverside Community Activity Centre.

Wurundjeri artists Luke Gardiner and Cathy Adams designed the mosaics in consultation with the Kulin Nation Cultural Heritage Organisation. Artist Libby McKinnon then translated and constructed the designs into mosaics. Local children from Morang south Primary School also contributed to the construction of the mosaic, making turtles and fish in the classroom which were later installed into the final mosaics.

Walking Trail at the Growling Frog Golf Course

Local stories, photographs and memories were collected from the owners of the properties adjoining the Growling Frog Golf Course. The owners were in their eighties and had all resided in the vicinity for many years. Using oral history methodology, the information collected was drafted into a bound publication. The stories and photographs were utilised to inform specific sites along a walking trail within the Golf Course, via interpretative boards. A palm top computer linked to the GPS was also utilised to access stories and photographs at specific sites along the trail.

10.2 WRITTEN CONTRACTS WITH ARTISTS

Developers / Commissioners are encouraged to draft a contract with the artist to ensure that a variety of issues are openly addressed.

Such issues include: copyright ownership / licences, moral rights, life expectancy of the work, decommissioning the work if damaged beyond repair or unsafe, maintenance procedures and processes, potential relocation of the artwork, delivery, installation responsibilities, payment schedules, project timelines, approval stages, etc.

As it is accepted practice that the artist has the first opportunity to repair their artworks, or carry out regular maintenance on their artworks it is important that the Developer retains the artists contact details. (For further information see 3.8 Copyright, Intellectual Property and Moral Rights, and 3.9 Decommissioning on pages 43 & 44 of the Cultural Collection Strategy).

- For information about Arts Law visit www.artslaw.com.
- Samples of contracts between artists and commissioning organisations can be purchased online at www.artslaw.com.

10.3 DETAILS REQUIRED FROM THE DEVELOPER / COMMISSIONER ABOUT EACH PUBLIC ARTWORK

City of Whittlesea requests that the Developer / Commissioner provide the following information / documents for review and approval.

The requirements have been divided into four stages - ***documents should be submitted for each stage.***

10.3.1 Provenance of the Public Artwork

All the information provided here will form the 'provenance' of the public artwork, and will be treated with confidentiality and be documented in Council's Digital Cultural Collection Catalogue upon transference of the artwork to Council.

Artist Contact Details	
Name of Artist	
Home Address	
Postal Address	
Home Phone	
Mobile Phone	
Home Fax	
Business Name	
ABN or ACN numbers	
Studio Address	
Studio Phone	
Studio Fax	
Email	
Website	
Recent Curriculum Vitae	

Details of Collaborating Artist/s / Collaborating Organisation / Representing Gallery	
Name	
Home Address	
Postal Address	
Home Phone	
Mobile Phone	
Home Fax	
Business Name	
ABN or ACN numbers	
Studio Address	
Studio Phone	
Studio Fax	
Email	
Website	

Property Developer Details	
Name	
Liaison Person	
Home Address	
Postal Address	
Home Phone	
Mobile Phone	
Home Fax	
Business Name	
ABN number	
Email	
Website	

10.3.2 The Initial Design Stage - (Stage 1)

Relationship to Site

It is encouraged that consideration is given to the specific site where the proposed artwork is to be located.

Please indicate where the artwork:

- Reflects local stories, themes and / or ideas, specific to its location;
- Is sympathetic and appropriate to the context of the site including the social, cultural and environmental benefits or sensitivities of the artwork to that particular site;

- Provides any recreational opportunities, or other community benefit, which may occur as a result of the artwork.

It is expected that the public artwork be designed to have a lifespan of a minimum of 15 years, with a 12 month warranty, require minimal maintenance and be as vandal proof as possible.

10.3.3 Finalised Design / Structure / Installation Details – (Stage 2)

Once the final design is confirmed please submit the following documents and details for Council approval well before the installation of the public artwork.

General Details of the Artwork

- Title of the artwork;
- Proposed site (address and Melways reference);
- History of the artwork or materials (i.e. wood or other material might be salvaged from a specific site);
- Purchase / commission price;
- Copyright ownership / licenses;
- Proposed site of construction;
- Colour photographs or illustrations of the proposed public artwork;
- A timeline which includes proposed dates for construction, reports, submissions and installation. NOTE: actual commissioning, construction and installation dates will need to be submitted when confirmed.

Construction and Installation Details

Please provide detailed construction and technical details, prepared by both a certified structural engineer and the artist.

- A site plan showing the artworks location, elevations, footing construction plans, and relevant dimensions, including proposed weight, size and holding points;
- Engineering design computations including design parameters, construction plans and structural engineering certification (information and plans) to Australian Standards;
- Materials specifications;
- A Landscape Plan identifying existing vegetation as well as proposed levels, materials and plants in close proximity to the artwork and how the artwork will be integrated into the surrounding landscape;
- Risk assessment report and ongoing maintenance plan for the artwork and its specific site;
- Proposed installation procedures and plans;
- Site and Traffic Management plan at installation and ongoing.

10.3.4 Maintenance Schedule – (Stage 3)

An estimate of all ongoing costs and methods (including labour) is required to ensure that the public art is maintained and continues to function in the way that it was originally intended for at least 15 years. It is accepted practice that the artist is offered the first opportunity to repair / maintain their own artwork.

Please provide an ongoing Maintenance Schedule for the proposed public art. This should include:

- A list of all materials used in the construction of the artwork, and their specifications. Include product names and codes, and suppliers contact details;
- All estimated costs associated with ongoing lighting or moving parts;
- Replacement / repair of parts (in order to adequately maintain any mechanical parts);
- Ongoing general maintenance / periodic cleaning requirements;
- Restoration procedures;
- The proposed costs associated with ongoing vandalism management including graffiti management.

10.3.5 Attribution / Transference to Council – (Stage 4)

Attribution of Artworks

It is encouraged that all public artworks have plaques accompanying them when on public display. The plaques will attribute the artist, and will include relevant information about the artwork. This will also satisfy the first Moral Right (part of the Copyright Act) - the right to be named as the author or creator of the work. (For more information on Copyright and Moral Rights Provision – see www.artslaw.com.au).

Upon Transference to Council

The ownership of the artwork will be transferred into Council's Cultural Collection, after the maintenance / handover period. From that time on, the ongoing management of the artwork will be managed in accordance with Council's Public Art Collection – Acquisition and Management Guidelines. This document should be attached to each contract drafted between the Developer and the artist.

The following should be clarified:

- Specific Date of Transference
- Specific 'handover' information

Council Liaison

Council's Cultural Collection Co-ordinator will offer limited support to ensure the successful integration of public art into new developments and estates. This support will include ongoing liaison to provide advice on Council's processes and procedures. Please contact the Cultural Collection Co-ordinator during office hours.

Sandy Caldwell
Cultural Collection Co-ordinator
Community Cultural Development Unit
CITY OF WHITTLESEA

CONTACT DETAILS

Phone: 9217 2143

Fax: 9409 9873

Mobile: 0408 511 863

Email: cultural.collection@whittlesea.vic.gov.au

Web Address: www.whittlesea.vic.gov.au

Street Address: Civic Centre, 25 Ferres Boulevard, South Morang, 3752.
(Melway Reference Map 183:A10)

Postal Address: Locked Bag 1, Bundoora, MDC, 3083

A selection of local history books and publications relevant to the history and cultural heritage of this municipality are also available.

The information you provide will be considered by relevant Council Officers and you will be notified of the outcome. If more information is required you will be contacted by a Council Officer. Please send this submission to the Cultural Collection Co-ordinator, or the relevant officer you are working with on the planning application.

Intellectual Property

All the information provided to Council will be treated with the strictest confidentiality.

Submitting this information to Council

Please send this submission to Sandy Caldwell, Cultural Collection Co-ordinator to be disseminated to relevant Council Officers, or liaise with the relevant Council Officer assigned to your subdivision.

11 ROADWORKS DESIGN

The City of Whittlesea has adopted the design standards contained in the EDCM and provides additional details within this section for clarification of requirements and / or alternatives not covered by the EDCM.

Roadworks shall be designed to the required standards within an overall framework that is defined by the following objectives:

- Provide attractive streetscapes which reinforce the functions of a street as important and valuable public places, adding value to the amenity of adjacent uses;
- Enable roads and verges to perform designated functions in the street network, recognising, that carriageways that are too wide encourage higher vehicle speeds;
- Provide safe and appropriate street geometry suited to its function;
- Accommodate and maximise on-street parking where required, recognising that the proximity of parked cars contributes to lower vehicle speed and pedestrian comfort;
- Provide a safe, distinct and pleasant environment for residents and other users, including people with disabilities;
- Provide stormwater run-off from paved areas in accordance with sustainable urban stormwater management provisions;
- Design streets to fulfil all their functions at a minimum whole of life cost to the community by adopting standard common elements and quality assurance principles;
- Provide a road edge that performs its required drainage function, is structurally adequate, meets requirements for access to properties, including disabled users, accommodates a desirable streetscape and is sensitive to the context of its location;
- Design verges / nature-strips for safe use by pedestrians and cyclists and which meet requirements for public utility services, sustainable water management features and canopy street trees;
- Materials with demonstrable environmental benefits are strongly encouraged, provided that the material is proven to meet all of its functional requirements with little or no impact on cost, maintenance and durability. Wherever possible, locally sourced materials are preferred.

It should be noted that Council's "Development Approval Checklist" (In Appendix B3) contains prescriptive engineering design standards which shall be applicable to all new works even though they may not always be replicated in the body of the document.

11.1 DOCUMENTATION

Documentation that is required to accompany an "Application for Engineering Plan Approval" is summarised in the application form (in Appendix B2).

For greater detail of supporting information which shall accompany the engineering construction plans refer to the "Development Approval Checklist", Parts D1 to D8 (in Appendix B3).

11.2 GEOTECHNICAL INVESTIGATION AND TESTING

11.2.1 Site Investigation

The City of Whittlesea provides the following advice to consultants regarding the provision of an evaluation of the potential for the presence of contamination and / or filling as part of the design and construction of residential subdivision within the Municipality.

The Department of Sustainability and Environment's "*General Practice Note (June 2005) - Potentially Contaminated Land*", which is designed to provide guidance for planners and applicants about how to identify if land is potentially contaminated, must be followed for all residential land being subdivided, commencing with levels of assessment recommended in *Table 2 – Assessment Matrix*.

An assessment shall also be undertaken and reported upon, in conjunction with geotechnical testing for road subgrades, of the potential for the existence of filling over any part of the site beyond the proposed road reserves.

11.2.2 Geotechnical Testing for Road Subgrades

The City of Whittlesea provides the following advice to consultants regarding testing subgrade soils and soil treatments as part of the design and construction of road pavements within the Municipality.

Investigation and testing of subgrade materials and conditions prior to the design of road pavements within the City of Whittlesea shall be conducted in accordance with the Metropolitan Planning Authority *Engineering Design and Construction Manual (EDCM)* - Section 11.

Additional information is provided below to compliment, without taking precedence over, the EDCM.

Substantial areas of the City of Whittlesea consist of weathered basalt formed from the "Newer Volcanics" of the Western Plains of Victoria. The weathering of these basalts has typically resulted in surface silts, underlain with firm to stiff residual clays, which grade to weathered basalt at depth. Many new urban subdivisions will therefore be in areas of highly expansive clay subgrades that are susceptible to environmental movement during seasonal moisture changes and loss of strength due to water ingress. With a desire to simplify design and standardise construction, appropriate pavement and capping layer compositions have been derived in the EDCM for these highly moisture dependent subgrades.

Evaluation and classification of subgrade soil types is prescribed in Section 11.5 of the EDCM.

VicRoads (October 2004) Code of Practice RC500.20: Assignment of CBR (strength) and Percent Swell to Earthworks Fill and Pavement Materials (RC500.20) is to be used in field investigation using Scale A (design AADT > 10,000 vpd) and Scale B (design AADT < 10,000 vpd).

However the following requirements must be read in association with *RC500.20*.

11.2.3 Method of Field Investigation

Geotechnical Engineer

An engineer, pre-qualified to VicRoads PT2 level, shall be engaged to locate the position of the boreholes. The geotechnical engineer is also to be present during drilling and to be responsible for logging the materials encountered, recovering samples for laboratory testing and performing field-testing.

Boreholes

Field investigations of proposed road subgrades are required prior to road pavement design. Boreholes, rather than backhoe pits, are the preferred method of investigation, to avoid ground disturbance. Multiple boreholes, or small test pits, may be required at some locations to recover sufficient samples for laboratory testing. Sampling is required at the rate of one borehole per 120 lineal metres of new road.

Dynamic Cone Penetrometer

Dynamic Cone Penetrometer (DCP) tests are to be performed next to each borehole. The DCP tests should be taken to a depth of 1.5 metres or refusal, whichever is shallower.

11.2.4 Laboratory Testing of Subgrade Materials

Tests Required

Representative testing of the various subgrade materials encountered on a site is required to provide information on CBR (%), Swell (%), Liquid Limit (%) and Plasticity Index together with a classification of the subgrade for expansion.

Atterberg Limits Tests

Atterberg Limits tests and linear shrinkage tests are also to be undertaken, on at least 2 representative samples of each subgrade material type, to establish the reactivity of the soils and their sensitivity to moisture changes and expansive nature.

Soaked CBR Tests

Laboratory soaked (4 day) CBR tests are to be performed on at least 2 representative samples of each subgrade material type, to establish CBR values that are more likely to represent the long-term worst subgrade condition.

11.2.5 Proof Roll Testing

The proof roll test remains the most practical acceptance test for subgrade stability and shall be applied to all pavement subgrades. The acceptance criteria shall be when an area withstands test rolling without rutting and with only minor visible deformation and springing.

Areas failing proof-roll tests require re-treatment until accepted by the Council Civil Works Supervisor.

Irrespective of design CBR (%) and expansion characteristics of the subgrade material, if soft local areas of subgrade are encountered at the time of construction then these shall be treated in accordance with the requirements of the EDCM, Clause 11.5.4 – Weak Subgrade.

11.3 PAVEMENT DESIGN

Road pavements within the City of Whittlesea are to be designed in accordance with the Metropolitan Planning Authority *Engineering Design and Construction Manual (EDCM)* - Section 11 with particular attention being given to the minimum requirements specified in the following:

- Clause 11.5.5 Type A Materials (Capping layer materials shall meet these requirements and be specified on the drawings);
- Clause 11.7.2 Calculation of Design Traffic (i.e. Direction Factor);
- Clause 11.8.2 Expansive Subgrades (Minimum total thickness);
- Clause 11.8.3 Pavement Design Speeds (Limitations of Appendix B).

11.4 DISABILITY ACCESS

Access for all users to the built environment, buildings and streetscapes has been identified by Council, through community consultations, to be a priority area requiring action by the City of Whittlesea.

The *City of Whittlesea Disability Action Plan 2013-2016* states:

The Built Environment

Goal: The built environment in our community will be universally accessible.

Council recognises the vital importance of accessibility of the built environment to the participation in our community by people with disabilities. The City of Whittlesea is one of the fastest growing urban areas in Australia and there is an existing opportunity to design and maintain a built environment that is inclusive for all now and into the future.

The *Disability Discrimination Act 1992 (DDA)* makes it unlawful to discriminate against someone on the basis of their disability or a disability of any associates of that person. The DDA clearly includes local government within its scope. Accordingly Council must ensure that access for all users is a priority when developing or maintaining built environment elements.

The essential key to an effective pedestrian system is the development and maintenance of Continuous Accessible Paths of Travel (CAPT), as defined in *Australian Standard 1428.1*. This is about the journey; it is about how a person can travel from their starting point to their destination with minimum difficulties or access challenges. Designs that work with the topography of an area and not against it will therefore benefit all users.

However, AS 1428.1 and AS1428.2 are for the provision of access to buildings and in the absence of specific information, it is recommended that appropriate clauses are applied to facilities in outdoor locations such as streetscape and open space areas.

Important contributing elements to a CAPT include path surfaces, definition of streetscape components, trip free transitions as well as consistent and clear property lines. The CAPT should include clearly defined footpaths, pathways, ramps, roadways, crossing points, outdoor spaces, signage and other way-finding cues. To be effective a CAPT requires provision of a

clearly defined continuous step and barrier free route linking key elements that can be safely negotiated by all users, including people with disabilities.

11.4.1 Footpath and Kerb Ramps

Footpath and kerb ramps will be provided in accordance with Council standards and will be DDA compliant. Priority is to be given to location and alignment that supports provision of Continuous Accessible Paths of Travel (CAPT).

Different pavement widths, materials and finishes may be considered in key node locations (e.g. Activity Centres, Inner Town Centre, etc.) and open space reserves thereby allowing designs which respond to the changed urban environment.

Construction standards must meet acceptable life cycle performance and maintenance objectives to Council's satisfaction.

For DDA compliance where there is no access to Continuous Accessible Paths of Travel (CAPT) pedestrians with a sight disability shall be catered for by the installation of Tactile Ground Surface Indicators.

11.5 TACTILE GROUND SURFACE INDICATORS

This brief guideline will assist in the design and use of TGSI and should be read in conjunction with relevant *Australian Standards*.

Use of Tactile Ground Surface Indicators (TGSI) shall be in accordance with DDA requirements and Council's Strategy for Disabled Access. The use of TGSI will be minimised by designing for a continuous path of travel in order to avoid their need at minor access street intersections. Changes of footpath direction at crossings are therefore discouraged.

TGSI consist of raised ground surface texture treatments intended to provide orientation and way-finding clues for pedestrians who are blind or who have vision impairment, in order to alert, guide and assist them to move safely and independently through the built environment including street networks.

There are two types of TGSI (warning and directional).

- Warning TGSI have flattened, domed indicators (dots) raised 4-5 mm above the surrounding surface and are designed to warn of a hazard or invite a change of direction, on a path of travel;
- Directional indicators have raised bars as directional guides indicating a safe route along a path of travel.

While TGSI are available in various materials, not all products are suitable for external use. For external installations the City of Whittlesea approves ivory ceramic TGSI, compliant with and installed in compliance with *Australian Standard 1428.4:2002 - Design for Access and Mobility Part 4: Tactile Indicators*. The City of Whittlesea encourages safe, accessible infrastructure design that minimises the use of TGSI.

Footpath and Pram Crossings in new subdivisions will be provided in accordance with DDA requirements. High importance is to be given to location and alignment which supports the principle of "continuous path of travel" requirements.

Because most pedestrians who have vision impairment retain some functional vision, which they use in moving through the built environment, a minimum of 30% luminance contrast between TGSIs and adjacent surfaces is vital.

The need for TGSIs can be minimised by good design, however they are required at all intersections unless:

- a) The geometry of a kerb ramp at an intersection is fully compliant with AS1428.1, and
- b) The ramp is located on the direct extension of the property line, and
- c) The top of the ramp is no more than 3000mm from the direction change of property lines (e.g. Splay angle).

TGSIs are therefore required at all kerb ramps that do not comply with all points above, at all mid-block crossings and at high usage vehicle crossovers (e.g. service stations and shopping centre car parks).

Directional TGSIs are to be used when a kerb ramp is not located on the direct extension of the property line or where an accessible path of travel from the building / boundary line will lead to warning indicators installed at the crossing (kerb ramp) point.

Directional and warning TGSIs will always be required at signed pedestrian crossings, school crossings, tram stops and bus stops.

Refer Council's Standard Drawing SD 320 for more details. All non-standard materials must be pre-approved by Council.

11.6 TRAFFIC ISLANDS

Splitter islands at connector-connector T-intersections and other traffic management locations shall be designed in accordance with *AustRoads Guide to Road Design*. The following design criteria shall apply:-

- Nominal width 1.2metres (kerb face to kerb face), minimum length 3.0metres, with SM1 kerb and suitable pavement infill;
- Setback from through carriageway is 1.5metres maximum to 0.5metres minimum;
- Islands are to be illuminated and delineated using line marking and RRPM's;
- Where islands incorporate a pedestrian refuge, this will be DDA compatible;
- The design must accommodate swept paths of the design vehicle and checking vehicle as per *AustRoads Design Vehicles and Turning Path Template Guide* (not less than *AustRoads 8.8metres service vehicle*);
- At nominated collector road / collector road intersections, the design must allow for left and right turns of Ultra-low Floor (ULF) buses;
- Traffic islands associated with other intersection treatments (e.g. Modified T, Deviation T, roundabout, etc.) shall be assessed and designed for the particular traffic management objectives of the installation.

11.7 SIGNAGE AND LINE MARKING

Signage and line marking plans must comply with the relevant standards and guidelines. Key reference documents include: AS1728.1 - Manual of uniform traffic control devices Part 1: General introduction and index of signs; AS1728.2 - Manual of uniform traffic control devices Part 2: Traffic control devices for general use; and the VicRoads TEM.

A separate signage and line marking plan shall be submitted accompanying the Civil Engineering Plans. The plan shall show the road layout of the entire stage(s)/site, signs, line marking and RRPMS for the development including a sign schedule for all signs.

Intersections

Intersections of Lanes and Access Places / Streets with Access Places / Streets will be self-regulating and will not require advisory traffic signage. Otherwise, all traffic management signage and line marking shall be to Australian Standards.

Perimeter line-marking must be provided around the central islands of the roundabout.

Street Network

On-road bicycle lanes will be both sign posted and line marked. Green surface treatment for on road bicycle lanes must be used where vehicles will cross cycle lanes to enter/exit the road. The green surface treatment must comply with the following:

- VicRoads Standard Section 430 for High Friction Surface Treatments.
- The preferred colour is G13 Emerald (AS2700 S – Colours Standards for General Purposes).

Indented parking bays on the Access street network need not be line marked.

Edge lines between travel lanes and indented parking bays will be required on higher order roads where not defined by a concrete invert (or edge strip).

Pavement marking applied to wearing course asphalt or final seal coat shall be long-life thermoplastic type. Temporary pavement marking required prior to the application of final surfacing may be waterborne paint to conform to the requirements of AS4049.3 but must be maintained by the developer until the wearing course asphalt and final line marking has been completed.

Shared Paths

Shared paths must be signed at the beginning of the path, immediately after each road crossing and elsewhere such that the spacing does not exceed 500m. Also consider regulatory signage to avoid any overuse.

Any signage used for shared paths/off road cycle paths must be of a 'special' size (as per AS1742.9)

Right Angled Bends in Access Streets

The use of 90° bends in subdivisions is strongly discouraged and should not be adopted in the urban design layout.

Where such bends are unavoidable they must be of low order use, designed to be wider around the bend, and only requiring line marking to manage vehicle movement.

Splitter islands on bends are generally not supported and will only be required as a solution of last resort.

For DDA compliance pedestrians must at all times have access to Continuous Accessible Paths of Travel (CAPT). For further details refer to the “Disability Access” clause of the document above.

Temporary Road Closures within Development Sites

A ‘Road Closed’ sign (G9-20) must be provided at all temporary discontinued or closed roads and must be combined with an ‘Obstruction Marker’ sign (D4-5).

12 DESIGN OF STRUCTURES

The City of Whittlesea requires the preparation and submission of plans of structural items for subdivisions and other forms of development wherever the works are to be gifted to Council upon completion. The requirements of the Metropolitan Planning Authority *Engineering Design and Construction Manual (EDCM)* Section 15, Structural Elements, also apply and are embodied herein.

When an item of infrastructure, whether part of the road and drainage works or hard landscaping, contains any structural element the following criteria shall be satisfied.

12.1 DESIGN CERTIFICATION

All structures delivered as part of development works, that will remain on private property, will require a building permit and designs shall be carried out by a qualified structural engineer and certified by a Registered Building Practitioner in accordance with *The Building Code of Australia 2012 (BCA)*.

Structures that will be handed over to Council require design and construction to be the responsibility of a qualified engineer who has relevant experience in the required field of practice. For works that are a component of road and drainage infrastructure, only those engineers who are currently registered on the VicRoads "Register of Pre-qualified Contractors & Consultants", within an appropriate category and pre-qualification level, are eligible to provide design and construction services.

Design Certification shall be provided prior to Council approval of the plans. The construction of works shall be inspected by a qualified Structural Engineer / Registered Building Practitioner and Construction Certification shall be provided prior to Council accepting responsibility for future care and maintenance.

12.2 CONCRETE PAVEMENTS

Trafficable pavements for Access Lanes / Places shall be designed and constructed in accordance with the Cement, Concrete and Aggregates Australia publication, "*Guide to Residential Streets and Paths (CCAA T51 - 2004)*".

Trafficable pavement designs must be submitted to Council for review and approval.

Joint construction details for trafficable pavements, including spacing and type, shall be in accordance with *CCAA T51 - 2004* and shown on the drawings. The pouring sequence shall be prescribed on the drawings for all extended areas of paving, including road pavements, as recommended for the mitigation of shrinkage stress cracking.

Trafficable rigid pavements for higher order streets shall be in accordance with *VicRoads - Code of Practice for Selection & Design of Pavements & Surfacing (RC 500.22)* and *AustRoads - Guide to Pavement Technology - Part 2: Pavement Structural Design (AGPT02)*.

Concrete type and grade shall be clearly stated on the drawings.

Standard concrete footpath paving shall be constructed in accordance with Council's Standard Drawings, including joint and spacing details. Where waste collections are required to be traversed over such pavement these are to be designed to appropriate industrial standards.

12.3 STANDARDS

The design of Bridges and Culverts shall satisfy the requirements of the EDCM Clause 15.4 – Bridges.

In the absence of information in the EDCM, these structures shall be designed in accordance with the principles, practices and procedures of the *AustRoads Guide to Bridge Technology and the VicRoads Bridge Technical Notes*. The relationship between Bridge Technical Notes, AS5100 and the AustRoads Guide to Bridge Technology is summarised in the “*VicRoads Supplement to the AustRoads Guide to Bridge Technology*”. Construction shall comply with VicRoads Standard Specification. Other relevant standards include, but are not limited to, the following:

All loading assessments, material specifications, other design inputs and methodologies, not otherwise specified by Council guidelines, shall be in accordance with the applicable Australian Standards. Design Criteria shall be based upon the following:

- Bridge Design Code: AS 5100;
- Steel Structures: AS 4100;
- Concrete Structures: AS3600;
- Timber Structures: AS 1720.1 SAA Timber Structures Code - Part 1: Design Methods (Note: All timber grades and types adopted must be in accordance with the durability criteria as directed by Council or as specified in the applicable Standard);
- Loading Codes: - AS1170;
- Maintenance requirements and methods to be detailed and submitted;
- Design life of structures as per Table 11.

Table 11: Design Life Criteria

Structure Type	Design Life
General	25 years (Unless otherwise directed by Council in writing)
Bridges / Culverts / Structures supporting road infrastructure	100 years
Pedestrian Bridges / Boardwalks	50 years
Temporary Structures	To be discussed with Council
Stormwater Pits	50 years
Retaining Walls – Timber (not applicable in road reserves, parks and along reserve boundaries)	25 years
Retaining Walls – Concrete	50 years
Retaining Walls – Rockwork	50 years
Council Building Structures (eg Shelters in Parks)	50 years

12.4 MATERIALS

Materials with demonstrable environmental benefits are strongly encouraged, provided that the material is proven to meet all of its functional requirements with little or no impact on cost, maintenance and durability.

A small cost impost will be considered if there is a proven reduction in embodied energy, toxicity, or other environmental impact over the course of the materials' lifecycle.

All non-standard materials must be pre-approved by Council.

12.5 PLAN SUBMISSIONS

Concept Design

The concept for any structure, including all design criteria, must be submitted to and agreed by Council prior to the preparation and submission of final details for approval.

Drawings and Documentation

Design certificates and a copy of structural computations, geotechnical investigation report and design criteria for each structural element clearly shown, must be provided with the plans submitted to Council. The sheet size and number of copies of plans for submissions shall be in accordance with Council's general engineering approval requirements and submitted with the standard application form.

Engineering designs for civil and structural works within open spaces, parks and reserves which are submitted in a package with landscape works (i.e. shelters, pergolas, street furniture and art supporting structures, etc.) must be presented on a separate plan(s) indicating all construction details but excluding cladding or architectural details, additional finishes and 'soft landscaping' details.

12.6 STEELWORK

Pre-welded (shop-welded) steelwork connections or bolted connections are required by Council.

On site welding is not acceptable unless demonstrated that there is no other connection method possible. All site welds are to be cold galvanized on site.

Finishes – all exposed steelwork must be hot-dip galvanized.

12.7 FOUNDATIONS

Copies of Geotechnical Engineering reports must be provided with the foundation computations.

Bearing capacity and depth requirements for foundations must be specified on the plans and verified on site by a pre-qualified Geotechnical Engineer. Copies of site inspection reports shall be submitted to council.

12.8 HERITAGE LISTED INFRASTRUCTURE

Special consideration shall be given where proposed works have impacts on heritage listed infrastructure (on the CoW Heritage Overlay, Victorian Heritage Inventory and Register) and such proposals shall be referred to a heritage advisor for comment.

Maintenance of infrastructure listed on the Heritage Overlay or State Inventory or Register may require specialist advice which should be considered during the design.

12.9 CONSTRUCTION SUPERVISION & CERTIFICATES

It is the responsibility of the Developer / Principal to ensure that a suitably qualified engineer is engaged for supervising all structural works on site and providing a Certificate of Completion, which verifies that the structural components of the works were completed in accordance with the approved design plans (refer to Clause 12.1 above).

During construction Council Officers shall be notified of all hold points unless confirmed otherwise by Council as part of design approval.

At the finalisation of the construction works the following procedures shall be adhered to:

- A copy of all Site Inspection Reports must be forwarded to Council for its records;
- Prior to Council's acceptance of Practical Completion (for the purpose of a Statement of Compliance), "As Constructed" plans shall be provided;
- The Defects Liability Period (DLP) that applies will be as for other engineering works or as required by the Planning Permit;
- The End of DLP and Handover process followed will be as for other engineering works;
- Standard structural details (and / or shop drawings) shall be provided to Council (unless issued by Council as a "Standard Drawing").

13 STORMWATER DRAINAGE DESIGN

13.1 OBJECTIVES

These drainage guidelines shall apply to the provision of stormwater drainage for all forms of residential, commercial, industrial and rural developments within the City of Whittlesea as appropriate.

The objective is to ensure stormwater drainage systems designed in the City of Whittlesea operate to maximise benefits to the community based upon adequacy of design, economy of construction and a high level of safety and amenity, including provision to:-

- Ensure hazardous situations do not arise on streets and footpaths;
- Ensure that all buildings in urban areas are protected against floodwaters to a similar standard to that applying in other growth areas of Melbourne;
- Limit rubbish and pollutants entering the stormwater drainage system;
- Prevent erosion and sedimentation in estate development;
- Integrate drainage works into urban planning of estate development;
- Provide for multiple use of land for drainage, recreation and transportation.

13.2 CONSISTENCY WITH OTHER GROWTH AREA COUNCILS

The City of Whittlesea has adopted the *Engineering Design and Construction Manual (the EDCM)* for Subdivision in Growth Areas which was delivered as a Metropolitan Planning Authority (MPA) Project. These Whittlesea drainage design guidelines have been revised to be consistent with the requirements of the EDCM. They also contain additional information on the provision of drainage infrastructure not covered by the agreed standards of the EDCM, including subdivisions in non-residential zones and other developments where drainage is a condition of a planning permit.

For ease of use the full technical content of the *EDCM Drainage Design Section* (contained in Metropolitan Planning Authority's publication dated April 2011) has been incorporated, thereby avoiding any need for cross referencing.

13.3 DRAINAGE PROVISION FOR SUBDIVISIONS

Where necessary in proposed developments, the drainage system shall accommodate runoff from the upstream catchment, using parameters applicable to the planning scheme zone(s), and provide for downstream drainage works to an approved point of discharge.

Council and Melbourne Water drainage schemes shall be shown on the plans.

Main drains should follow the valleys in reasonably straight alignments, with a minimum of deviation. Natural drainage paths shall be preserved, in the form of roadways, parkland, walkways, etc., and shall have a discharge capacity at least equal to that of the pipe drain.

Where the construction of drainage infrastructure within the mandatory open space provision of a subdivision cannot be avoided the Council will require any detrimental impact upon the

unencumbered use of that space to be mitigated either by variations to the works, special landscaping, additional space or a combination of these solutions as may be appropriate.

Private allotments will not be permitted downstream of low points in roadways, downhill court bowls, or any other locations where drainage flows may concentrate.

Gap flows shall be confined to roadways and reserves and under no circumstances encroach onto private allotments. Freeboard may be permitted to extend a limited distance into allotments in accordance with the provisions of these guidelines.

It is a requirement of the City of Whittlesea that the proposed land use for all of the above be clearly described on the Functional Layout Plan(s) for the subdivision (see Section 5.2 – Functional Layout Plan – Design and Preparation).

Council is the responsible authority for all minor and major drainage works outside the authority of Melbourne Water. All new drainage works on creeks and waterways shall be to the approval of both Council and Melbourne Water.

13.4 STORMWATER AND WATER SENSITIVE URBAN DESIGN

Clause 56 of the Victorian Planning Provisions (urban runoff management objectives and Standard C25) requires that stormwater run-off from residential subdivisions in an urban area comply with the *Urban Stormwater – Best Practice Environmental Management Guideline (BPEMG)*.

Council supports the principles of Water Sensitive Urban Design and requires the drainage design to incorporate these principles wherever practicable. Drainage designs for residential estates shall:

- Incorporate water quality and water quantity treatment measures to enhance quality of the drainage runoff before discharging it to a creek or other main drainage network; and
- Maintain pre-development flows at the outlet from the subdivision, unless otherwise approved by the responsible drainage authority;
- Refer to City of Whittlesea's Water Sensitive Urban Design Guidelines which have been specifically developed in conjunction with Melbourne Water.

13.5 DRAINAGE DESIGN REFERENCES

Design and construction of stormwater management systems for residential development needs to be in accordance with the current edition / version of the following documents:

- "Urban Stormwater – Best Practice Environmental Management Guideline", EPA, CSIRO, Melbourne Water et al;
- "Australian Runoff Quality Guidelines", Engineers Australia, (ARQ);
- "Australian Rainfall and Runoff", Institution of Engineers Australia, (ARR);
- "Land Development Manual", Melbourne Water, (LDM);
- Austroads "Guide to Road Design – Part 5"
- VicRoads Supplement to the Austroads Guide to Road Design – Part 5, 5A, 5B;

- “Fibre Reinforced Concrete Pipes” AS 4139; and
- “Design for Installation of Buried Concrete Pipes” AS 3725.

13.6 DRAINAGE DESIGN CRITERIA IN NEW URBAN AREAS

13.6.1 Parameters

All hydrologic computations shall be in accordance with the parameters of *Australian Rainfall and Runoff (ARR)* – current issue. Where local confirmable information, such as flood levels for known storm events and observed flow paths of major flood events are provided by the responsible drainage authority these should be used in conjunction with ARR parameters.

13.6.2 Flood Predictions

Urban drainage system design within the City of Whittlesea shall satisfy the requirements of both the **Major** and **Minor** flood predictions as defined in ARR.

The flood prediction model shall take into account the layout of the proposed drainage system including the measurement and influence of any outside catchments that contribute to the design flows, definition and measurement of sub-catchments, pipe networks and major flow routes.

Major storm event drainage design shall apply to residential, commercial and industrial subdivision development as well as significant infill and redevelopment sites.

The designer shall be required to:

- Keep developments clear of overland flow paths;
- Set floor levels above predicted flood levels;
- Upgrade existing drains, where necessary; and
- Provide reserves or constructed roads for overland flow paths.

13.6.3 Minor System Flows

The Minor system shall include the design of the gutter, pits and pipe network capable of carrying runoff from minor storms, without flooding of gutters, surface of property or access thereto.

The capacity of the Minor system shall be designed to receive and contain within the piped network of the property design flows determined in accordance with building regulations and / or calculated using the parameters nominated in this guideline.

In the event that the contribution of a Minor system flow from a development exceeds the point of discharge capacity available at the downstream trunk drain the designer shall provide an on-site detention / storage system to Council’s satisfaction (see Section 13.11, “On-Site Detention Systems”, of the document).

13.6.4 Major System Flows

The Major system shall comprise both planned and unplanned drainage routes, in piped networks and overland, that will convey runoff from Major storms to trunk drains.

The designer shall avoid trapped low points in road sags or downhill court bowls that could cause flooding of private property. Specific escape routes along roadways or public reserves shall be provided to eliminate such trapped low points.

The designer shall plan for roads, public open spaces or drainage reserves along overland flow paths. The pattern of drainage system flows shall be indicated on plans submitted with drainage design computations. The plans shall indicate specific routes designed to capture significant overland flows.

The designer shall ensure that proposed development within the drainage reserves, such as fences, facilities or bridges and culverts, shall not obstruct the path of flows from major storm events.

13.7 HYDROLOGICAL DESIGN

As an aid to the designer rainfall data for the City of Whittlesea, derived from ARR, has been included in these guidelines.

The Rational Method shall be used to estimate the peak flow rates for the determination of sizes of inlets, pipe and culvert sizes and overland flow calculations.

In situations where large detention basins for flood storage are proposed, then methods such as runoff routing are preferred. It is the designer's responsibility to use the most appropriate method for the particular situation under investigation.

13.7.1 Basis for Calculations

Catchment

Boundaries of the catchment may be determined by the following methods:

- Contour maps; or
- Aerial photographs; and/or
- Field inspection/survey levels.

A Catchment Plan containing accurate contour information shall be included with the drainage computations submitted to Council.

Where plans showing the location of existing drainage networks are available, these will be made available by Council at current charges. Any data from such plans must be confirmed by survey if it forms part of the new design.

The designer shall take into account future road patterns where the contributing catchment includes areas subject to future development.

Where the contributing catchment includes existing subdivision areas, the location of existing drainage systems and the catchment associated with the drainage network being designed shall be include in the computations.

Runoff Computations

Computation of runoff shall be determined using the Rational Method:

$$Q = CIA/360$$

Where:

Q	=	design discharge (m ³ /s)
C	=	runoff coefficient
I	=	rainfall intensity (mm/h)
A	=	catchment area (Ha)

For large catchments the designer shall be responsible for ensuring that possible “Partial Area Effects” are taken into account when calculating peak flows using the Rational Method.

Hydraulic programs using other than the Rational Formula may be permitted subject to prior agreement by Council.

The runoff coefficient to be used shall be determined based upon the fraction impervious surface within the contributing catchment and the design recurrence of the storm considered.

For subdivisions, the fraction impervious to be adopted and the coefficient of runoff for the type of development category shall be determined from the tables in this guideline.

For buildings and other development on individual property where the provision of drainage is a requirement of the planning permit the fraction impervious shall be calculated and the average exceedance probability selected for the appropriate development category in Table 16, “Land Use Fraction Impervious”, of these guidelines.

Rainfall Intensity

Australian Rainfall and Runoff (ARR) procedures shall be used to calculate rainfall intensities for the relevant location (see Section 13.14, “Rainfall Data”).

13.7.2 Average Exceedance Probability

The values in Table 14 below shall be used for drainage design. Water Sensitive Urban Design schemes shall use values indicated in Section 13.12, “Water Quality Treatment Measures” of these guidelines and referred documents.

Table 14: Average Exceedance Probabilities (AEP)

Urban Residential Subdivision	20% (Q ₅) – Subject to Note below.
Industrial/Commercial Subdivision	10% (Q ₁₀)
Floodways	1% (Q ₁₀₀)
Other Building Developments	Table 15 - Development Category (ARI)

Note: Pipelines located within easements on residential property carrying runoff contributed by non-residential sub-catchment shall be designed for an AEP of 10% (Q₁₀).

13.7.3 Time of Concentration

The maximum time to be adopted for flow travel from sub-catchment to point of entry into the drainage system shall be as per Table 15 of this guideline below.

Table 15: Times of Concentration

DEVELOPMENT CATEGORY	MAXIMUM TIME OF CONCENTRATION (T ₁)	AVERAGE RECURRENCE INTERVAL
MINOR SYSTEM		
Road Reserves:		
Access Lane / Place / Street	5 minutes	5 years
Connector / Arterial Road	6 minutes	5 years
Residential Lots:		
Area up to 450 sm	5 minutes	5 years
Dual Occupancy	5 minutes	5 years
Area 451 - 4000 m ²	7 minutes	5 years
Public Open Space:		
Parklands up to 4000 m ²	7 minutes	5 years
Parklands > 4000 m ²	Calculated	5 years
Other Uses:		
Retirement Living Sites	Calculated	5 years
Multi-unit Dwelling Sites	Calculated	5 years
Industrial / Commercial Sites	Calculated	10 years
Public Facilities:		
Civic Centres	Calculated	50 years
Educational	Calculated	50 years
Halls	Calculated	50 years
Hospitals	Calculated	100 years
Pre-Schools	Calculated	100 years
MAJOR SYSTEM		
Catchment < 60 Ha	Calculated	Council criteria
Catchment > 60 Ha	Calculated	MWC criteria

The Time of Concentration (T_c) for any sub-catchment shall be determined by summation of times of travel for overland flow, flow in channels, flow in gutters and pipe flow.

$$T_c = T_1 + T_2 + T_3$$

Where:

T_c = time of concentration

T₁ = time to reach the pipe or kerb and channel

T₂ = kerb and channel travel time

T₃* = pipe travel time; or, = L / V where L = pipe length

* T₃ shall be determined up to but not including the pipe reach being designed.

The Kinetic Wave Equation may be used to determine the time of concentration of overland flow.

Partial Area Effect

The designer shall be responsible for ensuring possible “Partial Area Effects” are taken into account when calculating peak flows using the Rational Method.

13.7.4 Runoff Coefficient

To simplify the application of runoff coefficients they have been calculated for the City of Whittlesea area in accordance with the *Australian Rainfall and Runoff (AR&R) Volume 1 (May 2003), Book VIII, Section 1.5.5 (iii) - Runoff Coefficients*.

Intensity Frequency Duration Data has been obtained from the Bureau of Meteorology website using coordinates that are central to the municipality.

<http://www.bom.gov.au/hydro/has/cdirswebx/index.shtml>

To simplify the application of runoff coefficients, values have been limited to those listed in Table 17 of this guideline.

For the design of Major and Minor Drainage Systems associated with subdivisions in “greenfield” catchments fraction impervious values for discrete sub-catchments of uniform use shall be taken from the “Typical Values” column in Table 16 of this guideline. Averaging values across multiple use zones or allotment density as listed is not permitted.

“Typical Values” do not apply for the design of Minor and Intra-lot Drainage Systems associated with infill subdivision, redevelopment and individual building development sites requiring a planning permit and the fraction impervious shall be calculated. Anticipated values are provided in the “Normal Range” column under “Individual Sites” of Table 16.

Table 16: Land Use Fraction Impervious

ZONE	ZONE CODE	BRIEF DESCRIPTION / EXAMPLES	NORMAL RANGE	TYPICAL VALUE
RESIDENTIAL ZONES:				
Residential 1 & 2 Zone	R1Z	Normal range of densities (Allotment size 601m ² – 1000m ²)	0.40 – 0.60	0.50
	R2Z	Medium densities (Allotment size 450m ² – 600m ²)	0.50 -0.70	0.60
		High densities (Allotment size <450m ²)	0.70 – 0.90	0.80
Low Density Residential Zone	LDRZ	Low densities (Allotment size 1001m ² – 4000m ²)	0.15 – 0.45	0.30
Mixed Use Zone	MUZ	Mix of residential, commercial, industrial & hospitals.	0.60 – 0.90	0.70
Township Zone	TZ	Small townships with no specific zoning structures	0.40 – 0.70	0.55
INDUSTRIAL ZONES :				
Industrial 1 Zone	IN1Z	Main zone to be applied in most industrial areas.	0.70 – 0.95	0.90
Industrial 2 Zone	IN2Z	Large industrial zones away from residential areas.	0.70 – 0.95	0.90
Industrial 3 Zone	IN3Z	Buffer between Zone 1 and Zone 3 - for garden	0.70 – 0.95 0.30 – 0.30	0.90 0.50 0.30

ZONE	ZONE CODE	BRIEF DESCRIPTION / EXAMPLES	NORMAL RANGE	TYPICAL VALUE
		supplies/nurseries - for quarries	0.60 0.10 – 0.40	
BUSINESS ZONES :				
Business 1 Zone	B1Z	Main zone to be applied in most commercial areas.	0.70 – 0.95	0.90
Business 2 Zone	B2Z	Offices and associated commercial uses	0.70 – 0.95	0.90
Business 3 Zone	B3Z	Offices, manufacturing industries & associated uses.	0.70 – 0.95	0.90
Business 4 Zone	B4Z	Mix of bulky goods retailing & manufacturing industries.	0.70 – 0.95	0.90
Business 5 Zone	B5Z	Mix of offices & multi-dwelling units	0.70 – 0.95	0.90
RURAL ZONES :				
Rural Zone	RUZ	Main zone to be applied in most rural areas.	0.05 – 0.20	0.10
Environmental Rural Zone	ERZ	Rural areas with specific environmental considerations.	0.05 – 0.20	0.10
Rural Living zone	RLZ	Predominantly residential use in rural environment.	0.10 – 0.30	0.20
PUBLIC LAND ZONES :				
Public Use Zone		Use of land for public purposes.		
Service and Utility	PU1Z	Power lines, pipe tracks and retarding basins. Reservoirs.	0.20 – 0.30 0.40 – 0.60	0.25 0.50
Education	PU2Z	Schools and universities.	0.60 – 0.80	0.70
Health and Community	PU3Z	Hospitals.	0.60 – 0.80	0.70
Transport	PU4Z	Railways and tramways.	0.60 – 0.80	0.70
Cemetery / Crematorium	PU5Z	Cemeteries and crematoriums.	0.50 – 0.70	0.60
Local Government	PU6Z	Libraries, sports complexes and offices / depots.	0.70 – 0.90	0.80
Other Public Use	PU7Z	Museums	0.50 – 0.80	0.60
Public park and Recreation	PPRZ	Main zone for public open	0.20 –	0.25

ZONE	ZONE CODE	BRIEF DESCRIPTION / EXAMPLES	NORMAL RANGE	TYPICAL VALUE
Zone		space, including golf courses.	0.30	
Public Conservation and Resource Zone	PCRZ	Protection of natural environment or resources.	0.05 – 0.25	
Road Zone – Category 1	RDZ1	Major roads and freeways.	0.60 – 0.90	
Road Zone – Category 2	RDZ2	Secondary and local roads.	0.50 – 0.80	
SPECIAL PURPOSE ZONES :				
Special Use Zone	SUZ	Development for specific purposes.	0.50 – 0.80	0.60
Comprehensive Development Zone	CDZ	Large and complex developments – residential.	0.40 – 0.80	0.50
Urban Floodway Zone	UFZ	Land identified as part of an active floodway.	0.05 – 0.25	
COMMONWEALTH LAND :				
Commonwealth Land	CA	Army barracks, CSIRO.	0.50 – 0.80	0.60
INDIVIDUAL SITES :				
High Density Residential		Dual occupancy, Multi-unit and Retirement Living Developments	0.70 – 0.90	NA
Industrial / Business Property		Industrial and Commercial Developments	0.80 – 1.00	NA
Recreation / Public Space		Formal Landscape, Playgrounds, Sports Fields and Wetlands.	0.30 – 0.80	NA
Community Facilities		Schools, Hospitals, Community Centres	0.60 – 0.90	NA

Table 17: “C” Values

NORTH-WEST REGION – WHITTLESEA

f = fraction impervious

$C'_{10} = 0.16031382$

f	C5	C10	C50	C100
0.2	0.293	0.308	0.355	0.370
0.5	0.504	0.530	0.610	0.636
0.6	0.574	0.604	0.695	0.725
0.7	0.644	0.678	0.780	0.814
0.8	0.714	0.752	0.865	0.902
0.9	0.785	0.826	0.950	0.991
1.0	0.855	0.900	0.991	1.000

13.8 HYDRAULIC DESIGN

Drainage design shall be based on hydraulic grade line (HGL) analysis, using appropriate pipe friction and drainage structure head loss coefficients. Friction losses in pipe drains shall be calculated using Manning's formula. The Colebrook-White formula may also be used if appropriate. Pipe sizes shall be determined using an applicable programme or from a velocity/discharge diagram based upon one of the above equations.

13.8.1 Pipeline Flows

HGL analysis shall be carried out by starting at the outfall structure at the lower end of the pipe network and proceeding upwards through each consecutive pipe run to the most remote structure of the pipe network. The HGL shall be shown on drainage plans and designed to be at least 300mm below the surface or kerb or channel invert and not more than 2metres above the pipe obvert.

Where the outfall is an existing pipe network and more accurate information is not available the tailwater level shall be taken as 300mm below either:

- Invert of kerb and channel for drains in roads; or
- Existing surface in easements and open space.

Council may require the information to include section(s) downstream to confirm the hydraulic assumptions.

13.8.2 Pipe Friction

Table 18: Friction Factors

	MANNING N	COLEBROOK - WHITE k (mm)
Concrete	0.013	0.6
Other Materials	To Manufacturer's specification	To Manufacturer's specification

13.8.3 Pipe Flow Velocity and Grade

Desirable Minimum Design Velocity for any depth of flow is 1.0m/sec but may be reduced in special circumstances, with approval, to limits shown in Table 19 below.

Desirable Maximum Velocity is 4.0m/sec but may be increased in special circumstances, with approval, to limits shown in Table 19 below.

Where the HGL Design velocity is less than the desirable value the designer shall make every attempt to adjust invert levels that will provide flow of at least 1.0 m/s when not under head.

Table 19: Acceptable Velocities

	DESIRABLE	GENERAL	FLAT TERRAIN	STEEP TERRAIN
Minimum	1.0 m/s	0.9 m/s	0.6 m/s	NA
Maximum	4.0 m/s	5.0 m/s	NA	6.0 m/s

13.8.4 Head Losses

Wherever the configuration of pits, changes of pipe alignment and increases in grade create significant head losses these shall be calculated using ARR and / or AustRoads design procedures.

13.9 PIT CRITERIA

Inlets to the drainage system shall be designed to capture and limit the width of gutter flows to acceptable dimensions during the storm event for which the pipe system is designed and to ensure pedestrian kerb ramps remain “dry”.

For all new road construction Grated Entry Pits (GEP's) shall be provided. Old style Side Entry Pits (SEP's) may only be used for the modification of existing pipelines. Pits may be precast providing they are single units in accordance with the Standard Drawings.

Junction Pits (JP's) with dimensions greater than shown on Standard Drawings shall be in accordance with applicable Melbourne Water Standards.

13.9.1 Alignment at Pits

Where possible, drops and deflections shall be kept to a minimum to maintain the flow through pits as a jet and minimise head loss created by turbulence.

Where drops through pits are unavoidable, the pit length should be increased to avoid flow impacting the opposite wall. Where abrupt changes of pipe alignment are unavoidable, deflectors in pits are preferred.

Required drops (at invert)

- Generally 50mm to 100mm for same size pipes;
- Match springing lines for change in diameter, but a drop shall not be less than 50mm;
- Drops in the range 100mm to 1.5 Do are not permitted except:

Where springing lines are matched

For minor branches where $D_b < 2/3D_o$ (D_b = branch diameter and D_o = outlet diameter)

To dissipate head in steep terrain

- Drops greater than $1.5D_o$ are acceptable on long pipe reaches (where there are considerable savings in excavation) for pipe sizes up to 450mm.

The maximum permitted deflections in pits are

- For $D_o \leq 600\text{mm}$:

$0^\circ - 50^\circ$: align as in standard detail

$50^\circ - 90^\circ$: provide deflector in pit floor

$>90^\circ$: not permitted

- D_o 675mm – 900mm:

Maximum deflection - 45°

- $D_o \geq 1050\text{mm}$

Maximum deflection – 10°

13.9.2 Kerb Inlet Locations

Pits shall be spaced to capture all surface flow resulting from the design rainfall event with a maximum spacing of 90m.

In addition to the provision of kerb inlets at low points, they are required as follows:

- Adjacent to tangent points of kerb returns where the channel falls towards the intersection;
- The upstream tangent points of curves in streets;
- Double entry pits at low points of streets where one or both channel grades are greater than 7%;
- At 10metres, approximately, either side of the low point in flat vertical curves, except where “saw-tooth” grading of the kerb is employed;
- Construction limits where existing inlets downstream are inadequate.

13.9.3 Kerb Inlet Design

Hydraulic criteria for entry design of Grated Entry Pits (GEP's) vary and shall be investigated for specific cases where appropriate, including the following:

- Inlets at trapped low points in streets shall be double entry (or triple where necessary) and shall be designed as an orifice with a 50% safety factor. When considering this condition the head required to achieve design flow / capture shall be within permitted safety limits;
- At trapped low points the effects of total inlet blockage and / or by-pass shall also be evaluated to ensure the level of flood waters, in relation to footpaths and properties meets safety and freeboard requirements.

Where a standard pit, on grade, is insufficient to capture the full flow the designer shall either:

- Reduce the pit spacing; or
- Provide multiple entry pits (double or triple).

13.10 SURFACE DRAINAGE

The capture and / or control of surface flows from within new subdivisions and from undeveloped land external to any development often requires the provision of significant land space that can impact upon the planning of a development. The methods proposed to satisfy the spatial requirements of this aspect will be checked by Council during assessment of the Functional Layout Plan.

13.10.1 Design Flow (Minor System)

The maximum depth of flow in kerb and channel, for a 20% Annual Exceedance Probability (AEP) design storm, shall be 0.14metres for barrier type (B2) and 0.11metres for roll-over type (SM2).

The maximum width of flow in the channel and roadway for a design storm shall not be greater than 3.0m, or the width of a parking lane if one is provided.

In locations where the level at a property line is below the kerb level, care shall be taken to ensure the maximum allowable depth of flow is not exceeded (see also Section 5.1, "Pipeline Design Criteria" - Part (m), of these guidelines).

13.10.2 Gap Flows (Major System)

All streets shall be designed for the conveyance of the 1% AEP design storm, where no pipe is provided, or the applicable gap flow.

Main drains shall not be located within local streets unless an adequate cross section has been approved, during the planning phase, to contain gap flows meeting Melbourne Water design requirements.

The maximum depth and velocity of flow along an overland flow path for a 1% AEP design storm shall be in accordance with relevant requirements including the *Melbourne Water LDM, Appendix A - Floodway Safety Criteria*.

13.10.3 Freeboard in Subdivisions

For City of Whittlesea drainage systems (usually catchments of less than 60 Ha.) finished levels of allotments adjacent to overland flow paths for a 1% AEP design storm should ensure gap flows are retained in the road reserve with 150mm freeboard.

Where the finished surface of a lot is above fixed levels at the property line the freeboard (i.e. the level 150mm above the gap flow design level) will be allowed to extend a maximum of 2.0m into the lot.

Where the finished surface of a lot is below fixed levels at the street add required controls on title. The minimum floor level may need to be specified.

For Melbourne Water pipe drainage systems (usually in designated “Valley Floor” locations serving catchments of 60 Ha. and over) finished levels of allotments adjacent to overland flow paths for a 1% AEP design storm shall provide a minimum 300mm freeboard in accordance with requirements of the *Melbourne Water LDM, Section 5.3.2 - Designing for Stormwater Conveyance - Hydrologic and Hydraulic Design*.

13.10.4 Overland Flow Paths

Where a low point occurs in a longitudinal road grading or at the end of a court bowl, the footpath or fixed level at the property line shall be designed to prevent inundation and to provide an overland flow path for the 1% AEP design storm clear of private property and unencumbered open space. The use of surface grates and pipes with capacity exceeding the 20% AEP design shall not be relied upon to avoid the provision of the overland flow path.

13.10.5 Protection from Natural Sheet Flows

Property adjacent to large areas of open space and planning zones that preserve the natural catchment conditions shall be protected from rainwater runoff, either occurring as sheet flow or concentrated by minor contour changes.

Swales catch drains and other drainage infrastructure shall be provided along the high side of the development and be appropriate for the natural conditions, including the provision of access for maintenance.

Hydrological parameters such as fraction impervious and times of concentration shall be assessed in accordance with ARR methodologies for the specific location, taking into account terrain, geology and vegetation cover that might increase rates of runoff above those derived by adopting “typical values” from Section 3, Hydrological Design, of these guidelines above. The designs shall cater for a 1% AEP design storm with a minimum 150mm freeboard.

13.10.6 Floodways in Drainage Reserves

Floodways in drainage reserves shall be designed for both Minor and Major Storm criteria. Finished levels of new development adjacent to floodways shall provide a minimum 600mm freeboard above the 1% AEP design storm.

Provision for pedestrian access in reserves (shared paths, etc.) shall be consistent with the safety criteria for the predicted flood extent. Depth and velocity of flow at paths, crossing structures and intersecting streets shall be within limits contained in the *Melbourne Water LDM, Appendix A - Floodway Safety Criteria*. Also refer to *Melbourne Water Shared Path Guidelines (2009)*

13.10.7 Design and Construction Criteria

Pipelines shall be uniformly graded and generally aligned in straight sections between pits. Curved pipelines are permitted only where they are of constant radius with joints in accordance with the pipe manufacturer’s specifications and meeting all other requirements of these guidelines.

13.10.8 Pipeline Criteria

- (a) Fibre Reinforced Concrete (FRC) pipes, or heavy duty sewer quality UPVC pipes subject to project specific approval, may be used. All pipes, pipe laying, bedding and backfilling shall conform to the relevant Australian Standards and the Council Specification for road and drainage construction.
- (b) Minimum diameter of pipelines in easements is 225mm except that pipelines carrying runoff solely from allotments may be 150mm when laid at 1 in 80 and steeper.
- (c) Minimum diameter of pipelines in road reservations shall be 300mm, except that pipelines carrying runoff solely from allotments may be 225mm.
- (d) Reduction of pipeline diameter between the inlet and outlet is prohibited for sizes 375mm or less.
- (e) Jointing of Pipelines on straight alignments:
 - Sizes up to and including 750mm diameter shall be Rubber Ring Jointed (RRJ);
 - Sizes 825mm and larger shall be flush jointed with external sealing bands.
- (f) Curved alignments may be used for pipelines up to and including 750mm diameter where a large radius curve can be achieved using deflections at joints within manufacturer's recommendations.
- (g) Curved alignments for pipelines 825mm diameter and larger shall be designed as segmented curves using splayed pipes with bandaged joints to manufacturer's specifications. Standard segments (square ended) may be used for deflections greater than manufacturer's recommendations provided bandaged joints to Melbourne Water Standard Drawing 7251/4/308 is used.
- (h) Design HGL shall be at least 300mm below the invert of kerb and channel within roads or existing surface in easements and open space and not more than 2.0metres above pipe obvert.
- (i) Connections to open waterways, for which Melbourne Water is the Responsible Authority, shall be in accordance with the requirements of Melbourne Water. Pipelines upstream of that connection will not be approved by Council without evidence of Melbourne Water approval being provided.
- (j) Connections to open waterways, for which Council is the Responsible Authority, shall be designed to:
 - Be angled downstream;
 - Have drops, from pipe invert to normal receiving tailwater, of not more than 300mm;
 - Limit exit velocities to the values specified in the Melbourne Water LDM.
- (k) Drains within the road reserve shall be located on the high side of the road, unless specifically approved otherwise during assessment of the Functional Layout Plan.
- (l) Minimum cover to reinforced concrete pipes shall be:

- In easements and open space reserves, 450mm subject to pipe class requirements being satisfied for maintenance vehicle loading;
- In road reserves, the greater of 750mm below design surface or 150mm below underside of pavement (including the capping layer);
- Subject to pipe class requirements being satisfied for excess construction equipment loading.

(m) Nature strips in new subdivisions shall not grade towards private property. In existing roads where the “reverse fall” on a nature strip must be retained the HGL of the drainage line shall be at least 300mm lower than the top of any pit grate in the footpath cut-off drain.

(n) Anchor blocks shall be provided where pipe slope is steeper than 1 in 10 and pipe length greater than 25metres. Spacing shall be determined to ensure there is one anchor block for each 2.5metre rise as follows:

Table 20

ANCHOR BLOCK SPACING			
GRADE	MAX SPACING	GRADE	MAX SPACING
1 in 1	2.5	1 in 6	15.0
1 in 2	5.0	1 in 7	17.5
1 in 3	7.5	1 in 8	20.0
1 in 4	10.0	1 in 9	22.5
1 in 5	12.5	1 in 10	25.0

Refer to Standard Drawings for details of anchor block construction.

13.10.9 Pit Design Criteria

- Pits shall be used for all pipe junctions (other than 150mm property connections), increases in size, changes of direction and at the start and end of curved pipelines.
- For pipelines 1050mm diameter and larger, any change of direction greater than 10 degrees must be achieved by introducing a curved alignment.
- For pipelines 1050mm diameter and larger Council approval may be granted for maintenance access points to be more than 90 metres apart in accordance with Melbourne Water practice for large diameter pipelines.

Pits within streets should, preferably, be located at or about the mid-point of allotment frontages to reduce the likelihood of conflict with future driveway locations. Pits shall be located with a minimum 1metre clearance from planned vehicle crossings and pedestrian kerb ramps.

Pit inverts shall be profiled to shape with mass concrete to match the outfall pipe in accordance with Standard Drawings. Where deflectors are proposed they shall be detailed on the plans, as variations to the Standard Drawings, for approval.

Where surface grates of non-standard design are required they must be safe for cyclists.

13.10.10 Property Connections

- (a) A property connection shall be placed at the lowest point of each property. Refer to Standard Drawings for the applicable residential property connection arrangement.
- (b) Stormwater connections from all properties are to be connected directly into the underground drainage system unless otherwise approved as part of a WSUD treatment train.
- (c) Generally, unless otherwise required and approved in advance of design submission, only one outlet from the internal stormwater system of a property will be permitted to connect into Council drainage.
- (d) Whenever the depth of a connection is critical for adequate lot control the invert level shall be calculated, for internal system to satisfy Plumbing Regulations, and shown on the plans.
- (e) Stormwater connections, other than a standard 150mm property connection from a single dwelling site, shall be sized for full development of the property in accordance with these guidelines using a pipe laid at minimum slope.
- (f) All industrial properties and other similar development sites shall be provided with a junction pit, inside the property boundary, suitable for the connection of all internal drainage.

13.10.11 Subsurface Drainage

Subsurface drainage is to be provided as indicated in the Standard Drawings and shall discharge into pits at a level above the highest obvert of any stormwater pipe open to the pit.

In situations where the swell potential of the sub grade is 2.5% or more (i.e. highly expansive subgrade), a continuous unbroken capping layer is generally required. In these cases the invert of the sub surface drain is to be raised such that it drains the pavement only. Trenches for the sub surface drains must not be into the subgrade below the capping layer.

Provision should be made for “flush-out-risers” at crests in accordance with standard drawings and the construction specification.

13.11 ON-SITE DETENTION SYSTEMS

Generally multi-dwelling, commercial and industrial building development on a property, for which the existing drainage is inadequate by current standards, will require an On-Site Stormwater Detention system (OSD). An exemption may be granted where there has been an investigation, to the satisfaction of Council, which proves that existing Council drainage for the property is designed for the likely total area of hard surfaces and is therefore adequate.

Where OSD is required, the system must be sited within the property clear of any proposed building or easements serving other property, including Council drainage or other authorities' use. The system must be designed in accordance with the following requirements and the computations of the proposed system must be submitted for approval.

- ARI = 10 years (for discharge control and storage)
- $C_{(pre-development)}$ = 0.35 (or higher value provided by Council)
- $C_{(post-development)}$ = As determined in accordance with Council Guidelines

An “orifice plate” type control pit, multi-cell device or other approved flow restriction system is to be used.

The minimum control orifice design size shall be 63mm diameter. Where the orifice is less than 90mm size, a suitable mesh screen must be installed to prevent blockages.

Overflow from the flow restriction device must be taken into account when designing the outlet, to allow for un-planned events (gap flows, blockages, etc.). The overflow weir / plate shall be at least 300mm upstream of the outlet pipe and have a minimum clearance of 100mm from the underside of any cover.

13.11.1 Design Parameters for On Site Detention

To protect the capacity of the existing drainage system the On-Site Stormwater Detention system needs to be designed based on estimates of flows from the site. The document provides details of how these calculations shall be done. The design parameters for an OSD system include:

- (a) Site area;
- (b) Base case (predevelopment) fraction impervious of 0.35. Council may, at its discretion, adopt a higher value when the existing Council drainage is known to have been designed using a value greater than 0.35;
- (c) Proposed fraction impervious, based on all planned impervious surfaces, including paving;
- (d) Site time of concentration, to be determined by designer;
- (e) Catchment time of concentration (Council reserves the right to nominate this value);
- (f) Flow travel time from site to catchment outlet (Council reserves the right to nominate this value for “OSD4” calculations);
- (g) Rainfall intensity, to be determined by designer in accordance with the City of Whittlesea Drainage Guidelines; and
- (h) Average Recurrence Interval (ARI), as nominated in these guidelines.

13.11.2 Key Aspects of an On Site Detention System

There are two elements that need to be determined for a site from the above parameters. These are:

- Permissible Site Discharge (PSD); and
- Site Storage Requirement (SSR).

The PSD is based on a 5 year ARI storm. Most Council drains in residential areas were designed for a 5 year ARI peak flow. The aim of the PSD is to limit the site discharge to ensure that existing Council pipe drains do not surcharge more frequently as a result of site redevelopments. Council reserves the right to nominate the time of concentration for the catchment to be used in the computation of PSD.

The SSR is based on a 10 year ARI storm. All High Density Residential, commercial and industrial areas are designed for a 10 year ARI, in accordance with ARR. The Council has therefore set the storage requirement to ensure new OSD systems do not overflow to Council

drains and compromise their 1 in 10 year design capacity. The requirement for an SSR based on the 10 year ARI storm also allows for an increased volume and duration of runoff from the redeveloped site and the possibility of this delayed flow coinciding with the peak flow from the larger catchment.

13.11.3 Design Details of On Site Detention Systems in Whittlesea

The site drainage system is to be designed to collect runoff from the whole site including all pervious and impervious areas and direct it to the site storage area in accordance with accepted plumbing requirements. All surface inlets must have suitable grates to prevent blockages of the underground drainage system.

Site Storage System

The site storage is required to temporarily store rainwater during a storm, while the flow out of the storage is controlled.

Storage shall be provided below ground in a fixed storage system that is free draining. Pipes used for storage must be laid at a minimum slope of 1 in 200.

For some developments of significant size (e.g. Retirement Villages), where topography and space permit, Council may, at its sole discretion, allow that part of the site storage volume in excess of the 5 year ARI storage to be provided above ground. Any such above ground storage shall satisfy the following:

- Contained without the possibility of overflowing beyond the site;
- The maximum storage depth in a paved area shall be 150 mm;
- Storage above permanent water features shall meet safety requirements elsewhere in these guidelines and not interfere with their normal function;
- No landscaped area shall be used which, over time, may be reshaped;
- A design plan, longitudinal section and cross sections of the proposed storage shall be included as part of the drainage approval submission.
- The maximum water level of any site storage is to be at least 300 mm below all habitable floor levels on site.
- Rainwater tanks are only acceptable for providing site storage where their use was incorporated into Council's Water Sensitive Urban Design drainage system in accordance with Section 7.4, Rainwater Tank Alternative, in these guidelines.

Flow Control Outlet

The flow control outlet is to be located between the site storage and the Council drainage system. The outlet is to be designed to limit the flow to the Council drainage system to the PSD when the storage is at the SSR.

The outlet is to be designed to be resistant to blockage. All outlets must have a trash grate located upstream of the outlets, or sufficient screening on all inlets to prevent blockages of the flow control outlet. Screens shall not have openings greater than 90mm. All outlet details shall be provided to Council for approval.

Outlet and storage are to be accessible for both maintenance and regular checking for blockage without the need to enter a confined space. This shall be achieved by not making the system too deep and by having sufficient access from the surface. Step irons will be required to comply with Council standards for drainage access.

All storage facilities and the control outlet must have a Signage Plate attached (as per SD146) and be located clear of buildings and outside easements designated for Council drainage or other authorities' use.

13.11.4 Calculations to be Submitted

Calculations of peak stormwater flows from small urban sites may be done manually or using the proprietary program OSD4.

Manual Calculations

The Permissible Site Discharge (PSD) is to be calculated using the following parameters:

- Base Case Site Fraction Impervious (fB) = 0.35;
- Average Recurrence Interval (ARI) = 5 years;
- Catchment Time of Concentration (Tc). Council reserves the right to nominate this value.

The Site Storage Requirement (SSR) is to be calculated using the following parameters:

- PSD;
- Site Time of Concentration;
- Planned site fraction impervious;
- Average Recurrence Interval (ARI) = 10 years.

A range of storm durations needs to be considered to calculate the SSR. Typically storm durations from 6 minutes up to approximately 2 hours will need to be considered to determine the maximum storage volume required.

OSD4 Computer Program

Calculations of PSD and SSR values using OSD4 are accepted provided the submitted design is accompanied by print-outs showing all data inputs and outputs.

Inputs used for Catchment Time of Concentration (Tc) and Travel Time to Outlet (Tso) must be obtained from Council.

13.12 WATER QUALITY TREATMENT MEASURES

Where required, drainage design will incorporate water quality treatment measures to enhance the quality of the drainage runoff before discharging into waterways or other main drainage networks and to minimise the quantity of flows to near pre-development levels.

The City of Whittlesea follows a fully integrated process for the application and approval of new developments, whether they are subdivisions of residential and industrial estates, or the development of multi-unit residential property and commercial enterprises. This approach requires that Council be involved in all stages of the development of both major wetlands (usually a Melbourne Water DSS element) and minor treatment train elements, including sediment basins and associated ponds (usually part of Council infrastructure). Pre-application discussions will involve planning and engineering staff to determine the suitability and extent of WSUD in any proposed development.

Water Sensitive Urban Designs shall be prepared in consultation with Council's Engineering and Planning Departments and in accordance with the requirements of Melbourne Water's publication "*Design, Construction and Maintenance of WSUD*", including the companion City of Whittlesea addendum document.

It is usual for landscaping elements of the "public space" around Melbourne Water wetlands (above the waterline) to be the subject of an agreement between Council and Melbourne Water for the Council to undertake regular maintenance and upkeep. Council's standards for design, construction and maintenance are therefore applicable to those areas.

WSUD elements in public parks are considered to be drainage infrastructure and are not to be incorporated into statutory public open space where the space and form of those works are considered by Council to compromise the function of the open space.

13.12.1 Bio-Retention Swales

When swales are being considered the following specific objectives shall be applied:

- Swales in nature strips must have cross sections with walkable slopes (within the range between 11% and 17%);
- WSUD principles incorporating smaller wetlands, swales, rain gardens etc. may be substituted for conventional wetlands;
- Swales shall not be located in streets within Town Centres other than centre medians that are not required for pedestrian access. The construction must not impede the location or functionality of footpaths driveways and street trees.

13.12.2 Rain Gardens

When Rain Gardens are being considered the following specific objectives shall be applied:

- Location in road verges shall be subject to the requirements of all other services for clearance and access being met;
- Rain gardens shall form part of stormwater modelling;
- Their construction must not impede the location or functionality of footpaths, driveways and street trees.

13.12.3 Operation of Water Sensitive Urban Design (WSUD) Elements

When the operation and maintenance aspects of WSUD are being considered the following specific objectives shall be applied:

- WSUD elements are first and foremost drainage infrastructure, which is to be constructed and handed over to Council after a separable defects liability period for the earthworks, bio-mass, vegetation and associated civil works;
- Wetland elements must be designed and located for ease of maintenance equipment access and operation;
- Access to wetland elements for on-going maintenance shall be based upon Council's preferred use of suitable smaller excavation equipment;
- Inaccessible locations shall be avoided. Locations under power lines shall be subject to specific maintenance operation plans;
- The developer shall be responsible for maintenance and protection of all WSUD elements and shall re-set any degraded elements after the defects liability period. A Certificate of Compliance will be issued after resetting is established;
- Handover of wetland elements shall be accompanied by an appropriate "Maintenance Plan" that includes all operational requirements;
- Council standards for design and construction shall apply to embankment slopes and landscaping above the waterline of all wetlands. Council must be kept informed of hand-over procedures involving Melbourne Water Wetlands (see Council requirements for "Preparation of Maintenance Agreements with Melbourne Water" in Landscaping Construction Framework section of the document).

13.12.4 Rainwater Tank Alternative

Rainwater tanks can be used to control total runoff volume and pollutant loads. They also have the potential to control peak flows in a similar manner to OSD systems. However, predictable flow control will only occur if tanks are not full when a storm runoff starts.

Council will consider the use of rainwater tanks as an adjunct to drainage infrastructure design, provided the option of using rainwater tanks is discussed with Council and written agreement in principle has been obtained. At the time of subdivision it will be necessary to put a mechanism in place which provides Council with an ability to ensure future buildings include the installation of rainwater tanks as follows:

- All of the roof area can be connected to the rainwater tanks;
- The roof area connected to the tanks is at least 3 times the area of any paved surface (that is not connected to the rainwater tanks);
- Airspace is provided in the rainwater tanks to provide runoff storage;
- The outlet(s) from the rainwater tank(s) control the total peak flow from the roof area to less than 75% of the PSD;
- The property owner is to be responsible for the continuing operation, maintenance and replacement of the rainwater tank system; and

- Council is able to inspect the operation and performance of the system.

13.12.5 Gross Pollutant Traps (GPT's)

Council requires the installation of GPT's for all urban development in the following instances:

- Residential development with a contributing catchment greater than 5Ha.;
- Commercial / Industrial development with a contributing catchment greater than 1Ha.

When discharging to open water the GPT shall:

- Be located immediately upstream of the receiving water-body and designed with an outlet that provides a dry waste chamber suitable for cleansing by suction hose from a tanker.

GPT's shall be designed in accordance with *"Australian Runoff Quality – A Guide to Water Sensitive Urban Design"*, including the following:

- To capture targeted litter above 5mm size;
- To treat stormwater discharges from a 3 month return interval with bypass capacity matching inlet drain flow; and
- Have an adjacent hard stand area (11m x 3m minimum) that is accessible by maintenance tanker of 30 tonne GTM.

13.13 DRAWING SUBMISSIONS

All submissions for approval shall include the following information on the drawings:

- Catchment plan(s) of all sub-catchment areas (in Ha.) and inlet points (pits numbered), consistent with detail plans and readily identified, by inspection, with content of drainage computations;
- External catchment boundaries shown to scale on a topographic plan;
- All new drains and any existing outfall drain(s) as required, including hydraulic gradient determination;
- Hydraulic grade lines plotted to scale on each pipe on longitudinal sections, including 1 in 100 scale drawing(s) where applicable;
- Pit loss co-efficients at each pit location on longitudinal sections;
- Tailwater level at outfall and flow velocity;
- Pipe longitudinal grades and capacities (running full and design flow);
- Pipe diameter, material, class and backfilling;
- Other authority plans and / or approvals for proposed works impacting upon drainage;
- Melbourne Water DSS (Pipes) – Engineering plans and design verification, including drainage network with catchments less than 60 Ha to Council standards;

- Melbourne Water DSS (Waterway, Ponds and other WSUD assets) - Engineering plans, design verification, wetlands vegetation design, Maintenance Plans showing asset ownership and a detailed maintenance program meeting Council requirements;
- Temporary outfall and / or treatment train, consistent with an approved Functional Layout Plan (FLP), including a detailed maintenance program meeting Council requirements.

13.14 RAINFALL DATA

IFD Tables, Curves and Parameters

The information contained in the following Intensity Frequency Duration (IFD) tables, curves and parameters for use in determining rainfall intensity throughout the City of Whittlesea originate from and are in accordance with “*Australian Rainfall and Runoff*” (ARR), Vols. 1 & 2, (1997 edition published by Engineers Australia). Particular references are also found in the extract of ARR Vol. 1 “*Book VIII – Urban Stormwater Management*”.

Nine sites were examined within the City of Whittlesea to determine the Design Rainfall Isoleths for the 1 hour, 12 hour and 72 hour storms for the 2 year and 50 year Average Recurrence Intervals (ARI).

Examination of the upper and lower bound values of each site produced very small changes to the derived IFD tables. On that basis the average of the nine sites was chosen as being representative and the values in A-1 have been adopted.

Design Rainfall Isoleths

TABLE A.1 Intensity Frequency Duration Values

2 Year Average Recurrence			50 Year Average Recurrence		
1 Hour Duration	12 Hour Duration	72 Hour Duration	1 Hour Duration	12 Hour Duration	72 Hour Duration
19.75	4.10	1.15	39.78	7.42	2.32

Average Regional Skewness (G) = 0.338

Geographical Factor (F2) = 4.29

Geographical Factor (F50) = 14.95

Hydrologic Parameters

It is permissible to use the values for the constants (a) to (g) in the polynomial expression for rainfall intensity (I).

(I) = mm per hour (T) = Time of Concentration in hours (not to be less than .01 hour)

TABLE A.2 Polynomial Constants

Constant	Average Recurrence Interval (years)						
	1	2	5	10	20	50	100
a	2.6869E+00	2.9587E+00	3.2374E+00	3.3860E+00	3.5559E+00	3.7550E+00	3.8924E+00
b	-5.9700E-01	-6.0400E-01	-6.1900E-01	-6.2800E-01	-6.3600E-01	-6.4500E-01	-6.5100E-01
c	-2.5070E-02	-2.6630E-02	-3.0470E-02	-3.2620E-02	-3.4480E-02	-3.6650E-02	-3.8150E-02
d	9.3000E-03	8.8990E-03	7.8907E-03	7.3257E-03	6.8390E-03	6.2690E-03	5.8756E-03
e	-7.3800E-03	-4.1700E-04	3.8240E-04	8.3050E-04	1.2650E-03	1.6685E-03	1.9805E-03
f	-4.4460E-04	-3.7080E-04	-1.8500E-04	-8.0830E-05	8.8825E-06	1.1394E-04	1.8645E-04
g	5.3467E-05	3.2783E-05	-1.9120E-05	-4.8200E-05	-7.3260E-05	-1.0260E-04	-1.2280E-04
$LN(I) = a + b(LN(T)) + c(LN(T))^2 + d(LN(T))^3 + e(LN(T))^4 + f(LN(T))^5 + g(LN(T))^6$							

14 CONSTRUCTION

The roles of developer, consultant / superintendent and contractor are distinct, as are the roles within Council of development engineer, construction engineer and supervisor. All share a common interest in delivering engineering infrastructure for new estates.

It is Council's objective to provide a clear understanding of Council officers roles, responsibilities and requirements from developers through the Construction Approval Team (CAT) process which adopts a co-ordinated approach in managing the construction stage, led by the nominated engineering co-ordinator (see Appendix A7 – Construction Works and Compliance Process).

14.1 ENGINEERING CONSTRUCTION FRAMEWORK

The construction framework and processes that follow the planning and engineering approval stages of a development are described in the Metropolitan Planning Authority *Engineering Design and Construction Manual (EDCM)* and are only reproduced here, in part, where this provides a context to construction practices in the City of Whittlesea. Details of the general framework can be found in the EDCM Clauses 1.4, Structure and Content of the Manual and Clause 17.2, Construction of Works – Planning Framework.

Construction specifications and standards shall be in accordance with the EDCM Part D. However, the guidelines for construction procedures to be followed in the City of Whittlesea take precedence over all documents listed in the EDCM Clause 17.3, Order of Precedence, with the exception of Acts of Parliament.

Preliminary specification clauses are based on Section 160 of the standard VicRoads' specifications. It follows therefore that contractors and superintendents will require quality systems in place.

A third party accredited integrated management system (as provided by the Civil Contractors Federation), incorporating quality, safety and environmental aspects, is a minimum requirement for all Principal Contractors engaged for subdivision construction.

The requirements of the Occupational Health and Safety Act and Regulations must be adhered to in all construction activities related to development, including the supervision and execution of the works. For details refer to the *EDCM Clause 1.7.5, Occupational Health and Safety and "Dial Before You Dig" objectives in Clause 1.7.12, Coordination of Street Works.*

14.2 CONSTRUCTION PROCEDURES

14.2.1 Site Management Plans

Council, in its role as the responsible authority, wishes to ensure that development occurs in an environmentally sustainable manner that is based upon sound documentation of the outcomes required during construction, prepared in advance and having due regard for all attributes of the site and its environs. Information and requirements accumulated during the investigation, planning and design phases need to be combined effectively with good construction practices in a manner which ensures knowledge transfer to the constructors. This guideline is therefore applicable to the construction activities of all new development, whether by subdivision or buildings and works for which a planning permit containing conditions for a “Site Management Plan” has been issued. Every stage of a development, including site establishment, works for other authorities, landscaping and maintenance activities, are to be the subject of SMP documentation.

The SMP must be site specific and relevant to the issues applicable to a stage of subdivision or any works being undertaken as part of the development. It is to combine the following four items for the proposed works in a single document:-

- Environmental Management;
- Waste Management;
- Traffic & Pedestrian Management;
- Project Management (incorporating OH&S).

14.2.2 Construction Environmental Management Plan

The EDCM Clause 18.1, Construction Environmental Management Plan (CEMP), states:

- A “CEMP” must be prepared by the Contractor and submitted to Council prior to any works commencing on site. The plan shall aim at minimising the impact of construction works, particularly erosion and sediment control;
- The Construction Environmental Management Plan shall be based on the current EPA publication 960, 2004 – “Doing It Right on Subdivisions, Temporary Environmental Protection Measures for Subdivision Construction Sites”;
- Council will respond to the submitted plan within 5 working days of receipt.

The City of Whittlesea requires the use of the Melbourne Water Site Environmental Management Plan (EMP) Kit, which has been developed in conjunction with Local Government and the EPA. Details of the requirements, guidance notes and templates are readily available from Melbourne Water.

Please refer to *Melbourne Water Land Development Manual – Site Management Plans* on the website: <http://melbournewater.com.au/Planning-and-building/Standards-and-specifications/site-management/Pages/Develop-a-site-management-plan.aspx>

The plan must incorporate the protection, to best practice standards, of significant vegetation (including protected species, habitat areas and River Red Gum Tree Protection Zones), receiving waters (including Council drains) and cultural aspects (including heritage structures, indigenous sites and historic items) likely to be affected and any other related town planning or Council permit system requirements. For adopted best practice objectives refer to the EDCM Clause 1.7.6, Environmental Management.

The plan must also incorporate and address weed control (see the EDCM Clause 1.7.8, Weed Management) and any conditions relating to Site Management Plans placed upon the development by the Department of Sustainability and Environment or other referral authority.

14.2.3 Waste Management Plan

It is documented that up to 30% of all waste in Australian landfills (by mass) is attributable to the construction and demolition of buildings. Council wishes to encourage management processes that reduce the amount of construction waste going to landfill.

To this avail, all applications for new developments are requested to provide a Waste Management Plan that incorporates the following:

- A clear target for the proportion of site waste that will be recycled;
- A plan for providing accessible space for collecting waste in separated streams ready for recycling;
- Procedures for waste removal from site and details of the waste collection facilities to be utilised;
- Contractor instructions on waste management, to be included in the Site Induction.

14.2.4 Traffic Management Plan

The EDCM Clause 18.2, Traffic Management Plan (TMP), states;

- A “TMP” in accordance with the Road Management Act 2004, Worksite Safety-Traffic Management Code of Practice must be prepared by the Contractor and submitted to Council prior to any works commencing on site; and
- Council will respond to the submitted Traffic Management Plan within 5 working days of receipt of the documentation.

Traffic Management Plans are required to demonstrate the safe ingress and egress of construction vehicles from the worksite, which may include a requirement by VicRoads for a road safety audit when main road access is involved. It should have due consideration for safety of the general public, other motorists and pedestrians whilst works are occurring, including periods of inactivity prior to completion. The plan must show safe management of pedestrian movements for the duration of the works.

Where works are conducted on a public road reserve all Traffic Management Plans are required to be undertaken as per AS1742. Any requirement for speed restrictions will also require an authorised Memorandum of Authorisation from VicRoads.

The plan must include the means by which foreign material will be restricted from being deposited on public roads by vehicles associated with construction activities (i.e. wheel wash facility) and an identifiable response process to the occurrence of any hazard and / or nuisance arising from the failure of such restriction measures.

The plan must include Project or Estate name and Stage, commencement and completion date of the proposed works.

14.2.5 Project Management Plan

The Project Management Plan is required to demonstrate the processes for achieving both product quality and OH&S objectives for the proposed works. It should address, but not be limited to, matters such as:

- Scope of work and details specific to the subject construction contract;
- Project objectives and targets covering quality and health and safety;
- Processes, including communication protocols, necessary for meeting City of Whittlesea and / or Client requirements;
- Management roles, responsibilities and authorities.

14.2.6 Pre-Commencement Meeting

The EDCM Clause 18.3, Pre-commencement Meeting, states:

- The Consulting Engineer is to arrange a pre-commencement site meeting with Council's Construction Supervisor, the contractor and the consultants. At this meeting, the documentation required under clauses 18.1 and 18.2 and other relevant items will be considered;
- Whilst all documentation does not need to be completed for the pre-commencement site meeting, these must be submitted by the Contractor and approved by Council, prior to works commencing;
- Pre-commencement meetings should be held no greater than 3 weeks prior to the commencement date of construction.

14.3 LANDSCAPING CONSTRUCTION

Landscaping works are generally bonded and construction proceeds after Titles Office approval of the Plan of Subdivision. The landscape works must therefore be undertaken in accordance with a Site Management Plan (SMP) which is site specific and relevant to works being undertaken within public roads and open space adjacent to properties in private ownership. The SMP will contain environmental, traffic and project management requirements for the works.

In some instances co-operative arrangements with road and drainage contractors may exist but the landscape contractor will ultimately remain responsible for traffic control and public safety requirements during construction of landscaping.

Landscape Works Pre-commencement Meeting

Prior to the commencement of landscape works the applicant must arrange a landscape pre-commencement meeting on site. The intent of the meeting is to inspect and document the condition of the site prior to works commencing, discuss site and project specific issues, identify hold points to enable inspection of concealed works and for Council to obtain copies of relevant documentation including Site Management Plans, Road Opening Permits, Traffic Management Plans and Project Management Plans including OH&S procedures etc. A Council checklist, used for recording details of the meeting is provided at Appendix B13 – Landscape Works Pre-commencement Checklist.

The applicant must produce a copy of the stamped approved landscape plans at this meeting. Council must be kept informed of any changes / amendments associated with the design and construction or of any revisions to the abovementioned plans in writing. Occupational Health and Safety Act and Regulations must be adhered to in all construction activities related to the development, including the supervision and execution of the landscaping works.

14.4 EARTHWORKS

Attention is drawn to the EDCM Section 21.3.3 – Filling on Allotments and Reserves which requires the preparation and construction of engineering fill to satisfy Level 1 standard control under AS 3798 – *Guidelines on earthworks for commercial and residential developments (current issue)*.

As per the above requirement, Council requires the developer to ensure “Level 1 Inspection and Testing” is undertaken by an independent geotechnical authority (consultant) with responsibility for onsite records and reporting in accordance with the planning permit.

Prior to Council accepting Practical Completion of works verification of compaction standards achieved on site must be provided via a Level 1 Report for all filling. In addition, certified survey levels must be provided for those allotments adjacent to waterways and overland flow routes.

14.5 BLASTING AND EXPLOSIVES

14.5.1 Blasting

Blasting shall not be undertaken in the execution of work within the City of Whittlesea without the written agreement of the Manager Engineering and Transportation Department.

The Contractor shall comply with the *Mineral Resources (Health and Safety) Regulations 1991*, all WorkCover Authority and Environmental Protection Agency requirements and the requirements of any other relevant Authority and / or legislative regulation for the use of explosives and blasting on site.

The Contractor shall use explosives only in circumstances where it is safe to do so, having due regard to the safety of persons, third parties and the safety of the Works.

No explosives shall be manufactured or charges loaded before 7.00 a.m. or after 3.00 p.m. or on any day other than an ordinary working day and no charge shall be primed and no shot fired before 9.00 a.m. or after 3.30 p.m.

Firing shall not occur before the designated time for any single blast, nor more than 30 minutes after the designated time. The Contractor shall nominate set times, within those times detailed

above, for firing of blasts. These times shall be made public via notice boards at relevant areas of the site and distribution of flyers at least seven (7) days prior to the planned blast date. The extent of the flyer distribution shall, as a minimum, correspond with the adopted Site Management Plan.

The Contractor shall give occupants of nearby premises and owners of underground services adequate notice of intended blasting. Prior to blasting the Contractor shall arrange with occupants and the owners of underground services for any necessary protection of persons, property or livestock.

The Contractor shall notify the Council's Construction Supervisor, third parties, statutory authorities and service owners that have an interest in or are likely to be affected by blasting operations, of the general nature of the operation. The Contractor shall give a minimum of fourteen (14) days' notice to the Council's Construction Supervisor and others described above of the proposed use of explosives. Within this notification, the Contractor shall submit a detailed method statement on all aspects of the proposed use of explosives, including treatment of misfires.

The Contractor shall provide the Council's Construction Supervisor with the following information at least 48 hours in advance of any blasting:

- Details of the proposed location/s and timing of all operations;
- The name of the person who will have control of the operation and proof of his/her license;
- Documentary evidence of all necessary licenses and permits from the relevant Authorities;
- Documentary evidence of the currency of the Contractor's Public Liability Insurance policy;
- Precautions proposed to be taken for the protection of the public and property during the operation, including evidence that all affected parties have been notified;
- Full details of explosives, blasting patterns, blasting design details including ground vibration predictions, and any other relevant information; and
- Method of monitoring blast vibration.

The shot firer shall keep a record of the number of shots fired, time of firing, type and weight of explosives used and the type and number of detonators used, together with a record of the post blast situation for each and every location. A copy of the record shall be available to the Council's Construction Supervisor.

A copy of vibration monitoring in accordance with the "Ground Vibration" requirements detailed herein and for the corresponding period shall be made available for the Council's Construction Supervisor to review at the end of every shift on which shots are fired.

The Contractor shall also establish and comply with air blast limits that ensure no damage occurs to any adjacent buildings.

14.5.2 Ground Vibration

The Contractor shall employ construction methods that minimize ground vibrations near existing buildings, structures and underground services. Ground particle velocities shall be measured by the Contractor immediately adjacent to any building or underground service which might be damaged by vibrations. The Contractor shall bear all costs associated with any claim for

damages resulting from the effects of ground vibration attributable to the Contractor's construction methods or work.

The Contractor shall adopt construction methods to ensure no damage occurs to any adjacent buildings, services or structures. In all cases, the Contractor shall establish and maintain ground vibration limits that satisfy this requirement.

The limits established by the Contractor shall ensure no property damage occurs, and shall not be greater than the levels suggested in AS 2187.2 to avoid cosmetic damage to properties.

Vibration monitoring shall be conducted throughout the duration of relevant construction operations.

If vibration limits are exceeded, the Contractor shall immediately notify the Council Construction Supervisor and initiate an investigation to ascertain the cause of the exceedance. The Contractor shall provide an explanation of the exceedance and propose a course of action via a Non Conformance Report to ensure that the exceedance is not repeated. Further work on the activity that resulted in the vibration limits being exceeded, shall not proceed until the cause of the high vibration levels has been ascertained and the proposed course of action reviewed by the Manager Engineering and Transportation Department.

15 SUBDIVISION WORKS COMPLIANCE

15.1 RECORDING OF ASSET INFORMATION

15.1.1 As Constructed Plans (Engineering Works)

The provision of “As Built Data” is a standard requirement for infrastructure created for subdivisions and includes the associated metadata required by Council for its Asset Management System. Provision of digital asset data under the “D-Spec” system has been adopted as the basis for this requirement.

Drainage shall be recorded in full (as per D-Spec) and other infrastructure is to be recorded to varying degrees of accuracy and extent according to type. For background see the EDCM Clause 1.7.13, Recording of Asset Information.

Where a planning permit requires additional digital asset information, such as for WSUD and open space, this is mandatory and shall be provided in accordance with Council's requirements.

Details required by Council, as revisions to the approved engineering plans, including shop drawings for structural components and AusNet Services lighting plans, are to be submitted as follows:

- Any significant change in the location and / or alignment of the works that has occurred during construction;
- Sufficient levels to confirm the adequacy of overland drainage flow paths;
- Allotment levels adjacent to watercourses or floodways;
- Subgrade improvement measures, including depth, extent and materials;
- Capping layer details, including depth, material and permeability tests;
- Plan view (1 : 500 scale) shall be prepared on GDA94_MGA55 datum;
- Drainage location and alignment, as captured, to "D-Spec" standards;
- Easements for drainage and / or services accurately reflect those provided on the sealed plan of subdivision;
- Electrical plan(s) amended to show final location and the distributor's ID Number of each non-standard public lighting pole; and
- The complete set of plans shall be provided in digital AutoCAD format (including dwg, xhs and xref files) and PDF format (on CD).

Data required by Council, in electronic format (A-spatial data) for Council's asset data base, is as follows:

Drainage (by line and pit)

- Details and quantities, as captured, to "D-Spec" standards.

Streets (by name and limits if any change)

- Kerb & Channel type (as per applicable VicRoads and Council's standard);
- Footpath type (normally "RC 125mm depth");
- Road formation width (between backs of kerb);
- Road pavement width and depth (including capping layer);
- Road seal / wearing course width and type (e.g. W x 7mm Type N Asphalt).

Structures (by street location)

- Type of structure (e.g. RC box culvert, steel pipe culvert, RC bridge, cantilever wall, etc.);
- Length of the structure (measured along road centreline);
- Width of the structure (measured across road);
- Ancillary items forming part of main structure (retaining wall, RC drop structure, etc.).

Non-standard Public Lighting (by pole location)

- AusNet Services CAM number;
- Pole type and size (Commercial name and nominal height);
- Lantern type and number per pole (Commercial name and whether one or two on each pole).

Reports and records associated with construction are required by Council as follows:

- Written confirmation from the Contract Superintendent that all construction has been completed in accordance with the approved plans and that services in allotments and reserves are within easements provided on the plan of subdivision for the purpose;
- Compaction test results for pavement courses;
- Level 1 Report for filling on allotments;
- Actual construction cost of civil infrastructure shown on the approved plans, including variations and / or other associated construction costs;
- Copy of "Approved AusNet Services record plan" showing actual pole locations and CAM numbers for non-standard lighting fixtures (electrical kiosk and cabling details are not required by Council);
- Copy of shop drawings for components / connections etc. and / or foundation details that were not part of the submission approved by Council.

15.1.2 As Constructed Plans (Landscaping Works)

Before 21 days after issue of Certificate of Practical Completion for landscaping a complete set of “As Constructed” plans (which will be the stage landscape plan amended if necessary to show any changes that may have occurred during construction), must be submitted in AutoCAD digital file format. All electronic plans are to be geo-referenced with a datum (Map Grid of Australia Zone 55 [GDA 94] or AGD 94). “As Constructed” details of assets shown on the approved WSUD plans are also required.

Soft landscape / vegetation component of WSUD construction shall also have a maintenance period of two (2) whole summers PLUS three (3) months from the date of Practical Completion for that work.

Within the City of Whittlesea there is a maintenance agreement between Melbourne Water and Council for all open space around wetlands to be maintained by Council upon the satisfactory conclusion of the maintenance period for those Melbourne Water assets. It can therefore be expected that Council’s acceptance of the standard of work will be sought by Melbourne Water as part of the hand over. Refer to Appendix G “*Maintenance Agreement Kit (2010)*” containing information on the preparation of a maintenance agreement with Melbourne Water.

15.2 PRACTICAL COMPLETION REQUIREMENTS - ENGINEERING

Requirements of the EDCM Clause 9.4.1, Practical Completion of Engineering Works, shall apply to subdivisions and other development where the construction of engineering works is a condition of the planning permit.

The City of Whittlesea regards Practical Completion as a single event that occurs when the sum total of all required engineering construction and associated activity has been completed. Should more than one contract be involved partial certificates will not be issued by Council.

This position on Practical Completion ensures that safety is provided to motorists and pedestrians and that there is separation between road construction activity and builder traffic.

It should be noted that Practical Completion is a separate issue to the bonding of unfinished works that may be required to achieve a Statement of Compliance. Council can issue compliance prior to Practical Completion, but only subject to prior agreement. However, Practical Completion cannot be agreed to until the work and other prerequisites are complete.

15.3 PRACTICAL COMPLETION REQUIREMENTS – LANDSCAPING

15.3.1 Completion of Landscape Works

Before occupation of the development starts or by such later date as is approved by the responsible authority in writing, the landscape works shown on the endorsed plans must be carried out and completed to the satisfaction of the responsible authority. Upon completion of the landscape construction works, the applicant must notify the responsible authority to enable its inspection. Subject to satisfactory completion of the landscaping in accordance with the endorsed plan and relevant Certificates of Compliance being supplied to Council (electrical, water, structural etc.), a Certificate of Landscape Practical Completion will be issued, triggering the commencement of the maintenance period.

15.3.2 Landscape Works Fees

A fee of 0.75% of the landscape project cost will be charged for plan checking fees and a fee of 2.5% of the landscape project cost will be charged for surveillance based on the estimated cost of work. Invoices will be sent to the developer after the Certificate of Landscape Practical Completion has been issued.

15.4 DEFECTS LIABILITY

15.4.1 Engineering Works

Conditions applicable to Defects Liability Bond, Commencement of Defects Liability Period, End of Defects Liability Inspection and time for completion of defects can be found in the EDCM Clauses 9.4.3, 4 & 5 and Clause 23.5.6 respectively.

During the Defects Liability Period for subdivision roadwork it is the practice of the City of Whittlesea to undertake the usual municipal maintenance of hard infrastructure and to conduct building control activities under local laws. The Final Inspection, undertaken by Council staff at the end of the Defects Liability Period, will therefore apply only to omissions and defects related to original construction of the works. Items to be rectified before Council accepts on-going care and maintenance of the works will not include damage attributable to builders, road users or other activity by the public.

However, attention is drawn to the determination of the date for commencement of Defects Liability which is **“the date of issue to Council of the title(s) for roads created on the Plan of Subdivision ...or on Practical Completion of (all) works ...whichever is the later”**.

As stated previously in the document, Council will separate Practical Completion of WSUD elements if these works are to be deferred for the purpose of avoiding damage by construction of houses and other buildings. Conditions will be provided as part of the “Uncompleted Works Bond” arrangements.

The developer should therefore ensure arrangements are in place for control, protection and remediation of damage during the period leading up to the commencement of Defects Liability if this is not aligned with a contractor’s responsibility.

15.4.2 Landscape Works

Standard Council requirements for the maintenance of all landscape construction works are included in permit conditions and are generally as follows:

- All landscaping (except for grass in nature strips of streets abutting private property) shown on the approved stage landscape plans, must be maintained to the satisfaction of the responsible authority for a minimum period of 18 months ending on 31 May of the given year from the date of issue of a Certificate of Practical Completion of landscaping, including that any dead, diseased or damaged plants are to be replaced, bare areas of grass are to be re-established, mulched surfaces reinstated, damaged or faulty infrastructure repaired or replaced etc. Rectification works must not be deferred until the completion of the maintenance period;
- To ensure all assets as identified in the approved stage landscape plans are retained in a safe and functional state and to prolong functional life of the asset, landscape works shall be maintained in accordance with Council’s “Minimum Landscape Maintenance Specification of Services and Works (May 2010)” ;

- Upon the completion of maintenance of the street tree planting and landscaping works, the developer must notify the responsible authority to undertake an inspection prior to the issue of the Certificate of Final Completion.

15.5 UNCOMPLETED WORKS BOND

Bonding of uncompleted engineering works to facilitate the issue of a Statement of Compliance is governed by the principles contained in the EDCM Clause 9.4.2, Uncompleted Works Bond, and this clause.

Council has a mandatory requirement for the deferral of wearing course asphalt, with the provision of security. This is consistent with the EDCM and satisfies the criterion which states, in part, *“Deferment will avoid ...possible damage to the works taking into account ...housing construction ...will follow”*.

Developer requests for the bonding of unfinished works are generally made to facilitate the early issue of a Statement of Compliance and then title release when delays cannot be overcome by other means.

The City of Whittlesea does not support the release of titles before works have reached practical completion as a means of achieving commercial targets. However, if particular circumstances warrant a reconsideration of this position the following parameters will be used, in conjunction with the EDCM Clause 9.4.2, to assess whether or not bonding will be acceptable:

- There must be significant and justifiable reasons for the bonding of particular unfinished works;
- If an early release of titles will result in a poorly finished subdivision, has an adverse impact on public safety or a conflict of interest is likely for the developer (between contractual rights of a purchaser and the obligations of the roadwork contractor) then the works will not be bonded;
- Any legitimate request for bonding must be made in writing and be supported by a clear and achievable program, acceptable to the Council, for the completion of works;
- It must be shown that all roadwork will be completed prior to any builders, who may be contracted for house construction, become legally entitled to have access over those works;
- The developer and/or contractor have a demonstrable capacity and capability to complete the outstanding works within the proposed program;
- The method proposed by the developer to ensure that no builder activity can occur prior to Practical Completion of roadwork within the subdivision must be legally binding.

Under no circumstances will the Council consider bonding the following works:

- Road pavement courses (other than wearing course asphalt);
- Kerb and channel;
- Engineering fill on lots;

➤ Stormwater drainage.

Council's requirements prior to the issuing of a Statement of Compliance for subdivisions that have not reached Practical Completion of all works is as follows:

- An unconditional bank guarantee, with no expiry date, shall be provided for an amount, agreed by Council, commensurate with the circumstances and / or risk to Council of the works not being completed satisfactorily. Conditions may vary but the amount of security required will be 150% of the cost to finish the works;
- The developer, or contractor on his behalf, is required to submit a construction program for the unfinished works with a nominated completion date;
- Evidence is provided by the developer confirming that no access over the uncompleted works, for house construction, can be legally obtained until Practical Completion has been accepted by Council;
- When Titles Office approval of the plan of subdivision is granted the streets become part of the public road network and are subject to Council Local Laws. The developer shall notify his contractor(s) of this change to site conditions and ensure that work site signage and traffic control is implemented, to Council's satisfaction, for the changed circumstances. This may require the submission and approval of a new Site Management Plan;
- Achievement of Practical Completion to Council's satisfaction will require the works to be presented in a fully conforming condition, including the repair of any damage by third parties which may have occurred prior to the final Council inspection. Both the developer and contractor shall confirm that arrangements have been made between them to fulfil this requirement;
- There must be a clear understanding that when Council issues a Statement of Compliance involving bonding of unfinished works the Defects Liability Period for the whole of the work will not commence until all parts of the required construction are completed to Council's satisfaction. Any Staged Practical Completion Certificate, for a part of the works unaffected by bonding, is a contractual matter for the Superintendent and not involving Council.

15.5.1 Statement of Compliance with deferment of Landscape Works

Before the issue of a Statement of Compliance (SoC) for any stage or by such later date as is approved by the responsible authority in writing, the applicant may seek, to the satisfaction of the responsible authority, the issue of the Statement of Compliance (SoC) but with deferment of completion of all or part of landscape construction works shown on the endorsed plans, provided:

- An amount equivalent to 150% of the agreed estimated cost of outstanding streetscape / landscape construction plus an agreed amount for the maintenance works will be required by the responsible authority as security deposit;
- A works program is provided setting out the proposed timing of all outstanding landscape construction works. Works must commence within 3 months of issue of Statement of Compliance for the given stage of the subdivision and must be completed prior to occupancy of any new dwelling within the given stage;
- Upon completion of the deferred landscaping construction works, the applicant must notify the responsible authority to enable its inspection. Subject to satisfactory completion of the deferred landscaping, a Certificate of Practical Completion for landscaping will be issued,

triggering the commencement of the maintenance period. If the works have been completed to its satisfaction, the responsible authority must refund fully the works security bond. The return of the landscape maintenance bond will occur after the specified maintenance period has expired and Council has issued a Landscape Certificate of Final Completion.

16 LIST OF COUNCIL DOCUMENTS REFERENCED

The following publications are available as stand-alone documents and can be downloaded from Council's website or copies can be obtained by contacting Council's Customer Service Centre:

- Park Lighting Strategy (2014)
- River Red Gum Tree Protection Policy (2014)
- A Guide to Growth Area Street Tree Planting (2010)
- Environmental Sustainability Strategy (2012 - 2022)
- Green Wedge Management Plan (2011 – 2021)
- Recreation Strategy (2012 – 2017)
- Disability Action Plan (2013 - 2016)
- Playspace Planning Framework and Policy (2013 – 2016)
- Housing Diversity Strategy (2013 – 2033)
- Local Structure Plans and Development Plans
- Municipal Public Health and Wellbeing Plan (2013 - 2017)
- Integrated Transport Strategy (2014)
- Stormwater Management Plan (2012 - 2017)
- Waste Management and Resource Recovery Strategy (2012 – 2020)
- Whittlesea Bicycle Plan (Draft) (2015)

17 LIST OF TECHNICAL STANDARDS AND GUIDELINES

The following Statutory Authority and Australian Standards (*the latest version) are applicable to the planning, design and construction of new development in the City of Whittlesea, as appropriate, unless overridden by the requirements of this document.

STANDARD / GUIDE TITLE	AGENCY
AS/NZS 1158 - Lighting to roads and public spaces	Standards Australia
AS 1348.1 - Road and traffic engineering – Glossary of terms	Standards Australia
AS 1428.1 - Design for access and mobility – General requirements for access – New building work	Standards Australia
AS 1428.2 - Design for access and mobility – Enhanced and additional requirements – Buildings and facilities	Standards Australia
AS/NZS 1428.4 - Design for access and mobility – Tactile indicators	Standards Australia
AS 2890.1 - Parking facilities – Off-street Car Parking	Standards Australia
AS 2890.5 - Parking facilities – On-street Parking	Standards Australia
AS/NZS 2890.6 - Parking facilities – Off-street parking for people with disabilities	Standards Australia
Disability Discrimination Act (DDA) Sub-section 31 (1) - Disability Standards	Australian Government
AS 4586 - Slip Resistance of Pedestrian Surfaces	Standards Australia
AS 1742 Set - Manual of uniform traffic control devices (Parts 1-15)	Standards Australia
Supplement to the AustRoads Guide to Road Design	VicRoads
Road Design Guidelines (RDG) Part 7 – Drainage Design	VicRoads
SD 5011(B) – Grouted Random Rubble Retaining Wall	VicRoads
Guide to Road Design	AustRoads
Guide to Traffic Management	AustRoads
Design Vehicles and Turning Path Templates	AustRoads
Minimum access requirements	CFA/MFB
Water Sensitive Urban Design (WSUD) Guidelines	Melbourne Water
Land Development Manual	Melbourne Water
Melbourne Water (MW) “Shared Pathways Guidelines”	Melbourne Water
Australian Rainfall and Runoff	Engineers Australia
Australian Runoff Quality	Engineers Australia
Engineering Design and Construction Manual for Subdivisions in Growth Areas	Metropolitan Planning Authority (MPA)

18 GLOSSARY OF TERMS

ACRONYMS	FULL NAME
ARI	Average Recurrence Interval
AS	Australian Standards
BMP	Best Management Practice
BPP	Best Planning Practice
CAPT	Continuous Accessible Paths of Travel
CAT	Construction Approval Team
CBR	California Bearing Ratio
CFA	Country Fire Authority
CPI	Consumer Price Index
DDA	Disability Discrimination Act
DOT	Department of Transport
DP	Development Plan
DSS	Department of Social Services
EC	Engineering Co-Ordinator
EDCM	Engineering Design and Construction Manual
ESD	Ecologically Sustainable Development
FCR	Fine Crushed Rock
FLP	Functional Layout Plan
FFTP	Fibre To The Premise
GPT	Gross Pollutant Trap
LSP	Local Structure Plan
NBN	National Broadband Network
PAT	Planning Approval Team
PC	Planning Co-ordinator
PDF	Portable Document Format
PSP	Precinct Structure Plan
PVC	Polyvinyl Chloride
SOC	Statement of Compliance
Threshold	Is the road pavement between kerbs at a street intersection
Activity Node	Is that locality defined for a special purpose on a Development Plan
TGSI	Tactile Ground Surface Indicators
TND	Traditional Neighbourhood Design
TPZ	Tree Protection Zone
UGZ	Urban Growth Zone
VEM	Vehicle Exclusion Mechanisms
WSUD	Water Sensitive Urban Design

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